OFGEM

GAS DISTRIBUTION PRICE CONTROL REVIEW

FIVE YEAR CONTROL

(CAPEX/REPEX)

REPORT 6

LONDON NETWORK

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1 EXECUTIVE SUMMARY

1.1 CAPEX

PB Power has reviewed the submission by National Grid Gas (NGG) for the Capex allowances for the London (Lon) network for the period 2008/09 to 2012/13, and sets out in this report its proposed cost projections, and the reason for any changes to the London's submission.

Capex costs are the total (net) costs of:

- LTS & Storage Capex
- Connections Capex
- Mains and Governors Capex
- Other Operational Capex
- Non-operational Capex

For each activity, we have, where possible, identified the benchmark activity costs by examining the unit costs in the base year (2005/06). Setting the level of the benchmark unit costs has also been informed by NGG's forecast costs for 2006/07. When the actual operating costs for 2006/07 are known, we will review our proposals and make adjustments if appropriate.

This report makes proposals for NGG's Capex allowances for the next price control period (2008/09 to 2012/13). In this report we have made adjustments to bring the Network's forecast expenditure towards the frontier. Our proposals and NGG's normalised submission are summarised in the following table and chart.

London Network Capex Submission v Proposed

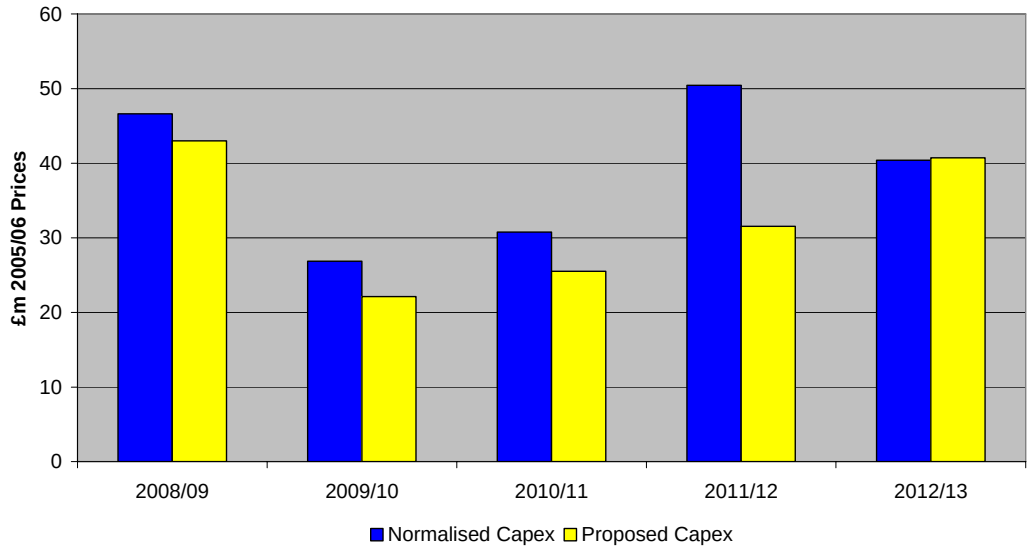

Figure 1-1

London Network Net Capex £m (2005/06 prices)	2008/09	2009/10	2010/11	2011/12	2012/13	Total
BPQ Submission						
LTS & Storage Capital Expenditure	26.8	9.0	8.8	22.7	17.9	**85.2**
Connections	5.9	5.9	6.1	6.2	6.3	**30.3**
Mains Reinforcement	1.6	1.5	1.5	3.2	3.3	**11.1**
Governors	2.2	2.2	2.3	2.4	0.6	**9.7**
Other Operational	1.6	1.5	1.7	1.5	1.6	**7.9**
Non Operational	12.4	7.3	10.7	15.8	12.8	**59.0**
Total	**50.5**	**27.4**	**31.1**	**51.7**	**42.5**	**203.2**
Normalisation Adjustments						
LTS & Storage Capital Expenditure	-0.5	-0.4	0.0	0.0	0.0	**-0.9**
Non Operational	-3.4	-0.1	-0.3	-1.3	-2.1	**-7.2**
Total	**-3.9**	**-0.5**	**-0.3**	**-1.3**	**-2.1**	**-8.1**
Normalised Capex	0.0	0.0	0.0	0.0	0.0	0.0
LTS & Storage Capital Expenditure	26.3	8.6	8.8	22.7	17.9	**84.3**
Connections	5.9	5.9	6.1	6.2	6.3	**30.3**
Mains Reinforcement	1.6	1.5	1.5	3.2	3.3	**11.1**
Governors	2.2	2.2	2.3	2.4	0.6	**9.7**
Other Operational	1.6	1.5	1.7	1.5	1.6	**7.9**
Non Operational	9.0	7.2	10.4	14.5	10.7	**51.8**
Total	**46.6**	**26.9**	**30.8**	**50.4**	**40.4**	**195.1**
Adjustments						
LTS & Storage Capital Expenditure	-1.1	-2.0	-1.8	-14.7	3.0	**-16.6**
Connections	-0.8	-0.9	-1.3	-1.5	-1.7	**-6.2**
Mains Reinforcement	-0.3	-0.2	-0.2	-0.7	-0.8	**-2.2**
Governors	-1.6	-1.6	-1.7	-1.8	0.0	**-6.8**
Other Operational	0.0	-0.1	-0.1	-0.1	-0.1	**-0.4**
Non Operational	0.2	0.0	-0.1	-0.1	0.0	**-0.1**
Total	**-3.6**	**-4.8**	**-5.3**	**-18.9**	**0.3**	**-32.2**
Proposed Capex						
LTS & Storage Capital Expenditure	25.2	6.6	7.0	8.0	20.9	**67.7**
Connections	5.1	5.0	4.8	4.7	4.6	**24.1**
Mains Reinforcement	1.3	1.3	1.3	2.5	2.5	**8.9**
Governors	0.6	0.6	0.6	0.6	0.6	**2.9**
Other Operational	1.6	1.4	1.6	1.4	1.5	**7.5**
Non Operational	9.2	7.2	10.3	14.4	10.7	**51.7**
Total	**43.0**	**22.1**	**25.5**	**31.6**	**40.7**	**162.9**

Table 1-1

1.2 REPEX

PB Power has similarly reviewed the submission by NGG for replacement expenditure for the period 2008/09 to 2012/13.

Repex costs are the total (net) costs of:

- Replacement Mains
- Replacement Services
- Replacement LTS Pipelines

Our approach to replacement expenditure has been similar to Capex and our proposals and NGG's submission are summarised in the following table and chart.

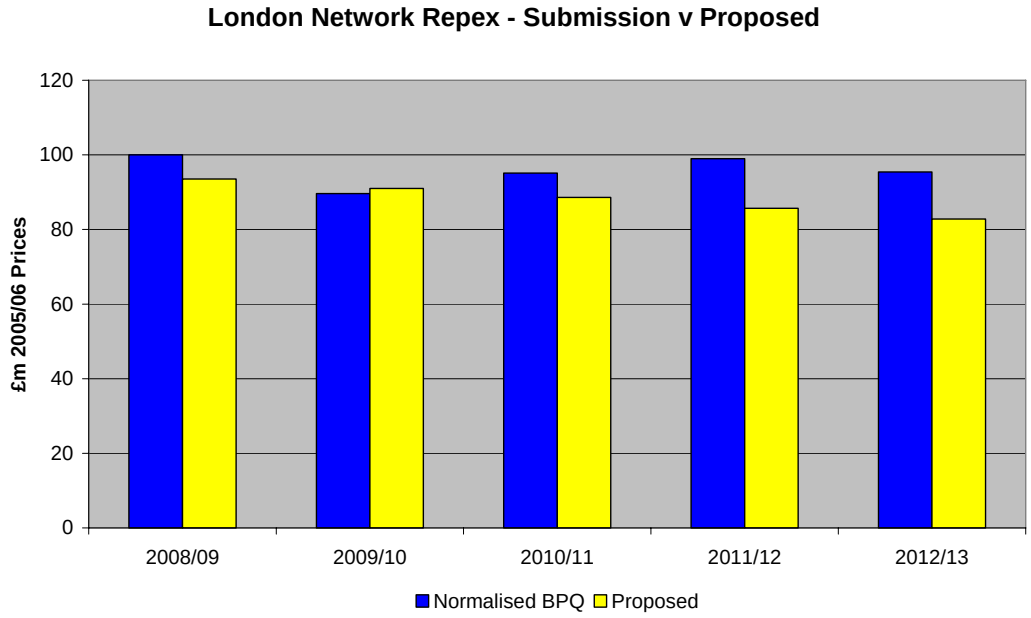

Figure 1-2

London Network Net Repex £m (2005/06 prices)	2008/09	2009/10	2010/11	2011/12	2012/13	Total
BPQ Submission						
Mains	70.6	62.4	66.3	67.9	64.9	**332.1**
Services	31.9	29.2	30.9	33.2	32.7	**157.9**
LTS	0.0	0.0	0.0	0.1	0.1	**0.2**
Total	**102.4**	**91.5**	**97.2**	**101.2**	**97.8**	**490.1**
Normalisation Adjustments						
Services	-2.4	-1.9	-2.1	-2.2	-2.3	**-11.1**
Total	**-2.4**	**-1.9**	**-2.1**	**-2.2**	**-2.3**	**-11.1**
Normalised BPQ						
Mains	70.6	62.4	66.3	67.9	64.9	**332.1**
Services	29.4	27.2	28.8	31.0	30.4	**146.8**
LTS	0.0	0.0	0.0	0.1	0.1	**0.2**
Total	**100.0**	**89.6**	**95.1**	**98.9**	**95.4**	**479.0**
Adjustments						
Mains	-1.8	4.6	-1.6	-6.7	-5.9	**-11.4**
Services	-4.6	-3.2	-4.9	-6.6	-6.8	**-26.2**
LTS	0.0	0.0	0.0	0.0	0.0	**0.0**
Total	**-6.5**	**1.4**	**-6.5**	**-13.3**	**-12.6**	**-37.5**
Proposed						
Mains	68.7	67.0	64.7	61.2	59.1	**320.7**
Services	24.8	24.0	23.9	24.4	23.6	**120.7**
LTS	0.0	0.0	0.0	0.1	0.1	**0.2**
Total	**93.5**	**91.0**	**88.6**	**85.7**	**82.8**	**441.5**

Table 1-2

2 INTRODUCTION

2.1 PRICE CONTROL REVIEW TIMETABLE

The final proposals for the one-year price control have been accepted by the GDNs. Ofgem is now carrying out a further review to set price control allowances for 1 April 2008 to 31 March 2013. The full process is shown in the following diagram.

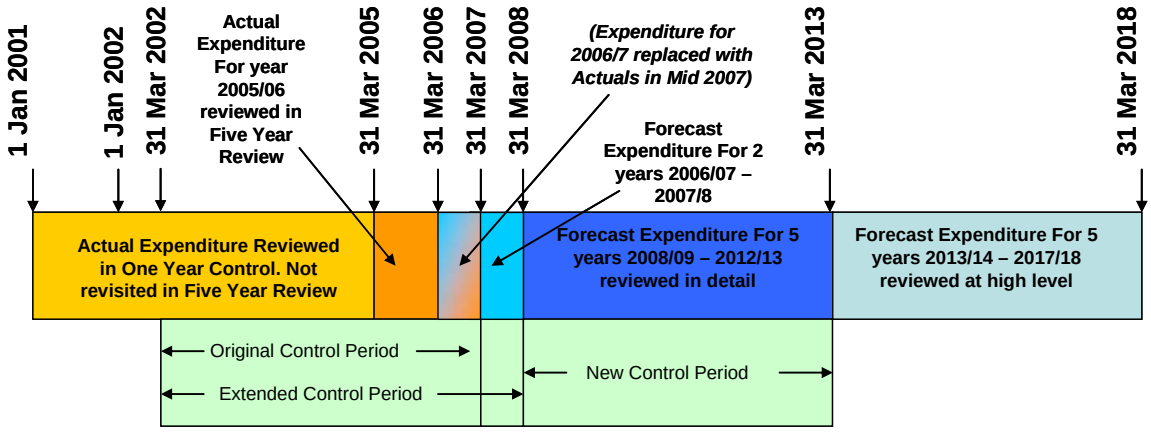

Figure 2-1

2.2 FIVE YEAR CONTROL

Ofgem appointed PB Power working in partnership with Rune Associates Limited to assist them in the preparation of the Capex and Repex elements of the Business Plan Questionnaires (BPQs). Subsequently Ofgem extended this work to include the analysis of the Capex, Repex and Direct Opex submissions by the GDNs.

Our findings on the Capex and Repex submissions are contained in this report, whilst the Direct Opex findings are the subject of a separate report.

The questionnaires were issued on 30 June 2006. These were returned to Ofgem between 6 and 13 October 2006. Additionally a series of cost visits were held with the GDNs between 10 November and 1 December 2006. Our findings have been drawn from the BPQs, cost visits and responses to supplementary questions sent to the GDNs.

2.3 BUSINESS PLAN QUESTIONNAIRE

A combined BPQ was issued on 30 June. This covered the Financial Statements, Opex, Capex and Repex requests. The Capex and Repex areas covered by this report were covered by 20 Excel worksheets, guidance to the GDNs as to how to complete the worksheets and additional narrative questions.

GDNs were asked to respond to Ofgem by 6 October 2006 and to upload all the data onto PB Power's file management system, PBShare. All parties in the process were granted appropriate access to relevant folders and documents. Some documents had to be provided in paper copy and these were sent both to PB Power and to Ofgem.

As the analysis of the submissions progressed and where the return was either unclear or insufficient it became necessary to ask the GDNs for additional information. These supplementary questions and the additional information which was presented in reply, were logged and stored on PBShare.

At the end of the process the worksheets were updated to include all amendments submitted and should be read in conjunction with this report.

2.4 PURPOSE

The purpose of the report is for PB Power to provide recommendations to Ofgem on the efficient levels of expenditure required by NGG to carry out their activities in the London Network. Ofgem will consider these recommendations together with other information in proposing appropriate expenditure allowances for 2008/09 to 2012/13.

2.5 ANALYSIS AND REPORTING PROCESS

The BPQ was designed to collect all the data required for analysis.

PB Power has structured this report into the following workstrands:

i) Capex: for Local Transmission System (LTS) and Storage: for all work on the network from 85 bar down to 7 bar, including HP and LP storage.

ii) Capex: for connections works on the below 7 bar network.

iii) Capex: for mains reinforcement and governor works on the below 7 bar network.

iv) Capex: for other operational items including Plant & Equipment and Land & Buildings.

v) Capex: for non-operational items including I.T. and System Operation work.

vi) Repex: for all replacement work below 7 bar including the Policy Mains Replacement Programme.

vii) Repex: for all LTS replacement work above 7 bar

2.5.1 COST NORMALISATION

A key requirement for robust analysis is that GDN costs for particular Capex/Repex activities should be allocated on a consistent basis. Following detailed analysis of the BPQ returns, a number of adjustments have been made to achieve this objective. These adjustments include applying the results of the work on accounting adjustments carried out by Ofgem. The process restates the GDNs' BPQ submissions on this "normalised" basis.

2.5.2 COST ASSESSMENT PROCESS

The expenditure projections for the efficient level of expenditure required by the GDN have been carried out in a number of different ways depending on the activity and quality of information available for this review.

Principally two main techniques have been used:

- comparative benchmarking between GDNs where workload is sufficiently well defined to obtain reliable regression analysis, and
- a bespoke review by our consultants to form a judgement on the appropriate expenditure projections based on the information provided.

With both methods full analysis of the information presented in the context of the requirements of a Gas Distribution business has been carried out to support the findings.

The process of developing our expenditure proposals has the following steps:

- Cost normalisation,
- Establishing base year for cost analysis,
- Benchmarking costs derived from the base year costs,
- Workload projections for the period 2005/06 to 20012/13,
- Cost projections,
- Gap adjustment.

2.5.3 ESTABLISH BASE YEAR

A base year was chosen in order to carry out the comparative regression analysis. The preferred year was 2005/06, where the availability of actual outturn values removed any element of variation due to GDN forecast values. However, for some activities the year 2006/07 has been used due to variations in the 2005/06 data. Generally it has been found that the year 2004/05 contains too many inconsistencies in data reporting, mainly due to the network sales process, and is not suitable as a base year for comparative analysis.

2.5.4 BENCHMARK COST ANALYSIS PROCESS

We have determined benchmark costs in the manner most appropriate to the data and the activity.

Some costs were best assessed on an individual basis. For example, lift and shift pipeline costs are contract specific.

These costs were removed before determination of the benchmark costs of an activity, and were assessed separately. If appropriate an allowance for such costs were added back after the assessment of the costs for the activities which are common across GDNs.

Where possible we used comparative analysis to determine benchmark activity costs. In general we have used the following type of cost function which is common in the regulatory literature:

$$\text{Cost} = K\, w^{a} \qquad (1)$$

where K and a are constants.

Where there are economies of scale associated with an activity, a<1, so that the unit cost of an activity for a larger network will be less than for a smaller network. For each activity we have used our knowledge and experience to explore different cost drivers and select the most appropriate workload driver (w) for the activity concerned.

By taking the natural log of equation (1) we can derive the following equation:

$$\ln(\text{Cost}) = \ln(K) + a \ln(w) \qquad (2)$$

This equation is used to carry out the regression analysis and estimate each of the parameters of the cost function.

2.5.4.1 Assessment of regression outcome

When we have carried out regression analysis we have assessed the fit of the regression line to the data points by calculating the r^2 value and by carrying out hypothesis testing where the r^2 values are not directly comparable.

The value of r^2 is one indicator of goodness of fit. It is the proportion of the variance in the cost data that is explained by the variance in the cost data derived from the Ordinary Least Squares (OLS) regression.

We have used appropriate tests to determine whether the linear or the logarithmic linear regression gives the better fit to the data and have used the regression with the better fit. Where there is no significant difference in fit the logarithmic linear regression has been used.

For all the regression relationships used in this report $r^2>0.7$. Unit cost and/or bottom-up analysis has been used in all other cases.

The values of r^2 have the following significance:

- It is possible that the data points could show a relationship between the reported costs and the explanatory variable by chance. Analysis of variance identifies the component of the cost variable which is explained by the regression and the component unexplained by the regression. This gives a value for the F statistic and taking into account the number of data points, this can be used to test whether the explanation provided by the regression is better than is likely to have arisen by chance. With 8 (GDN) data points the test value for the F statistic is 5.99 and the corresponding value for r^2 is 0.5. If r^2>0.5 we can reject the hypothesis that the relationship arose by chance at the 5% significance level. If r^2>0.7 we can further reject the hypothesis at the 1% significance level

In order to test for the robustness of the regression results and in particular of the slope of the regression line, we have tested each regression result for heteroscedasticity (that is for a relationship between the variance in the disturbance term and the magnitude of the explanatory variable). This is important since evidence of heteroscedasticity could indicate a mis-specification in the regression model. The regression results presented in this report do not show such evidence at a significant level.

Although we have carried out detailed work to seek to ensure that the costs used in the regression analysis have been allocated to activities on a consistent basis across all GDNs, we recognise that that some different allocations may remain and that the use of regression to determine benchmark costs could potentially lead to an inadequate level of total Capex/Repex for a particular GDN. We have addressed this possibility by selecting the upper quartile value, rather than the lowest value as the benchmark cost, with any remaining effects mitigated by the gap closure process.

2.5.4.2 Two or more workload drivers

In all cases activity costs are driven by a number of different workload types. We have therefore constructed a composite scale variable (CSV) which includes the different drivers scaled by the proportion of costs attributable to each type of workload.

Logarithmic linear regression has been used to determine the relationship between costs and the CSV in this report.

2.5.4.3 Regression Values

Further details of the regression calculations and numbers are given in Appendix 8.

2.5.5 WORKLOAD PROJECTONS

The above approach has allowed the analysis to fully reflect the workload forecast by the GDNs, adjusted as deemed appropriate by our consultants. It has also minimised any inconsistent allocation of costs between activities, which is suspected in a number of areas.

The PB Power workload projections for the activity are determined for the period 2005/06 to 2012/13 from the activity analysis.

2.5.6 COST PROJECTIONS

This benchmark performance applied to our workload projections has then been used as the target which all under performing GDNs should move towards.

The following shows the performance measures used in assessing the Capex/Repex proposals.

Performance Measures Used in Determining The Opex Proposals	
Benchmark Performance	The Upper Quartile performance as determined from the regression analysis tracked forward from the base year to 2012/13 taking account of PB Power's expected productivity improvements. When showing this trend in the charts, along side our proposals, it is also adjusted for PB Power's assumptions for real price effects.
Baseline Performance	The GDNs BPQ reported performance in the base year tracked forward to 2012/13 taking account of PB Power's expected productivity improvements. When showing this trend in the charts, along side our proposals, it is also adjusted for PB Power's assumptions for real price effects.

Table 2-1

The benchmark costs against workload are shown in pink on the graphs. This is the target which all under performing GDNs should move towards

In the logarithmic linear regressions the pink line is parallel to the regression line.

In our approach annual productivity improvements are applied to total costs. This gives the end (2012/13) target cost line, shown in yellow on the graphs. This represents the expected position of the benchmark 2012/13 costs after allowing for the productivity improvements we expect to apply to a frontier efficient company.

2.5.7 GAP ADJUSTMENT

In order to form a view of the speed at which the GDNs should be expected to move towards this target performance, extrapolation of the base year performance has also been carried out for the whole period using our standard assumptions for any price rises which are expected to be in excess of the Retail Prices Index (RPI). Section 2.7 provides more details on real price effects.

A gap adjustment has been included where appropriate to provide a smooth transition from the BPQ level of costs at the PB Power workload levels to the benchmark performance by 2012/13. The gap adjustment will allow the GDN a period to review and amend their work arrangements to achieve the proposed benchmark efficient cost levels.

2.5.8 SUMMARY CHART

The overall process for deriving our recommended expenditure projections is shown in the flow chart below.

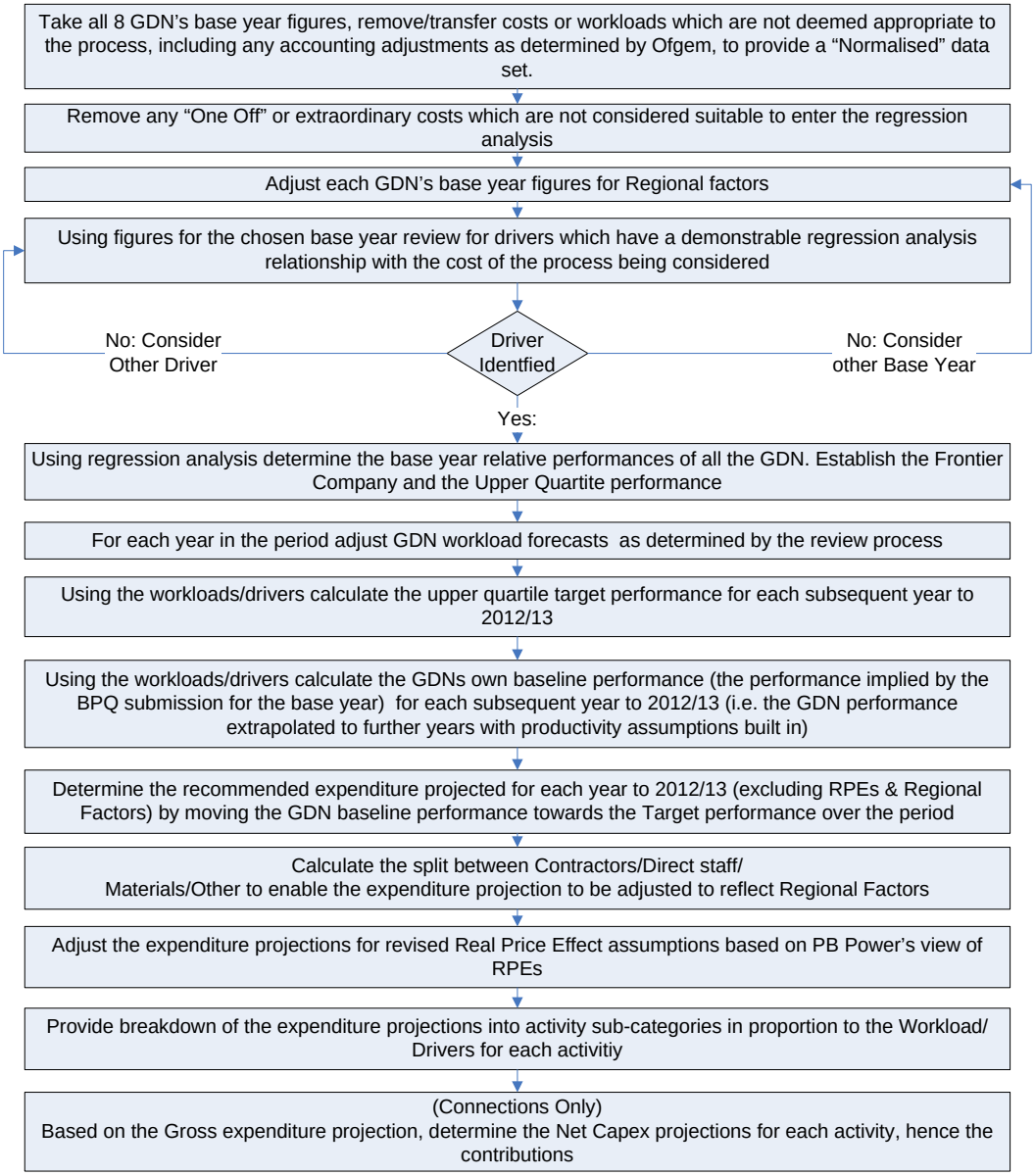

Figure 2-2

2.5.9 CONSULTANT ANALYSIS

Where analysis has shown that the workload is small, irregular or unit costs are volatile the regression techniques are not considered robust. For these activities a process has been used whereby the BPQ costs have been "Normalised" as outlined in section 2.5.1 above, and have then been restated taking account of regional factors and removing real price assumptions which have been declared by the GDN. This provides our consultants with an objective presentation of the costs and workloads for them to review and make appropriate recommendations regarding adjustments. The process is outlined in Figure 2-3

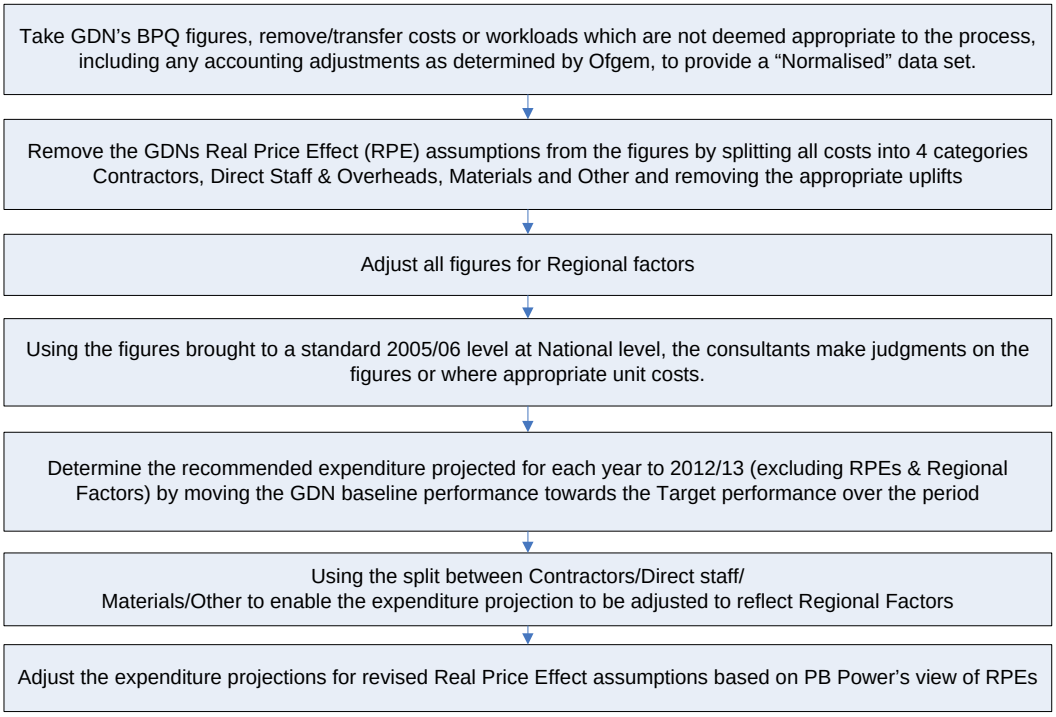

Figure 2-3

Once the adjustments have been assessed the process then reapplies the regional factors and our standard assumptions for RPEs, thus delivering our recommended projections for the activity.

2.6 COSTS

All costs in the report are in 2005/06 prices unless otherwise stated.

The table below shows the factors which have been used to convert pre 2005/06 costs to 2005/06. These factors have been used throughout the analysis.

Convert to	Convert from: 2000	2001	Q1 2002	2002/03	2003/04	2004/05	2005/06
Index	170.25	173.35	173.87	177.52	182.48	188.15	193.11
2000	1.00	0.98	0.98	0.96	0.93	0.90	0.88
2001	1.02	1.00	1.00	0.98	0.95	0.92	0.90
Q1 2002	1.02	1.00	1.00	0.98	0.95	0.92	0.90
2002/03	1.04	1.02	1.02	1.00	0.97	0.94	0.92
2003/04	1.07	1.05	1.05	1.03	1.00	0.97	0.94
2004/05	1.11	1.09	1.08	1.06	1.03	1.00	0.97
2005/06	1.13	1.11	1.11	1.09	1.06	1.03	1.00

Table 2-2

2.7 REAL PRICE EFFECTS

The submissions have been made on the basis of 2005/06 prices and RPEs have also been identified. In addition to the increases from the Retail Prices Index (RPI) assumed at an annual rate of 2.5%, other costs have been assessed as potentially rising faster than this rate. These additional increases used in this report have been summarised in Table 2-3 and are discussed further in the sections below. The assumptions used by NGG for RPEs are given in Appendix 8.

We have made adjustments to the submissions for all areas of the BPQ excluding Non-Operational Capex as we consider most of this expenditure is project based which will have been made on the basis of the best available planned processes at the time of the submissions. We consider it more appropriate to consider adjustments to this type of expenditure on a case by case basis.

Real Price Effects		2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
Contractor Rates Year on Year	2.25%	100.0	102.3	104.6	106.9	109.3	111.8	114.3	116.9
Materials year on Year	1.00%	100.0	101.0	102.0	103.0	104.1	105.1	106.2	107.2
Direct Labour	1.00%	100.0	101.0	102.0	103.0	104.1	105.1	106.2	107.2

Table 2-3

2.7.1 CONTRACTOR PRICES

Contractor prices have a major impact on the costs of the GDN operations particularly in the areas of connections, mains replacement works and LTS projects. All GDNs have forecast that contractor prices will increase at a greater rate than the RPI. They have quoted particularly the Price Adjustment Formulae for Construction Contracts Indices published by the DTI (commonly known as the Baxter Indices) as evidence of the historical rate of real price inflation for these contracts. These trends have been set out in Figure 2-4 below.

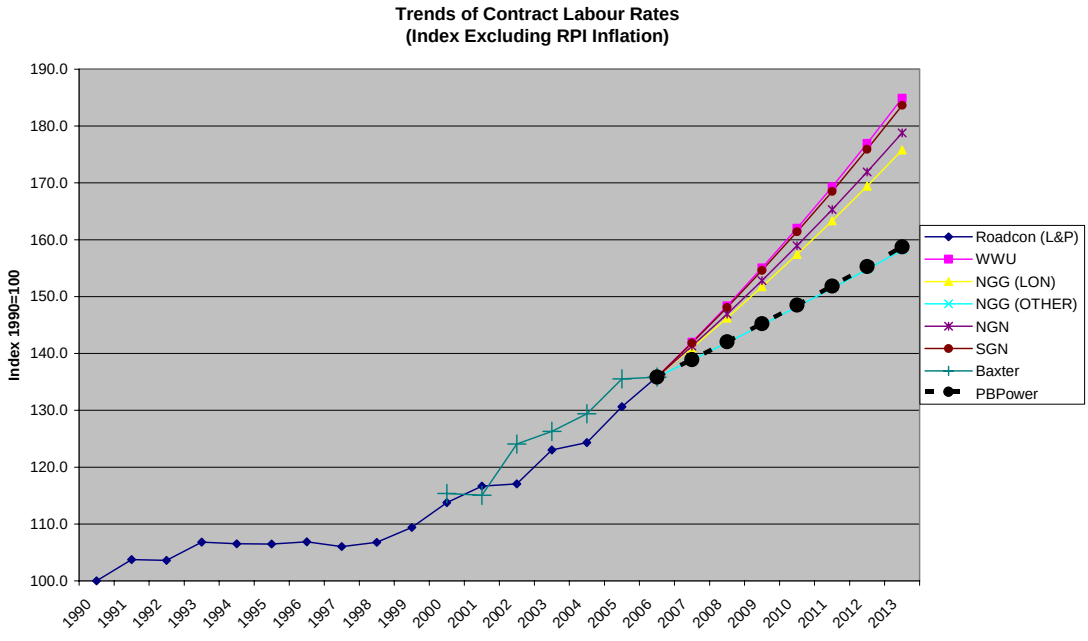

Figure 2-4

We have investigated these trends looking for comparisons for the gas distribution costs. These indices do not uniformly increase month by month as there tend to be step changes each year as contracts are re-negotiated. Examination of the most recent trends suggests that the high increases experienced a year ago have flattened out.

We have also compared the data with the Public Sector Construction Works Indices (Road Construction) published by the DTI. Whilst this sector is not directly reflective of gas distribution activities it is useful as a comparator to the Baxter Indices. As can be seen from Figure 2-4, whilst the two indices show small differences year on year the trends demonstrate very similar increase.

Having considered all of the previous trend information we have concluded that a projection of 2.25% is appropriate which is also shown in Figure 2-4.

Our analysis assumes a single rate of Contractor price increases across all GDNs with no differences between regions of the UK for the rate of increase.

2.7.2 DIRECT LABOUR COSTS

All GDNs have submitted the view that direct labour costs will continue to increase at a greater rate than the RPI.

Forecasting future wage and salary trends in relation to inflation is a matter of speculating on the outcome of future negotiations and many complex factors. Government's concern is with the control of inflation and as such encourages settlements at or below inflation.

The best evidence for future trends comes from recent experience. The DTI Employment Relations Research Series document No 56 dated March 2006 indicates that in the past decade, UK employees have enjoyed strong real (inflation adjusted) wages growth of 2.75% per year in the private sector. Public sector employees saw a slightly lower annual growth rate of around 2.25% to 2.5% in real earnings. This period spanned the introduction of the minimum wage and it appears that more recent real growth has slowed. The most recent Annual Survey of Hours and Earnings (ASHE) in April 2006 indicated that median gross weekly earnings were 4.1% in 2005. During this period inflation averaged 3%. Continuing this trend, the Ernst & Young ITEM Club indicated recently that average earnings increased annually by 4.1% in the year to November, despite a tightening labour market.

Based on recent evidence, a real price effect forecast of 1% for direct staff costs has been used in our analysis.

2.7.3 MATERIAL COSTS

All GDNs have submitted the view that material costs will continue to increase at a greater rate than the RPI. Having reviewed these rates we believe a reasonable rate of increase above RPI will be 1%. We conclude that this figure should be taken together with the productivity savings assumed which balance the effect of these increases.

2.7.4 OTHER COSTS

No specific evidence has been provided on real price rises for other costs and therefore our analysis has assumed no increases above RPI.

2.8 REGIONAL FACTORS

2.8.1 CONTRACTOR PRICES

We have based our initial views on the Quarterly Review of Building Prices as published by the Building Construction Information Service (BCIS) of the Royal Institution of Chartered Surveyors (RICS). This document provides a complete regional index of construction costs for the UK. For the purposes of our analysis we have rebased the October 2006 indices with Northern Ireland, Jersey and the Scottish Highlands excluded.

We have estimated the percentage for each county falling into each GDN, thus being able to derive an index of construction costs for each GDN. The table below sets out the values used for the analysis, the same factors have been used for each year. Details of the assumptions used to determine these factors are given in Appendix 7.

Regional Factors	WW	No	Sc	So	EoE	Lon	NW	WM
Regional Factors (Contractor Prices)	0.96	1.01	0.99	1.06	1.00	1.11	0.93	0.94

Table 2-4

2.8.2 DIRECT LABOUR COSTS

The Annual Survey of Hours and Earnings (ASHE) published by the DTI shows that there is a substantial London effect on average earnings. This shows that London wages are on average 30% higher than the national average.

Using this figure for London only, an assessment has been made as to how this impacts the GDNs. We concluded that only Southern and London GDNs are affected and that they are not fully exposed to the 30% uplift as the whole of the GDN is not within London and many activities are carried out away from the London location.

Our conclusions are set out in Table 2-5.

Regional Factors	WW	No	Sc	So	EoE	Lon	NW	WM
Regional Factors (Direct Labour)	0.98	0.98	0.98	1.03	0.98	1.10	0.98	0.98

Table 2-5

2.8.3 MATERIAL COSTS

No specific evidence has been provided of a regional impact on material prices and therefore our analysis has used any regional factors for material costs.

2.8.4 OTHER COSTS

No specific evidence has been provided of a regional impact on material prices and therefore our analysis has used any regional factors for other costs.

2.9 PRODUCTIVITY

Although we have not undertaken a full study of past productivity we have examined published information to determine an assumed base annual increase in productivity. We understand other consultants are undertaking broader economic studies of the operation of the GDN businesses.

Looking at the productivity information published by National Statistics on output per worker the average annual increase over the last 10-40 years is in the range 1.7% - 2.0%. In addition a report on the OFWAT web site compiled by Stone & Webster Consultants Limited in 2004 concluded “Broadly, the average rate of Opex productivity growth for [Water and Sewage Companies] has been in the range 1.7-1.9% per annum over the [period 1992-93 to 2002/03]”. In the light of these figures we have made a conservative assumption of 1% base annual increase. We have then used our engineering experience and judgement when reviewing the business plans of the companies to determine where we believe there is scope for additional productivity above this base rate.

The table below lists the areas in which our analysis has used an assumption for productivity to automatically generate our proposals over the period. The table also shows where we believe there is scope for productivity improvements, higher scope being identified by more ticks.

In other areas of analysis we have used the GDN's own forecasts modified as appropriate for specific issues.

Activities	Rate	Potential Opportunities (Above base Productivity)					
		New Techniques	Labour Productivity	Clerical Support Costs	Process Improvements	Contractual Reductions	IS Improvements
Opex – Work Management	1%						√√√
Opex – Remaining	1%						
Capex - Connections	3%	√	√√	√√√	√√√	√√	√√
Capex – Mains Reinforcement	2%	√√	√	√	√	√√√	√
Repex - All	1.75%	√	√	√	√	√√	√

Table 2-6

Our productivity assumptions are extrapolated to subsequent years based on the regression carried out on the information provided in the regression base year. We recommend that following the update of 2006/07 outturn figures, our assumptions are reviewed in the light of potential performance improvements already achieved during the 2006/07 financial year.

2.10 OUTER MET AREA

A geographical area on the boundary of the East of England Network and the London Network, the Outer Met Area, is for regulatory and income accounting purposes part of the East of England Network. However, the area is managed by NGG as part of the London Network.

In the review of Capex all comparative analysis has been carried out on the basis that the costs and work for the Outer Met Area have been included within the London figures. The BPQ has been completed by NGG on this basis

In the review of Repex all comparative analysis has been carried out on the basis that the costs and work for the Outer Met Area have been included within the East of England figures. The BPQ has been completed by NGG on this basis

The operating costs, assets and liabilities are deemed to be 9% of the transportation business operating costs, assets and liabilities of the London Network. We recommend that future returns and analysis is carried out on the basis that all aspects of the Outer Met Area is reported and analysed as being part of East of England Network.

3 LTS AND STORAGE CAPEX

3.1 SUMMARY

Net Capex £m (2005/06 prices)	2008/09	2009/10	2010/11	2011/12	2012/13	Total
BPQ Submission						
Pipelines	19.5	1.6	3.0	17.2	13.8	**55.1**
NTS Offtakes	0.0	0.0	0.0	0.0	0.0	**0.0**
PRSs	5.3	5.5	4.5	4.6	3.1	**23.0**
Other storage	2.0	1.9	1.3	0.9	1.0	**7.1**
Total	**26.8**	**9.0**	**8.8**	**22.7**	**17.9**	**85.2**
Normalisation Adjustments						
Other storage	-0.5	-0.4	0.0	0.0	0.0	**-0.9**
Total	**-0.5**	**-0.4**	**0.0**	**0.0**	**0.0**	**-0.9**
Normalised BPQ						
Pipelines	19.5	1.6	3.0	17.2	13.8	**55.1**
NTS Offtakes	0.0	0.0	0.0	0.0	0.0	**0.0**
PRSs	5.3	5.5	4.5	4.6	3.1	**23.0**
Other storage	1.5	1.5	1.3	0.9	1.0	**6.2**
Total	**26.3**	**8.6**	**8.8**	**22.7**	**17.9**	**84.3**
Adjustments						
Pipelines	-0.8	-1.6	-1.5	-14.3	3.4	**-14.7**
NTS Offtakes	0.0	0.0	0.0	0.0	0.0	**0.0**
PRSs	-0.2	-0.3	-0.3	-0.4	-0.3	**-1.4**
Other storage	-0.1	-0.1	-0.1	-0.1	-0.1	**-0.4**
Total	**-1.1**	**-2.0**	**-1.8**	**-14.7**	**3.0**	**-16.6**
Proposed						
Pipelines	18.7	0.0	1.5	2.9	17.2	**40.4**
NTS Offtakes	0.0	0.0	0.0	0.0	0.0	**0.0**
PRSs	5.1	5.2	4.2	4.2	2.8	**21.6**
Other storage	1.4	1.4	1.2	0.8	0.9	**5.8**
Total	**25.2**	**6.6**	**7.0**	**8.0**	**20.9**	**67.7**

Table 3-1

3.2 POLICIES & PROCEDURES

3.2.1 INTRODUCTION

This section reviews the various statements made by Londondon in support of their planning and decision making processes which drive and deliver LTS and Storage Capex.

LTS and Storage Capex is determined by gathering forecast supply and demand data and using network simulation models to determine the optimum plant necessary to meet the capacity requirements. We have reached the conclusion, based on our limited review, that the planning work for development of the London Network and in particular that of the local transmission and storage system has been carried out in a competent manner.

Appendix 1 reviews the financial and technical framework under which London operates, the structure it utilises to manage their assets effectively and the key policies it adopts to ensure it meets its statutory and licence obligations and other regulatory requirements.

3.2.2 SCOPE OF POLICIES AND PROCEDURES

NGG policy T/PL/NP4 sets out the requirements for above 7 bar network analysis, and policy T/PL/NP2 sets out the procedure for the validation of Local Transmission System (LTS) and describes the process needed to provide the required level of accuracy. A description was given of the process used to develop and match the network models to the actual network, including the network validation process. London's network planning arrangements are reviewed in Appendix 2.

NGG uses a range of network analysis tools including GBNA and LINAS for < 7bar networks and graphical Falcon for steady state and transient analysis of the Local Transmission System (LTS), and has described how demands are derived for each. This indicates an appropriate level of coordination and consistency between the analysis sections dealing with different pressure tiers.

An important feature of network modelling is the determination of the diurnal storage volumes needed under 1 in 20 network conditions. London uses the Storage Simulation Model (SSM). SSM uses demand data, diurnal swing information and forecast performance data taken from system operation as core inputs. This information is run through a statistical model with demand and weather forecasting data to simulate the network's storage requirements. Following the analysis and review of results, the findings and recommendations are subject to approval by senior London management.

In terms of financial controls, all capital projects are approved within the governance framework set by the NG Group Board. All capital projects in excess of £50,000 require direct approval of the Distribution Project Sanctioning Committee (DPSC). NGG describes the selection of projects to address predicted capacity shortfalls, storage shortfalls, system performance, safety and environmental performance with net present cost a key part of the project selection process. Net present value criteria are used to select projects which improve future operating efficiency.

3.2.3 REVIEW AND UPDATE PROCESS

NGG's responses indicate that their process for regular review of network capacity ensures that their plans deliver appropriate and timely solutions whilst remaining flexible to accommodate supply or demand changes.

NGG are currently developing asset management procedures based on the principles of BSI PAS55. These procedures will prioritise actions to ensure that the appropriate type and quality of data is available to support key business decisions in investment management.

NGG report that their selection of capital projects is in line with the principles of PAS55, with objectives reflecting their licence and legislative requirements, expected levels of system performance and the need for efficient performance.

NGG have described the process for updating the key parameters of the SSM model on an annual basis, with the largest factor influencing the volume of storage required being forecast demand. The current version of the model was introduced in 2003, and no revisions have been made since DN sales. NGG report no immediate plans to undertake further significant revisions.

3.2.4 EFFICIENCY AND PRODUCTIVITY

Sourcing of London's major pipeline construction is managed through NGG's UK Construction directorate. All projects are subject to our competitive tender arrangements, whilst ensuring that sufficient workload is available to ensure suppliers remain within the market.

NGG DPSC requires detailed completion reports automatically for all projects of £30m or more and can request reports for other projects (for example projects with a high complexity or where there has been a significant cost variance). NGG has provided a number of completion reports in which lessons learnt are set out. However, there is no

evidence that there is a systematic process for these lessons to be embedded into the business to improve future project delivery performance. Also, in our view the £30m threshold for requiring automatic detailed completion reports is too high if techniques for improvements are to be taken from the experience on small projects as well the >£30m projects.

3.3 HISTORICAL PERFORMANCE

3.3.1 INTRODUCTION

London's historical expenditure was reviewed in detail as part of the 1 year review.

This section summarises London's expenditure on the LTS in the period 2002/03 to 2005/06.

3.3.2 DEFINITION OF ACTIVITY

The Local Transmission System (LTS) operates at pressures > 7barg and transports gas from NTS offtakes to distribution systems and directly to some large users. The LTS is the primary source of additional diurnal storage related to demand growth, and is also required to transmit diurnal storage where this is procured from the NTS. Expenditure to reinforce the LTS is driven by increases in demand, but investment in reinforcement pipelines is generally more economic where a project provides capacity to meet more than one year's growth in demand. Therefore expenditure on LTS projects tends to be lumpy.

3.3.3 ESTABLISH UNDERLYING COSTS

London's capital expenditure on LTS & Storage over the period 2002/03 to 2005/06 is shown in the chart below. The chart shows actual expenditure in 2005/06 prices.

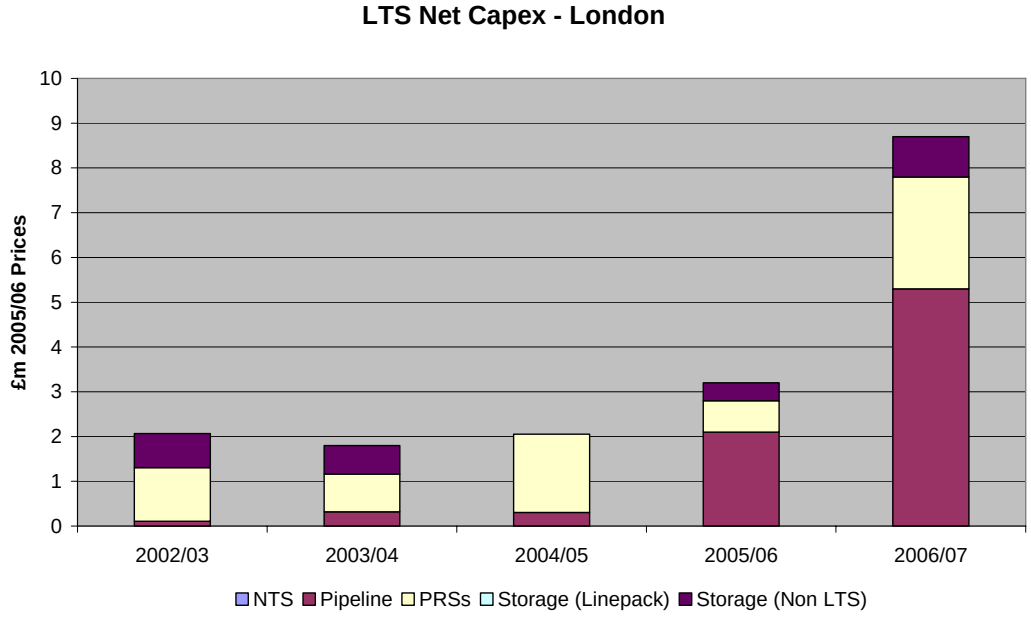

Figure 3-1

This expenditure provided sufficient capacity for London to be able to generate more diurnal storage than required to meet its supply obligations from 2006/07. It plans to provide 1.2 mcm of diurnal storage to the NTS in 2006/07, and amounts over 1 mcm in each of the years to 2009/10, with smaller amounts thereafter.

3.3.4 EFFICIENT LEVEL OF COSTS

Over the period 2002/03 to 2005/06, London's expenditure on LTS capital projects was £9.3m (2005/06 prices).

The 1 year review investigated historical expenditure in detail. This expenditure did not include any major projects (except for some early spend on the Harefield to Southall pipeline project). There were no London projects of sufficient scale to be included in the assessment in Appendix 6.

3.4 FORECAST

3.4.1 INTRODUCTION

The efficiency of forecasting LTS and storage capital expenditure requirements depends on the performance of the GDN in network planning and design and on the effectiveness of their business planning processes. The network planning and design performance was reviewed as part of the 1 year review, with specific questions asked in this review regarding diurnal storage planning and the control of expenditure. The policies and procedures applied by London, including their business planning processes were reviewed in section 3.2. No issues have been identified in relation to London's performance in these areas, although specific project assumptions are challenged below.

LTS & storage expenditure requirements are driven in the main by the projected growth in the 1 in 20 peak day over the period.

London are predicting an increase in demand over the 4 year period 2005/06 to 2008/09 of 3%, whereas National Grid's Transportation's Ten Year Statement 2006 is predicting that 2008/09 demand in London's area will be similar to that in 2005/06. For comparison, over the 4 years from 2001/02 to 2005/06 peak demand in London's area showed a very slight overall increase.

London has provided information on demand forecasting performance over the period since 2003/04. It said that on a 3 year ahead basis, the typical horizon for investment decisions, peak forecasts were very slightly over-forecast.

Overall London is forecasting a rise in peak demand of 7 GWh/day per year over the period from 2006/07 to 2012/13 whereas National Grid are forecasting peak demand rising at 9 GWh/day per year on average with the strongest rises in demand in the later years of the plan.

The following table shows London's forecasts of demand over the period to 2012/13 and the rate of increase in the forecast demand.

Peak demands North Thames LDZ	Lon forecasts GWh/day	% annual increase in peak demand from 2006/07
2006/07	497	N/A
2008/09	509	1.2%
2012/13	537	1.3%

Table 3-2

If London had used the National Grid peak demand forecasts, its LTS investment plans may have shown different phasing of investments to those shown in the BPQ submission. NGG said that National Grid had assumed a significant consumer response to the high fuel prices in the domestic market impacting both annual and peak demands. NGG said that it considered that there was no evidence to support the reduction in peak demands and, based on technical advice from National Grid, had removed this effect from the

forecasts. In all other respects NGG said that they had used National Grid's forecasts of peak demand.

Demand forecasts accuracy was raised with NGG including the uncertainties surrounding current trends in usage, and they considered they were using the most appropriate forecasts for planning purposes.

Our work has not included an analysis of demand forecasts in sufficient depth to make a judgement on the most appropriate forecasts to use for capital expenditure planning. In this report we have carried out a cost analysis, assuming the GDN proposed demand forecasts.

The level of LTS & storage future investment is also driven by the level and pattern of historical investment, since individual investments can provide capacity for a number of future years.

3.4.2 COMPANY PROPOSALS

The figure below shows the company projections of capital expenditure on LTS & storage projects.

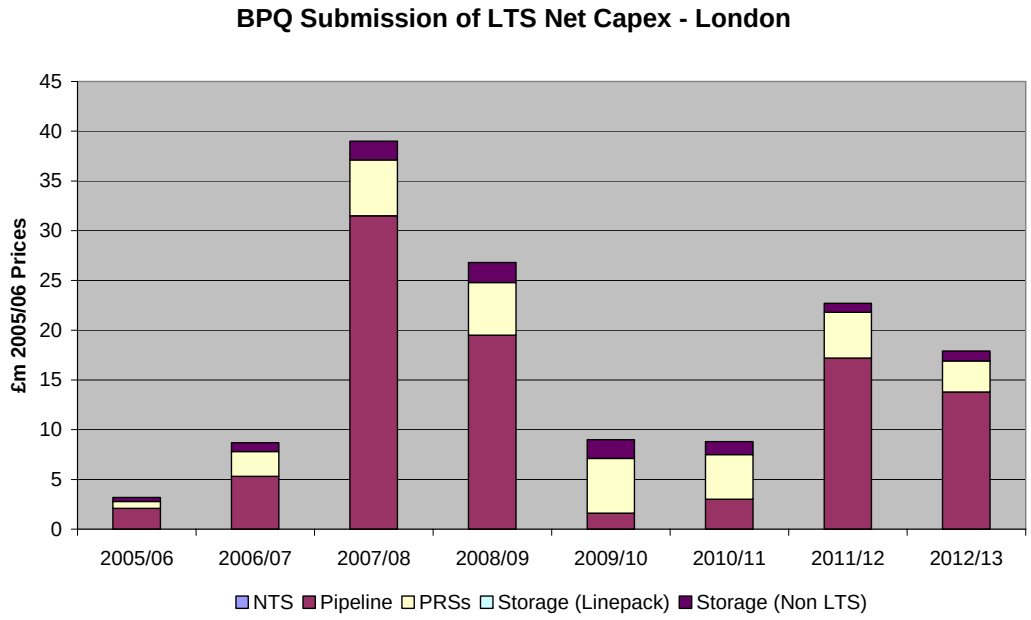

Figure 3-2

The following schemes have been reviewed:

Harefield to Southall 18km 1200mm pipeline

- Project costs: £58.6m
- Project commissioning date: 2008/09
- The cost of construction is approximately two times the cost of a similar pipeline built in open ground. London have explained the construction difficulties in building this pipeline and the higher level of costs that will be incurred.
- The project is required to provide 1 in 20 capacity to the new Southall PRI and to reinforce the pipeline systems from Southall to Fulham and to Hedgerley. The reinforcement can be achieved by laying a 900mm diameter pipeline which also generates 0.28 mcm of diurnal storage. London propose to build the pipeline in 1200mm diameter pipeline to release a further 0.27 mcm of diurnal storage.

- The cost of upsizing from 900mm to 1200mm is estimated at £5.4m. The cost of the additional diurnal storage is £20m per mcm. We consider that this provision of diurnal storage to be economic (see Appendix 5).
- The project provides storage which could be used to offset the loss of LP storage arising from the London Supply Strategy for MP main replacement.
- The project timing is consistent with London not taking diurnal storage from the NTS
- Project adjustments are discussed in section 3.4.4.

Peters Green to South Mimms 26km 1200mm pipeline

- Project costs: £35.6m
- Project commissioning date: 2012/13
- The pipeline will run in parallel to the existing 48 inch Peters Green high pressure pipeline.
- The pipeline generates 1 mcm of diurnal storage. This pipeline is the 1st phase of 3 pipelines proposed over the next 12 years to generate diurnal storage.
- The cost of the diurnal storage from the pipeline is £35.6m per mcm. We consider that this provision of diurnal storage to be economic (see Appendix 5).
- The diurnal storage requirements forecast by London do not show a firm need for this storage in 2012/13, particularly taking into account the provision of diurnal storage by London to the NTS. It is therefore proposed that the project completion date is deferred until 2013/14.
- Project adjustments are discussed in section 3.4.4.

3.4.3 PROPOSED PROJECTIONS

Our proposed projections are derived from a review of the specific projects costs plus a review of the overall expenditure required to meet load growth (called the capacity adjustment). Our proposed costs are discussed in section 3.4.4.

The need for diurnal storage capacity is an important indicator of load growth and driver for investment, alongside the 1 in 20 peak demand.

The figure below shows the diurnal storage capacity installed within the GDN and to be procured from the NTS over the period to 2012/13.

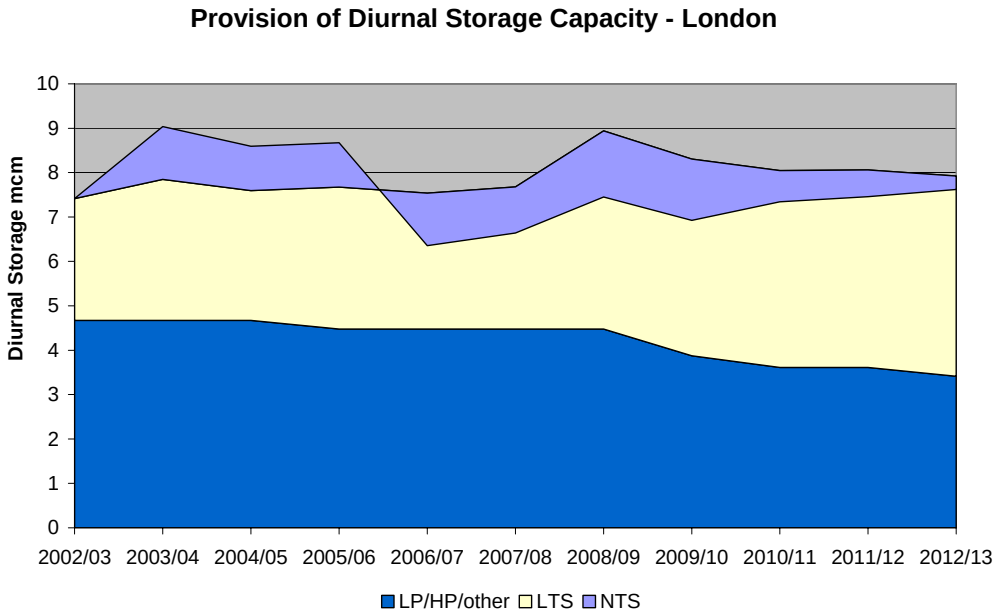

Figure 3-3

This graph shows that London taking storage from the NTS up to and including 2005/06, but planning on the basis of providing diurnal storage capacity to the NTS from 2006/07 onwards. The graphs show the volume of LP holder capacity decreasing from 2009/10 and increasing volumes of LTS linepack.

3.4.4 SPECIFIC COST AREAS

This section describes the specific costs reviewed by PB Power and how the separate capacity adjustment is calculated and applied.

The Outer Met Adjustment is not included in any of the analyses in our report and must be taken into account when finalising the PCR allowances.

Pipelines

We have carried out an analysis of a range of LTS pipeline construction projects (see Appendix 6). Our view is that the following unit costs are appropriate to LTS pipelines, reflecting the average lengths and conditions of construction.

LTS pipeline diameter	Unit cost (2005/06 prices)
1200mm	£1.2m per km

Table 3-3

Although we would expect GDNs to capture ongoing efficiency improvements in both procurement and in construction methods throughout the plan period, we have not included any adjustments to the unit costs for such effects.

Applying these costs to the pipeline project described in Section 3.4.2, the following cost is proposed:

Harefield to Southall 18km 1200mm pipeline

- No adjustments (other than RPE adjustments) are proposed because of the particular difficulties associated with the construction of this pipeline.

Peters Green to South Mimms 26km 1200mm pipeline

- London cost estimates less RPEs = £31.1m
- PB Power estimate excluding RPEs = £31.2m
- Variance from London proposal = +£0.1m (excluding RPE effects)
- Adjustments are made to defer the completion date by 1 year.
- It is recognised that this project potentially supports London's strategy to install a 2 bar MP system as part of the Repex programme (see Section 8). This distribution strategy could sterilise approximately 60% of the current LP storage in the Network because of increased operating pressures. The 2 bar system will be constructed by replacement of existing large diameter medium pressure mains, typically by insertion.
- NGG says that a consequence of deferring the Peters Green to South Mimms pipeline would be the need to increase the proportion of large diameter mains to be replaced by open cut, in order to lay size-for-size mains to maintain adequate system pressures, at increased cost.
- London have provided some information on alternative solutions such as LP holder compressors to avoid these increased costs, but we do not consider that the assessments provided are conclusive.
- We consider that further work should be carried out to establish the optimal overall solution.
- Although we have deferred the Peters Green to South Mimms pipeline based on diurnal storage considerations, our proposals nevertheless include £19m in the later years of the plan for early spend on this pipeline project or another project to support the optimisation of the MP system works.
- Consideration should also be given to funding any advancement of this project (if that is appropriate from the assessments) from a contribution from the proceeds of the sale of holder sites.

Other storage

London have included costs for compliance with the working at heights regulations in LTS & Storage Capex. PB Power have reviewed these costs under Storage maintenance (Opex) and have set out a projection under that category of expenditure.

The costs removed from LTS & Storage as part of the cost normalisation are as follows:

Cost normalization £m 2005/06 prices	2006/07	2007/08	2008/09	2009/10
BPQ submission				
Gasholder - working at heights	0.0	-0.5	-0.5	-0.4

Table 3-4

PRSs

Preheaters

London has described their proposed preheater replacement programme to improve reliability and reduce operating and maintenance costs. It is based on replacement of all preheaters at sites with high or normal criticality. NGG have also identified preheaters that will be replaced as part of works to increase capacity. The following table shows the breakdown of preheater costs into these two categories. We have concluded that this work is appropriate.

£m 2005/06 prices (Excluding RPEs)	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
Pre-heaters (BPQ submission)	0	0.7	0.9	0.9	0.7	0.5	0.6
Pre-heaters expenditure – condition replacement	0	0.5	0.7	0.7	0.5	0.4	0.4
Pre-heater expenditure - capacity	0	0.2	0.2	0.2	0.2	0.1	0.2

Table 3-5

Capacity adjustment

We have reviewed above the major projects proposed by the Network. In addition, the Network has proposed a number of smaller projects which have not been reviewed.

We consider that the analysis used in this section provides supporting evidence to the specific project analysis carried out above and that where a GDN has made provision for a number of projects at various locations through their network, it provides a means of assessing the overall level of expenditure that gives the GDN flexibility to select the appropriate mix of small projects to remedy local constraints.

In order to assess whether the overall level of expenditure on capacity related projects is consistent with forecast increases in demand, this capacity related expenditure has been assessed against the stated requirements for incremental diurnal storage. Since diurnal storage is calculated as a percentage of peak demand, incremental diurnal storage is a good measure of incremental capacity requirements.

The GDN diurnal storage requirement is determined from the SSM model, with projected volumes determined by a number of factors, including demand forecasts and the capability of the LTS to profile its gas take from the NTS (and the ability of the NTS to deliver such volumes).

	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
London							
Peak demand GWh/d	497	500	509	516	523	528	537
Stated storage required mcm	6.01	6.06	6.24	6.43	6.59	6.81	7.02

Table 3-6

The above table shows London projected demands and diurnal storage requirements over the period 2006/07 to 2012/13. The diurnal storage volumes are based on SSM output values.

The following table shows the final storage requirements for 2006/07, showing that a small amount of diurnal storage was supplied to the NTS.

Diurnal Storage Balance 2006/07	Storage Volume (mcm)
Final Storage Requirement	**6.24**
Storage availability	
- within GDN	6.30
- from NTS	-0.06
Total Available	**6.24**

Table 3-7

Note: NGG advise that the difference between the stated diurnal storage requirement for 2006/07 and the final requirement arises because the final requirements were derived after further analysis of the demand data.

GDNs have described the issues surrounding the availability of NTS linepack after the current arrangements end in 2009/10. We have estimated a notional cost of NTS linepack (if it were available) of £50m per mcm (see Appendix 5); we have called this our reference cost. Unit linepack costs in the LTS are driven by both the pressure range and the pipe diameter, and GDN plans show that large diameter pipelines are being installed to provide diurnal storage.

We recognise that LTS expenditure is lumpy in nature, but in this review period, the average length of proposed pipelines across all GDNs is 12km. We have estimated that a pipeline of this length produces up to 0.1mcm of diurnal storage (depending on pressure range and diameter), and typically around 0.05mcm. In other words, LTS projects can be matched fairly closely to increased requirements for diurnal storage. It is also noted that new or modified PRSs can generate linepack at lower costs than new pipelines, and in some cases can provide diurnal storage increments in smaller steps to match requirements more precisely.

We therefore consider that GDNs should be able to meet their incremental diurnal storage associated with load growth at costs approaching our reference costs. We also recognise that linepack storage volumes reduce as demands increase and so the cost of meeting the total diurnal storage requirement (transmission capacity and storage considered together) will generally be higher than the cost of meeting the growth in diurnal storage alone. We have assumed a factor of 2 times applied to the reference cost is appropriate to allow for this effect.

Therefore where we consider that a GDN has a requirement to invest in diurnal storage over the period from 2006/07 to 2012/13 the efficient cost of constructing that capacity is assessed against 2 times the reference cost and an adjustment made where the costs exceed this threshold.

Table 3-8 shows the efficient cost of the GDN's LTS Capex proposals, and the deduction of the non-capacity Capex to give the net adjusted Capex (capacity related). The table also shows this expenditure expressed on a cumulative basis from 2006/07 to 2012/13.

The table further shows the cumulative diurnal storage increment proposed by the GDN and the associated reference expenditure, also expressed on a cumulative basis.

	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
Adjusted LTS Capex £m	8.6	37.5	25.2	6.6	7.0	8.0	20.9
Non-capacity Capex £m	0.9	2.7	2.2	2.2	1.8	1.3	1.4
Net adjusted Capex (capacity related) £m	7.7	34.7	23.0	4.5	5.2	6.7	19.6
Cumulative net Capex £m	7.7	42.4	65.5	69.9	75.1	81.8	101.4
Cumulative diurnal storage increment mcm		0.0	0.2	0.4	0.6	0.8	1.0
Reference expenditure £m	0.0	2.6	12.1	22.3	31.1	43.4	55.4
Capacity adjustment £m	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Table 3-8

If the cumulative net Capex is more than 2 times the cumulative reference expenditure, consideration is given to a capacity expenditure adjustment. Where there is non-zero capacity adjustment we have investigated the reasons for the adjustment. No capacity adjustment applies to London.

3.4.5 REAL PRICE INCREASES

Section 2.7 sets out the real price effects assumed by NGG in their BPQ proposals and also the real price effects proposed by PB Power.

In addition to any efficiency adjustments, the Network costs have been normalised by adjustments to remove the GDN real price effects and the PB Power real price effect assumptions have subsequently been added in deriving the proposed allowances.

3.4.6 RECOMMENDATIONS

The following figure summarises our capital expenditure proposals for the price control period (2008/09 to 2012/13) for LTS & storage. The build-up of these proposals is given in section 3.1.

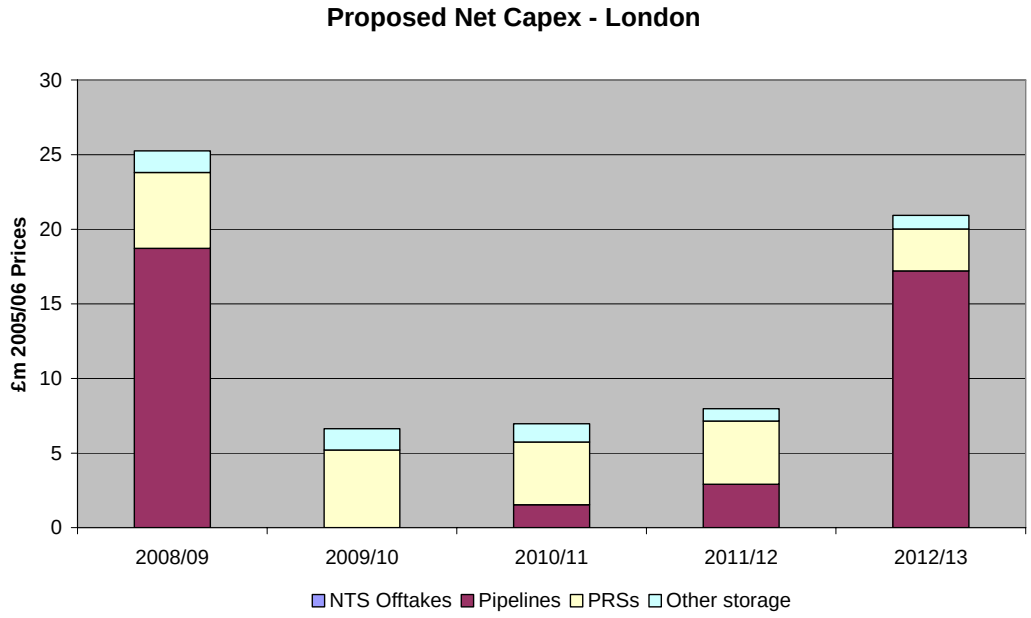

Figure 3-4

4 CONNECTIONS CAPEX

4.1 SUMMARY

Net Capex £m (2005/06 prices)	2008/09	2009/10	2010/11	2011/12	2012/13	Total
BPQ Submission						
New Housing	1.2	1.1	1.1	0.9	0.9	**5.3**
Existing Housing	4.5	4.6	4.9	5.1	5.2	**24.1**
Non-Domestic	0.2	0.2	0.2	0.2	0.2	**1.0**
Total	**5.9**	**5.9**	**6.1**	**6.2**	**6.3**	**30.3**
Normalisation Adjustments						
New Housing	0.0	0.0	0.0	0.0	0.0	**0.0**
Existing Housing	0.0	0.0	0.0	0.0	0.0	**0.0**
Non-Domestic	0.0	0.0	0.0	0.0	0.0	**0.0**
Total	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Normalised BPQ						
New Housing	1.2	1.1	1.1	0.9	0.9	**5.3**
Existing Housing	4.5	4.6	4.9	5.1	5.2	**24.1**
Non-Domestic	0.2	0.2	0.2	0.2	0.2	**1.0**
Total	**5.9**	**5.9**	**6.1**	**6.2**	**6.3**	**30.3**
Adjustments						
New Housing	-0.5	-0.4	-0.4	-0.2	-0.3	**-1.8**
Existing Housing	-0.3	-0.5	-0.9	-1.2	-1.4	**-4.2**
Non-Domestic	0.0	0.0	-0.1	-0.1	-0.1	**-0.2**
Total	**-0.8**	**-0.9**	**-1.3**	**-1.5**	**-1.7**	**-6.2**
Proposed						
New Housing	0.7	0.7	0.7	0.7	0.7	**3.5**
Existing Housing	4.2	4.1	4.0	3.9	3.8	**19.9**
Non-Domestic	0.2	0.2	0.1	0.1	0.1	**0.7**
Total	**5.1**	**5.0**	**4.8**	**4.7**	**4.6**	**24.1**

Table 4-1

4.2 POLICIES & PROCEDURES

NGG Policies and Procedures associated with connections activities have been reviewed as detailed in Appendix 1. The various levels of engineering and safety documents together with the governance arrangements have been reviewed and no issues found.

The key policies covering the connection of new assets constructed by others to the NGG network are:-

- Connections Policy Manual

  The suite of documents forming the NGG Connections Policy Manual sets out the principles and policies applicable to all activities associated with connections to the Network and those activities relating to the point at which gas is off taken by customers. The activities include new connections, increases in demand, alteration, disconnection and taking ownership of pipes laid by others. Each is contained in a separate Policy Statement.

- Management Procedure for the design of 3rd Party System Extensions and Connections to NGG Networks

  T/PM/NP14 is for use in the design of all new mains, services and risers, to be connected to a NGG parent main which is operating at a pressure not exceeding

7bar. In addition, it also provides the procedure for the evaluation of alterations to existing services subject to increased demands. Its purpose is to provide a consistent and defensible approach to the sizing of services, stub connections and approach mains and the quotation of design pressures.

We believe these documents provide a comprehensive commercial and technical methodology for the management of new connections to the Network.

4.3 HISTORICAL PERFORMANCE

4.3.1 INTRODUCTION

Connections Capex includes all expenditure associated with the provision of new customer connections to the below 7 bar distribution network. The workload volume is driven by customer requests for gas connections.

4.3.2 DEFINITION OF ACTIVITY

4.3.2.1 Gross Capex

Connections expenditure is allocated to the following customer categories:

- Connections to New housing
- Connections to Existing housing
- Connections to Non-domestic

The BPQ information details the mains and services expenditure against these categories. Expenditure on governors associated with new connections is also included and is allocated to district or service governor categories.

Mains activities also include specific reinforcement necessitated by individual requests for a new connection to the network. Specific reinforcement is subject to an economic test to determine the associated customer contribution.

4.3.2.2 Net Capex

Connections Net Capex consists of the expenditure which is not re-charged to the customer including the Domestic Load Connection Allowance (DLCA)[1], the Final Connection Allowance[2] and the cost of Employer Ordered Works (EOW). EOW is work that is essential to complete the connection to the distribution system but is not foreseen when the quotation to the customer is given, e.g. additional work resulting from inaccurate mains records.

4.3.3 ESTABLISH UNDERLYING COSTS

Figure 4-1 shows the trends in total mains and total services gross expenditure for the period 2002/03 to 2006/07.

The mains expenditure increase in 2005/06 is coincident with a 21% increase in total workload and a 37% increase in unit cost compared to 2004/05 levels.

[1] The Domestic Load Connection Allowance (DLCA) comprises the mains connection and up to the first 10m of service pipe in the public highway. Qualifying premises must be situated within 23m of a relevant main (Gas Act Section 10 para 2(a)).

[2] Final connection allowances are applicable to non-domestic loads up to 2,196,000kWh situated within 23m of a relevant main. Since 2005 the majority of GDNs have withdrawn this allowance.

Total services expenditure decreased by 22% between 2004/05 and 2005/06, due to reductions in workload and unit costs, which offsets the increase in mains expenditure to some degree.

Mains and services workloads increase in 2006/07 but the expenditure increase is offset by reductions in unit costs compared to 2005/06.

It has not been possible to analyse these expenditure movements further due to inconsistencies in the disaggregation of connections data to mains and services level for this period (see Section 4.3.4.1 - Data Accuracy)

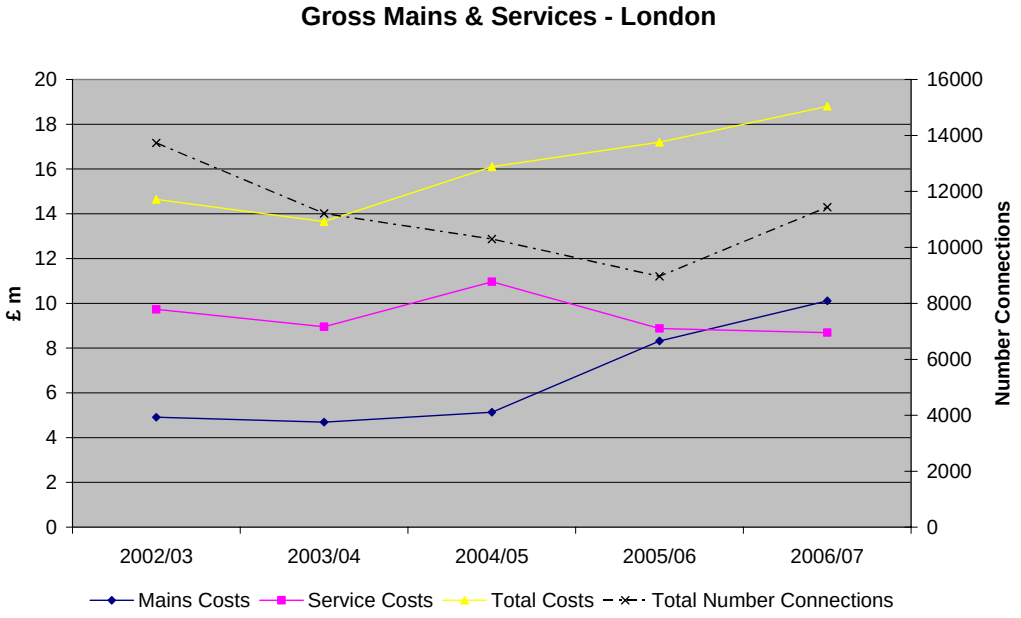

Figure 4-1

The trend in total cost per connection for the period 2002/03 to 2006/07 is included in the chart in Section 4.4.3.1 for the period to 2012/13.

4.3.4 PROPOSE EFFICIENT LEVEL OF COSTS

4.3.4.1 Data Accuracy

Connections activities are separated into three main categories: New Housing connections, Existing Housing connections and Non-Domestic connections. The BPQ returns have been made by the GDNs against these categories, together with the costs associated with feeder mains, specific reinforcement and governors.

We have examined the 2005/06 and 2006/07 BPQ data returned by the GDNs to determine the degree of consistency in the allocation of expenditure to the mains and services activity categories.

Generally, the GDNs have stated that their management information systems do not generate information in the format and degree of disaggregation required. Therefore, information has been synthesised and accuracy cannot be assured, particularly the expenditure allocations between mains and services activities. It is evident that there is a significant degree of inconsistency between the GDNs in terms of the BPQ information returned, including wide variations in mains and services unit costs.

In addition to our concerns regarding the reliability of the reported split of costs between the three categories of connection, the costs associated with feeder mains, specific reinforcement and governors must be allocated between these categories. Following feedback from the GDNs these costs are allocated between the Non-Domestic and New

Housing categories only, as we have been advised that there is limited or no expenditure on these activities associated with Existing Housing connections.

Given the concerns outlined above we have investigated methods of minimising the impact of the allocation of costs between categories by carrying out benchmarking analysis on both a separate and total connections basis.

4.3.4.2 Analysis Process

We have developed expenditure projections for the efficient level of expenditure required by London to carry out its connections activities through benchmarking across GDNs, analysis of their workload assumptions, and review of their forecasts. The analysis process is described in detail in Section 2.

An accounting adjustment of -£1.74m has been applied to expenditure for 2005/06, as required by Ofgem. This adjustment is related to Fulcrum and related third party margins.

No adjustments to workloads have been identified.

We have carried out analysis using both 2005/06 and 2006/07data. Having examined both years we concluded that 2006/07data provided the most robust analysis for the projections. In addition, we have carried out the analysis both at the total connections level and also at the level of separate analysis in each of the three connections activity categories.

The regression carried out for Existing Housing separately provided robust results, however, the regressions for the Non-Domestic and New Housing categories were less conclusive. We believe this is due in part to uncertainty of the correct allocation of costs between the connections categories and in part to the lack of precise allocation of specific reinforcement, feeder mains and governor installations costs.

We concluded that analysis of the total costs would deliver the most representative review of the effectiveness of the Connections operation. However, we have tested this conclusion by comparing the outcomes of both the total and separate analyses. By using each analysis we have derived the total expenditure which is considered appropriate for the number of connections proposed. We therefore generated a comparison for each year of the control period, for each GDN, giving a total of 40 comparisons.

Figure 4-2 below shows the number of these samples for each percentage variation. It can be seen that in almost 80% of the samples, the difference in outcome between the total and separate analysis was less than 4%. These results confirmed our view that the analysis at the total connections level was the most appropriate basis for our proposals.

The total connections analysis resulted in higher costs in 37 of the 40 sample comparisons.

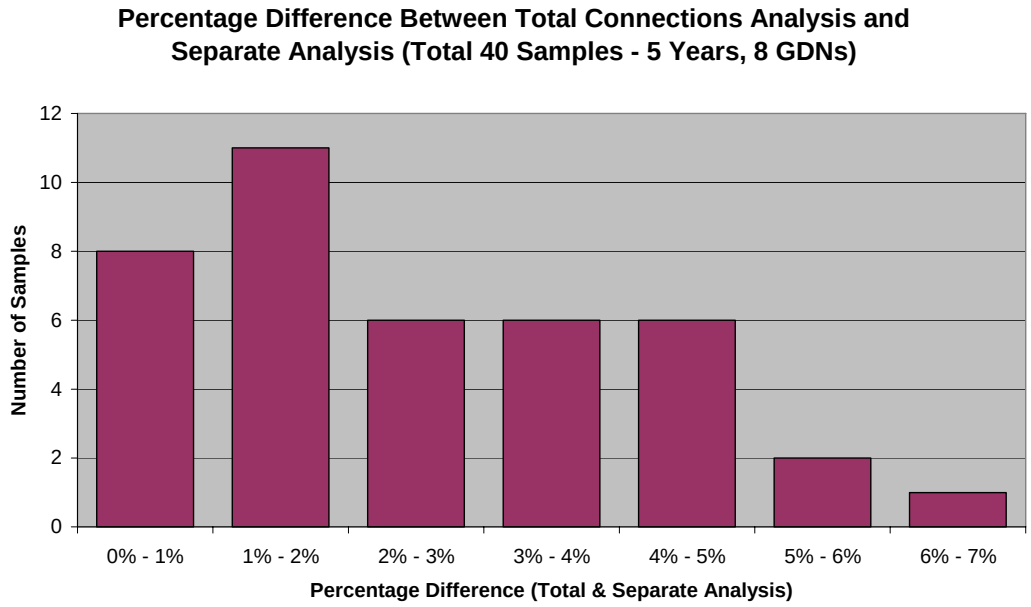

Figure 4-2

NGG has made significant organisational changes during 2005/06 to deliver efficiency improvements in the management and execution of all connections processes and activities. NGG has not quantified precisely the level of improvement expected but we are of the view that efficiency savings within the range 5% in 2007/08 reducing to 2% in 2012/13 are appropriate. This range has been smoothed in the analysis process to 3% year on year over the forecast period, in addition to any progression to the benchmark performance level by underperforming GDNs.

In order to derive our projections for efficient expenditure we have assumed that where a GDN is underperforming the benchmark, the gap with the benchmark will be reduced over the forecast period to 30% at 2012/13. Where a GDN is outperforming the benchmark the projection will be reduced year on year to match the GDN's out performance in 2012/13.

Finally, the projections are adjusted to incorporate Regional Factors and our Standard Real Price Effect assumptions, as specified in Section 2.7.

4.3.4.3 Benchmarking Analysis

A number of regression options have been explored, however, for most activities we have concluded that the most suitable regression is achieved by analysis of the logarithmic values of normalised costs and the chosen driver. A "basket of work" approach has been used to produce a driver based on a weighted average of a number of different work elements (pipe sizes). The driver is calculated by multiplying the work volume by a nominal unit cost for the activity. The approach is not sensitive to the actual level of these nominal unit costs, but works on the relative costs between work types.

This approach allows the analysis to fully reflect the workload forecast by the GDNs, adjusted for the period 2008/09 to 2012/13 as deemed appropriate by our consultants.

The starting point for setting the target benchmark is an Ordinary Least Squares (OLS) regression on the eight data points, one for each GDN, applicable in the base year (2006/07). The regression line is shown in black on the graphs. The R^2 value indicates how well the variation in costs is explained by the variation in the workload driver.

The OLS regression calculation takes into account all the data points in determining the relationship between the costs and the workload driver. This relationship could be used to determine the frontier costs for each network, but these costs are unlikely to be efficient since generally only some networks will be operating at the efficiency frontier.

We therefore propose to obtain the benchmark cost relationship by adjusting the OLS regression line so that it reflects efficient network performance rather than average performance.

This relationship could be constructed by shifting down the regression line until all the data points are above the line except for one data point which is on the line. This is the Corrected Ordinary Least Squares (COLS) regression line.

However, we consider that there are differences between GDNs which may not be fully explained by the regression analysis and that it is reasonable to set the frontier relationship by shifting the regression line down to the upper quartile. This is the upper quartile COLS regression line and is shown in pink on the charts. This is the target which all under performing GDNs should move towards.

Where the regression uses log-linear analysis, the effect of rejecting the OLS regression line as the frontier relationship in favour of the upper quartile COLS regression line is to reduce the target costs of each network by the same percentage.

With this approach, 75% of networks will be performing at or below the frontier in the base year and these networks will be expected to continue to improve their performance over the period to 2012/13, and our proposed ongoing productivity improvements are set out in Section 4.4.4.1. The resulting target costs for 2012/13 are shown in yellow on the charts.

Total Connections

Figure 4-3 shows the benchmarking analysis of 2006/07 connection costs for the total connections category.

Workload and costs associated with large scale Local Authority modernisation schemes in Scotland have been excluded from the regression analysis as this is a low unit cost activity which is unrepresentative of the general level of costs associated with connections to existing housing.

London's performance ranks 7th best after allowing for regional factors.

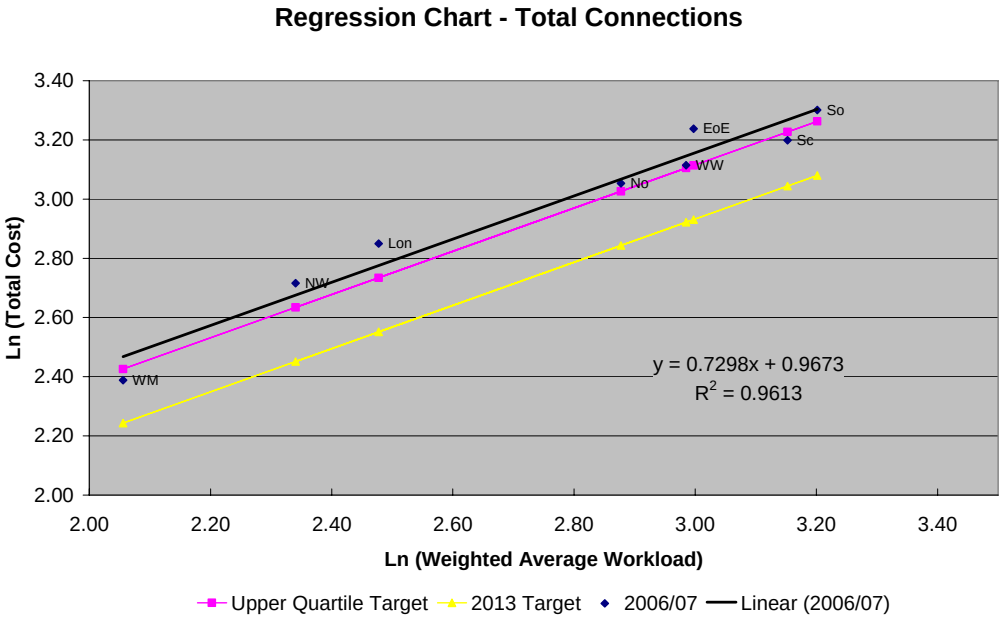

Figure 4-3

New Housing Connections

Figure 4-4 shows the benchmarking analysis of 2006/07 connection costs for the new housing activity category.

Figure 4-4

Existing Housing Connections

Figure 4-5 shows the benchmarking analysis of 2006/07 connection costs for the existing housing activity category.

Workload and costs associated with large scale Local Authority modernisation schemes in Scotland have been excluded from the regression analysis as this is a low unit cost activity which is unrepresentative of the general level of costs associated with connections to existing housing.

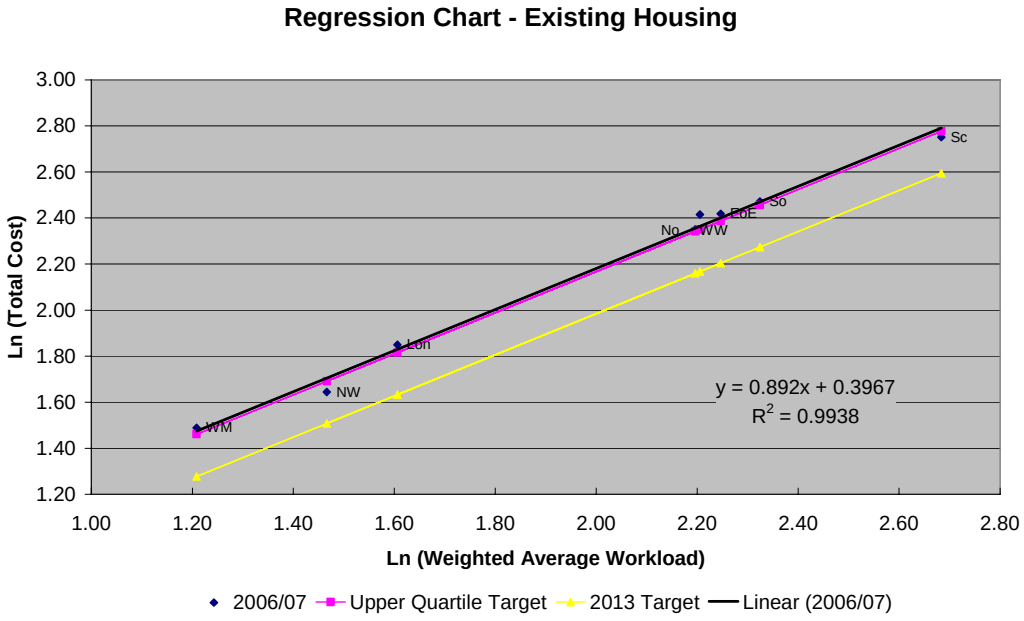

Figure 4-5

Non-domestic Connections

Figure 4-6 shows the benchmarking analysis of 2006/07 connection costs for the non domestic activity category.

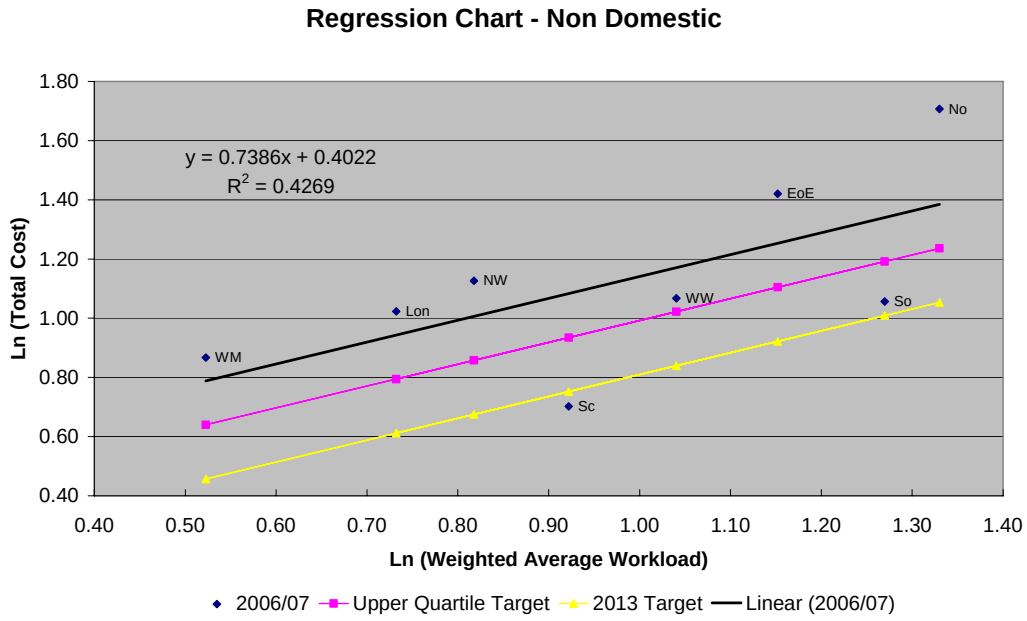

Figure 4-6

4.4 FORECAST

4.4.1 INTRODUCTION

During the period 2002/03 to July 2005, Fulcrum Connections (FC) undertook all connections activities on behalf of London and the other GDNs. The Service Provider Contract (SPC) formed the basis for the contractual relationship between London and FC. NGG coordinated the interface between FC and the GDNs.

Following the networks sales process in July 2005 NGG implemented the decision to in-source standard charge domestic connections activities which represents approximately 95% of the existing housing connections workload. This decision was taken due to the lack of competition in the domestic connections market and to realise potential efficiencies by utilising NGG operations resources and the recently tendered TERM contracts. These contracts were expected to deliver a 6% reduction in work execution costs compared to the FC EPC contracts. FC will continue to undertake all remaining work until the end of the current Service Provider Contract in July 2007 when NGG intend to re-tender all outsourced connections activities.

In assessing the Network's expenditure projections for connections activities we have reviewed the annual workload volumes proposed together with the forecasting assumptions applied.

4.4.2 COMPANY PROPOSALS

4.4.2.1 Key Assumptions

In addition to the generic assumptions for London, detailed in Section 2.7, NGG has stated that their connections expenditure forecasts also take into account the following assumptions and issues:

Gross expenditure

- Existing housing connections are assumed to plateau throughout the forecast period due to market saturation.
- Non-domestic connections are assumed to follow the historic trend reduction.

- New housing connections are predicted to increase in line with government policy which indicates a national house building programme increasing from 150,000 to 200,000 properties per annum.
- Mains workload planning assumptions:
    - 4m per new housing connection
    - 1m per existing housing connection
    - 9m per non-domestic connection

Net expenditure

- The unit cost of DLCA is estimated at £936 for 2005/06 and £932 for 2006/07.
- The DLCA will apply to 97% of services to existing housing.
- EOW costs are incorporated into net Capex and are assumed to be 6% of the combined gross Capex for mains and services activities.
- Introduction of a 'prospective pricing' policy will eliminate net Capex associated with 'time lag'.[3]
- The non domestic Final Connection Allowance is withdrawn (with effect from October 2005).

4.4.2.2 Workload Forecasts

Figures 4-7 and 4-8 show London's connections mains and services workload forecasts.

London's workload forecasts for the period 2008/09 to 2012/13 have been reviewed taking into account historic trend levels and NGG's assumptions.

The downward trend in new housing services workload over the period 2002/03 to 2005/06 is not carried forward into the forecasts which increase by 19% from 2006/07 to 2012/13 to reflect NGG's assumption for growth in this activity. We have considered whether to reduce the forecast workload volumes and have concluded that no adjustment should be made.

The forecast annual total connections workloads are generally consistent with historical levels. However, the combined effect of NGG's connections workload assumptions detailed in Section 4.4.2.1 - Key Assumptions is an increase of 3.8% in the forecast annual total connections workload over the period 2008/09 to 2012/13.

The national average total mains length per connection is 3.03m for the period 2008/09 to 2012/13. London is consistent with the national average at 3.12m and, therefore, no adjustment is made to the forecast mains workload on this basis.

We recommend that the BPQ service connections and mains workload forecasts are accepted.

[3] Historically, a significant proportion of Net Capex resulted from work in progress, i.e. work that was quoted before a price increase but executed after the price change. Connection charges were based on current costs at the time of quotation and, therefore, when costs were increasing under recovery occurred. In July 2006 NGG published a revised Statement of Principles and Methods to be Used to Determine Charges for Gas Distribution Connection services. The statement included a revision to the basis on which labour charges are calculated from current costs to expected costs. This 'prospective pricing' approach is now adopted for customer quotations.

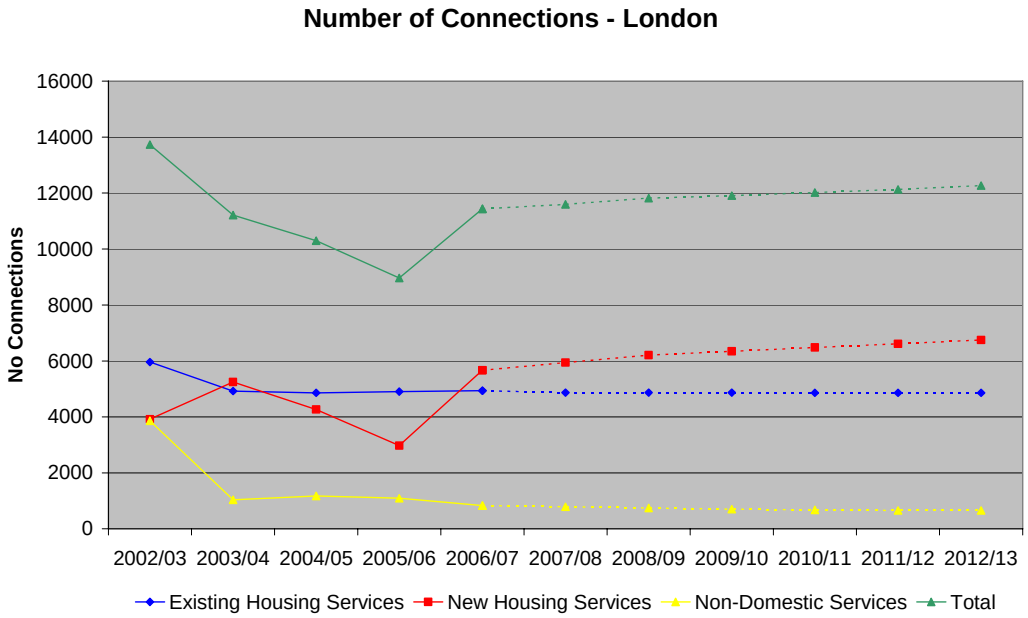

Figure 4-7

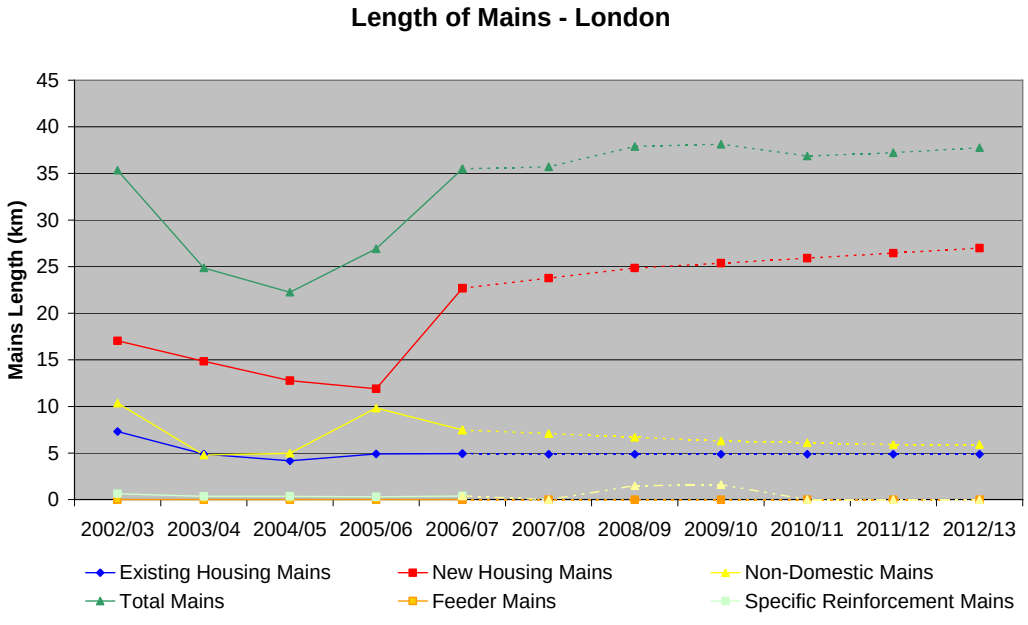

Figure 4-8

4.4.3 PB POWER PROPOSALS

The regression analysis is used to determine the total Gross Capex which is appropriate for the proposed workload. The regression workload drivers are then used to apportion this total expenditure between all work activities based on the proposed workloads for each activity. The costs for feeder mains, specific reinforcement and governors have been split between New Housing and Non-Domestic Connections in proportion to the number of connections in each category.

4.4.3.1 Total Connections

Figure 4-9 shows London's gross expenditure projections for the total connections category over the forecast period 2008/09 to 2012/13.

The recommended expenditure projection reflects closing the gap with the target performance to 30% at 2012/13.

Chart showing London's Proposed Connection Gross Capex

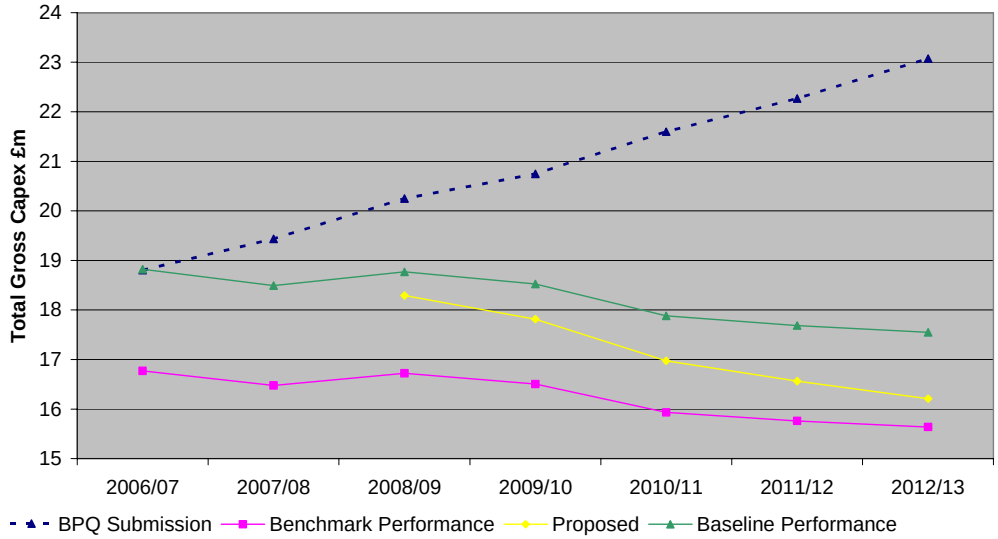

Figure 4-9

Figure 4-10 shows London's cost per connection projections for total connections over the forecast period 2008/09 to 2012/13.

Cost per Connection - All Types

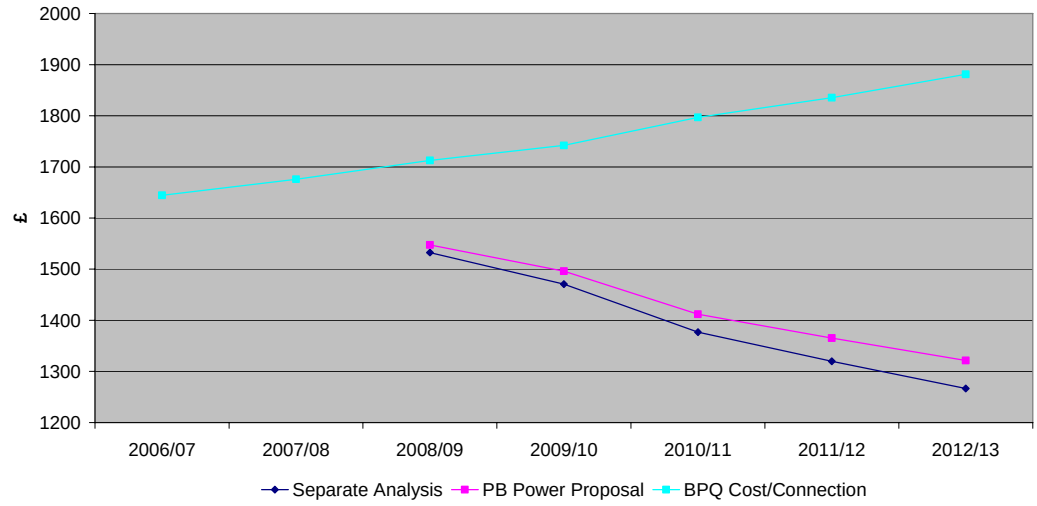

Figure 4-10

Gross expenditure for total connections is summarised in Table 4-2 below.

Total Connections Gross Capex All figures £m 2005/06 prices	2008/09	2009/10	2010/11	2011/12	2012/13	Total
BPQ Gross Submission	20.2	20.7	21.6	22.3	23.1	107.9
Normalisation Adjustment	0.0	0.0	0.0	0.0	0.0	0.0
Normalised Gross BPQ	20.2	20.7	21.6	22.3	23.1	107.9
Workload Adjustment	0.0	0.0	0.0	0.0	0.0	0.0
Efficiency Adjustment	-2.0	-2.9	-4.6	-5.7	-6.9	-22.1
Total Adjustments	-2.0	-2.9	-4.6	-5.7	-6.9	-22.1
Projected Gross	18.3	17.8	17.0	16.6	16.2	85.9

Table 4-2

4.4.3.2 New Housing Connections

Figure 4-11 shows London's cost per connection projections for the new housing connections category over the forecast period 2008/09 to 2012/13.

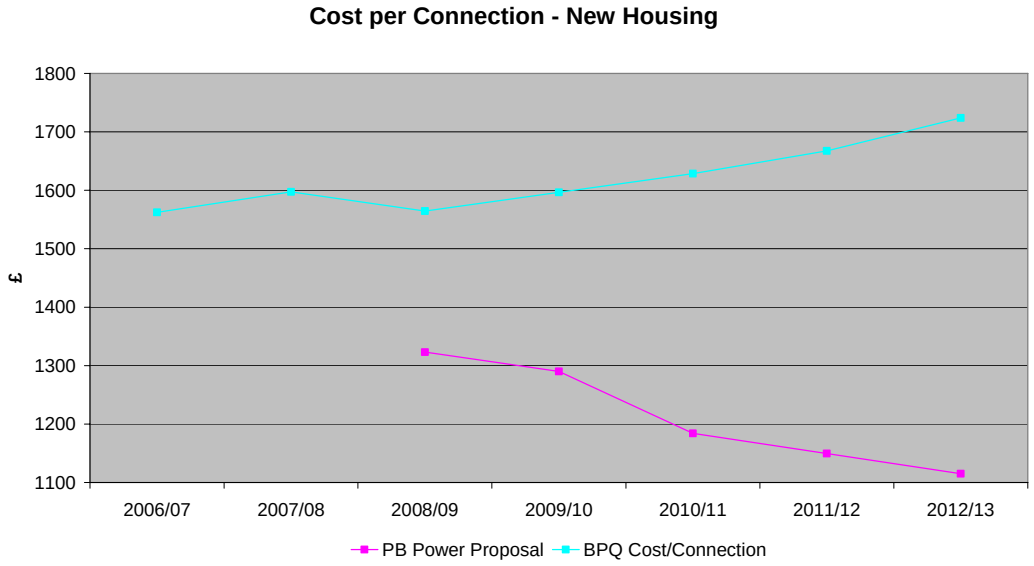

Figure 4-11

Gross expenditure for new housing connections is summarised in Table 4-3 below.

New Housing Gross Capex All figures £m 2005/06 prices	2008/09	2009/10	2010/11	2011/12	2012/13	Total
BPQ Gross Submission	9.7	10.1	10.6	11.0	11.6	53.1
Normalisation Adjustment	0.0	0.0	0.0	0.0	0.0	0.0
Normalised Gross BPQ	9.7	10.1	10.6	11.0	11.6	53.1
Workload Adjustment	0.0	0.0	0.0	0.0	0.0	0.0
Efficiency Adjustment	-1.5	-1.9	-2.9	-3.4	-4.1	-13.9
Total Adjustments	-1.5	-1.9	-2.9	-3.4	-4.1	-13.9
Projected Gross	8.2	8.2	7.7	7.6	7.5	39.2

Table 4-3

4.4.3.3 Existing Housing Connections

Figure 4-12 shows London's cost per connection projections for the existing housing connections category over the forecast period 2008/09 to 2012/13.

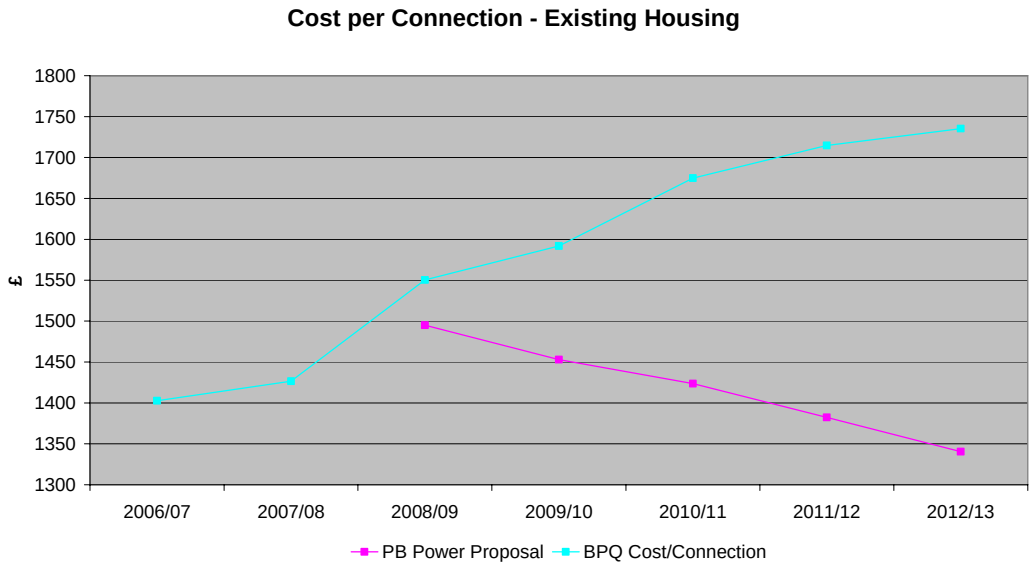

Figure 4-12

Gross expenditure for existing housing connections is summarised in Table 4-4 below.

Existing Housing Gross Capex All figures £m 2005/06 prices	2008/09	2009/10	2010/11	2011/12	2012/13	Total
BPQ Gross Submission	7.5	7.7	8.1	8.3	8.4	40.2
Normalisation Adjustment	0.0	0.0	0.0	0.0	0.0	0.0
Normalised Gross BPQ	7.5	7.7	8.1	8.3	8.4	40.2
Workload Adjustment	0.0	0.0	0.0	0.0	0.0	0.0
Efficiency Adjustment	-0.3	-0.7	-1.2	-1.6	-1.9	-5.7
Total Adjustments	-0.3	-0.7	-1.2	-1.6	-1.9	-5.7
Projected Gross	7.3	7.1	6.9	6.7	6.5	34.5

Table 4-4

4.4.3.4 Non-domestic Connections

Figure 4-13 shows London's cost per connection projections for the non domestic connections category over the forecast period 2008/09 to 2012/13.

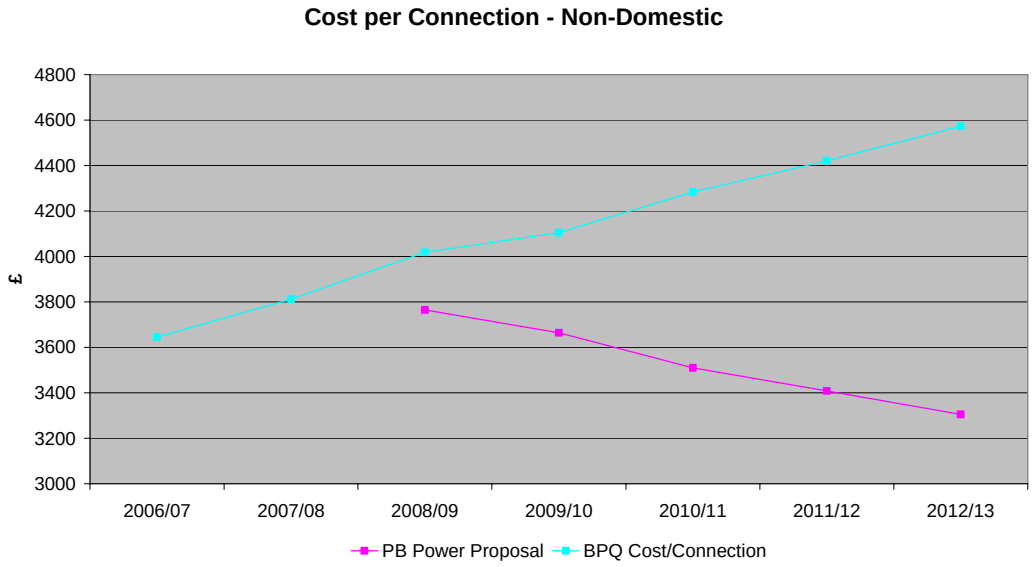

Figure 4-13

Gross expenditure for non domestic connections is summarised in Table 4-5 below.

Non-Domestic Gross Capex All figures £m 2005/06 prices	2008/09	2009/10	2010/11	2011/12	2012/13	Total
BPQ Gross Submission	3.0	2.9	2.9	2.9	3.0	14.7
Normalisation Adjustment	0.0	0.0	0.0	0.0	0.0	0.0
Normalised Gross BPQ	3.0	2.9	2.9	2.9	3.0	14.7
Workload Adjustment	0.0	0.0	0.0	0.0	0.0	0.0
Efficiency Adjustment	-0.2	-0.3	-0.5	-0.7	-0.8	-2.5
Total Adjustments	-0.2	-0.3	-0.5	-0.7	-0.8	-2.5
Projected Gross	2.8	2.6	2.4	2.2	2.2	12.1

Table 4-5

4.4.3.5 Connections Net Capex

Our recommended connections Net Capex projections are based on the benchmarking analysis Gross Capex projections and incorporate the following assumptions:

- DLCA cost - Determined at 58% of existing housing services and 5% of new housing services gross Capex, based on the weighted average of the GDN DLCA assumptions for the base year 2006/07.
- EOW cost - Assessed at 6% of combined mains and services gross expenditure for all connections categories, which is the lowest level assumed by the majority of the GDNs.
- Final connection allowance (non-domestic) - nil
- Costs associated with time lag & unaccepted quotations - nil

Our recommended Net Capex projections are detailed in Section 4.4.6 - Recommendations.

4.4.4 SPECIFIC COST AREAS

4.4.4.1 Efficiency Improvements

NGG has made significant organisational changes during 2005/06 to deliver efficiency improvements in the management and execution of all connections processes and activities. NGG has not quantified precisely the level of improvement expected but we are

of the view that efficiency savings within the range 5% in 2007/08 reducing to 2% in 2012/13 are appropriate. This range has been smoothed in the analysis process to 3% year on year over the forecast period.

4.4.4.2 Waste Management Regulations

We asked the Network to identify additional costs within its forecast associated with the disposal of waste arising from excavations.

The Network explained that following recent changes in Regulations (July 2005) it expected more of its waste to be classified as “non-hazardous” rather than “inert” as at present. The standard Landfill Tax charge is currently £21/tonne for non-hazardous waste, with a lower rate of £2/tonne charged for inert waste. The Government has stated that the standard rate for non-hazardous waste will increase by at least £3 annually to a rate of £35 in 2010.

The shift from inert to non-hazardous status is primarily driven by the volume of bituminous materials to be disposed of, either directly, or where inert material has become contaminated with bituminous material making the whole of the contaminated waste non-hazardous and subject to the higher rate of tax.

The Network has included these higher tax costs within its forecast together with associated costs related to the improved segregation of materials and increases in tipping charges.

We acknowledge that the changes to the Regulations will generate additional costs but we judge that the Network is able to continue to mitigate these by improving the management and scope of the measures it already has in place (minimisation of excavation, re-use of materials, recycling and conditioning etc.) and introducing new procedures, such as materials testing to establish inert status, where there is a benefit.

The effect of the increased tax charge has been considered taking into account the assessment provided by NGG which indicated a relatively low cost associated with Capex operations. We have concluded that the resulting additional expenditure is minimal and, therefore, no adjustment has been made to our expenditure projections. However, we recognise that there is uncertainty regarding the cost implications of these Regulations and recommend that the GDN be required to model the costs, based on our workload projections, for further consideration.

4.4.5 REAL PRICE INCREASES

The recommended cost projections presented in Section 4.4.6 incorporate our real price inflation assumptions, as detailed in Section 2.7.

4.4.6 RECOMMENDATIONS

4.4.6.1 Workload

We recommend that the London BPQ workload forecasts for connections activities are accepted as detailed in Table 4-6 below.

BPQ Workload Volumes	2008/09	2009/10	2010/11	2011/12	2012/13
District Governors	0.0	0.0	0.0	0.0	0.0
Existing Housing Mains <=180mm	4.9	4.9	4.9	4.9	4.9
Existing Housing Mains>180mm	0.0	0.0	0.0	0.0	0.0
Existing Housing Services	4868	4866	4864	4862	4862
Feeder Mains <=180mm	0.0	0.0	0.0	0.0	0.0
Feeder Mains >180mm	0.0	0.0	0.0	0.0	0.0
New Housing Mains <=180mm	24.8	25.4	25.9	26.5	27.0
New Housing Mains >180mm	0.0	0.0	0.0	0.0	0.0
New Housing Services	6210	6345	6480	6615	6750
Non-Domestic Mains <=180mm	6.7	6.3	6.1	5.9	5.9
Non-Domestic Mains >180mm	0.0	0.0	0.0	0.0	0.0
Non-Domestic Services	743	699	677	656	656
Service Governors	0	0	0	0	0
Specific Reinforcement Mains <=180mm	0.0	0.0	0.0	0.0	0.0
Specific Reinforcement Mains >180mm	1.5	1.6	0.0	0.0	0.0

Table 4-6

4.4.6.2 Expenditure

Our recommended Net Capex projections are detailed in Tables 4-7, 4-8 and 4-9 below.

New Housing Net Capex All figures £m 2005/06 prices	2008/09	2009/10	2010/11	2011/12	2012/13	Total
BPQ Net Submission	1.2	1.1	1.1	0.9	0.9	5.3
Normalisation Adjustment	0.0	0.0	0.0	0.0	0.0	0.0
Normalised Net BPQ	1.2	1.1	1.1	0.9	0.9	5.3
Workload Adjustment	0.0	0.0	0.0	0.0	0.0	0.0
Efficiency Adjustment	-0.5	-0.4	-0.4	-0.2	-0.3	-1.8
Total Adjustments	-0.5	-0.4	-0.4	-0.2	-0.3	-1.8
Projected Net	0.7	0.7	0.7	0.7	0.7	3.5

Table 4-7

Existing Housing Net Capex All figures £m 2005/06 prices	2008/09	2009/10	2010/11	2011/12	2012/13	Total
BPQ Net Submission	4.5	4.6	4.9	5.1	5.2	24.1
Normalisation Adjustment	0.0	0.0	0.0	0.0	0.0	0.0
Normalised Net BPQ	4.5	4.6	4.9	5.1	5.2	24.1
Workload Adjustment	0.0	0.0	0.0	0.0	0.0	0.0
Efficiency Adjustment	-0.3	-0.5	-0.9	-1.2	-1.4	-4.2
Total Adjustments	-0.3	-0.5	-0.9	-1.2	-1.4	-4.2
Projected Net	4.2	4.1	4.0	3.9	3.8	19.9

Table 4-8

Non-Domestic Net Capex All figures £m 2005/06 prices	2008/09	2009/10	2010/11	2011/12	2012/13	Total
BPQ Net Submission	0.2	0.2	0.2	0.2	0.2	1.0
Normalisation Adjustment	0.0	0.0	0.0	0.0	0.0	0.0
Normalised Net BPQ	0.2	0.2	0.2	0.2	0.2	1.0
Workload Adjustment	0.0	0.0	0.0	0.0	0.0	0.0
Efficiency Adjustment	0.0	0.0	-0.1	-0.1	-0.1	-0.2
Total Adjustments	0.0	0.0	-0.1	-0.1	-0.1	-0.2
Projected Net	0.2	0.2	0.1	0.1	0.1	0.7

Table 4-9

5 MAINS AND GOVERNOR CAPEX

5.1 SUMMARY

Net Capex £m (2005/06 prices)	2008/09	2009/10	2010/11	2011/12	2012/13	Total
BPQ Submission						
Reinforcement Mains	1.6	1.5	1.5	3.2	3.3	**11.1**
District Governors	2.2	2.2	2.3	2.4	0.6	**9.7**
Service Governors	0.0	0.0	0.0	0.0	0.0	**0.0**
Total	**3.9**	**3.7**	**3.8**	**5.6**	**3.9**	**20.8**
Normalisation Adjustments						
Reinforcement Mains	0.0	0.0	0.0	0.0	0.0	**0.0**
District Governors	0.0	0.0	0.0	0.0	0.0	**0.0**
Service Governors	0.0	0.0	0.0	0.0	0.0	**0.0**
Total	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Normalised BPQ						
Reinforcement Mains	1.6	1.5	1.5	3.2	3.3	**11.1**
District Governors	2.2	2.2	2.3	2.4	0.6	**9.7**
Service Governors	0.0	0.0	0.0	0.0	0.0	**0.0**
Total	**3.9**	**3.7**	**3.8**	**5.6**	**3.9**	**20.8**
Adjustments						
Reinforcement Mains	-0.3	-0.2	-0.2	-0.7	-0.8	**-2.2**
District Governors	-1.6	-1.6	-1.7	-1.8	0.0	**-6.8**
Service Governors	0.0	0.0	0.0	0.0	0.0	**0.0**
Total	**-1.9**	**-1.8**	**-1.9**	**-2.4**	**-0.9**	**-9.0**
Proposed						
Reinforcement Mains	1.3	1.3	1.3	2.5	2.5	**8.9**
District Governors	0.6	0.6	0.6	0.6	0.6	**2.9**
Service Governors	0.0	0.0	0.0	0.0	0.0	**0.0**
Total	**1.9**	**1.9**	**1.9**	**3.1**	**3.0**	**11.8**

Table 5-1

5.2 POLICIES & PROCEDURES

NGG Policies and Procedures associated with reinforcement mains and governors activities have been reviewed as detailed in Appendix 1. The various levels of engineering and safety documents together with the governance arrangements have been reviewed and no issues found.

5.3 HISTORICAL PERFORMANCE

5.3.1 INTRODUCTION

Mains and Governor Capex includes all expenditure associated with reinforcement of the below 7bar distribution network to ensure that transportation capacity is adequate to meet the forecast peak demand. Network reinforcement is substantially driven by general demand growth and the objective of the activity is to ensure that the minimum pressure required at customers' meters is maintained throughout the network. The workload volume is generated from periodic network analysis supported by validation to ensure consistency between modelled and actual pressures.

Governor Capex also includes expenditure associated with governor replacement activities.

5.3.2 DEFINITION OF ACTIVITY

5.3.2.1 Reinforcement Mains

General reinforcement mains activity and expenditure is driven by the following:

- The requirement to ensure that the transportation capacity of the distribution network is adequate to meet the forecast 1:20 peak demand to a 5 year horizon without constraint.
- GDN policy regarding the maximum operating pressure (MOP) of the distribution network and the necessity to ensure that the minimum pressure requirement at customer's meters is maintained throughout the network.
- Up sizing of risk policy replacement mains to compensate for the effects of mains abandonment and replacement of transportation capacity.
- Non-contiguous reinforcement activity associated with customer connection requests.
- General demand growth.

5.3.2.2 Governors

Governor activity and expenditure is driven by the following:

- New district governor installations associated with distribution network reinforcement necessitated by general demand growth.
- Replacement of district governor installations to increase capacity due to demand growth.
- Replacement of district and service governor installations due to obsolescence.
- Failure of district and service governor installations, and the economics of repair versus replacement.
- Replacement of district and service governor installations to ensure compliance with risk mitigation policy requirements and design standards.

5.3.3 ESTABLISH UNDERLYING COSTS

5.3.3.1 Reinforcement mains

Figure 5-1 shows reinforcement mains gross expenditure levels for the period 2002/03 to 2006/07.

The high workload volumes and expenditure in 2002/03 and 2003/04 included three major projects (>£0.5m) and resulted from a Transco initiated validation programme in 1999/2000 to validate all low and medium pressure networks which led to higher levels of reinforcement expenditure.

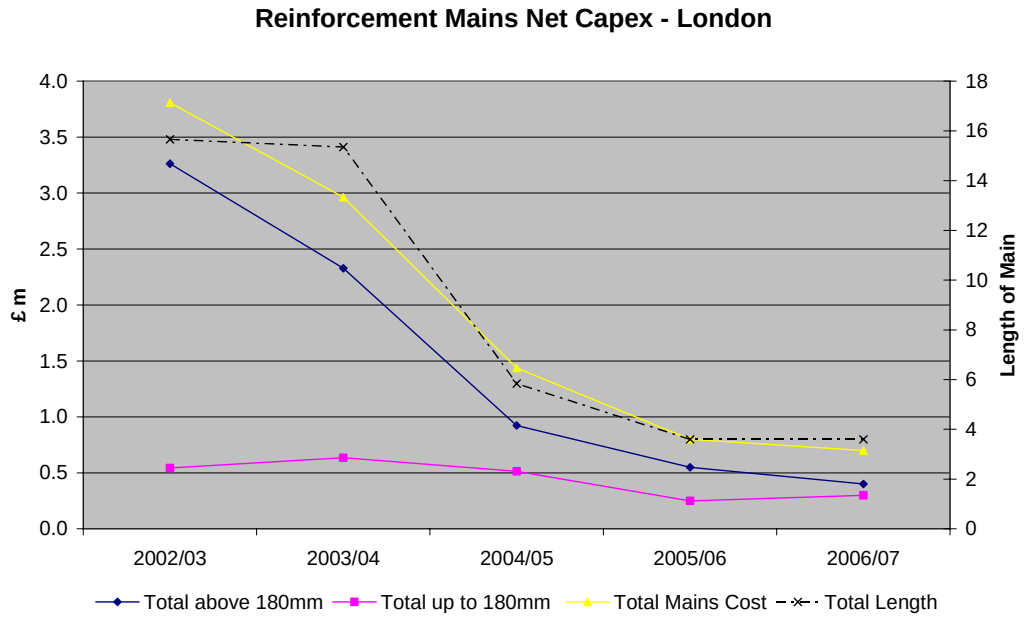

Figure 5-1

Governors - Renewal and Growth

Figure 5-2 shows renewal and growth governor gross expenditure levels for the period 2002/03 to 2006/07.

Expenditure increased in 2006/07 as a consequence of a high governor renewal workload volume compared to historic levels.

The variability of workload volumes and expenditure between years does not reveal any trend to inform our review of the forecasts.

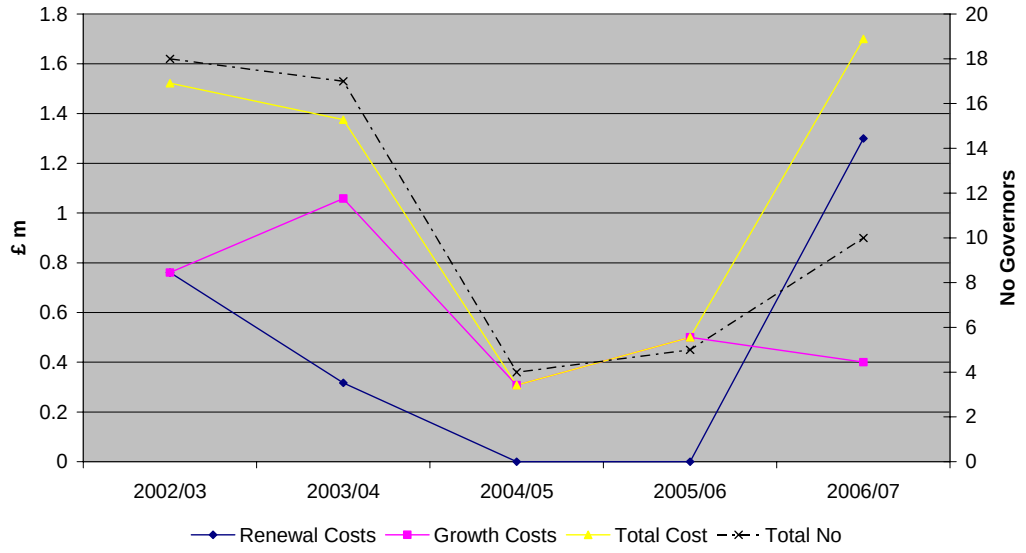

Figure 5-2

5.3.3.2 Governors - Service

Zero workload and expenditure has been reported for London.

5.3.4 PROPOSED EFFICIENT LEVEL OF COSTS

5.3.4.1 Analysis Process

We have developed expenditure projections for the efficient level of expenditure required by London to carry out its reinforcement and governors activities through benchmarking across GDNs, analysis of their workload assumptions, and review of their forecasts. The analysis process is described in detail in Section 2.

No normalisation adjustments have been identified for this activity.

No adjustments to workloads have been identified.

Reinforcement mains activities are separated into two main categories, below and above 180mm pipe size bands. Using 2005/06 as a base year, we have carried out regression analysis for the separate categories and also for total reinforcement mains. The analyses for the separate categories are adversely affected by outlying values and having examined the results we concluded that total reinforcement mains data provided the most robust regression and analysis for the projections. The analysis process is described in detail in Section 2.

NGG has not quantified a level of efficiency improvement for this activity. However, we are of the opinion that there is scope for improvements driven by optimised management of operations and alliance contractual arrangements. It is considered that 2% year on year performance improvement is appropriate for this activity, in addition to any progression to the benchmark performance level by underperforming GDNs.

In order to derive our projections for efficient expenditure we have assumed that where a GDN is underperforming the benchmark, the gap with the benchmark will be reduced over the forecast period to 30% by 2012/13. Where a GDN is outperforming the benchmark the projection will be reduced year on year to match the GDN's out performance in 2012/13.

The expenditure projections are adjusted to incorporate Regional Factors and our Standard Real Price Effect assumptions, as specified in Section 2.7.

5.3.4.2 Reinforcement Mains Benchmarking Analysis

A number of regression options have been explored, however, for most activities we have concluded that the most suitable regression is achieved by analysis of the logarithmic values of normalised costs and the chosen driver. A "basket of work" approach has been used to produce a weighted average of a number of different work elements (pipe sizes). The driver is calculated by multiplying the work volume by a nominal unit cost for the activity. The approach is not sensitive to the actual level of these nominal unit costs, but works on the relative costs between work types.

This approach allows the analysis to fully reflect the workload forecast by the GDNs, adjusted for the period 2008/09 to 2012/13 as deemed appropriate by our consultants.

The starting point for setting the target benchmark is an Ordinary Least Squares (OLS) regression on the eight data points, one for each GDN, applicable in the base year (2005/06). The regression line is shown in black on the graphs. The R^2 value indicates how well the variation in costs is explained by the variation in the workload driver.

The OLS regression calculation takes into account all the data points in determining the relationship between the costs and the workload driver. This relationship could be used to determine the frontier costs for each network, but these costs are unlikely to be efficient since generally only some networks will be operating at the efficiency frontier.

We therefore propose to obtain the benchmark cost relationship by adjusting the OLS regression line so that it reflects efficient network performance rather than average performance.

This relationship could be constructed by shifting down the regression line until all the data points are above the line except for one data point which is on the line. This is the Corrected Ordinary Least Squares (COLS) regression line.

However, we consider that there are differences between GDNs which may not be fully explained by the regression analysis and that it is reasonable to set the frontier relationship by shifting the regression line down to the upper quartile. This is the upper quartile COLS regression line and is shown in pink on the charts. This is the target which all under performing GDNs should move towards.

Where the regression uses log-linear analysis, the effect of rejecting the OLS regression line as the frontier relationship in favour of the upper quartile COLS regression line is to reduce the target costs of each network by the same percentage.

With this approach, 75% of networks will be performing at or below the frontier in the base year and these networks will be expected to continue to improve their performance over the period to 2012/13, and our proposed ongoing productivity improvements are set out in Section 5.4.4.1. The resulting target costs for 2012/13 are shown in yellow on the charts.

Figure 5-3 shows the output from benchmarking analysis of 2005/06 cost performance for total reinforcement mains and indicates a very good fit for this activity. The values of cost and synthetic drivers being less than one, lead to the logarithmic values being negative at these values.

London's performance ranks 8th best after allowing for regional factors.

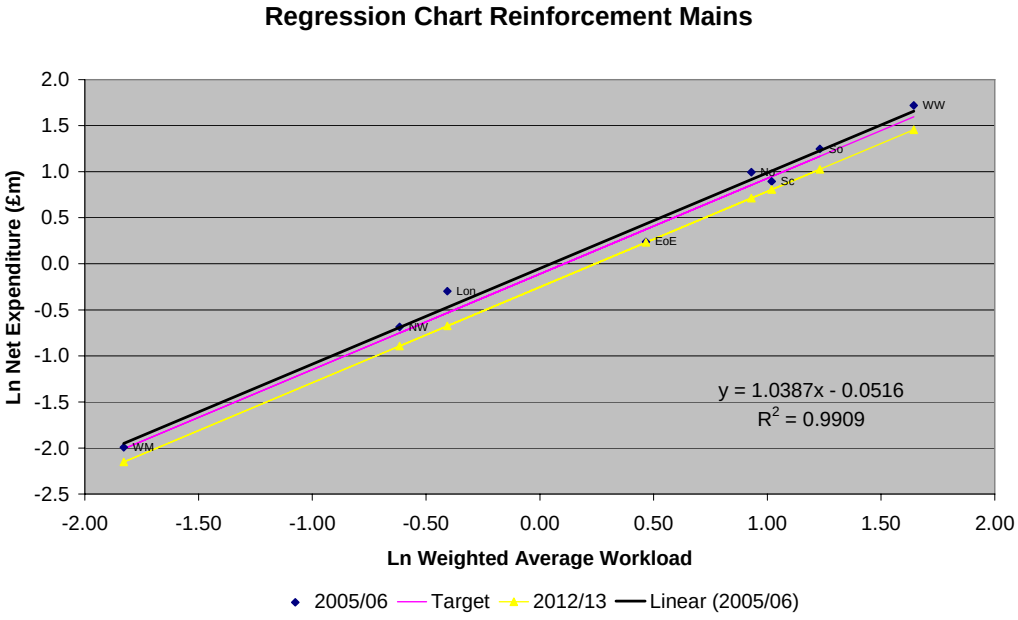

Figure 5-3

5.3.4.3 Governors Analysis

We have examined the BPQ information returned by the GDNs and wide variations in unit costs are evident across all activity categories. Unit cost performance for governor activity categories is significantly influenced by workload volumes, design pressure and capacity, complexity of site installation and cost allocation issues, e.g. costs associated with inlet/outlet mains connections, site security, telemetry, pressure optimisation equipment. We have asked for further information on cost allocations from the GDNs but the responses did not reveal any significant reasons for the unit cost variations.

Governor activities are separated into three main categories, i.e. renewal, growth and service. We have carried out regression analysis for the separate categories and also for total governors. Due to data inconsistencies, the results did not provide a robust basis for

our expenditure projections over the forecast period. Therefore, our analysis is based on review of BPQ workload and unit cost projections for the renewal, growth and service governor activity categories taking into account historical and forecast trends, and NGG's assumptions.

Recommended expenditure projections incorporate any adjustments made in the review process, Regional Factors and our Standard Real Price Effect assumptions.

We are of the opinion that governors operational activities do not provide the opportunity for significant improvements in efficiency. We have therefore applied no efficiency adjustments.

5.4 FORECAST

5.4.1 INTRODUCTION

5.4.1.1 Reinforcement Mains

London's forecasts for reinforcement mains incorporate the following activities:

- General reinforcement - Growth

  This activity is driven by the requirement to ensure that the transportation capacity of the distribution network is adequate to meet the forecast 1:20 peak demand to a 5 year horizon taking into account growth in demand.

- Replacement mains upsizing

  A proportion of the reinforcement workload results from upsizing of mains replacement to compensate for the loss of transportation capacity caused by inserting smaller mains. The accounting convention generally operated is such that if a replacement main is greater than 2" larger in diameter, the expenditure is allocated to reinforcement. The replacement mains upsizing workload is driven by the requirement to contain maximum operating pressures and ensure adequate transportation capacity in the distribution system to meet forecast demand.

- Network operating pressures

  NGG has stated that reinforcement will be delivered raising network operating pressures provided this is the most cost effective solution. Reinforcement projects examined include evidence that the option of increasing system pressure is considered and the most cost effective solution is adopted.

5.4.1.2 Governors

In assessing the Network's expenditure projections for governors we have reviewed the annual workload volumes and unit costs proposed, together with the forecasting processes applied. Also, we have investigated the background to the NGG policy associated with their district governors renewal programme and our conclusions are detailed in the following section of this report.

NGG District Governors renewal programme

NGG's expenditure forecasts for the period 2008/09 to 2012/13 include £21.74m to replace district governor installations that do not comply with current policy. The principal reason for replacement is mitigation of risk but the policy also addresses issues associated with obsolescence and minimisation of lifecycle costs.

The forecast expenditure and workload volumes for each GDN are as follows:

NW - £13.26m - 189 installations

WM - £1.91m - 13 installations

London - £6.57m - 32 installations

EoE - Nil

The affected installations generally comprise streams of single regulators with inlet pressures up to 7 bar that do not incorporate safety devices to protect the downstream distribution network from over or under - pressurisation in the event of equipment failure. Such installations were originally identified for replacement under the terms of a risk based policy implemented in 1984 following a number of failure incidents. At that time a prioritised programme of replacement work was established which was scheduled for completion in the year 2000. A policy review in 1994 extended the deadline to 2010 and further guidance was issued in 1996 which resulted in re-assessment of the necessity for replacement and removal of particular installation types from the programme.

NGG's expenditure forecasts are based on achieving compliance with the current version of their governor replacement policy (T/PL/R6 October 2004) which is supported by a management procedure (T/PM/GOV/1) that incorporates a decision support tool to determine priority for replacement based on risk. The associated programme of work commenced substantially in 2006/07 and continues to 2012/13.

Discussions with NGG revealed that the installations included in the forecasts for replacement should have been given high priority for replacement under the 1984 policy. The precise reasons why these installations were not replaced in the period 1984 to 1994 are not known but it can be argued that the associated expenditure should have been incurred at that time and, therefore, the expenditure projections for the period 2008/09 to 2012/13 should be reduced to take account of this issue. This does not imply that the current policy is inappropriate technically or the workload identified is not necessary. In our opinion the policy is entirely appropriate to ensure safe operation of district governors and security of supply within the distribution network.

For the reasons identified our recommendations incorporate a reduction in the replacement expenditure projections to zero. The replacement workload forecasts have not been adjusted since it is necessary to undertake the work.

Growth Governors

The growth governors unit cost for 2008/09 has been reduced £113k to align with the overall trend.

5.4.2 COMPANY PROPOSALS

5.4.2.1 Reinforcement mains

Key Assumptions

In addition to the generic assumptions for London, detailed in Section 2.7, NGG has stated that their reinforcement mains expenditure forecasts also take into account the following assumptions and issues:

- Approximately 40% of reinforcement will be delivered through pressure elevations provided this is the most cost effective solution.
- Demand forecasts indicate a 17% increase in annual gas demands by 2015/16, with forecast peak demand growing by 13% over the same period.
- Local networks are becoming more fully utilised as demand continues to grow. Reinforcement projects are typically affecting larger sections of the network and more pressure tiers resulting in an increased proportion of >180mm workload.
- Non-contiguous specific reinforcement generated by customer connections is included in the workload assessments. It is assumed that his workload will be fully funded as few projects fail the economic test.

Workload Forecasts

Figure 5-4 shows the reinforcement mains workload forecasts for London.

The lead time for planning for distribution system reinforcement projects is generally 2 to 3 years and is based on network validation exercises. Therefore the workload projections

for the period 2008/09 to 2012/13 are, substantially, estimates based on the key assumptions and historical levels.

London LP average system pressures are forecast to increase from 26.3 mbar in 2005/06 to 31.7 mbar in 2012/13. This increase is aligned with the forecast assumptions and will result in deferral of reinforcement mains expenditure. Sample reinforcement projects examined include evidence that the option of increasing system pressure is considered and the least cost solution is adopted.

London's reinforcement mains workload forecasts include approximately 2km per year associated with replacement mains upsizing.

The workload forecasts have been considered taking into account historical trend levels, NGG's assumptions and the impact of major projects. Workload volumes incorporate increased above 180mm activity which reflects the forecast assumptions.

We recommend that the workload forecasts are accepted.

Length of Reinforcement Mains - London

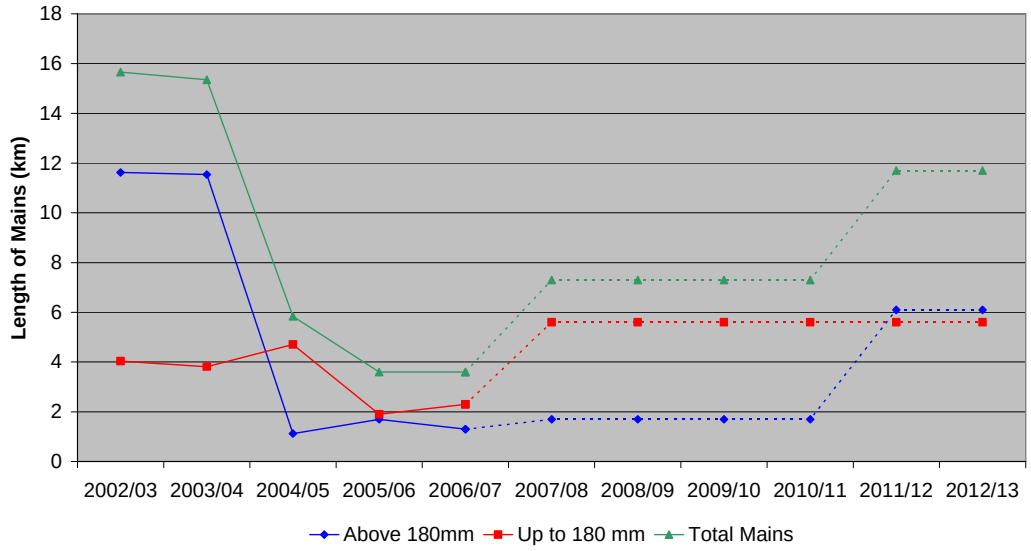

Figure 5-4

5.4.2.2 Governors

Key Assumptions

In addition to the generic assumptions for London, detailed in Section 2.7, NGG has stated that their governors expenditure forecasts also take into account the following assumptions and issues:

- Unit cost assumptions reflect operating experience from 2006/07 and take account of the increasing difficulty in obtaining agreement for above ground installations.
- Renewal workload volumes are driven by non-compliance with risk based policy requirements, asset condition, age profiles, fault analysis and component obsolescence.
- Growth workload volumes are generally driven by mains reinforcement workload forecasts. In line with the increased proportion of >180mm reinforcement mains, the design capacity for growth governors and the associated costs are forecast to increase.

Workload Forecasts

Figure 5-5 shows the governor workload forecasts for London.

Zero workload is forecast for the service governor activity categories.

The growth governors workload forecasts have been considered taking into account historical trends and NGG's assumptions.

We recommend that the growth workload forecasts are accepted.

A review of the renewal governors workload forecasts is included in Section 5.4.1.2. For the reasons identified we recommend that the renewal governors workload forecasts are accepted.

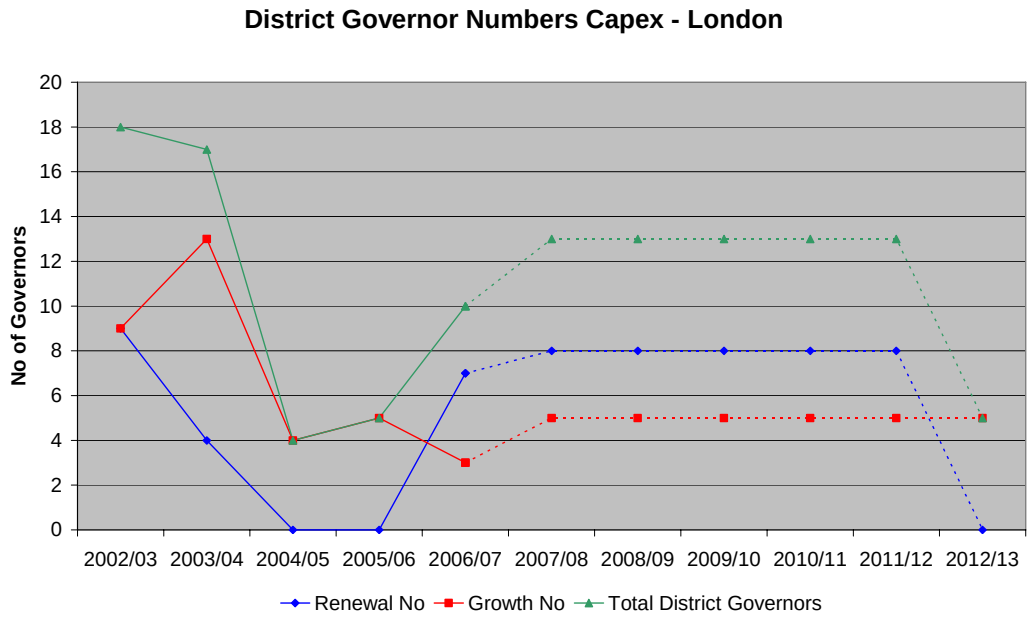

Figure 5-5

5.4.3 PB POWER PROPOSALS

5.4.3.1 Reinforcement mains

Figure 5-6 shows London's expenditure projections for the total reinforcement mains activity over the period 2005/06 to 2012/13.

The recommended expenditure projections reflect closing the gap with the target performance to 30% by 2012/13.

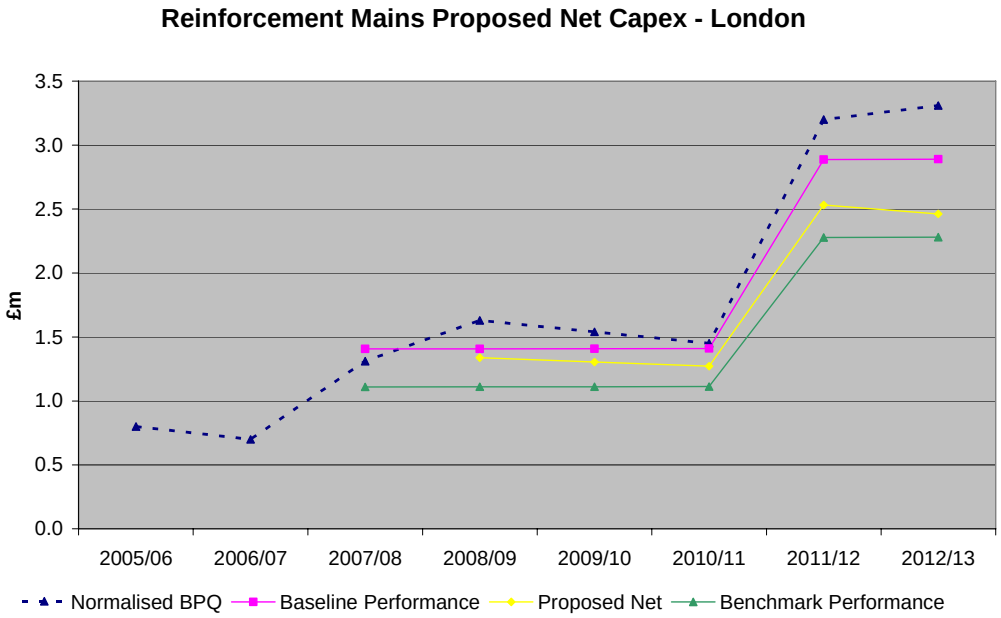

Figure 5-6

5.4.3.2 Governors

As stated in Section 5.3.4.3, governors cost projections for the forecast period have been assessed by review of BPQ workload and unit cost forecasts for the renewal, growth and service governor activity categories taking into account historical trends and NGG's assumptions. Recommended cost projections take into account any adjustments made.

No adjustments have been made to London's workload forecasts but expenditure projections have been adjusted in accordance with Section 5.4 .1.2. The expenditure projections for the renewal governors category are zero and the growth governors unit cost for 2008/09 has been reduced £113k.

Figure 5-7 shows the expenditure projections for governor activities over the period 2005/06 to 2012/13.

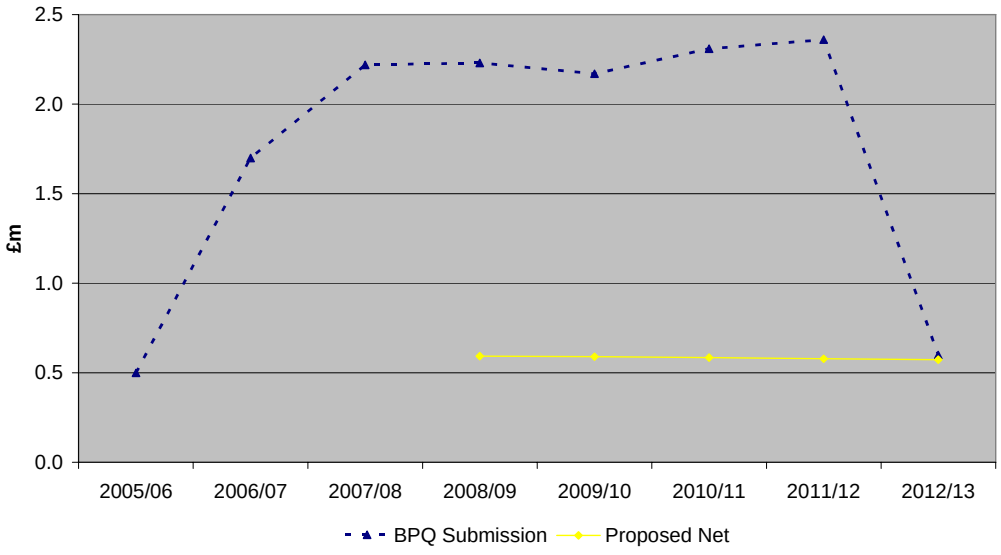

Figure 5-7

5.4.4 SPECIFIC COST AREAS

5.4.4.1 Efficiency Improvements

NGG has not quantified a level of efficiency improvement for reinforcement mains. However, we are of the opinion that there is scope for improvement driven by optimised management of operations and alliance contractual arrangements. It is considered that 2% year on year performance improvement is appropriate for this activity.

5.4.4.2 Governors - Renewal

No adjustments have been made to London's workload forecasts but expenditure projections have been adjusted in accordance with Section 5.4.1.2., i.e. the projections for the renewal category are zero.

5.4.4.3 Waste Management Regulations

We asked NGG to identify additional costs within its forecast associated with the disposal of waste arising from excavations.

NGG explained that following recent changes in Regulations (July 2005) it expected more of its waste to be classified as "non-hazardous" rather than "inert" as at present. The standard Landfill Tax charge is currently £21/tonne for non-hazardous waste, with a lower rate of £2/tonne charged for inert waste. The Government has stated that the standard rate for non-hazardous waste will increase by at least £3 annually to a rate of £35 in 2010.

The shift from inert to non-hazardous status is primarily driven by the volume of bituminous materials to be disposed of, either directly, or where inert material has become contaminated with bituminous material making the whole of the contaminated waste non-hazardous and subject to the higher rate of tax.

NGG has included these higher tax costs within its forecast together with associated costs related to the improved segregation of materials and increases in tipping charges.

We acknowledge that the changes to the Regulations will generate additional costs but we judge that the Network is able to continue to mitigate these by improving the management and scope of the measures it already has in place (minimisation of excavation, re-use of materials, recycling and conditioning etc.) and introducing new procedures, such as materials testing to establish inert status, where there is a benefit.

The effect of the increased tax charge has been considered taking into account the assessment provided by NGG which indicated a relatively low cost associated with Capex operations. We have concluded that the resulting additional expenditure is minimal and, therefore, no adjustment has been made to our expenditure projections. However, we recognise that there is uncertainty regarding the cost implications of these Regulations and recommend that NGG be required to model the costs, based on our workload projections, for further consideration.

5.4.5 REAL PRICE INCREASES

The recommended cost projections presented in Section 5.4.6 incorporate our real price effect assumptions, as detailed in Section 2.7.

5.4.6 RECOMMENDATIONS

5.4.6.1 Workload

We recommend that the London BPQ workload forecasts for reinforcement mains and governors activities are accepted, as summarised in Tables 5.2 and 5.3.

Reinforcement Mains Length (km)	2008/09	2009/10	2010/11	2011/12	2012/13
BPQ					
<180mm	5.6	5.6	5.6	5.6	5.6
>180mm	1.7	1.7	1.7	6.1	6.1
	7.3	7.3	7.3	11.7	11.7
Normalisation Adjustments					
<180mm	0.0	0.0	0.0	0.0	0.0
>180mm	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0
BPQ					
<180mm	5.6	5.6	5.6	5.6	5.6
>180mm	1.7	1.7	1.7	6.1	6.1
Total	7.3	7.3	7.3	11.7	11.7
Work Load Adjustments					
<180mm	0.0	0.0	0.0	0.0	0.0
>180mm	0.0	0.0	0.0	0.0	0.0
Total	0.0	0.0	0.0	0.0	0.0
Projected					
<180mm	5.6	5.6	5.6	5.6	5.6
>180mm	1.7	1.7	1.7	6.1	6.1
Total	7.3	7.3	7.3	11.7	11.7

Table 5-2

Number District Governors	2008/09	2009/10	2010/11	2011/12	2012/13
PBQ Workload					
Growth	5.0	5.0	5.0	5.0	5.0
Renewal	8.0	8.0	8.0	8.0	0.0
Total	13.0	13.0	13.0	13.0	5.0
Work Load Adjustments					
Growth	0.0	0.0	0.0	0.0	0.0
Renewal	0.0	0.0	0.0	0.0	0.0
Total	0.0	0.0	0.0	0.0	0.0
Projected Workload					
Growth	5.0	5.0	5.0	5.0	5.0
Renewal	8.0	8.0	8.0	8.0	0.0
Total	13.0	13.0	13.0	13.0	5.0

Table 5-3

5.4.6.2 Expenditure

Tables 5-4 and 5.5 summarise our net expenditure projections.

Reinforcement Mains Net Capex All figures £m 2005/06 prices	2008/09	2009/10	2010/11	2011/12	2012/13	Total
BPQ Net Submission	1.6	1.5	1.5	3.2	3.3	11.1
Normalisation Adjustment	0.0	0.0	0.0	0.0	0.0	0.0
Normalised Net BPQ	1.6	1.5	1.5	3.2	3.3	11.1
Total up to 180mm	0.8	0.8	0.8	0.8	0.9	4.0
Total above 180mm	0.9	0.8	0.6	2.4	2.5	7.1
Total Adjustments	-0.3	-0.2	-0.2	-0.7	-0.8	-2.2
Workload Adjustment	0.0	0.0	0.0	0.0	0.0	0.0
Efficiency Adjustment	-0.3	-0.2	-0.2	-0.7	-0.8	-2.2
Proposed Net	1.3	1.3	1.3	2.5	2.5	8.9
Total up to 180mm	0.8	0.8	0.8	0.8	0.8	4.0
Total above 180mm	0.5	0.5	0.5	1.7	1.7	5.0

Table 5-4

District Governor Net Capex All figures £m 2005/06 prices	2008/09	2009/10	2010/11	2011/12	2012/13	Total
BPQ Net Submission	2.2	2.2	2.3	2.4	0.6	9.7
Normalisation Adjustment	0.0	0.0	0.0	0.0	0.0	0.0
Normalised Net BPQ	2.2	2.2	2.3	2.4	0.6	9.7
Growth	0.7	0.6	0.6	0.6	0.6	3.1
Renewal	1.5	1.6	1.7	1.8	0.0	6.6
Total Adjustments	-1.6	-1.6	-1.7	-1.8	0.0	-6.8
Workload Adjustment	0.0	0.0	0.0	0.0	0.0	0.0
Efficiency Adjustment	-0.1	0.0	-0.1	-0.1	0.0	-0.3
Disallowed Costs	-1.5	-1.5	-1.7	-1.7	0.0	-6.4
Proposed Net	0.6	0.6	0.6	0.6	0.6	2.9
Growth	0.6	0.6	0.6	0.6	0.6	2.9
Renewal	0.0	0.0	0.0	0.0	0.0	0.0

Table 5-5

6 OTHER OPERATIONAL CAPEX

6.1 SUMMARY

Net Capex £m (2005/06 prices)	2008/09	2009/10	2010/11	2011/12	2012/13	Total
BPQ Submission						
Plant & Equipment	1.3	1.1	1.4	1.2	1.3	**6.3**
Land & Buildings	0.3	0.4	0.3	0.3	0.3	**1.6**
Total	**1.6**	**1.5**	**1.7**	**1.5**	**1.6**	**7.9**
Normalisation Adjustments						
Total	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Normalised BPQ						
Plant & Equipment	1.3	1.1	1.4	1.2	1.3	**6.3**
Land & Buildings	0.3	0.4	0.3	0.3	0.3	**1.6**
Total	**1.6**	**1.5**	**1.7**	**1.5**	**1.6**	**7.9**
Adjustments						
Plant & Equipment	0.0	0.0	-0.1	-0.1	-0.1	**-0.3**
Land & Buildings	0.0	0.0	0.0	0.0	0.0	**-0.1**
Total	**0.0**	**-0.1**	**-0.1**	**-0.1**	**-0.1**	**-0.4**
Proposed						
Plant & Equipment	1.3	1.1	1.3	1.1	1.2	**6.0**
Land & Buildings	0.3	0.4	0.3	0.3	0.3	**1.5**
Total	**1.6**	**1.4**	**1.6**	**1.4**	**1.5**	**7.5**

Table 6-1

6.2 POLICIES & PROCEDURES

6.2.1 INTRODUCTION

6.2.1.1 Land and Buildings

There are no indicated specific policies or procedures relating to this area. However, the procurement or disposal of such assets is covered by NGG's comprehensive financial procedures. NGG holds the freeholds for its operational sites which are not covered by easements or wayleaves. The Network's other sites such as offices, depots, and stores are predominantly leased and there is no stated intention to move away from this position.

6.2.1.2 Plant and Equipment

NGG states that "There is no bespoke procurement strategy or process specific to plant and equipment. Purchases follow NGG's standard procedures for [such] equipment which is, in short, generally via competitive tender following approval of specific management schemes under the normal investment governance process."

6.2.2 EFFICIENCY AND PRODUCTIVITY

6.2.2.1 Land and Buildings

Procurement of operational sites will normally be included in the appropriate Capex project authorisation process. Rates paid for such sites may often have a 'ransom' element which is unavoidable except by following a compulsory purchase order which takes too long and would add other delay costs to the projects. The optimum project solution would only be changed if this element becomes material.

Procurement of other sites is normally on an open market basis and therefore optimum solutions can usually be attained.

6.2.2.2 Plant and Equipment

The efficiency with which plant and equipment is procured is commensurate with NGG's overall procurement policies and procedures.

Investment in new plant and equipment has a direct bearing on the productivity and efficiency of the work areas for which it is provided. Therefore a reasonable and sustained level of investment is to be expected to support sustained productivity and improvements in these activities.

6.3 HISTORICAL PERFORMANCE

6.3.1 DEFINITION OF ACTIVITY

6.3.1.1 Land and Buildings

This activity covers the procurement of freeholds for non-operational sites and capitalized upgrades to leased premises which are not funded by the landlord (e.g. adding air conditioning, building a security fence etc.).

NGG's expenditure on contaminated land has been restricted to statutory compliance. Non statutory site remediation is only undertaken as part of a site disposal and the costs are borne by the proceeds of sale. Because of a pre-existing financial provision, there is no Opex charge other than for the unwinding of the provision, and there are no net Capex costs.

6.3.1.2 Plant and Equipment

This activity includes the procurement of aggregate recycling equipment, pressure management and gas conditioning equipment, valve remediation work and kiosk refurbishment.

6.3.2 ESTABLISH UNDERLYING COSTS

6.3.2.1 Land and Buildings

Net Capex £m All figures in 2005/06 Prices	2002/03	2003/04	2004/05	2005/06	2006/07
Land & Buildings	0.2	0.0	0.3	2.5	0.9

Table 6-2

These costs represent one-off periodic expenditure only, indicating that there is no historical trend on which to base future projections.

6.3.2.2 Plant and Equipment

Net Capex £m All figures in 2005/06 Prices	2002/03	2003/04	2004/05	2005/06	2006/07
Plant & Equipment	1.3	0.6	0.1	0.0	0.4

Table 6-3

This demonstrates a fluctuating spend up to the time of the GDN sale with some 'caution' in discretionary spend around the time of the GDN sales.

6.4 FORECAST

6.4.1 COMPANY PROPOSALS

6.4.1.1 Land and Buildings

London Network proposes to spend £1.6m over the five year period which is marginally higher than the upper quartile.

Net Capex £m All figures in 2005/06 Prices	2008/09	2009/10	2010/11	2011/12	2012/13	Total
Land & Buildings	0.3	0.4	0.3	0.3	0.3	1.6

Table 6-4

Land & Building Net Capex

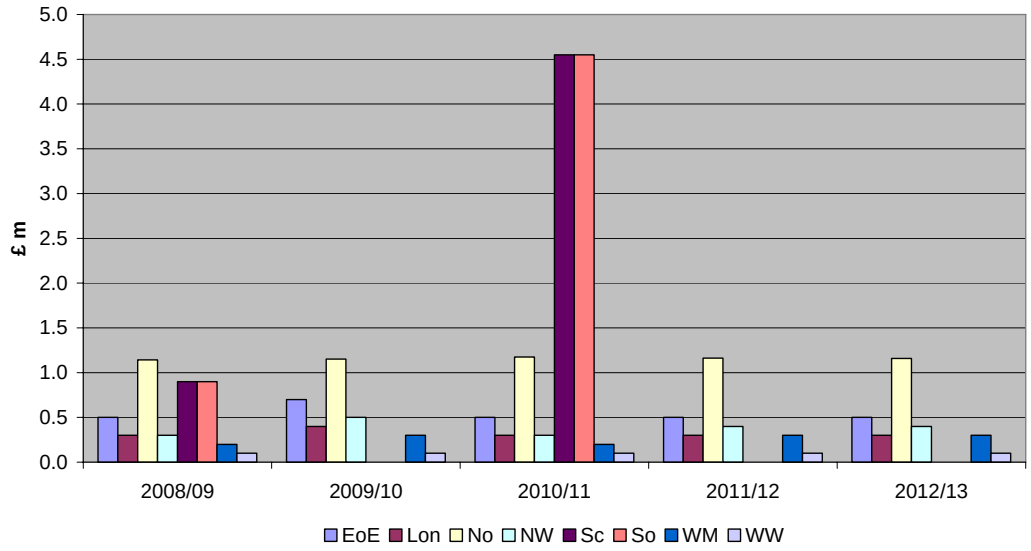

Figure 6-1

6.4.1.2 Plant and Equipment

The Network is proposing to spend £6.3m over the five year period. This expenditure is listed against specific subcategories.

Net Capex £m All figures in 2005/06 Prices	2008/09	2009/10	2010/11	2011/12	2012/13	Total
Plant & Equipment	1.3	1.1	1.4	1.2	1.3	6.3

Table 6-5

Plant & Equipment Net Capex

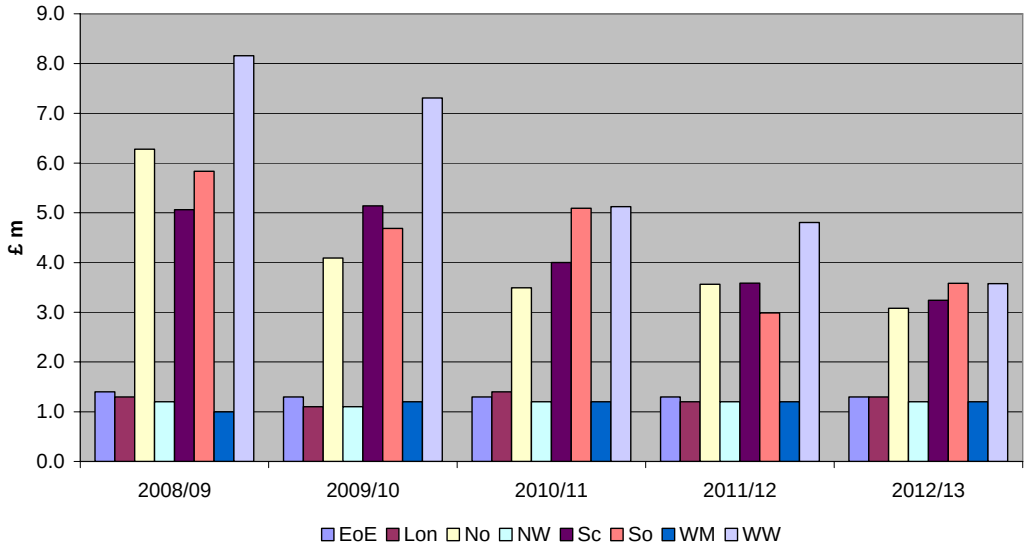

Figure 6-2

6.4.2 SPECIFIC COST AREAS

6.4.2.1 Land and Buildings

There is nothing exceptional about the expenditure proposals.

6.4.2.2 Plant and Equipment

There is nothing exceptional about the expenditure proposals.

6.4.3 RECOMMENDATIONS

6.4.3.1 Land and Buildings

In considering the appropriate level to set the target maximum level of expenditure, we have discounted the GDN with the lowest proposed spend over the period as this in our view is not sustainable for the other GDNs.

We have therefore in this case taken the upper quartile performance of the remaining 7 GDNs and this gives a target maximum spend over the period of £1.5m.

London Network, after the adjustments for real price effects, is within the target figure for the period and therefore it is proposed that this expenditure is allowed in full.

6.4.3.2 Plant and Equipment

The Plant and Equipment section comprises of a wide set of activities and not all GDNs have requested monies against all activities. However, the requested expenditure for this

network is listed against named sub categories and reasons given for the work, which is deemed necessary.

Accordingly, for London it is proposed that after adjustment for real price effects, the expenditure is allowed in full.

7 NON-OPERATIONAL CAPEX

7.1 SUMMARY

GDN Capital Expenditure £m (2005/06 prices)	2008/09	2009/10	2010/11	2011/12	2012/13	5 Yr Total
System Operations	0.2	0.1	1.1	1.4	0.0	2.8
IS Infrastructure	1.8	1.5	1.1	1.7	2.2	8.3
IS Systems	2.1	2.1	3.0	3.8	3.4	14.4
xoserve Capex	1.7	0.1	1.8	1.4	0.1	5.1
Vehicles	0.3	0.7	1.4	4.2	2.9	9.5
Telecoms, Office	0.0	0.0	0.0	0.0	0.0	0.0
Security	1.5	1.3	0.5	0.6	0.6	4.5
Furniture and fittings	0.0	0.0	0.0	0.0	0.0	0.0
Tools & Equipment	0.9	0.9	0.9	0.9	0.9	4.5
Other	3.9	0.6	0.9	1.8	2.7	9.9
Total	12.4	7.3	10.7	15.8	12.8	59.0
Normalisation Adjustments						
Capitalised Interest Charges	-3.4	-0.1	-0.3	-1.3	-2.1	-7.2
Net Total	-3.4	-0.1	-0.3	-1.3	-2.1	-7.2
Efficiency Adjustments						
System Operations	0.2	0.0	-0.1	-0.1	0.0	-0.1
Net Total	0.2	0.0	-0.1	-0.1	0.0	-0.1
Proposed Net Capex						
System Operations	0.4	0.1	1.0	1.3	0.0	2.7
IS Infrastructure	1.8	1.5	1.1	1.7	2.2	8.3
IS Systems	2.1	2.1	3.0	3.8	3.4	14.4
xoserve Capex	1.7	0.1	1.8	1.4	0.1	5.1
Vehicles	0.3	0.7	1.4	4.2	2.9	9.5
Telecoms, Office	0.0	0.0	0.0	0.0	0.0	0.0
Security	1.5	1.3	0.5	0.6	0.6	4.5
Furniture and fittings	0.0	0.0	0.0	0.0	0.0	0.0
Tools & Equipment	0.9	0.9	0.9	0.9	0.9	4.5
Other	0.5	0.5	0.6	0.5	0.6	2.7
Total	9.2	7.2	10.3	14.4	10.7	51.7

Table 7-1

Non-Operational Capex includes various activities set out below:-

- System Operations
- IS Costs, which includes IS Systems and IS Infrastructure Costs
- xoserve
- Vehicles costs
- Other, which comprises the remaining Non-Operational Capex items (Telecoms & Office, Security, Furniture and fittings, Tools & Equipment and Other)

London's total Non-Operational Capex Spend is fifth highest compared with the other GDNs as shown below in Figure 7-1.

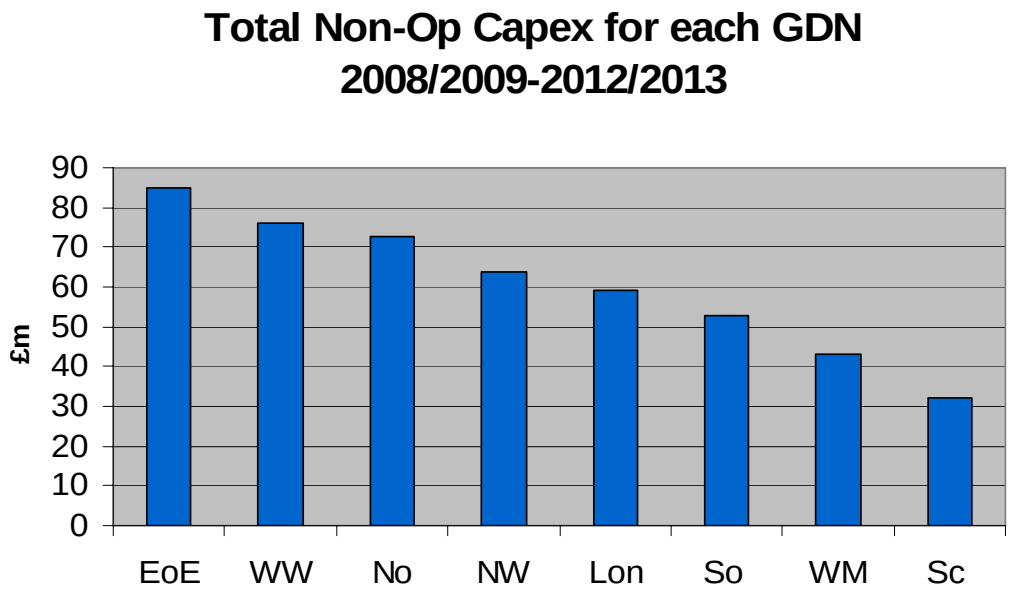

Figure 7-1

7.2 BACKGROUND

7.2.1 INTRODUCTION

This section reviews the relevant background to the operations covered under Non-Operational Capex.

7.2.1.1 System Operation

The DNCS programme.

The Gas Transportation Management System (GTMS) is the Supervisory Control & Data Acquisition (SCADA) System effecting operational control over all UK Distribution Networks. All GDNs are currently operated, by National Grid Gas (NGG) at Hinckley, under the System Operation Managed Service Agreement (SOMSA).

GTMS is old technology and has been enhanced by NGG since its inception in the mid 1980s; it has been in its current form since 1996. NGG completed an assessment of the system establishing its longevity at no later than 2009; the major issues are spares and an unsupported operating System.

With this in mind NGG embarked upon a course of action to replace the system and to keep it effective until the decommissioning date; respectively known as the Distribution National Control System (DNCS) and Prolonged Active Life (PAL) projects. The decision to replace GTMS was taken in autumn 2005 with support from all GDNs to collaboratively undertake the job. The GDN's supported the reasoning that this was the most appropriate technical option for the industry, cost effective and would allow a phased exit from SOMSA, once delivered to NGG, within a timeframe to suit all 4 GDNs. Specification work was undertaken and a contract awarded to a consortium led by Serck controls.

NGG has entered into a formal collaboration agreement with NGN, SGN and WWU to jointly replace the existing GTMS control system with this new Serck control system and for it to be deployed into NGG's Control Centre at Hinckley. The new control system is being designed to have the same operating functionality as the GTMS, although its architecture will be developed such that its operating structure is aligned to individual

GDNs to facilitate transfer and so ease SOMSA exit. It is planned to complete GTMS replacement and deploy the new system into NGG in summer 2008. This constitutes Phase 1 of the project. The costs for Phase 1 have been agreed with Serck and a sharing arrangement for these costs has been agreed between the GDNs.

Phase 2 of the project is the implementation (essentially, a replication) of the system into the GDNs to enable them to exit SOMSA and take over operational control for themselves. Each GDN is responsible for its own costs in delivering the systems into its own business and is contracting separately with Serck for this part of the project.

London carry out system operation services internally. However, the same rules applied under the contractual arrangement with the participating independent networks are rigidly applied by NGG to London and other retained GDNs. The Contract itself comprises of 14 sections of general terms and 3 Schedules. These are for the following items

(1) Operational Services,

(2) Control System and Telemetry and

(3) SOMSA Exit arrangements.

The SOMSA contract for operational arrangements with NGN, SGN and WWU expires on 31 March 2008 with an extension for any GDN needing regulatory agreement. London will continue to manage its own system operation from NGG DNCC at Hinckley and so should not incur any SOMSA exit costs.

Through the collaboration agreement NGG, NGN, SGN and WWU are working to identify and understand the exact extent of the activities that would have to be completed by NGG and its partners to allow transfer of operations. NGG DNCC staff currently operating London will be part of this activity.

PB Power believes that the collaborative project to replace the GTMS is the most efficient solution for the industry. There are several reasons for this

1. The collaborative project reduces the time in which a system can be constructed; 4 individual systems for 3 exiting GDNs would call on the same NGG control and IS staff for assistance resulting in a pinch point in any program. These staff would also be working on the NGG variant of the System.
2. The sorting of the System into the correct components for exit whilst constructing a new system is viewed as cost effective. Serck only need to construct one system & slice it appropriately instead of up to potentially 4 contractors constructing 4 different Systems. The GDN's then benefit from an initially aligned system capable of future individual development.
3. Collaboration allows for a phased agreed exit from SOMSA.

7.2.1.2 IS Capex

IS Costs include IS Systems and IS Infrastructure (essentially software and hardware respectively). PB Power has reviewed the IS Capex expenditure with a view to confirming that the planned projects are appropriate and categorising which projects might be expected to yield productivity (Opex) savings over the longer term. Further work is being carried out on whether levels of expenditure are appropriate for IS projects. As a result no adjustments have currently been made in this report.

7.2.1.3 xoserve

xoserve is a separate business which started trading on 1 May 2005 as a wholly owned subsidiary of National Grid Group. On 1 June 2005 it became multi-owned by the GDNs and National Grid UK Transmission. The shareholding is split amongst National Grid NTS (11%) and all the GDNs in proportion to the number of supply points in March 2005.

xoserve provides transactional services primarily through UK LINK, as well as IS Support and Change Management to the GDNs under an Agency Services Agreement (ASA).

xoserve is planning a series of significant capital development projects in the next period, including a rewrite of UK-LINK.

PB Power understands that xoserve is now proposing to recover the cost of capital expenditure from the GDNs in the year in which it is incurred. To date the GDNs have treated xoserve charges as Opex – although some (NG and WWU) have submitted elements of Capex in their forecast costs. PB Power are therefore reviewing and, where necessary, adjusting the Opex/Capex split for each DN.

London has submitted a significant level of xoserve Capex, with minimal Opex.

xoserve cost forecasts and the scope of development work they will undertake in the next period are the subject of an ongoing industry discussion workgroup.

xoserve is jointly owned by the GDNs, although National Grid is not able to exercise voting power proportionate to its total shareholding. The work programme is determined through industry consultation and in response to customer requirements.

xoserve states in its BPQ submission that it plans to deliver 3% annual savings on direct operating costs (salaries, pensions, agency staff costs, travel and subsistence) offset by real earnings growth of 2% for directly employed staff.

xoserve procures significant levels of bought-in services, including IS Support services, from National Grid. As a result many of its costs have been subject to competitive purchase through National Grid's procurement processes.

However, xoserve makes regular full value-for-money reviews of all of its bought-in services to ensure that its provision continues to be cost effective and efficient in the market place. In general, xoserve benefits significantly from National Grids purchasing power.

7.2.1.4 Vehicles

With regard to Vehicles, London owns their commercial vehicles, which have historically been acquired on finance leases with the capital cost charged to Capex and the associated interest charges captured within the interest line on the profit and loss account (with interest payable in table A1). Consequently there are no Opex costs other than day-to-day running costs (fuel maintenance and licensing).

London has a fleet which averages at 514 vehicles over the five year period.

London's replacement policy is as follows:

- Light Commercial Vehicles replaced on 5 year cycle
- HGV's: 7 years

London state that they continually review their requirements and compare numbers of employees against numbers of vehicles to compare patches across NGG's networks and highlight areas where there may be scope to reduce fleet size. Additionally the VESAS tracking system is used as a tool to highlight any vehicles that are not in regular use and could be potentially utilised elsewhere in the business.

When a vehicle is no longer required, a number of options are considered:-

- Relocation, both nationally and locally to:
    - Release hired vehicles
    - Defer new vehicles purchase
    - Release an older and more costly vehicle
- Provision of vehicles to contractors to reduce contract charges

- Resale or release of vehicle against current contracts

During the period, NGG intends to continue to own all its vehicles, and new vehicles will be purchased outright, rather than under a finance leasing arrangement. There will therefore continue to be no Opex costs, other than day to day running.

NGG's vehicle fleet is sized to meet the requirements of the field force:-

- A single man working for first call emergencies.
- Two man repair & replace teams, with some allowance for mixed direct labour and contractor(GD1) teams, and specialist support vehicles.
- A mix of single man and team vehicles as appropriate within maintenance

7.2.1.5 Other

Capitalised interest charges relate to financing costs of LTS projects, as NG has confirmed in SQ 217. We have been advised by Ofgem that since the PCR allows for financing costs through the cost of capital, these costs should not be included. We have therefore removed this line of costs as a normalization adjustment. This is explained further in 7.3.4.5

Other costs in the Non-Operational Capex category include Telecoms & Office, Security, Furniture and fittings, Tools & Equipment and Other. PB Power has made inter-GDN comparisons of these costs.

London is forecasting the highest GDN spend (£4.5m) on security and has £9.9m forecast as 'Other' Capex costs. For all NGG's GDNs, the latter comprises

- Accounting adjustments
- Other centrally allocated charges
- Other non-operational Capex
- P&L Recharges
- NDC Recharges
- Capitalised Interest

7.3 HISTORICAL PERFORMANCE

7.3.1 INTRODUCTION

The following table shows London's performance in Non-Operational Capex in the previous period (NB: 5 years to end 2006/07), and compares the total historic expenditure with the total forecast costs in the BPQ submission for the next review period (NB: 5 years), as a high level indication of the general trends in each cost item. The forecast for 2007/08 is shown for completeness but is not included in the totals.

GDN Reported Net Capex	2002/03	2003/04	2004/05	2005/06	2006/07	Total	2007/08	Next Period Total	Change
System Operations	0.8	1.0	0.8	0.3	0.4	3.2	0.6	2.8	-0.4
IS Infrastructure	0.8	1.1	0.9	1.1	1.7	5.5	1.5	8.3	2.8
IS Systems	1.0	1.9	1.6	2.3	3.3	10.1	5.2	14.4	4.3
xoserve Capex	0.0	0.0	0.0	0.0	0.1	0.1	0.6	5.1	5.0
Vehicles	1.4	0.0	1.3	1.6	3.1	7.4	2.6	9.5	2.1
Telecoms, Office	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Security	0.0	0.0	0.0	0.0	0.3	0.3	0.8	4.5	4.2
Furniture and fittings	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tools & Equipment	0.0	0.0	0.0	0.5	0.5	1.0	0.6	4.5	3.5
Other	0.8	-0.1	0.0	0.2	-0.2	0.7	2.8	9.9	9.2
Total	4.7	3.8	4.7	6.0	9.2	28.4	14.7	59.0	30.6

Table 7-2

7.3.1.1 System Operation

GDN network control is still carried out by NGG on behalf of the networks, as part of the SOMSA agreements. It is therefore not meaningful to compare historic performance of the GDNs in relation to System Operation costs with the forthcoming formula period.

7.3.1.2 IS Capex

There is an increase of £7.03m in total IS Capex (Systems and Infrastructure) overall for the next period, due to the projects which are planned. There is also significant IS expenditure planned for 2007/08.

7.3.1.3 xoserve

xoserve has only existed as a standalone business since 2005. The annual levels of forecast Capex for xoserve are higher than those in the historic period, reflecting the forthcoming development programme which is anticipated for xoserve.

7.3.1.4 Vehicles

The forecast costs for vehicles Capex are broadly in line with those for the historic period, and London anticipate significant expenditure in 2007/08 reflecting the point in the replacement cycle. Taking the historic costs and the 2007/08 costs together, these total a slightly higher figure than the forecast for the next period, probably reflecting a degree of anticipated efficiency in replacement costs resulting from the intended strategy of buying vehicles outright, rather under lease arrangements.

7.3.1.5 Other

London appear to be facing increasing costs for tools and equipment and for security in the next period. The negative figures in the historical period reflect the net position after accounting adjustments.

7.4 FORECAST

7.4.1 INTRODUCTION

The following table shows the forecast position for London, as submitted in their BPQ:-

GDN Capital Expenditure £m (2005/06 prices)	2008/09	2009/10	2010/11	2011/12	2012/13	5 Yr Total
System Operations	0.2	0.1	1.1	1.4	0.0	2.8
IS Infrastructure	1.8	1.5	1.1	1.7	2.2	8.3
IS Systems	2.1	2.1	3.0	3.8	3.4	14.4
xoserve Capex	1.7	0.1	1.8	1.4	0.1	5.1
Vehicles	0.3	0.7	1.4	4.2	2.9	9.5
Telecoms, Office	0.0	0.0	0.0	0.0	0.0	0.0
Security	1.5	1.3	0.5	0.6	0.6	4.5
Furniture and fittings	0.0	0.0	0.0	0.0	0.0	0.0
Tools & Equipment	0.9	0.9	0.9	0.9	0.9	4.5
Other	3.9	0.6	0.9	1.8	2.7	9.9
Total	12.4	7.3	10.7	15.8	12.8	59.0

Table 7-3

7.4.2 COMPANY PROPOSALS

7.4.2.1 System Operation

NGG's GDNs are forecasting that from 2009/2010 operational gas control duties, for NGG only, will be undertaken from Hinckley, ensuring that NGG will have complete autonomy over its' business boundaries and that NGG can make any changes to Control Centre activities without impacting any contractual arrangements with the other GDNs. This is viewed as sensible and prudent operational practice.

NGG are managing the collaborative project centrally and charging the other GDNs for NGG provided services including the management activity. NGG has supplied figures for the breakdown of the charging mechanism to include both its internal IS & management costs with a view to full allowance.

7.4.2.2 IS Capex

PB Power has reviewed the IS Costs submitted by the GDNs with a view to confirming that the planned projects are appropriate and categorising which projects might be expected to yield productivity (Opex) savings over the longer term. This is examined in 7.4.3.2 below.

7.4.2.3 xoserve

The following table shows how London has submitted its total xoserve costs, split between Opex and Capex, alongside the equivalent figures which xoserve has submitted for its anticipated turnover from London.

London (£m 2005/06 prices)	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	Total shown	5year total
Opex	2.71	3.23	2.92	2.90	2.88	2.88	2.87	2.86	2.84	26.08	14.38
Capex	0.00	0.10	0.60	1.70	0.10	1.80	1.40	0.10	1.10	6.90	5.10
Total	2.71	3.33	3.52	4.60	2.98	4.68	4.27	2.96	3.94	32.98	19.48
xoserve turnover	2.64	3.34	3.49	4.58	3.02	4.65	4.25	3.00	3.93	32.90	19.50
Difference	-0.08	0.02	-0.03	-0.02	0.04	-0.02	-0.02	0.04	-0.01	-0.08	0.02

Table 7-4

For all GDNs, the amount they anticipate being charged is the same (within rounding errors) as the turnover xoserve expects to receive.

7.4.2.4 Vehicles

During the next period, NGG state they intend to replace c.2,300 vehicles at a cost of £41.8m for all the NGG GDNs. London's share of this cost is submitted as £9.5m.

7.4.2.5 Other

London has submitted higher costs for security and for tools and equipment for the forthcoming period. These are examined further in 7.4.3.5 below.

7.4.3 SPECIFIC COST AREAS

7.4.3.1 System Operation

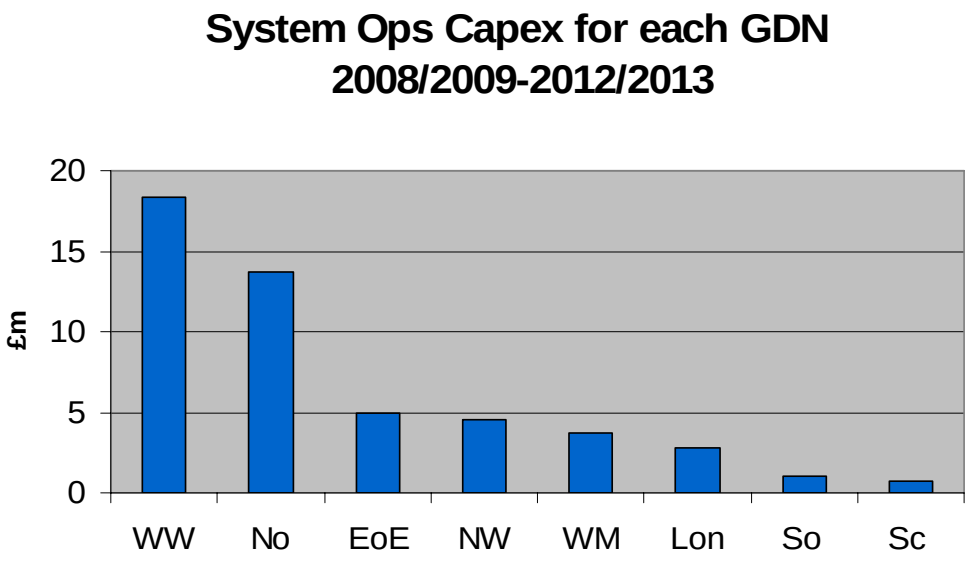

Figure 7-2

London's proposed spend on System Operations Capex appears reasonable in comparison with the other GDNs, as illustrated above.

However, it was clear at the point of network sales that costs associated with SOMSA exit would not be allowed, and Ofgem set out the following principles in its consultation document[4] regarding the allowable costs for GTMS replacement:-

- Ofgem must be satisfied that GTMS is obsolete before any replacement costs are allowed.
- Only efficient costs of GTMS replacement would be allowed. Any additional costs intended to facilitate SOMSA exit would not be allowed, nor any costs associated with bringing forward the replacement to facilitate SOMSA exit.

We are satisfied that the GTMS is effectively obsolete, as from 2009 spares will no longer be readily available and the operating system will no longer be supported by the suppliers.

We believe that the collaborative programme of replacement is the most efficient solution, and therefore that the agreed allocation of the costs of Phase 1 (implementation of DNCS into NGG) constitute allowable costs, according to Ofgem's principles above. In addition, we are aware that NGG propose to charge the GDNs an additional amount to cover

[4] Third Consultation, section 3.28, p23

NGG's costs in managing the replacement programme. We therefore believe the iGDNs should also be allowed an amount to cover this additional cost.

The cost allocation agreed through the collaborative project are shown below, along with a 50% uplift for the non-NGG GDNs which we estimate should reflect what they are likely to be charged by NGG for programme management:-

Phase 1 Costs - Established Position Cost Sharing £m agreed between the Parties	NGG	NGN	WWU	SGN	Total
Without Uplift	9.70	1.17	1.06	2.11	14.04
After Uplift	9.70	1.80	1.59	3.16	16.25
Date of SOMSA exit	-	Apr-09	Sep-09	Sep-08	

Table 7-5

NGG Phase 1 GTMS replacement costs of £9.7m have been allocated to each of NGG's GDNs and London's share is 18%. We have examined the BPQ submission, and note that declared GTMS expenditure is phased from 2006/07 to 2008/09, so we have phased the allowable costs correspondingly across that period.

In addition, NGG has included System Operation Capex for:-

- A DNCS (SCADA systems) Upgrade, to be carried out post-SOMSA exit, and principally to address the requirements of exit reform. The estimate of these costs would be expected to be refined once the path of exit reform is more clearly understood, and would be expected to be significantly reduced if Ofgem decided not to implement changes to the exit regime, or to implement a 'flat only' model of exit capacity. For the time being, PB Power propose this expenditure is allowed in full.
- System Security. These costs are required as the control system is classified as 'Critical National Infrastructure'. We propose these should be allowed.
- Control Room refurbishment, a reasonable cost of maintaining the fabric of the control rooms. We propose these should be allowed.
- Non-SCADA Upgrades. NGG has estimated the costs of replacement of SC2004 and other non-SCADA systems as £7.8m in total for all its networks. It has also estimated a cost of £4.6m which it expects to be paid for by the iGDNs for 'Analysis and Delivery' of Non-Scada systems.

  SC2004 is in need of rationalisation and upgrade as it is an assortment of various disparate systems, including forecasting and interruption management systems. Rather than being technically obsolete or unsupported, the functionality is in part made obsolete as a result of SOMSA exit, but the systems would in any case be due for improvements during the next review period.

  We believe that in practice the most effective means of development of SC2004 is still under consideration by NGG and the other GDNs and that it is likely to be most efficient if the GDN's collaborated to provide replacements for the Non-SCADA elements of their required System Control functionality. We also believe that NGG is likely to benefit from the 'Analysis and Delivery', the costs of which it has currently allocated exclusively to the other GDNs.

  NGG and the other GDNs may yet choose to adopt a collaborative approach to non-SCADA systems provision, or may choose to develop these systems separately.

  We believe it is appropriate that some allowance should be made for all the GDNs for these systems, since they are essential operationally and without them (or access to them) the GDN's will not be able to operate independently.

  However, following Ofgem's line in relation to SOMSA exit and GTMS costs, we believe that only efficient costs should be allowed and it would therefore be

inappropriate to allow the full costs of new Non-SCADA systems provision to each of the GDNs.

Therefore, we have calculated an allowance for each GDN for Non-SCADA systems based on National Grids' estimate of these two elements of cost associated with Non-SCADA systems. We have allocated a total of £12.4m across all the GDN's on a 4:2:1:1 split (following the basic rationale for the split of GTMS costs).

For NGG, this results in a total allowance for non-SCADA systems of £6.2m, which we have split and phased for each of their GDNs in proportion with the submitted costs for 'non-SCADA systems upgrade'.

Table 7-6 below shows the declared System Operation costs from the BPQ submission, followed by our assessment of the allowable costs, our total deduction, and the remaining 'proposed' System Operation Capex costs.

London (£m 2005/06 prices)	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	5 Yr Total
System Operation Costs as submitted	0.40	0.60	0.20	0.10	1.10	1.40	0.00	2.80
Allowed GTMS share of Costs	0.70	0.87	0.17	0.00	0.00	0.00	0.00	0.17
Allowed SC2004/Bus Apps Costs	0.00	0.00	0.00	0.00	0.56	0.56	0.00	1.11
Other Allowed System Operation Capex	0.40	0.60	0.20	0.10	0.40	0.70	0.00	1.40
Total 'Allowed' costs			0.37	0.10	0.96	1.26	0.00	2.69
Total 'Efficiency Adjustment'	-	-	0.17	0.00	-0.14	-0.14	0.00	-0.11
Proposed System Operation Costs	-	-	0.37	0.10	0.96	1.26	0.00	2.69

Table 7-6

Note that the phasing of the declared GTMS costs illustrates how the costs fall mostly in the previous period. We are making adjustments for the 2008/09 -2012/13 period only in this report.

7.4.3.2 IS Capex

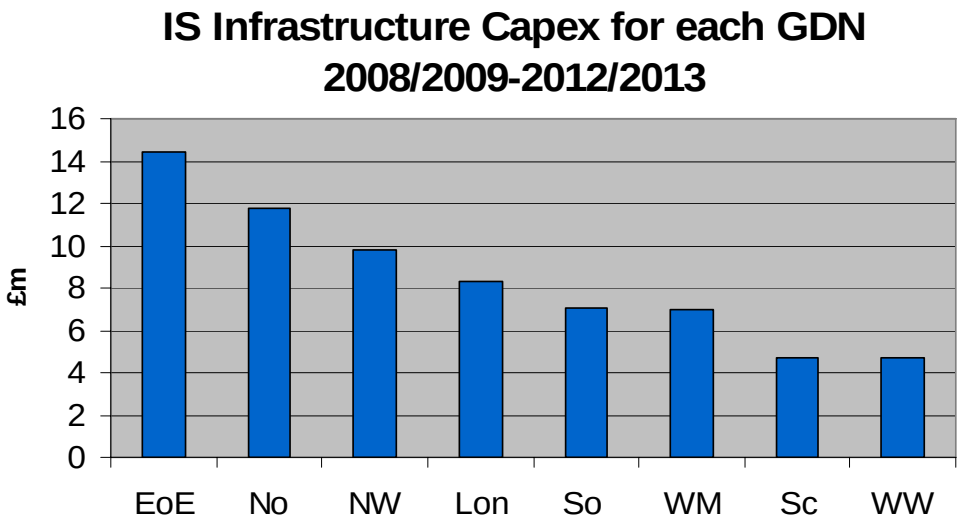

Figure 7-3

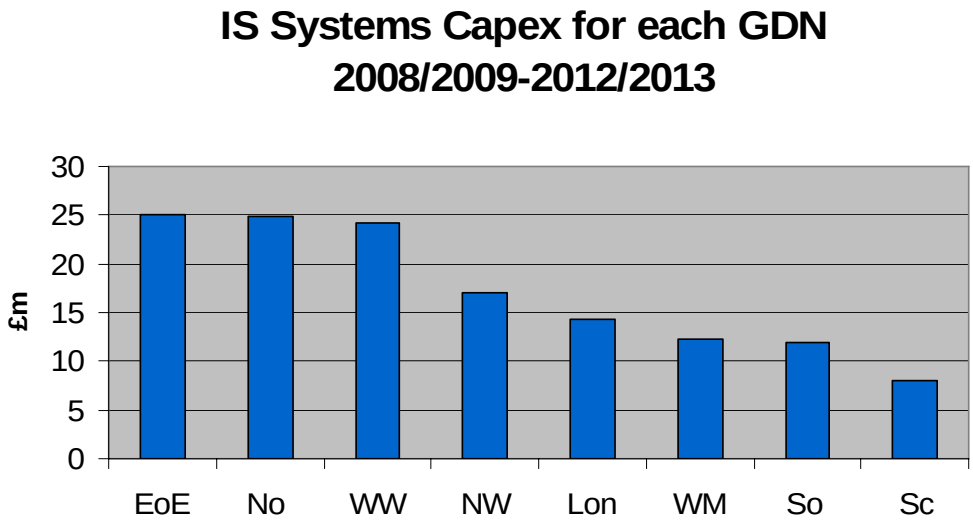

Figure 7-4

London's IS expenditure for both Infrastructure and Systems is fifth highest amongst the GDNs, despite being slightly higher in total for the forecast period than the historic. Their expenditure is driven primarily by Systems Replacement and Infrastructure costs as well as the Field Force Device Replacement and the FFE Consolidation project.

The following table shows the components of IS Capex submitted by London. The first line of costs is the component of IS Infrastructure costs, as submitted, and the remaining cost lines have been submitted as IS Systems costs. In our view, the Field Force Device replacement and FFE Consolidation projects are simple replacement programmes and would not be expected to lead to productivity gains. The remaining items of systems enhancements and improvements however, we believe could be expected to contribute to future productivity.

London (£m 2005/06 prices)	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	5 year total
Infrastructure	1.1	1.7	1.5	1.8	1.5	1.1	1.7	2.2	8.3
Field Force Device Replacement	0.0	0.9	1.8	0.0	0.0	0.0	0.5	1.8	2.3
FFE Consolidation	0.0	0.0	0.0	0.0	0.6	1.3	1.3	0.2	3.4
UKD Systems - GPS Asset Data Capture	0.0	0.1	0.2	0.1	0.0	0.0	0.1	0.2	0.4
UKD Systems -Basecase	0.0	0.1	0.4	0.3	0.0	0.2	0.2	0.0	0.7
UKD Systems - Replacement	0.0	0.0	0.0	0.0	1.5	1.4	1.4	0.7	5.0
Shared Services Projects allocation	0.1	1.2	1.6	1.7	0.0	0.1	0.3	0.4	2.5
IS Systems < 0.5m	0.0	0.2	0.1	0.0	0.0	0.0	0.0	0.1	0.1
Total IS Capex	1.2	4.0	5.5	3.9	3.6	4.1	5.5	5.5	22.7
Assumed Productivity 20% Total	0.2	0.8	1.1	0.8	0.7	0.8	1.1	1.1	4.5

Table 7-7

We estimate that over the 5 year period, 20% of the £22.7m IS Capex submitted by London could be expected to contribute towards improving efficiency, which could be expected to manifest itself in Opex gains.

7.4.3.3 xoserve

The following table shows what each GDN has submitted against Non-Operational Capex for xoserve.

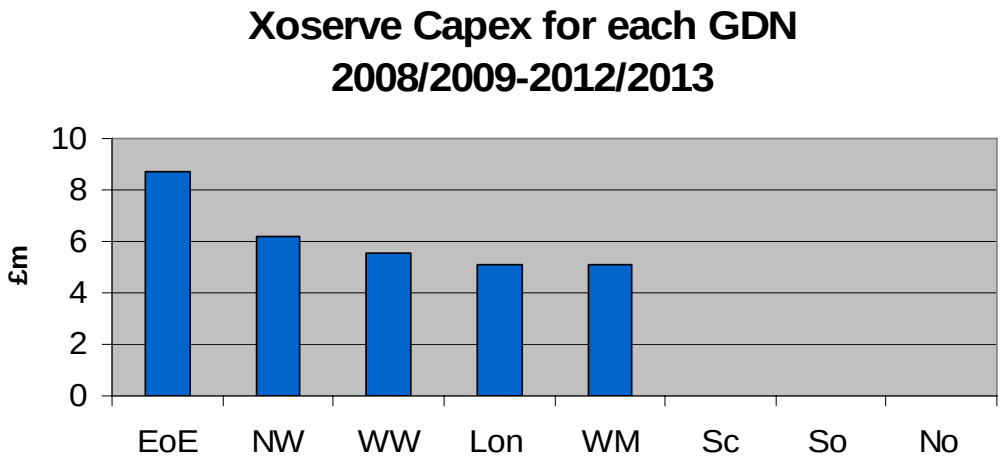

Figure 7-5

Although the total amount of expenditure submitted by all the GDNs equals the turnover that xoserve has set out as expected, three GDNs have not submitted any of their share as Capex. London's allocated share is the second smallest of all the GDNs submitted xoserve Capex. Since the costs relate to capital projects which xoserve intend to charge in the year in which they are incurred, we believe it is appropriate that an element of each GDNs total xoserve costs should be allocated as Capex.

In the case of WWU and all NGG's GDNs we have verified that the Opex/Capex split is such that the Capex allocation reflects their proportionate shareholding in xoserve and hence their appropriate share of the costs allocated to them. We have used this approach to estimate appropriate Capex allocations for those GDNs who have not charged some of their xoserve costs to Capex.

7.4.3.4 Vehicles

Comparing vehicles to numbers of employees, we have performed a regression of this data and it is clear that there is a broadly consistent approach, demonstrating the dependency of vehicles on the number of employees.

London Vehicles Capex appears to be phased such that most of the expenditure is made during the last two years of the next review period, reflecting its position in the replacement cycle.

7.4.3.5 Other

Other Costs in the Non-Operational Capex category comprise Telecoms & Office, Security, Furniture and fittings, Tools & Equipment and 'Other'.

London has submitted zero for Telecoms & Office and Furniture and Fittings.

Figure 7-6 shows that London has the highest proposed spend at £4.5m for security, significantly higher than the other GDNs. Presumably this reflects the location and the height of current concern about security in the UK's Capital City.

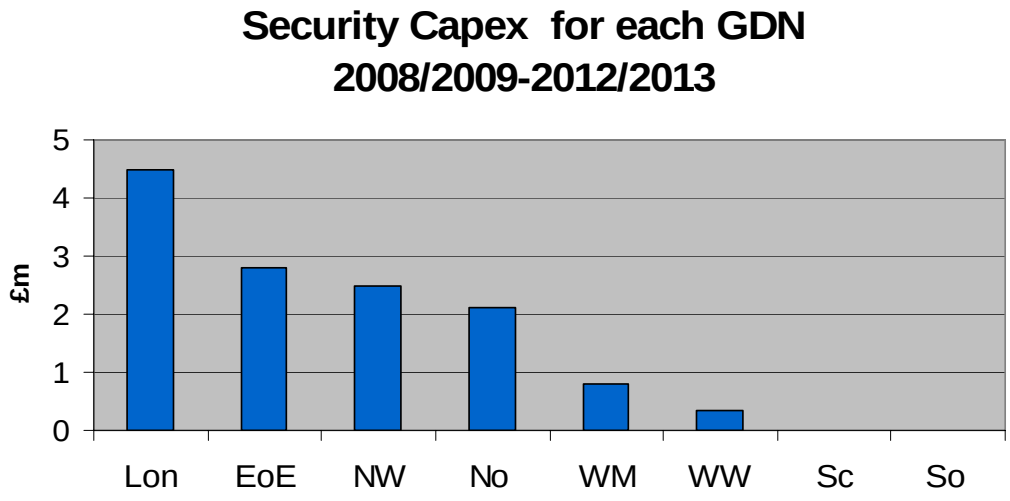

Figure 7-6

London's proposed expenditure of just over £4m for Tools/Equipment appears reasonable relative to the other GDNs, as shown in fig 7.7

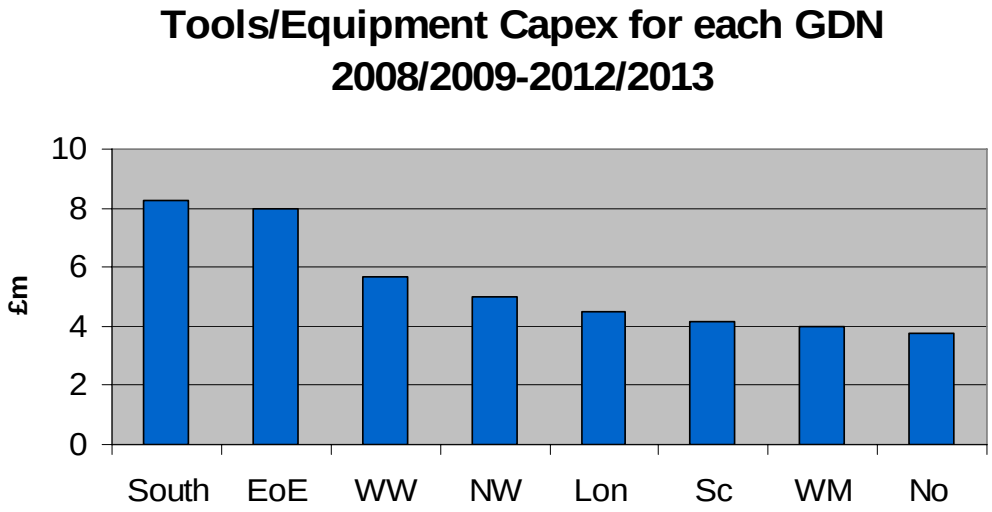

Figure 7-7

The figure below shows that London also is submitting the highest 'Other' Cost line, relative to the other GDNs.

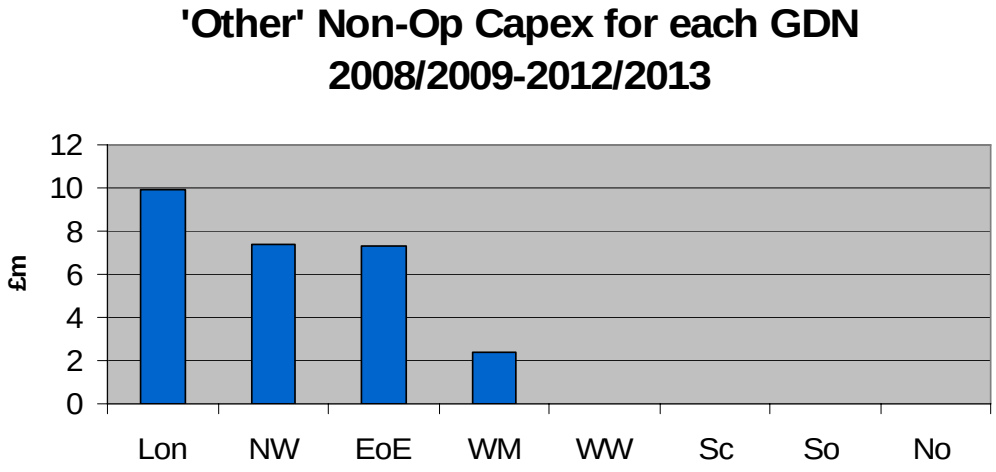

Figure 7-8

At £10m, London's remaining 'Other' Capex is clearly the main driver of its proposed costs in the remaining elements of Non-Operational Capex. The components of these costs are given in the BPQ submission, summarised in the following table:

London (£m 2005/06 prices)	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	5 Yr Total
Accounting Adjustments	0.0	-0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other Centrally Allocated Charges	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other Non-Operational Capex	0.2	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.2
P & L Recharges	0.0	0.2	0.4	0.3	0.3	0.3	0.2	0.4	1.5
NDC recharges	0.0	0.2	0.2	0.2	0.2	0.2	0.2	0.2	1.0
Capitalised Interest	0.0	0.3	2.2	3.4	0.1	0.3	1.3	2.1	7.2
Total ' Other '	0.2	-0.2	2.8	3.9	0.6	0.9	1.8	2.7	9.9

Table 7-8

We have been advised by Ofgem that since the PCR allows for financing costs through the cost of capital, these costs should not be included. We have therefore removed this line of costs as a normalization adjustment. This adjustment is shown in table 7-1.

This table shows that London's other costs are being driven principally by the last three items. The first two items in Table 7-8 above were used for historical data submission, and none of the NGG GDNs have submitted any forecast data against these items.

Other Non-operational Capex consists of costs for purchase of small items of office and telecoms equipment, plus cyclical replacement of office furniture across all NGGD locations. These costs appear reasonable.

Procurement & Logistics recharges costs cover motor tractor units, trailers, mechanical handling devices, racking etc required as part of providing a supply chain service to the group. NGGD receives an allocation of this investment based on its use of the service, and state that it averages at c. 25% of group Capex investment, and that costs are split between the GDNs on the basis of the no of supply points.

National Distribution Centre recharges are an allocation of the annual operating costs of the NDC, for storage, handling and delivery of materials specifically to support the capital investment programme of the retained DNs. These costs are also split on a supply point basis.

Capitalised interest charges relate to the cost of financing LTS construction projects during the construction period. For EoE, NGG provided the following breakdown:-

Capitalised Interest Breakdown £m 2005/06 prices	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	5 Yr Total
Harefield to Southall	0.3	2.2	3.4					3.4
Peters Green to South Mims								0.0
Supply Strategy Ph 1				0.1	0.3	1.3	2.1	3.8
Total	0.3	2.2	3.4	0.1	0.3	1.3	2.1	7.2

Table 7-9

These 'Other' charges have thus been explained and all appear reasonable.

7.4.4 RECOMMENDATIONS

7.4.4.1 System Operation

PB Power believes that the allowable costs of GTMS replacement, according to Ofgem's principles set out in the Consultation document, are the costs associated with the delivery of Phase 1 of the collaborative project to replace the existing system. We believe the collaborative project is the most efficient means of delivering GTMS replacement. The costs of Phase 1 have been allocated between the parties to the collaboration agreement and NGG's agreed share overall is £9.7m. We calculate this gives London an expenditure of £1.74m, which is due to be spent mostly during 2006/07 and 2007/08. We have phased this allowable cost in line with the declared spend on GTMS.

We have calculated a further allowance for Non-SCADA systems upgrades based on an overall view of efficient costs of replacement for all the GDN's combined. We have split this allowance (a total of £6.2m for NGG) between the GDN's on a 4:2:1:1 basis, and split and phased it for the NGG's GDNs.

We have allowed other submitted System Operation Capex items in full, including costs for security, control room refurbishment and a DNCS upgrade to be carried out post-SOMSA exit principally to assist with the efficient delivery of Exit Reform. The amount required for DNCS upgrade may be lower if a simpler version of exit reform is implemented.

7.4.4.2 IS Capex

PB Power is not proposing any adjustments to IS Capex Spend at this time. Further work is ongoing to determine whether levels of expenditure are appropriate for IS projects.

7.4.4.3 xoserve

We have validated that the costs submitted by London in relation to xoserve accurately reflects what they will be charged by xoserve, and confirmed that their split between Opex and Capex reflects LON's share of the Capex project costs.

7.4.4.4 Vehicles

Since there is consistency in the ratio of numbers of vehicles to number of employees, and NGG's approach to purchase and replacement seems appropriate, no adjustment to the company's proposed costs is necessary.

7.4.4.5 Other

Although London has the highest 'Other' Non-Operational Capex, we do not believe it is necessary to make any efficiency adjustments to their 'Other' costs. This item is largely due to capitalised interest charges reflective of its LTS investment programme, and we have removed this item via a normalisation adjustment since financing costs are already

allowed for through the PCR. The higher relative figure for Security is justifiable due to the location of this GDN.

7.4.4.6 Recommendations Summary

The following summarises our recommendations in respect of Non-Operational Capex:-

We are proposing a deduction of £ 0.1m resulting from the reallocation of non-SCADA systems costs across all the GDN's, and a deduction of £7.2m for non-allowed financing costs.

8 MAINS AND SERVICES REPEX

8.1 SUMMARY

Tables for Forecast section for each area of spend £m (05/06)		2008/09	2009/10	2010/11	2011/12	2012/13	Total
BPQ Submission							
	HSE Enforcement Policy	61.9	53.5	56.9	55.0	52.6	**279.9**
	MP Ductile iron	0.0	0.0	0.0	0.0	0.0	**0.0**
Mains	Non-Rechargeable Diversions	0.3	0.3	0.3	0.3	0.3	**1.6**
	Other Policy & Condition	9.0	9.1	9.6	13.1	12.6	**53.4**
	Rechargeable Diversions (Net)	-0.7	-0.6	-0.5	-0.5	-0.5	**-2.9**
	Non-Domestic Services	0.6	0.3	0.6	0.9	0.7	**3.1**
Services	Domestic Services	28.5	26.1	27.3	29.2	29.2	**140.3**
	Multi-occupancy Buildings	2.8	2.8	3.0	3.2	2.8	**14.5**
Total		**102.4**	**91.5**	**97.2**	**101.1**	**97.7**	**489.9**
Normalisation Adjustments							
Services	Domestic Services	-2.4	-1.9	-2.1	-2.2	-2.3	**-11.1**
Total		**-2.4**	**-1.9**	**-2.1**	**-2.2**	**-2.3**	**-11.1**
Normalised							
	HSE Enforcement Policy	61.9	53.5	56.9	55.0	52.6	**279.9**
	MP Ductile iron	0.0	0.0	0.0	0.0	0.0	**0.0**
Mains	Non-Rechargeable Diversions	0.3	0.3	0.3	0.3	0.3	**1.6**
	Other Policy & Condition	9.0	9.1	9.6	13.1	12.6	**53.4**
	Rechargeable Diversions (Net)	-0.7	-0.6	-0.5	-0.5	-0.5	**-2.9**
	Non-Domestic Services	0.6	0.3	0.6	0.9	0.7	**3.1**
Services	Domestic Services	26.1	24.1	25.2	26.9	26.9	**129.2**
	Multi-occupancy Buildings	2.8	2.8	3.0	3.2	2.8	**14.5**
Total		**100.0**	**89.6**	**95.1**	**98.9**	**95.3**	**478.9**
Adjustments							
	HSE Enforcement Policy	-0.3	6.6	1.0	-3.2	-2.2	**2.1**
	MP Ductile iron	0.0	0.0	0.0	0.0	0.0	**0.0**
Mains	Non-Rechargeable Diversions	0.0	0.0	0.0	0.0	0.0	**-0.1**
	Other Policy & Condition	-1.6	-2.1	-2.6	-3.5	-3.7	**-13.5**
	Rechargeable Diversions (Net)	0.0	0.0	0.0	0.1	0.1	**0.2**
	Non-Domestic Services	-0.3	-0.2	-0.3	-0.5	-0.4	**-1.7**
Services	Domestic Services	-4.3	-3.0	-4.6	-6.1	-6.3	**-24.4**
	Multi-occupancy Buildings	0.0	0.0	0.0	0.0	0.0	**0.0**
Total		**-6.5**	**1.4**	**-6.5**	**-13.3**	**-12.6**	**-37.5**
Proposed							
	HSE Enforcement Policy	61.7	60.2	57.9	51.8	50.4	**282.0**
	MP Ductile iron	0.0	0.0	0.0	0.0	0.0	**0.0**
Mains	Non-Rechargeable Diversions	0.3	0.3	0.3	0.3	0.3	**1.5**
	Other Policy & Condition	7.4	7.1	7.0	9.6	8.9	**39.9**
	Rechargeable Diversions (Net)	-0.6	-0.6	-0.5	-0.5	-0.5	**-2.7**
	Non-Domestic Services	0.3	0.1	0.3	0.4	0.3	**1.4**
Services	Domestic Services	21.7	21.1	20.6	20.8	20.6	**104.8**
	Multi-occupancy Buildings	2.8	2.8	3.0	3.2	2.8	**14.5**
Total		**93.5**	**91.0**	**88.6**	**85.6**	**82.7**	**441.4**

Table 8-1

8.2 POLICIES & PROCEDURES

T/PL/REP1 and T/PL/REP2 are the key documents requiring the monitoring and removal of risk arising from the distribution system. The mains and services replacement requirements are defined in a policy document (T/PL/REP1) and the procedure in T/PL/REP2. These documents form part of a suite of policies and procedures with comprehensive coverage of the Network's operations. Appendix 1 describes the framework in which the policies and procedures sit and the arrangements for governance, monitoring and review.

The current documents describe the requirements and processes for the replacement of all distribution pipes from identifying those pipes to be replaced, prioritising for replacement and developing projects. The design and optimisation of the replacement system relies on other policies and procedures. The documents have been reviewed and updated on a number of occasions in recent years and we found no evidence that the policy and procedure were not properly implemented.

8.3 HISTORICAL PERFORMANCE

8.3.1 INTRODUCTION

Replacement mains

The replacement of iron mains and associated services is an essential part of the Network's strategy for controlling the risk arising from the network. The rate of replacement and the procedures associated with the selection of pipes and development of projects are regulated by the HSE using the Gas Safety (Management) Regulations and the Pipelines Safety Regulations to enforce its policy. Ofgem's role is to ensure that the Network can fund the programme on an efficient basis.

It is appropriate to re-state here the recent history of the replacement programme that has been running in various forms since the 1970s. HSE requirements and policies and procedures have changed, and the key events are listed below.

Time Line	
2000	HSE issues an Improvement Notice in September 2000 requiring 2360 km of MP DI main within 30m of premises to be de-commissioned by 31.12.2002.
2001	HSE publishes its Enforcement Policy for the replacement of iron gas mains. 91,000km of cast and ductile mains believed to be within 30m of premises. Note that the policy does not include steel mains or service pipes. Ofgem increases mains and services Repex allowances to accommodate the HSE requirement.
2002	Transco introduces T/PR/REP1 & 2 policy and procedure for replacement. REP2 requires steel services to be replaced irrespective of condition (previously PE clad steel services could be transferred if in satisfactory condition) and unprotected steel <=2" to be replaced in the course of routine replacement work. >2" steel subject to risk assessment. Previously these pipes replaced on a condition basis. Initial (20/70/10) policy introduced (supported by "Smallworld")
2003	Pipeline Safety Regulations amended to require Networks to submit a replacement programme for approval. Transco submit an amended 20/70/10 policy (supported by MRDST) to HSE for approval. Agreed providing an equivalent amount of risk is removed from the system each year, and requiring an additional 10% of mains to be de-commissioned. Physical survey reveals that actual population of iron mains was 101,000km at 01.04.02 requiring a 10% increase in production to complete the programme within 30 years. HSE requires a minimum national rate of 3,500km/yr de-commissioned mains (an increase from 3,240km) from 06/07 to meet the 30 yr programme.
2004	Steel pipe included in the risk model.

Table 8-2

The HSE Enforcement policy has been successful in reducing the risk arising from the iron portion of the distribution system. The chart below shows how risk (as predicted from a mathematical model) has fallen steeply in each Network in response to targeted replacement over the last five years.

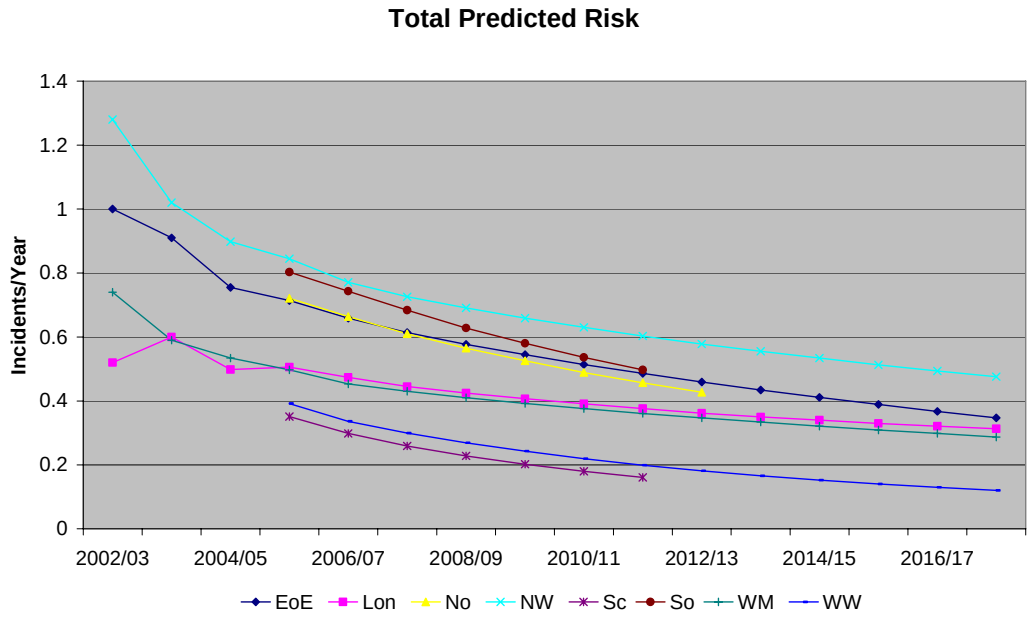

Figure 8-1

However, this has been achieved at increasing expense as Networks have been "ramping-up" their replacement activity to meet the HSE's required national replacement rate of 3,500km/yr by 2007/08.

The replacement of mains also generates a services workload as service pipes must be replaced or re-connected to the replacement main.

8.3.2 DEFINITION OF ACTIVITY

This section of the report deals with:

Replacement mains – costs and volumes reported in section C8 of the Network BPQ workbook (but excluding LTS Repex, see section 9 below)

Replacement services - costs and volumes reported in section C9 of the Network BPQ workbook and including non–domestic services and risers & lateral connections to multiple occupancy buildings.

8.3.3 UNDERLYING COSTS

The table below shows Network reported workload and costs over the first five years of the programme (2006/07 is a forecast)

Distribution Repex Total Cost Trends 2002/03 - 2006/07 £m All Prices 2005/06	2002/03	2003/04	2004/05	2005/06	2006/07
Replacement mains (excluding re-chargeable Diversions	42.1	32.0	32.5	27.2	29.3
Replacement Services (Domestic)	14.9	17.9	19.9	21.8	18.2
Replacement Services (Non-domestic)	0.1	0.1	0.0	0.0	0.0
Multiple Occupancy Buildings	0.0	0.0	0.0	1.4	0.9
Total Distribution Repex	**57.1**	**50.0**	**52.4**	**50.4**	**48.4**
Mains De-commissioned (km)	**225.6**	**248.4**	**222.5**	**221.1**	**219.4**

Table 8-3

2002/03 costs include the final year of the medium pressure ductile iron programme and are thus not representative of the current 30 year programme.

For the period up to 2004/05 costs associated with multiple occupancy buildings have not been separately identified but are included (where they are incurred) within the total. Re-chargeable mains diversions (normally a small negative cost after contributions) are excluded from the table for clarity.

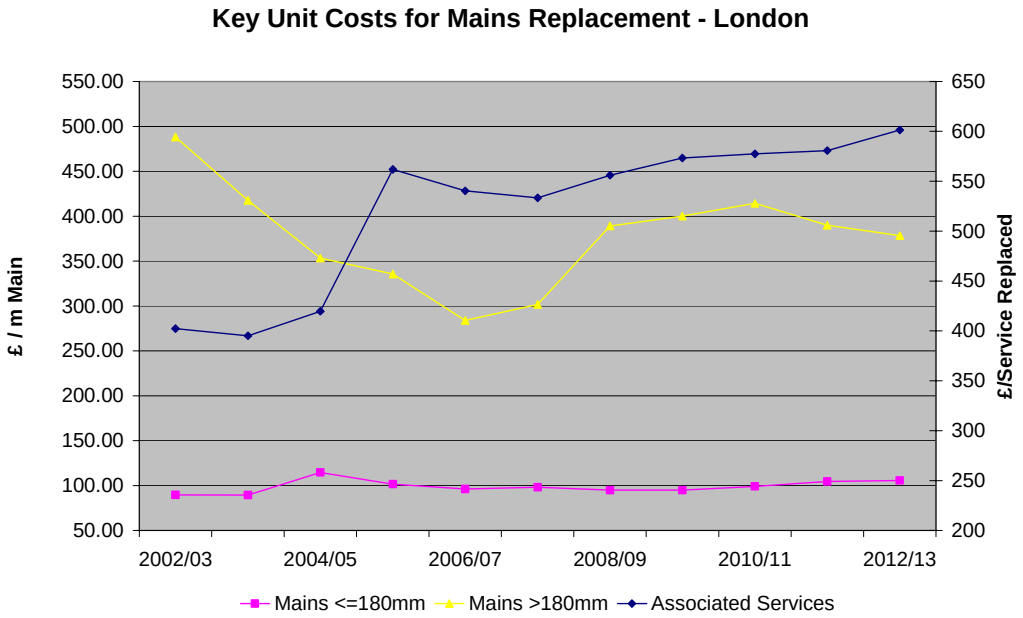

Figure 8-2

A significant increase in services unit costs (right hand scale) is apparent. The Network informed us that 2005/06 costs were influenced by the cost of risers and connections to low-rise apartments (< 6 floors) and that the corrected unit cost is £470, there is however a significant upward trend.

Mains unit costs have been more successfully managed and costs (<=180mm diameter) have been successfully contained. Post 2006/07 Unit costs for mains >180mm are sensitive to diameter and thus variable in historical years. Unit costs are forecast to rise in line with the Network's assumptions of real price effects. (See 8.4.2 below)

The Network has now moved to Alliance contracts for the majority of Repex work. The Alliance is incentivised to beat target costs on a year by year basis and this effect is shown in the Network's forecast for later years.

Total Distribution Repex (Excluding Rechargeable Diversions)

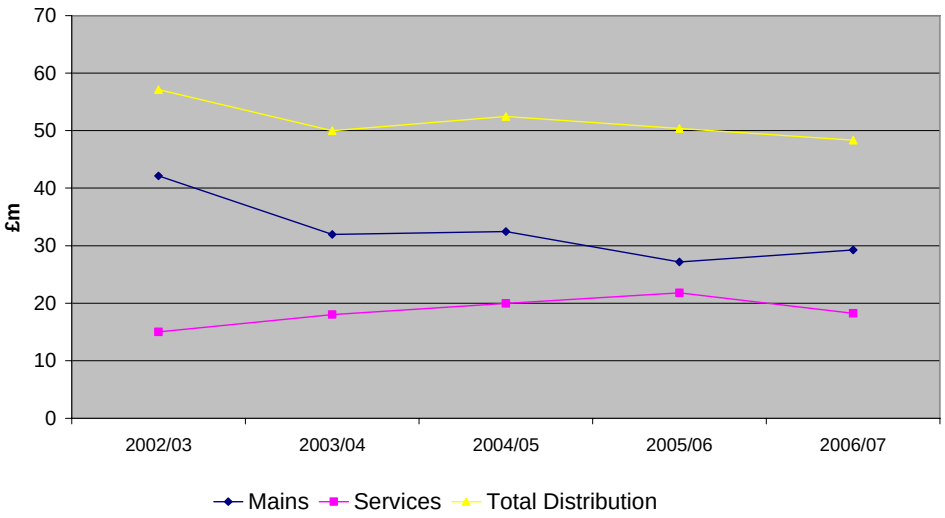

Figure 8-3

After completion of the medium pressure ductile iron programme in 2003, costs have been relatively flat as the Network has not yet "ramped-up" to the level required to complete de-commissioning of iron mains under the HSE Enforcement Policy by 2031.

8.3.4 APPROACH TO THE ASSESSMENT OF EFFICIENCY

Inter-Network Comparison

In assessing the efficiency of investment (2005/06 onwards) we have examined the Network's 2005/06 costs and compared these with the seven other Networks taking into account, as far as is possible, differences such as mains and services workload, the proportions of direct and contract labour, and regional cost differences as derived from indices published by BCIS (The Building Cost Information Service a subsidiary of the Royal Institution of Chartered Surveyors) and DTI – Annual Survey of Hours and Earnings (ASHE).

We have chosen a regression approach as it avoids the direct comparison of unit costs for different disaggregated cost categories, which we regard as unreliable given differences in cost allocation at a disaggregated level, and enables us to compare the Networks' costs and efficiency on a consistent basis

A number of regression options have been explored, and we have concluded that the most suitable regression is achieved by analysis of the logarithmic values of normalised costs and the chosen driver. A "basket of work" approach has been used to produce a weighted average of a number of different work elements (installed mains pipe sizes and

services by job type). The driver is calculated by multiplying the work volume by a nominal unit cost for the activity. The approach is not sensitive to the actual level of these nominal unit costs, but works on the relative costs between work types.

This approach allows the analysis to fully reflect the workload forecast by the Networks, adjusted as deemed appropriate by our consultants.

The starting point for setting the target benchmark is an Ordinary Least Squares (OLS) regression on the eight data points, one for each GDN, applicable in the base year (2005/06). The regression line is shown in black on the graphs. The R^2 value indicates how well the variation in costs is explained by the variation in the workload driver.

The OLS regression calculation takes into account all the data points in determining the relationship between the costs and the workload driver. This relationship could be used to determine the frontier costs for each network, but these costs are unlikely to be efficient since generally only some networks will be operating at the efficiency frontier.

We therefore propose to obtain the frontier cost relationship by adjusting the OLS regression line so that it reflects efficient network performance rather than average performance.

This relationship could be constructed by shifting down the regression line until all the data points are above the line except for one data point which is on the line. This is the Corrected Ordinary Least Squares (COLS) regression line.

However, we consider that there are differences between GDNs which may not be fully explained by the regression analysis and that it is reasonable to set the frontier relationship by shifting the regression line down to the upper quartile. This is the upper quartile COLS regression line and is shown in pink on the charts. This is the target which all under performing GDNs should move towards.

Where the regression uses log-linear analysis, the effect of rejecting the OLS regression line as the frontier relationship in favour of the upper quartile COLS regression line is to reduce the target costs of each network by the same percentage.

With this approach, 75% of networks will be performing at or below the frontier in the base year and these networks will be expected to continue to improve their performance over the period to 2012/13. The resulting target costs for 2012/13 are shown in yellow on the charts.

There is a further description of the analysis techniques employed in section 2 of this report.

Figure 8-4 shows the output from benchmarking analysis of 2005/06 cost performance for replacement mains and services.

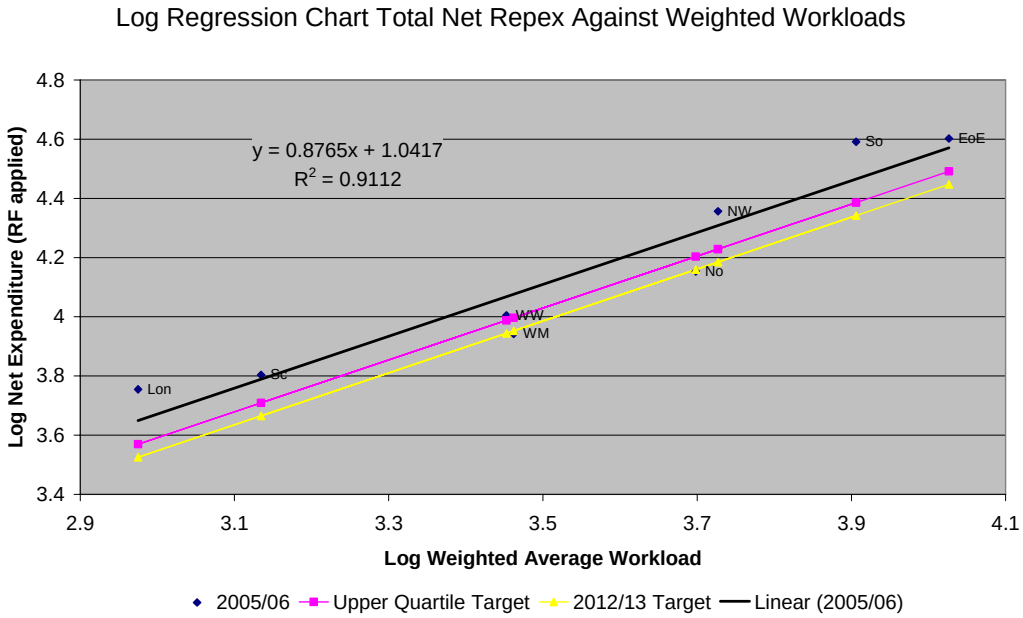

Figure 8-4

In the chart above (2005/06) London is behind the upper quartile and is the seventh most efficient Network

Comparison with Other Utilities' Costs

Ofwat Comparison

We have compared the cost of the Network's activities with data for water supply companies published by Ofwat.[5]

Gas and water mains installation activities are similar to the extent that the companies work in comparable conditions using similar technologies based around PE pipe systems. There are many minor differences which we have not evaluated and one major difference: the gas supply network has few valves, and flow-stopping equipment is needed for every dis-connection and re-connection required by the replacement process, whereas in water supply flow-stopping is achieved by operating existing valves. These "live gas" connections account for a significant element of mains replacement costs.

The replacement of gas and water services differs in that a water company's ownership ends at the footpath stop valve whereas the gas network extends to the meter control valve. In addition GDNs are required to undertake soundness and appliance safety checks prior to restoring the supply.

As part of its review process Ofwat compiles a series of "standard cost estimates" provided by the water companies. These cost estimates are prepared in accordance with assumptions provided by Ofwat to exclude atypical costs and normalise certain other costs. Because of this the Ofwat costs are lower than those that would normally be achieved within the business.

We have compared the standard costs estimates with the unit costs within the companies' BPQ submissions. These unit costs include all costs for the activity and therefore allowance must be made for the difference between the Network unit costs and standard cost estimates. The principal differences are:

The additional cost of gas connections.

Disposal of excavated material beyond the assumed 1km.

[5] Water and sewerage service unit costs and relative efficiency 2003-04 report - Ofwat

Replacement of the entire gas service and gas safety obligations

For comparison purposes an adjustment has been made to reported costs to allow for the above and this shows that gas and water costs are generally of the same order.

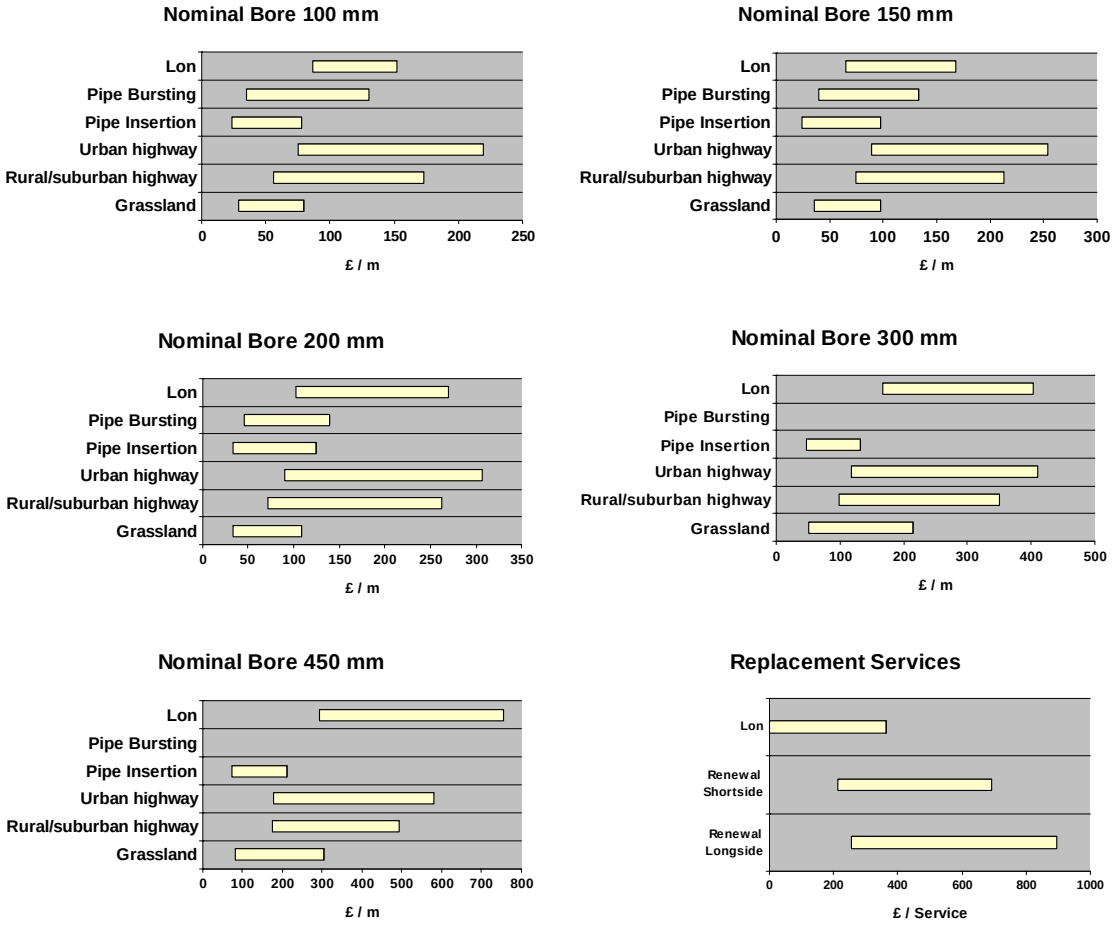

Figure 8-5

Base Year (2005/06) Assumptions and Adjustments

We have carefully examined the base year volumes and costs since it is this year that establishes the relative position of the Network and the potential efficiency savings available.

Installed Mains Base Year (2005/06) Assumptions and Adjustments (Excluding Re-Chargeable Diversions)	Volume (km)	Gross (Including Overheads) £m
BPQ Submission		
HSE Enforcement Policy	195.1	25.8
MPDI Programme	0.0	0.0
Other Policy & Condition Mains	6.6	1.3
Non-rechargeable Diversions	0.1	0.1
Total Repex Mains	**201.7**	**27.2**
Normalised BPQ		
HSE Enforcement Policy	195.1	25.4
MPDI Programme	0.0	0.0
Other Policy & Condition Mains	16.1	2.6
Non-rechargeable Diversions	0.1	0.1
Total Repex Mains	**211.2**	**28.1**

Table 8-4

The Network informed us that it had included the cost (£1.3m) of replacing risers to low-rise apartments (<= 6 floors) within replacement services. We have normalised this cost and volume to Other Policy and Condition Mains in line with the BPQ instructions. We have adjusted the mains volume (9.5km) in line with the BPQ instructions.[6]

HSE Enforcement Policy costs are reduced by £0.375m in respect of a NDC recharge adjustment and returned to Opex.

[6] SQ NGG159-047

Replacement Services-domestic Base Year (2005/06) Assumptions and Adjustments	Volume	Gross (Including Overheads) £m
BPQ Submission		
Domestic Services		
Relaid services associated with mains replacement	14746	9.6
Relaid services not associated with mains replacement (bulk relays)	0	0.0
Services relaid after escape	2867	4.6
Service test & transfer to new or other main	11678	4.9
Reposition domestic meter - service relays	0	0.0
Purge & relight after domestic service work	19966	0.7
Service relay domestic meterwork	0	0.0
Other domestic services	586	2.0
Total domestic services		**21.8**
Non-domestic Services	**5**	**0.0**
Multiple Occupancy Buildings		
Renew risers	3683	1.2
Renew service connections	397	0.3
Total - Multiple Occupancy Buildings		**1.4**
Total Services		**23.2**
Normalised BPQ		
Domestic Services		
Relaid services associated with mains replacement	14746	8.3
Relaid services not associated with mains replacement (bulk relays)	0	0.0
Services relaid after escape	2867	2.9
Service test & transfer to new or other main	11678	4.8
Reposition domestic meter - service relays	0	0.0
Purge & relight after domestic service work	19966	0.7
Service relay domestic meterwork	0	0.0
Other domestic services	586	2.0
Total domestic services		**18.7**
Non-domestic Services	**5**	**0.0**
Multiple Occupancy Buildings		
Renew risers	3683	1.2
Renew service connections	397	0.3
Total - Multiple Occupancy Buildings	**4080**	**1.4**
Total Services		**20.1**

Table 8-5

We have made the following adjustments:

The Network informed us that it had included the cost (£1.3m) of replacing lateral connections to low-rise apartments (<= 6 floors) within replacement services, but had not included the volume. Relaid services (after escape) costs have been reduced by £1.7m, transferred to Opex. This accounts for a change in practice by the Network under "The Way Ahead" initiative which has led to escape monitoring costs (Opex) being attributed to Repex.

Reposition meter – service relays is reduced by £0.1m

Multiple Occupancy Buildings

Historically, the cost of the replacement of that part of the distribution system within apartment blocks has been allocated to mains and services. Typically the cost of replacement risers (the vertical pipes within the block) was allocated to mains and the cost of the lateral connections to services. Work of this type was relatively unusual, and the allocation of costs and volumes was absorbed without overly distorting unit costs.

More recently, Networks have needed to replace these systems more frequently, often by constructing a new system on the face of the building which requires temporary access by scaffolding. The cost of these replacements is high and Networks requested that these costs (risers >20m) were separately identified within the BPQ.

It is now apparent the cost of risers <20m has been allocated to services and has inflated the unit cost. We recommend a future separate category to collect the cost of this work and suggest that "Relaid services associated with mains replacement" and similar job types are restricted to ground floor and first floor service entries where the cost of access is not likely to be out of proportion to the cost of the work.

Outside of 2005/06 which we have adjusted, we believe that within the current period the cost of replacement risers, as well as laterals, may have been allocated to services and that, if this is so, services costs may be inflated. This would ultimately be to the advantage of the Networks should a separate allowance for multiple occupancy buildings be made within the next control.

We believe, through the comparison of unit costs and contract rates, that for London Network these additional costs may be significant and we recommend further work to clarify this area.

8.4 FORECAST

8.4.1 INTRODUCTION

The Network forecast is generated in seven work categories:

HSE's Enforcement Policy for the Replacement of Iron Gas Mains.

The Repex forecast is aimed principally at delivering the requirements of the HSE as defined in its 2001 Enforcement Policy[7]. This requires iron mains within 30m of premises to be de-commissioned over the period to March 2032. The Network follows a programme, accepted annually by HSE, to achieve this.

Medium Pressure Ductile Iron Programme

This deals with any instances of medium pressure ductile iron mains within 30m of premises. These mains were de-commissioned in a major programme ending in 2003 but any encroachment, e.g. through new development, will trigger a replacement project.

The Network has opted to include this small workload in the category above.

Other Policy and Condition Mains

Small diameter steel mains are replaced if they are associated with Enforcement Policy work; other mains of any material may be replaced on the basis of condition.

The Network is following a policy to de-commission all asbestos cement mains by 2012.

[7] THE HEALTH AND SAFETY EXECUTIVE'S ENFORCEMENT POLICY FOR THE REPLACEMENT OF IRON GAS MAINS – September 2001

The Network has taken a strategic view of the replacement of certain medium pressure mains choosing to replace sections outside of the 30m proximity zone (HSE & MP Ductile Iron policies above) in order to operate the replaced mains at a higher pressure.

These factors contribute to a proposed workload of 41-52km/year.

Non-rechargeable diversions

The Network will occasionally be required to divert mains at its own expense and forecasts a small workload of 0.9km/year

Re-chargeable diversions

The Network is required to divert mains on a rechargeable basis, usually in conjunction with highway alterations. The Network is forecasting a small workload of 21-25km/year and minor income after cost recovery.

Replacement Services

Services replaced or transferred in association with mains replacement or relaid after escape, plus a range of other minor services activities.

Multiple Occupancy Buildings

Replacement of risers (> 20m) and laterals supplying multiple occupancy buildings.

The Network has forecast a workload of 1000 connections per year.

Forecasting Process

Our review of the forecast has focussed on the major cost areas; the HSE's Enforcement Policy programme, Other Policy and Condition mains, and Replacement Services.

Mains

We have reviewed the process used by the Network to generate its forecast. We found that the Network reasonably takes into consideration relevant factors that influence the forecast; the length and diameter mix of mains to be de-commissioned and installed, the likely ratio of installed to de-commissioned mains, the likely method of construction, the combined impact of upsizing and downsizing and the requirement for associated reinforcement of the system. Historical data is used to inform the forecast and this is modified where appropriate. The Network considers the impact of average system pressure increases, in compensation for downsizing, and the associated incremental change in the (Opex) cost of emissions, shrinkage and escapes.

Costs are generated from current costs and take into account work delivery (the proportion of the programme to be delivered by the Term and Alliance contracts) and forecast real price effects arising from own and contract labour, materials etc.

Services

Services workload forecasts are similarly generated using historical ratios modified in the light of expected changes to the make-up of the mains workload.

Outputs

Within the forecasting process outputs are also considered. The Network forecasts annually the reduction in risk arising from the distribution system that can be attributed to its replacement programme and the impact of the programme on network capacity is considered on a project by project basis.

At several stages in the development of the forecast it is subject to a review and challenge process and overall we found the Network's forecasting processes to be

reasonable, however we have made some adjustments which are detailed in section 8.4.2 below.

GDN Volumes (as presented) (Excluding Re-Chargeable Diversions)	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
Installed Mains (km)							
HSE Programme	197.6	297.0	325.3	277.7	293.4	311.7	296.6
MPDI Programme	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Non-rechargeable Diversions	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Other Policy & Condition Mains	19.2	26.6	41.3	40.0	39.0	49.0	45.8
Total Installed Mains (km)	**217.7**	**324.5**	**367.5**	**318.6**	**333.3**	**361.5**	**343.3**
Replacement Services - domestic							
Relaid services associated with mains replacement	10763	21490	22274	19172	20065	21802	21111
Relaid services not associated with mains replacement (bulk relays)	0	0	0	0	0	0	0
Services relaid after escape	3950	3905	3861	3817	3773	3730	3688
Service test & transfer to new or other main	10370	15261	15745	13511	14185	15494	14971
Reposition domestic meter - service relays	0	0	0	0	0	0	0
Purge & relight after domestic service work	16000	16000	9468	9432	9456	9752	9716
Service relay domestic meterwork	0	0	0	0	0	0	0
Other domestic services	1260	1383	1383	1383	1383	1383	1383
Total Domestic Services	**42343**	**58039**	**52730**	**47314**	**48861**	**52162**	**50869**
Replacement Services - Non-domestic	**15**	**26**	**165**	**69**	**144**	**231**	**156**
Multiple Occupancy Buildings							
Renew service connections	501	976	1060	1025	1058	1110	964
Total riser renewals (m)	4730	7942	8459	8356	8594	8997	7692

Table 8-6

GDN Costs as presented (Normalised) £m 2005/06 Prices (Excluding Re-Chargeable Diversions)	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
Installed Mains							
HSE Programme	26.4	48.0	61.9	53.5	56.9	55.0	52.6
MPDI Programme	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Non-rechargeable Diversions	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Other Policy & Condition Mains	2.6	4.5	9.0	9.1	9.6	13.1	12.6
Total Installed Mains	**29.3**	**52.7**	**71.3**	**63.0**	**66.8**	**68.4**	**65.5**
Replacement Services - Domestic							
Relaid services associated with mains replacement	6.6	12.6	13.6	12.2	12.9	14.0	14.0
Relaid services not associated with mains replacement (bulk relays)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Services relaid after escape	3.9	3.7	3.6	3.6	3.6	3.5	3.5
Service test & transfer to new or other main	3.9	6.2	6.8	6.0	6.5	7.2	7.1
Reposition domestic meter - service relays	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Purge & relight after domestic service work	0.6	0.6	0.3	0.3	0.3	0.3	0.3
Service relay domestic meterwork	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other domestic services	0.8	1.6	1.7	1.9	2.0	1.9	1.9
Total Domestic Services	**15.9**	**24.6**	**26.1**	**24.1**	**25.2**	**26.9**	**26.9**
Replacement Services - Non-domestic	**0.0**	**0.1**	**0.6**	**0.3**	**0.6**	**0.9**	**0.7**
Multiple Occupancy Buildings							
Renew service connections	0.2	1.0	0.7	0.7	0.7	0.8	0.7
Total riser renewals (m)	0.6	3.9	2.1	2.1	2.2	2.4	2.1
Total	**0.9**	**4.8**	**2.8**	**2.8**	**3.0**	**3.2**	**2.8**
Total Repex	**46.0**	**82.3**	**100.7**	**90.2**	**95.6**	**99.4**	**95.9**

Table 8-7

8.4.2 PBPOWER PROJECTIONS

Proposed Workloads

Replacement Mains

In assessing the Network's forecast for mains replacement we have reviewed the annual volume and diameter mix of the proposed workload.

HSE Enforcement Policy

Our starting point was the principal requirement of the HSE's Enforcement Policy – that iron mains within 30m of premises be de-commissioned by March 2031. We have assessed the workload on that basis, taking the remaining population of iron pipes to be de-commissioned (2006) and dividing by 26, the number of remaining years in the programme. After allowing for a five year "ramp-down" period at the end of the programme we set the appropriate rate of abandonment at 332 km/yr – more than that proposed.

Diameter Mix of Installed Mains

In addition to the overall length of installed mains the diameter mix is a significant cost factor. We compared the diameter mix with that of the target population to ensure a reasonable match taking into account that mains insertion (the most economic method of replacement) would create a bias towards the smaller diameters of installed mains.

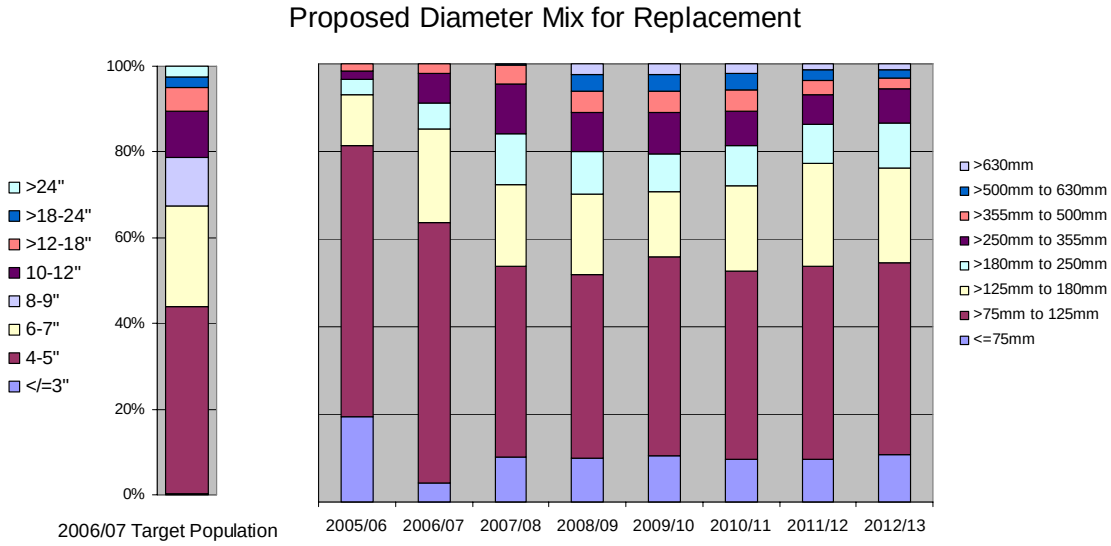

Figure 8-6

We also compared the Network's forecast with that of others and came to the overall conclusion that the forecast diameter mix was overly conservative. We have therefore increased the proportion of smaller diameter mains in the mix, reducing the length of larger diameter mains proportionately.

Diameter Mix of De-commissioned Mains

We have reviewed the Network's proposal for de-commissioned mains comparing it with the target population. Whilst the Network will give priority to replacing the higher risk mains (mostly smaller diameters) it should also be proportionately addressing the larger diameters. We found reasonable proportionality in the smaller diameter bands and noted some higher rates of de-commissioning in the larger diameter bands which we believe acceptable given the Network's proposals for strategic medium pressure mains.

2006/07 Target Population	1/25th Illustration	Network's Forecast - Abandoned Mains (HSE Programme)								
		2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	
21	</=3"	1	1	1	2	1	0	0	0	4
3508	4-5"	140	134	104	149	158	148	145	154	147
1883	6-7"	75	50	52	63	68	46	65	86	73
898	8-9"	36	14	20	34	32	24	28	29	33
873	10-12"	35	10	15	39	32	30	26	25	28
430	>12-18"	17	6	7	17	16	13	13	9	6
206	>18-24"	8	0	0	2	10	8	10	7	5
201	>24"	8	0	0	0	17	15	14	10	8
8020		321	215	199	304	335	286	302	320	304

Table 8-8

Ratio of installed to de-commissioned mains

We have examined the ratio of installed to de-commissioned mains within the proposal and compared this with others. The Network is forecasting installed mains 3-4% less than mains abandoned and we regard this as conservative. We have therefore, after taking into account up-sizing, scaled back the volume of installed mains to set the abandoned/installed ratio to 1.05.

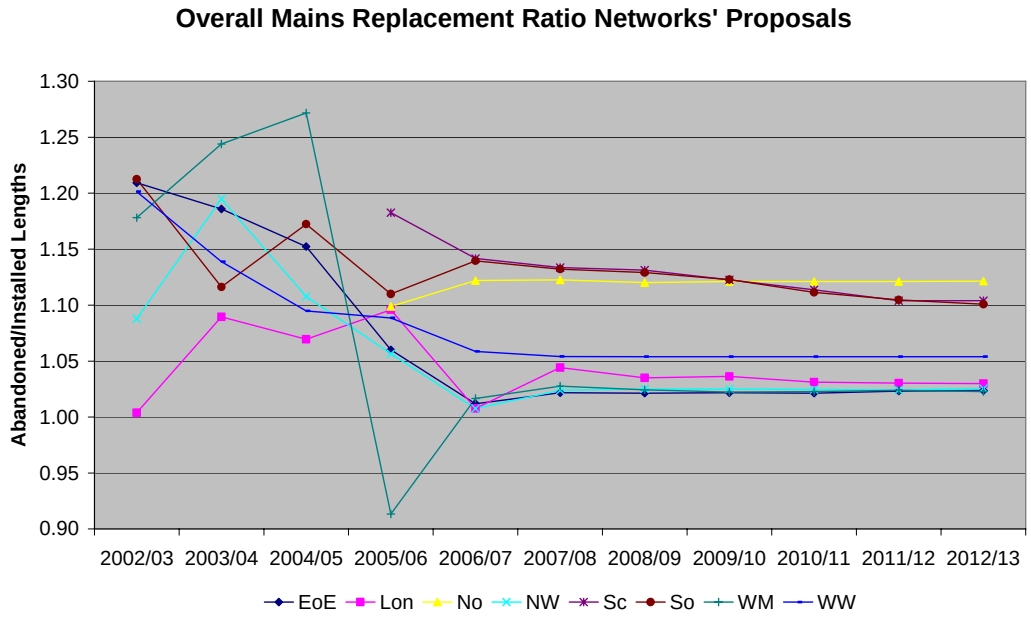

Figure 8-7

Reinforcement and Up-sizing

The Network operates an accounting rule such that (together with other conditions) if a replacement main is greater than 2" larger in diameter (up-sized) it is charged to reinforcement and Capex. Reinforcement and up-sizing can compensate for the loss of capacity caused by inserting new smaller diameter mains and where reinforcement or up-sizing is required, total project costs should be optimised. We are satisfied that the Network routinely undertakes cost-benefit analysis (taking into account pressure raising

alternatives and effects on emissions and PREs) and that the forecast levels of associated system reinforcement and upsizing are reasonable and in proportion to the overall programme.

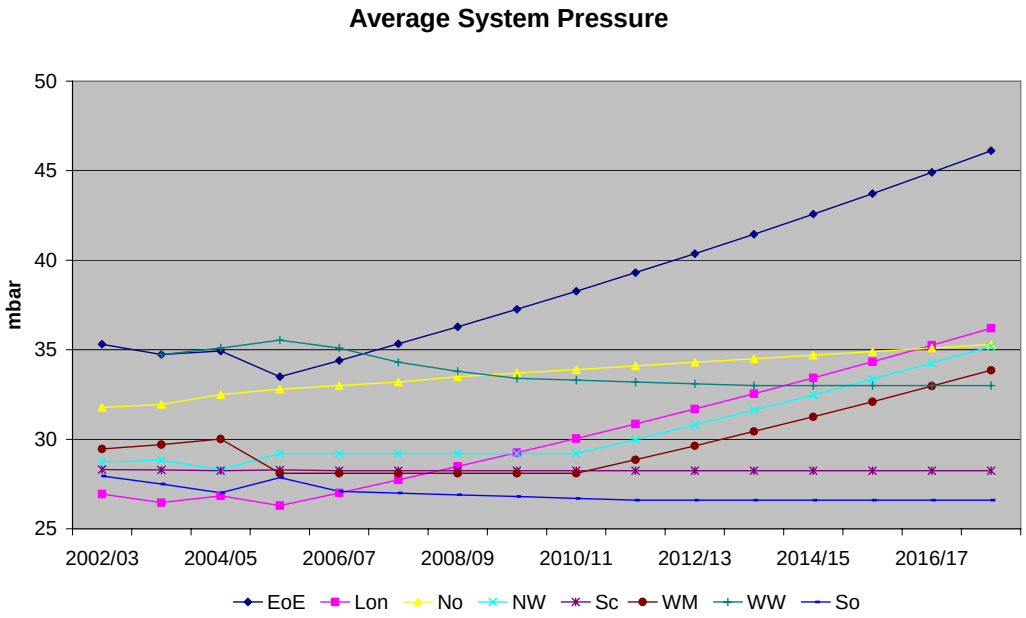

Figure 8-8

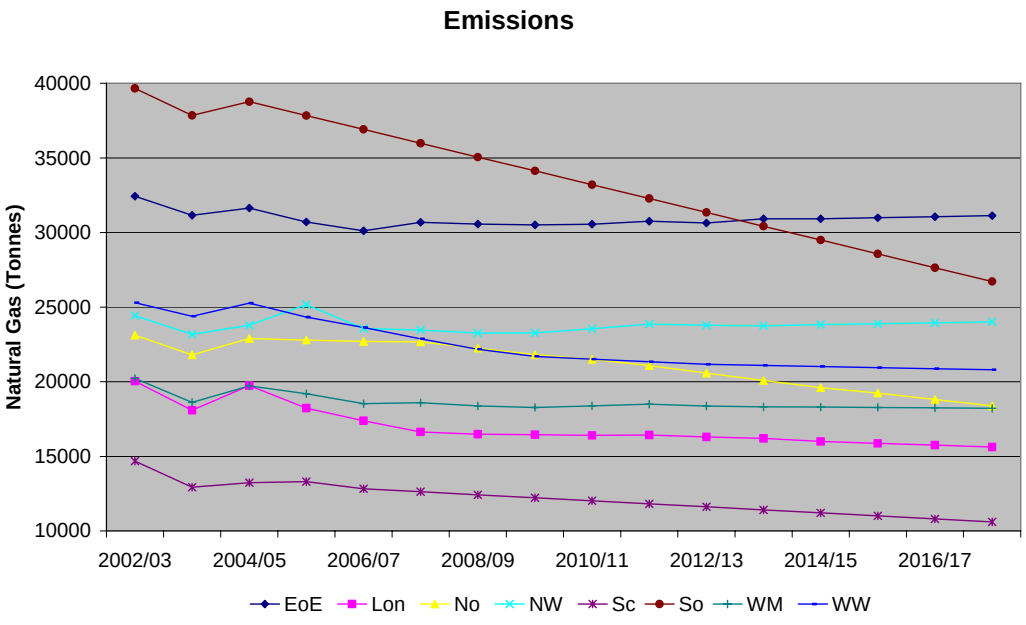

Figure 8-9

Other Policy and Condition Mains

Iron and Steel Mains

The Network has proposed a programme of 21-23km/yr to deal with small diameter steel mains de-commissioned in association with the HSE programme and other condition mains. This is in proportion to the overall programme and we propose no adjustment.

Strategic Medium Pressure Mains

The Network has a population of medium pressure iron mains which must be decommissioned according to risk. The Network has explained that these systems work

at full capacity and therefore size for size replacement is required if tackled on a piece-meal basis. Strategic replacement of larger sections of the system will allow downsizing, replacement by insertion and, with the iron sections de-commissioned, operation at higher pressures. We regard this approach, which we discuss in more detail below, to be appropriate and we have made no adjustment to the volumes proposed.

Replacement Services

We have reviewed the Network's forecast for domestic services workload and compared this with historical data to establish the number of services jobs/km of mains abandoned. We have also compared the forecast with others, on a pro-rata basis to mains de-commissioned. We have accepted the Network's forecast of the total number of services jobs.

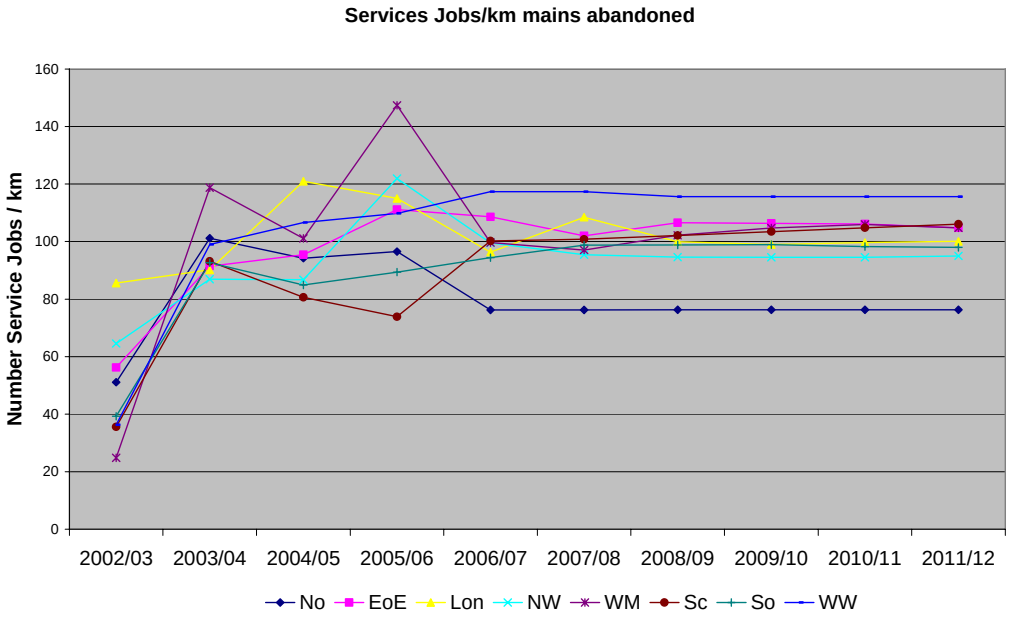

Figure 8-10

Transferred Services

In addition to the overall numbers of services jobs, the mix of relayed and transferred services is a significant cost factor. We compared the proposed proportions with historical data (together with that of other networks) and concluded that the Network had been conservative in the proportion of transferred services forecast. We have therefore increased the proportion of transferred services to historical levels.

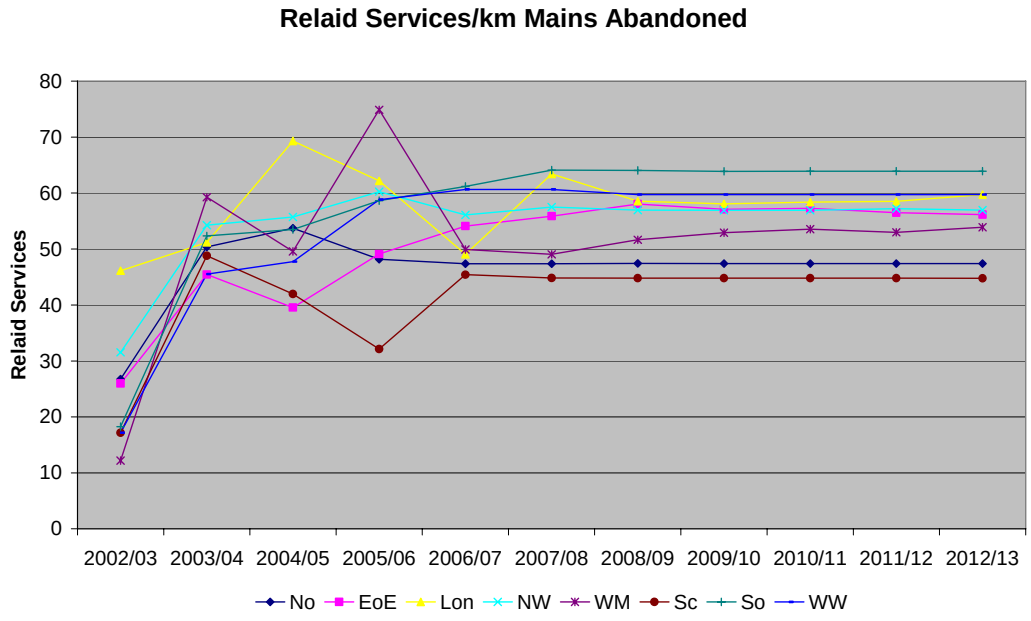

Figure 8-11

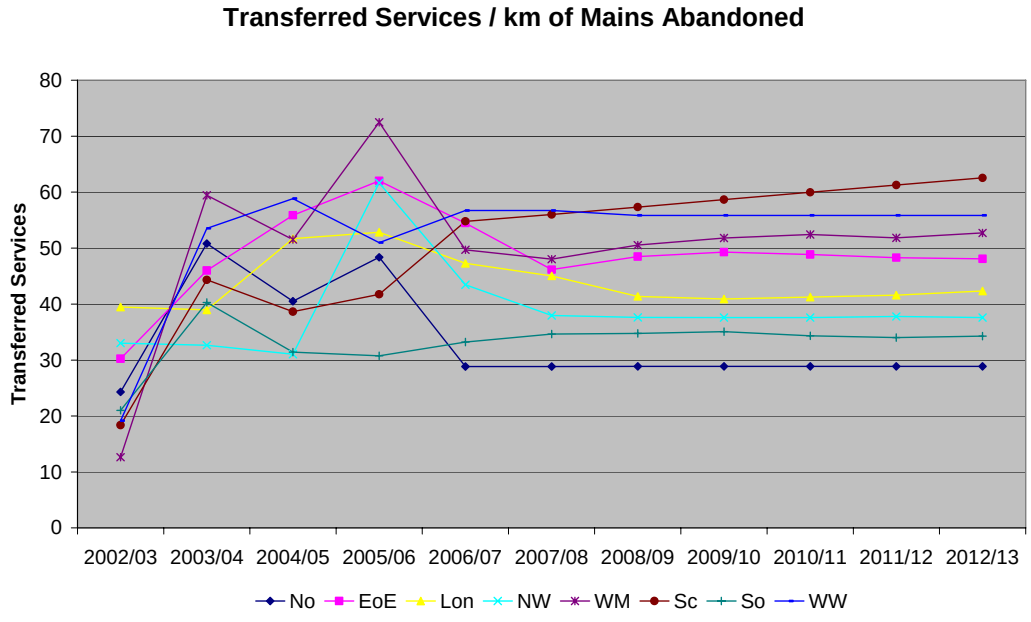

Figure 8-12

Non-domestic Services

We have accepted the forecast volumes as being in reasonable proportion to the domestic services workload and propose no adjustment.

Multiple Occupancy Buildings

The Network has suspended its survey (T/PM/LC21; 20% complete) and is revising the requirements to include information on the ease of isolation in emergency and the use of gas within the premises (e.g. water heating by gas). This additional information will enable the consequences of isolation (including the cost of compensation payments) to be taken into account in prioritising the work

The Network's current submission is on a "replace on failure" basis and we regard this as a reasonable approach, and in reasonable proportion to the services workload overall, whilst the survey is incomplete.

GDN Volumes (Adjusted)	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
Installed Mains (km)							
HSE Programme	197.6	297.0	323.2	323.3	322.0	322.8	322.9
MPDI Programme	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Non-rechargeable Diversions	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Other Policy & Condition Mains	19.2	26.6	40.5	39.3	38.1	47.8	44.7
Total Installed Mains (km)	**217.7**	**324.5**	**364.6**	**363.4**	**361.0**	**371.5**	**368.4**
Replacement Services - domestic							
Relaid services associated with mains replacement	10763	21490	21159	20889	20886	21589	21829
Relaid services not associated with mains replacement (bulk relays)	0	0	0	0	0	0	0
Services relaid after escape	3950	3905	3861	3817	3773	3730	3688
Service test & transfer to new or other main	10370	15261	17312	17091	17089	17663	17860
Reposition domestic meter - service relays	0	0	0	0	0	0	0
Purge & relight after domestic service work	16000	16000	9580	10961	10485	10263	10688
Service relay domestic meterwork	0	0	0	0	0	0	0
Other domestic services	1260	1383	1383	1383	1383	1383	1383
Total Domestic Services	**42343**	**58039**	**53294**	**54140**	**53616**	**54628**	**55448**
Replacement Services - Non-domestic	**15**	**26**	**165**	**69**	**144**	**231**	**156**
Multiple Occupancy Buildings							
Renew service connections	501	976	1060	1025	1058	1110	964
Total riser renewals (m)	4730	7942	8459	8356	8594	8997	7692

Table 8-9

Proposed Costs

In section 8.2.4 above we explained how we established the relative position of each Network, the upper quartile and the Network with the lowest unit costs overall.

We expect Networks behind the upper quartile to improve and close the gap and we have set the Network the target of closing 70% of the cost gap to the upper quartile over the five years to 2012/13.

Networks that are in front of the upper quartile (frontier Networks) are also expected to improve by closing the gap with our projection of their costs over the period to 2012/13. Our projection is based on the assumptions at 8.4.5 below and includes a 1.75% per annum productivity improvement. Thus as these Networks improve each year, the upper quartile moves forward, stretching the gap to be closed by those Networks behind.

On-going efficiency improvements

As part of our review we have considered how these efficiencies may be achieved.

Alliance Contract

The principal vehicle is likely to be the Alliance arrangement which the Network uses to deliver its replacement programme. The size of Alliance projects, and the proposed zonal replacement approach, enable economies of scale, together with detailed planning and management of the project to improve efficiency. Within the Alliance, the partners work together to optimise replacement projects from the planning process to final completion. This approach exposes the process to a single management body that is incentivised to reduce costs via a target cost and a painshare/gainshare arrangement. Other advantages of this approach are better management of customer issues (notification, disconnection time, reconnection, internal reinstatement etc.) and traffic and highway occupation times. Large projects also make techniques such as aggregate recycling, and the re-use of excavated material through conditioning more achievable, as well as providing the critical mass for further innovation.

Productivity improvements are "locked in" through stretched targets prompting the need to innovate and find further savings, and a range of KPIs, including a safety "gateway" ensure a balanced approach to other aspects such as delivery, quality, and people issues.

Zonal Replacement

The efficiency of the Alliance is dependent on large projects and the zonal approach to replacement as the platform on which to operate efficiently and drive down costs.

During our review the Network explained to us that HSE had accepted the Zonal approach provided that it removed an equivalent amount of risk to 20/70/10. The Network has demonstrated[8] that the zonal approach removes more risk than 20/70/10 and therefore there is no need for de-commissioning rates greater than those required to meet the thirty year programme.

8.4.3 SPECIFIC COST AREAS

Multiple Occupancy Buildings

The Network has forecast expenditure of around £3.0m/year for the replacement of risers & laterals in multiple occupancy buildings. This is sufficient to replace on failure but insufficient for a pro-active approach.

Ofgem, in its GDPCR Third Consultation Document, has invited views on the issues associated with the replacement of these connections and there may be developments which would enable Networks to follow a process leading to an alternative to replacement in some instances, although it is recognised that there are inevitably costs associated with this option.

We acknowledge that it is appropriate that the Network incorporates multiple occupancy buildings within its replacement programme, however we feel that at present too little is known about the population, its condition, and the consequences of isolation, to prioritise the work or assess the appropriate rate of replacement.

The cost of replacement risers and lateral connections to apartments within multiple occupancy buildings is influenced by a number of factors. We have reviewed the Network's proposals and compared them with data from other Networks including some examples of completed projects.

The recommended investment is our view of the reasonable cost of a "replace on failure" approach and is based on limited data provided by the Network on its population of these buildings and likely costs. If the Network can provide better data on the population, its condition and the consequences of isolation, it may be reasonable for Ofgem to review the allowance to accommodate a pro-active programme of prioritised replacement.[9]

8 National Grid Network Strategy, Mains Replacement Review 2007-2013

9 We have asked all the Networks to provided an update of their survey information and a revised forecast as part of the 2006/07 BPQ update.

Strategic Medium Pressure Mains

The Network has a population of medium pressure iron mains which must be decommissioned according to risk. The Network has limited the replacement of large diameter mains (MP & LP) during the first five years of the programme with the acknowledgement of HSE. The purpose was to focus on small diameter (higher risk) mains during the "ramp-up" period and allow time to develop alternatives to expensive size for size replacement in these larger diameters. No acceptable new techniques are currently available although a pipe refurbishment (internal coating) technique may be developed to become acceptable for LP mains.

The Network has explained that its MP systems are required to work at full capacity and therefore size for size replacement is required if tackled on a piece-meal basis. This would require the installation of large diameter pipe in urban/city situations and leave the Network operating a mixed material, large diameter, PE/metallic system. Strategic replacement of larger sections of the system will allow downsizing, complete replacement by insertion and, with the iron sections de-commissioned, operation at higher pressures.

The Network has developed a programme phased over 15 years, however this will isolate holder stock where the holders discharge into MP systems and ultimately 3mcm of storage will be lost. The Network is proposing an LTS project to replace this storage in three phases[10] to 2018. The cost of 80km of 48" pipeline is approximately £100m, offset by approximately £200m of savings from the avoidance of size for size replacement of the MP system.

We regard this approach, providing it is verified by cost-benefit analysis, to be appropriate and we have made no adjustment to the volumes proposed. We have supported the proposal because:

> The risk/km arising from large diameter medium pressure mains is now significantly greater than that from the low pressure system.
>
> The size for size replacement of the system will entail significant disruption on a scale that is probably unacceptable in central London.
>
> The strategic approach removes metallic sections (and the associated emissions and maintenance workload) that may well require replacement due to condition during the course of the programme.

We anticipate that these strategic medium pressure projects will be substantial; comprising both "HSE Enforcement Policy" and "Other Policy & Condition" components and Ofgem may wish to identify these on a project basis in a similar way to reinforcement.

If Ofgem proceeds with a revised Supplementary Incentive Mechanism, the impact of these schemes needs to be considered as the costs are less closely related to the diameter of the existing main. This may not be significant on an overall basis, but "over-funding" of larger diameters is inevitably balanced by "under-funding" of others, and since income from the mechanism is usually considered as part of the project design and approval process, a good fit to actual costs will minimise potential influence.

We asked the Network whether it had considered hose-lining as an alternative to replacement. Hose-lining is a refurbishment technique (a resin impregnated liner "bonded" to the inside of the pipe) used selectively in the 1980s and with many of the refurbished mains still in service. The Network is not currently considering hose-lining as an alternative to replacement (the merits of hose-lining, compared to replacement, are the subject of some debate) but we recommend that in the design of a revised Supplementary Incentive Mechanism it should be clear whether or not refurbished mains are included.

[10] Peters Green to South Mimms (£31m) is the first phase due to be commissioned by 2012. See Section 3 of this report.

Changes in the Regulation of the Disposal of Waste

The Network will be exposed to cost increases arising directly from the Landfill Regulations and Landfill Taxes. It will also incur other costs to optimise overall expenditure in this area and minimise waste to landfill.

Improved waste segregation will be required to prevent more of its waste being classified under the Landfill Regulations as "non-hazardous" rather than "inert" as at present. The shift from inert to non-hazardous status is primarily driven by the volume of bituminous materials to be disposed of, either directly, or where inert material has become contaminated with bituminous material making the whole of the contaminated waste non-hazardous and subject to higher disposal charges. In addition, the Environment Agency is becoming more active in enforcing the Landfill Regulations and Landfill Operators are becoming more cautious in accepting material as "inert", causing it to be disposed of as "non-hazardous" at higher cost.

As well as disposal charges, the Landfill Tax charge is currently levied at £2/tonne for inert/inactive waste, with a standard rate of £21/tonne charged for all other waste. The Government has stated that the standard rate for non-hazardous waste will increase by at least £3[11] annually to a rate of £35 in 2010.

The Network has included these higher tax costs within its forecast together with associated costs related to the improved segregation of materials and increases in tipping charges.

There is considerable uncertainty around the likely change in disposal and tax charges going forward. Variables are:

The volume of waste and the proportion of inert and non-hazardous (and possibly small volumes of hazardous) material for disposal.

The marginal costs of waste segregation and the level, and cost, of recycling achieved.

The cost of testing to establish the status of waste for disposal.

The rate of Landfill Tax due on the waste for disposal.

The Landfill Tax charge in our base year was £18/tonne (Standard Rate) and our analysis has made no allowance for the proposed increases in subsequent years. Nor has any allowance been made for possible changes in the enforcement of the Landfill Regulations.

We therefore recommend that this is treated as an uncertain cost and that an adjustment is made following further assessment.

8.4.4 REAL PRICE EFFECTS

We agree with the Network's view on the likely trend in labour and material costs but take a more optimistic view of RPI +2.25% (contractors) and RPI + 1% (direct labour & materials) each year. Our view has to be considered in conjunction with our overall productivity assumption of a 1.75% year on year gain.

Further details of our assumptions can be found in section 2

[11] Revised to £8 each year to 2011 in the recent Budget statement.

8.4.5 RECOMMENDATIONS

GDN Projected Costs	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
Installed Mains							
HSE Programme	32.4	52.1	61.7	60.2	57.9	51.8	50.4
MPDI Programme	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Non-rechargeable Diversions	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Other Policy & Condition Mains	2.0	3.4	7.4	7.1	7.0	9.6	8.9
Rechargeable Diversions	-1.1	-0.4	-0.6	-0.6	-0.5	-0.5	-0.5
Total Installed Mains	**33.6**	**55.4**	**68.7**	**67.0**	**64.7**	**61.2**	**59.1**
Replacement Services - domestic							
Relaid services associated with mains replacement	7.5	13.8	13.0	12.6	12.4	12.5	12.4
Relaid services not associated with mains replacement (bulk relays)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Services relaid after escape	2.8	2.5	2.4	2.3	2.2	2.2	2.1
Service test & transfer to new or other main	3.6	4.9	5.3	5.1	5.0	5.1	5.1
Reposition domestic meter - service relays	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Purge & relight after domestic service work	0.4	0.3	0.2	0.2	0.2	0.2	0.2
Service relay domestic meterwork	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other domestic services	0.9	0.9	0.9	0.8	0.8	0.8	0.8
Total Domestic Services	**15.2**	**22.4**	**21.7**	**21.1**	**20.6**	**20.8**	**20.6**
Replacement Services - Non-domestic	**0.0**	**0.1**	**0.3**	**0.1**	**0.3**	**0.4**	**0.3**
Multiple Occupancy Buildings							
Renew service connections	0.2	1.0	0.7	0.7	0.7	0.8	0.7
Total riser renewals (m)	0.6	3.9	2.1	2.1	2.2	2.4	2.1
Total	**0.9**	**4.8**	**2.8**	**2.8**	**3.0**	**3.2**	**2.8**
Total Repex	**49.7**	**82.7**	**93.5**	**91.0**	**88.6**	**85.6**	**82.7**

Table 8-10

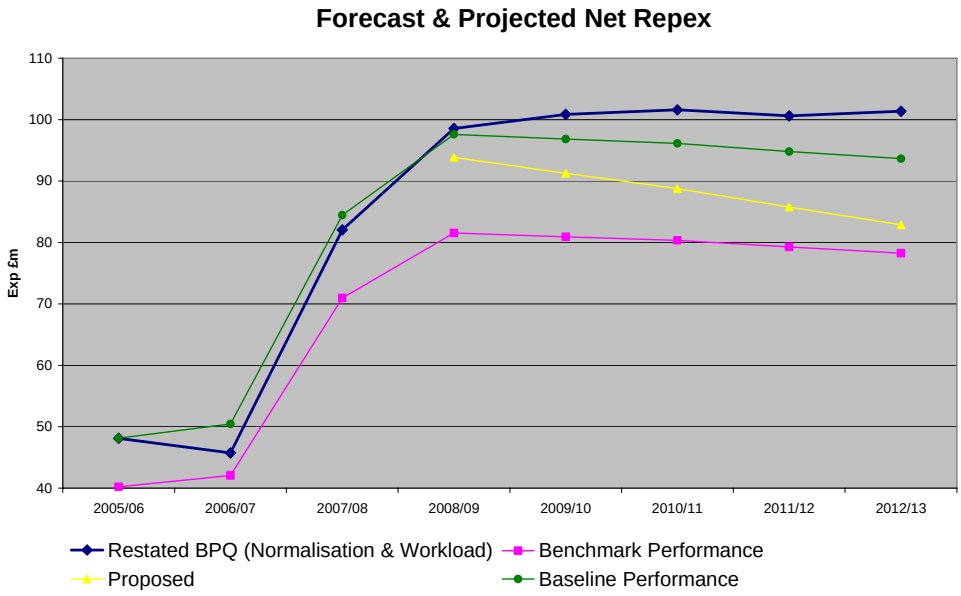

Figure 8-13

8.4.5.1 Supplementary Incentive Mechanism

The Supplementary Incentive Mechanism was introduced within the 2001 Price Control Review to address the "diameter effect" where a workload of smaller (than forecast) diameter mains could produce savings for the Network. The current incentive applies only to mains abandoned and rewards the Network if mains replacement costs are less than the "value" of the mains abandoned. This is calculated annually by multiplying the length abandoned in each diameter band by the appropriate matrix value. Thus the incentive acts to minimise the cost of replacement mains and maximise the mains abandoned.

Operation of the current incentive has raised the following issues:

Rather than simply minimising the cost of replacement mains, the incentive should reflect the need to optimise whole project costs and consider:

i) The cost of replacing the associated services (Repex)

ii) The requirement for system reinforcement (Capex)

iii) The effect on the operating pressure of the network, the level of public reported escapes and emissions/shrinkage (Opex)

We are satisfied that the Network does take these factors into account but we do not think it appropriate that the incentive should continue in its current form as it can be conceived as an incentive to transfer costs to these other areas and as a potential impediment to best practice in network management.

We understand that Ofgem intends to address these issues by including services within the Repex incentive and by introducing a similar Capex incentive to act on reinforcement. Networks will bear any additional Opex costs that fall outside of the Allowance.

We have therefore expressed the recommended expenditure in terms of mains decommissioned. In doing so we have made judgements on the overall ratio of mains installed to mains de-commissioned, and the likely diameters of installed mains (and the relative proportions) that contribute to the cost of de-commissioning by diameter band.

We have drawn on data made available to us during this review to allocate proportions of smaller, equivalent and larger diameters of installed pipe to each diameter band of de-commissioned mains. We thus developed a set of standard unit costs which set the relationship of each diameter band. These unit costs were then applied to the projected

volumes to give a total notional cost and a scaling factor when compared to our recommended efficient costs. Standard unit costs were then adjusted and applied to the projected volumes to total to the recommended efficient cost for each year as shown below.

Re-chargeable diversions are excluded as in the current version of the supplementary incentive mechanism

De-commissioned Mains	2008/09			2009/10		
£m (05/06)	Volume (km)	Unit Cost (£/m)	Total £m	Volume (km)	Unit Cost (£/m)	Total £m
</=3"	22.64	69.88	1.58	24.21	68.57	1.66
4-5"	160.70	76.29	12.26	174.02	74.86	13.03
6-7"	70.79	107.34	7.60	55.98	105.33	5.90
8-9"	33.74	198.55	6.70	29.47	194.84	5.74
10-12"	38.11	277.40	10.57	41.47	272.22	11.29
>12-18"	29.48	402.26	11.86	29.02	394.74	11.45
>18-24"	12.28	562.22	6.90	12.17	551.72	6.72
>24"	17.15	693.82	11.90	17.31	680.85	11.79
	384.89		**69.37**	**383.63**		**67.57**

	2010/11			2011/12		
£m (05/06)	Volume (km)	Unit Cost (£/m)	Total £m	Volume (km)	Unit Cost (£/m)	Total £m
</=3"	23.25	67.98	1.58	21.65	65.93	1.43
4-5"	161.76	74.22	12.01	163.42	71.98	11.76
6-7"	74.25	104.42	7.75	92.17	101.28	9.33
8-9"	32.68	193.16	6.31	31.87	187.35	5.97
10-12"	31.99	269.87	8.63	30.38	261.75	7.95
>12-18"	28.19	391.34	11.03	26.17	379.57	9.93
>18-24"	12.83	546.96	7.02	16.15	530.51	8.57
>24"	16.14	674.99	10.89	10.28	654.69	6.73
	381.08		**65.22**	**392.08**		**61.68**

	2012/13		
£m (05/06)	Volume (km)	Unit Cost (£/m)	Total £m
</=3"	23.60	65.10	1.54
4-5"	163.21	71.07	11.60
6-7"	82.37	100.00	8.24
8-9"	37.27	184.98	6.89
10-12"	35.26	258.44	9.11
>12-18"	24.64	374.76	9.23
>18-24"	13.39	523.79	7.01
>24"	9.15	646.39	5.92
	388.90		**59.55**

Table 8-11

9 LTS REPEX

9.1 SUMMARY

Repex £m (05/06 prices)	2008/09	2009/10	2010/11	2011/12	2012/13	Total
BPQ Submission						
LTS	0.0	0.0	0.0	0.1	0.1	**0.2**
Total	**0.0**	**0.0**	**0.0**	**0.1**	**0.1**	**0.2**
Normalisation Adjustments						
LTS	0.0	0.0	0.0	0.0	0.0	**0.0**
Total	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Normalised BPQ						
LTS	0.0	0.0	0.0	0.1	0.1	**0.2**
Total	**0.0**	**0.0**	**0.0**	**0.1**	**0.1**	**0.2**
Adjustments						
LTS	0.0	0.0	0.0	0.0	0.0	**0.0**
Total	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Proposed Repex						
LTS	0.0	0.0	0.0	0.1	0.1	**0.2**
Total	**0.0**	**0.0**	**0.0**	**0.1**	**0.1**	**0.2**

Table 9-1

9.2 POLICIES & PROCEDURES

9.2.1 INTRODUCTION

LTS Repex work falls into two categories. Firstly rechargeable works which are instigated by and paid for by the requesting authority (Local Authority, Highways Agency etc). NGG's policy here is to recover fully uplifted costs including any attributable overheads where applicable. Secondly, non-rechargeable works which result from legal requirements to relocate (lift and shift) pipelines under the terms of the easements (e.g. private land, railway bridges), or for 'asset condition' reasons such as corrosion or unstable land conditions (e.g. mining subsidence). Once the work has been identified and categorised the design, procurement, monitoring and control processes are the same as for LTS Capex projects.

9.2.2 SCOPE OF POLICIES AND PROCEDURES

As stated above, the planning and procurement of the actual works will be treated as per LTS Capex projects plus a further financial process for ensuring full recovery of costs from third parties for rechargeable work.

9.2.3 REVIEW AND UPDATE PROCESS

There is no specific reference in the submission to review processes for LTS Repex projects, but again the processes for LTS Capex controls will apply here. However, third parties dictate a large part of the programme and this often has to override any 'internal' planning process.

9.2.4 EFFICIENCY AND PRODUCTIVITY

All major works identified under LTS Repex will be open market tendered except for small and operationally complex work which may be undertaken by a period contractor on tendered rates.

Usually a replacement project will be more operationally complex than an equivalent capital project as it may need to be undertaken in stages and be linked with requirements to maintain continuous gas supplies. Hence unit costs or other such comparators are usually meaningless here. As with LTS Capex projects, the key to efficient execution is good planning. London's listing of LTS Repex work indicates an almost zero net cost overall for this work, as it is all rechargeable.

9.3 HISTORICAL PERFORMANCE

9.3.1 ESTABLISH UNDERLYING COSTS

LTS Net Repex All figures £m 2005/06 prices	2002/03	2003/04	2004/05	2005/06	2006/07
BPQ Gross Submission	0.0	0.0	0.0	0.0	1.0
BPQ Capitalised Overheads	0.0	0.0	0.0	0.2	0.2
BPQ Contributions	0.0	0.0	0.0	0.1	1.3
BPQ Net Submission	0.0	0.0	0.0	0.1	-0.1

Table 9-2

LTS Repex work is largely dictated by third parties. Therefore the historical trend cannot be taken as an indication of historical performance or efficiency. Work is tendered to ensure that the lowest cost is procured.

9.4 FORECAST

9.4.1 COMPANY PROPOSALS

The programme of LTS Repex work for 2008/09 to 2012/13 is costed in the submission. All the work is rechargeable.

LTS Net Repex All figures £m 2005/06 prices	2008/09	2009/10	2010/11	2011/12	2012/13
BPQ Gross Submission	0.2	0.2	0.2	0.1	0.1
BPQ Capitalised Overheads	0.2	0.2	0.2	0.2	0.2
BPQ Contributions	0.3	0.4	0.4	0.2	0.2
BPQ Net Submission	0.0	0.0	0.0	0.1	0.1

Table 9-3

9.4.2 SPECIFIC COST AREAS

Although the year on year expenditure can be variable, this is because it comprises a series of one-off projects which occur when they are needed. There will be no meaningful trend. For the London Network in the five year period, all the proposed work is rechargeable.

9.4.3 RECOMMENDATIONS

The programme is all rechargeable. Therefore the requested expenditure for each of the years from 2008/09 to 2012/13 is proposed to be allowed.

APPENDIX 1 FINANCIAL & TECHNICAL POLICIES

A1.1 INTRODUCTION

This appendix summarises our investigations of the financial and technical framework under which National Grid Gas Networks operates the Network. It considers the structure it utilises to effectively manage the network assets and the key policies it adopts to ensure it meets its Statutory Licence obligations and other legislative requirements.

A1.2 APPROACH

The key policies used by the Network have been reviewed and where appropriate comments are made on our findings.

Our analysis has been to consider key polices under the following headings:

Purpose -- context of the Policy, how it fits with legal requirements and its financial impact

Appropriateness -- does it deliver the required outcomes, are financial and/or technical risks adequately managed and does it fit with the Statutory and legal requirements of the Network owner/operator

Safety and Environment – are the safety and environmental risks appropriately managed, and are they clearly understood and documented

Omissions and Improvements – have any improvements or omissions been identified preventing achievement of the declared objectives

Implementation – have any issues relating to clarity of understanding and consistency of implementation been identified

This review of Policies and Procedures does not comprise a full and comprehensive approval process designed to ensure compliance with all policy requirements and statutes which could only be achieved with a properly conducted and structured audit programme. The objective is to consider whether the high level objectives of the policy are met and that the content is appropriate for the purpose intended.

A1.3 FINANCIAL AND TECHNICAL FRAMEWORK

National Grid Gas (Distribution) own and operate four gas distribution networks which are;

- London
- West Midlands
- East of England
- North West

NGG has largely completed a restructure of its business, using a centralised Asset Management model. This restructure was undertaken prior to, during and post completion of the sale of four of its Networks in 2005.

The model, which operates on a functional basis, consists of the following;

- Network Strategy
- Operations
- Construction
- Distribution Support
- Commercial
- Support Services Provision

The terms of the Licence held by NGG under the Gas Act requires them to;

- have a network code which sets out the transportation arrangements between NGG, the NTS, other GDN's and gas shippers for connection to and use of its pipeline system; and
- maintain security standards for system development. This standard stipulates that the pipeline system must be capable of meeting peak aggregate daily demand that is only likely to be exceeded (whether on one or more days) in 1 year out of 20 years

The Gas Safety (Management) Regulations 1996 require NGG to prepare a Safety Case for acceptance by the Health and Safety Executive. Compliance with the Safety Case is mandatory and the NGG Gas Requirements Manual (GRM) is a depository of the policies and procedures that ensure NGG fulfils its Safety Case obligations and meets the requirements of the Transporter Licence.

An overview of the financial and technical framework within the Network is shown in the table below.

Financial and Technical Framework

Board Level	
Statutory, legal and regulatory requirements	
Financial	Technical
Investment Guidelines	
Budgeting process	Safety Case
Project definition, alternatives etc.	Gas Requirements Manual
Levels of authority	Safety & Technical Competence
Monitoring & control	Policies and Procedures
Re-authorisation of over/underspends	Change Process & authorisation
Project completion	Compliance Audit
PIAs	

The key requirement of this framework is that the Board of NGG structures and operates the business to ensure compliance with the statutory, legal and regulatory obligations placed upon them.

A1.4 TECHNICAL POLICY FRAMEWORK

The Gas Requirements Manual (GRM) defines the policies associated with engineering of the Network assets, protection of the public, the well being of the workforce and contractors and the protection of the environment. The GRM is the central policy document that governs all other SHE and Engineering documents. It summarises the high-level arrangements for key gas activities, provides links to other documents for full details in specific subject areas and is regarded as the key document referenced by managers and staff involved in gas engineering activities. The GRM, in conjunction with the Safety Case, describes what they do and how they operate to achieve a safe and reliable gas transportation network.

The GRM covers the following areas:

1. Legislative Compliance
2. Risk Management
3. Control of Documents
4. Change Management
5. Technical Authority Levels: Competence and Behaviour
6. Safe Working Practices and Safe Control of Operations
7. Environment
8. Occupational Health
9. Use of Contractors
10. Gas Escapes
11. Gas Supply Emergencies
12. Gas Quality
13. Metering
14. Incident Reporting and Investigation
15. Network Planning Analysis
16. Records Data Management
17. Network Asset Integrity
18. Distribution Pipe Replacement
19. LNG
20. Audit
21. Security
22. Telemetry

A1.5 POLICY DEVELOPMENT AND CONTROL

Within NGG, engineering and SHE documents are developed and approved within a governance framework which is headed by the Gas Safety and Engineering Committee (GSEC).

The detailed arrangements for the control of these documents is contained in T/PM/GR/2: Management Procedure for the Control of SHE and Engineering Documents.

A summary of the arrangements is given below:

- The Gas Safety and Engineering Committee (GSEC), the UK Distribution Executive Safety Health and Environment Committee (DSHE) form an integral part of the company's governance process.
- The primary body is the Transco Board which is supported by executive committees.
- The Gas Safety and Engineering Committee (GSEC) reports to the Board and is responsible for safety and engineering issues, and for ensuring consistency across the company with regard to health, safety, environment and engineering.
-
- NGG have appointed Policy Managers for each of the major disciplines reporting to the Director of Network Strategy.
-

A1.5 FINANCIAL POLICY FRAMEWORK

Under Section 9 of the 1986 Gas Act, National Grid Gas has a general duty to develop and maintain an efficient and economical system of gas distribution, to comply with any reasonable requests for connections (provided economic) and to facilitate competition in the supply of gas. The successful management of major investment projects is central to ensuring that National Grid Gas complies with these duties.

The investment management strategy is supported by Distribution Investment Guidelines [v8.5 March 06] which are designed to ensure that all project expenditure can be justified on safety, business, technical and / or economic grounds and is properly controlled.

Most expenditure is authorised by the Distribution Project Sanctioning Committee [DPSC]. The DPSC is a sub-committee of the Distribution Executive Committee. DPSC receives business case submissions for authorisation and, where appropriate, re-sanctions capital and revenue expenditure and special revenue expenditure within its current delegated authority level. It also supports and recommends for approval submissions that are above its delegated authority for authorisation to the National Grid Group Executive or Board as appropriate.

The membership of the DPSC is given as;

- Chief Operating Officer
- Finance Director
- Director of Network Strategy, Distribution
- Director of Construction
- National Operations Director
- Director of Safety, Health and Environment
- Commercial Director
- Distribution Regulation Manager
- General Counsel
- Procurement and Logistics Manager

Terms of reference for the DPSC are given in Appendix 1 of the Investment Guidelines.

Levels of delegated authority are set within the financial policy framework of NGG consisting of primary, secondary, tertiary and lower delegations. Primary delegations set the authority at the highest level for the NG Group Board, NG Group Executive and the Executive Group Directors. Secondary delegations represent the limits for Subsidiary (or business) Boards. Tertiary delegations are the authorities given to Executive Teams and any direct reports to Directors. Beyond this are lower delegations that flow directly from tertiary delegations.

The returns made by NGG indicate that control over expenditure is maintained via the implemented policies and investment control bodies and a process for post investment reviews/appraisals (PIR/A) is in place.

A1.6 FINDINGS

A1.6.1 ENGINEERING AND SAFETY POLICY DOCUMENTS

The various levels of engineering and safety documents together with the associated governance arrangements have been reviewed and no issues found.

A1.6.2 TECHNICAL FRAMEWORK

The Technical governance process within NGG is clear and well formulated. Mandatory change control processes are in place to ensure proper document control and policy governance. Directors and Senior Managers are involved in the major governance groups reviewing and authorising safety, health, environmental and engineering policies. Arrangements are in place to review the impact of changes to legislative requirements and, importantly, to learn lessons from incidents or near misses should they occur.

A1.6.3 FINANCIAL FRAMEWORK

The documents reviewed show a clear process for budget formulation and approval, financial control and monitoring of investment expenditure. The Distribution Investment Guidelines were clear and precise and contained good advice and examples which we feel would create consistently high standards of project submission when followed.

APPENDIX 2 NETWORK PLANNING

A2.1 INTRODUCTION

NGG carries out network planning in accordance with the Policy for Network Planning (T/PL/NP/18). This document sets out the policy requirements for network planning activities for use with all natural gas systems operating at pressures up to 100 bar.

For systems above 7 bar, network analysis is carried out using Graphical Falcon. The network validation process is described in Management Procedure for Validation of High Pressure Distribution Network Analysis Models (NP2)

For systems below 7 bar, network analysis is carried out using GBNA and LINAS. The network validation process is described in Management procedure for the validation of networks with an operating pressure not exceeding 7 bar (NP29).

Systems must be designed to meet the maximum demand growth forecast to be placed upon them at the specified planning horizon.

- For systems operating at pressures not exceeding 7 bar the maximum demand is defined as the appropriately diversified 1 in 20 peak 6 minute demand expressed as an hourly rate.
- For systems operating at pressures exceeding 7 bar the maximum demand is defined as the 1 in 20 design criterion.

In addition, for all systems, where interruptible loads or non-typical loads, particularly seasonal loads, could affect the design of the network an evaluation for conditions away from peak must be undertaken.

The 1 year review investigated the London network planning processes and procedures and concluded that the planning work for development of the network and in particular that of the local transmission and storage system has been carried out in a competent manner.

A2.1.1 DIURNAL STORAGE

In this review demand and diurnal storage planning were reviewed in particular.

i) We asked about the demand experience in the years 2004/05 and 2005/06 and the impact on forecasts.

NGG stated that their forecasts were based on the published 2006 LTDS

NGG said that investment plans within the October BPQ submission were based on the 2006 demand forecasts approved in May 2006 arising out of the Transporting Britain's Energy process, undertaken by National Grid Gas Transmission. This is validated using actual throughput and therefore takes account of actual demand in recent years. Also, the economic indicators, used to generate the demand forecasts continue to be reviewed as part of the planning process and, where necessary, changes are made to reflect recent events - increases in fuel price being one such instance.

NGG said that its plan is reviewed annually against the revised demand forecasts and, where possible, projects are amended to reflect changes demand forecasts. Where forecast demand has increased it may be necessary to advance projects or invoke contingency arrangements.

NGG said that its Capex plan represents the minimum investment it believes is required meet our supply obligations based on the 2006 demand forecasts. However, the plan does not include expenditure to allow for the possibility of increased demand outside normal planning tolerances, nor does it include a full list of all possible projects from which we would choose the most optimum projects to satisfy demand.

We believe this approach to be satisfactory.

ii) We asked NGG about their post invesment appraisal processes and in particular lessons learnt in relation to LTS projects and how these are reported and disseminated.

NGG said that the Distribution Project Sanctioning Committee (DPSC) is the investment/expenditure committee operated by NGGD. This committee considers post investment appraisals and/or project completion reports for all LTS projects with an authorised sum of £50,000 and above. Very few such projects have been undertaken within NGGD's 4 networks over the last 5 years and only 2 since 2005.

NGG said that given the limited number of recent major LTS pipeline projects, DPSC does not formally maintain a list of lessons learnt, although the findings from each report are cascaded via directorate management meetings and are also taken into account when reviewing new projects. Furthermore, LTS pipeline projects are project managed for NGGD by National Grid's UK Construction directorate utilising standard processes and procedures.

NGG provided a detailed report on the lessons learnt from a recent project and the application of these lessons to projects in progress.

We believe this approach to be satisfactory.

iii) NGG provided an overview of the process of calculating diurnal storage volumes and details of the maximum volume of diurnal storage required and express this as a % of the 1 in 20 peak day demand in each year.

NGG says that diurnal storage model (SSM) provides the baseline assessment of the storage requirement and that the findings and recommendations subject to approval by senior London management. These reviews examine underlying trends and aim to ensure that the storage requirement is sufficient to meet NGG's obligations whilst not introducing step changes, unless supported by physical network changes. For this reason the agreed storage requirement values do not necessarily equate to the SSM outputs.

The following table shows the differences storage values, expressed as a percentage of peak demands.

Diurnal storage (% of peak demand)	Period 2008/09 to 2012/13
London (North Thames)	
SSM value	13.9%
Final value	13.9%

Table A2 - 1

NGG says that the key factors in establishing the diurnal storage requirement are demand, diurnal swing, forecast error and plant outages. However NGG also says that plant outage model was removed from the current SSM model because of insufficient historical data. NGG says that the impact of these factors varies across networks which results in the SSM output representing a more reliable indicator for some networks than for others. For the London network the SSM value is selected as the diurnal storage % amount.

iv) It is noted that the rising system pressures planned by London in its distribution system over the 5 year control period will increase the importance and frequency with which network validation needs to be carried out.

APPENDIX 3 PROCUREMENT & LOGISTICS

A3.1 INTRODUCTION

Following on from the one year review a further review and assessment of the procurement and logistics operation within NGG has been completed to ascertain whether or not the strategic approach and process is robust and effective in managing costs whilst maintaining security of supply.

Since the sell off of the Networks by National Grid, the new networks including NGG have a different market place in which to procure goods, services and works to support their business. There is no longer the advantage of large volume and single buyer status, so it is therefore crucial for the Network Companies to look for ways through procurement and logistics to obtain the best market solution possible for their particular needs and minimize costs.

A3.2 SOURCING STRATEGY

NGG do their procurement and logistics in-house and have a robust well established process.

A3.3 STRATEGIC PURCHASES

A3.3.1 MAINS AND SERVICE LAYING

NGG have put in place both alliance and term contracts. The spend for these contracts for the year to 31st March 2006 was £195m. The procurement process followed for these contracts was thorough and will have tested the market and the suppliers who tendered. As this is a very high spend strategic purchase, management of and the relationships in the contract are key to its success.

The one year review stated that after the first year (to 31st March 2006) the alliances were in gain share and that NGG has seen a 6 to 10% saving on previous EPC costs. The five year review has indicated that there has been a step change in costs of +25% for Repex services. Some of these costs may be due to market forces but NGG need to ensure that the contract is being effective and that cost reductions and continuous improvements are being implemented to minimize the unavoidable cost increases.

A3.3.2 CONNECTIONS

NGG is currently evaluating its options for the provision of NEW Housing and Non-Domestic connections following the expiry (30th June 2007) of the current SPC with Fulcrum connections.

The two options being considered are:

- A fully competitive tender in the open market or
- Full insourcing

NGG have demonstrated that they are considering how to address issues from the previous contract arrangements and have already tried to address under-recovery by introducing prospective pricing (effective 1st July 2006) and have made changes to Siteworks terms (effective 1st April 2007), these changes will be embedded within any future arrangements.

A3.3.3 BULK PURCHASES

NGG's overall strategy in the procurement of bulk purchases, specifically commercial vehicles, telecoms, office furniture and tools & equipment is to use their group leverage by consolidating their requirements across both Gas and Electricity. Most of these

categories have been competitively tendered using group leverage and therefore they should have achieved the best market costs for their requirements.

They have also competitively tendered their PE pipe and fittings requirements and have contracts in place with two suppliers. The contracts are proactive in product development and continuous improvement providing a positive approach to reducing costs and minimising the impact of unavoidable cost increases.

A3.3.4 SECURITY OF SUPPLY

NGG employ two strategies to ensure security of supply. They hold stock within their supply chain and secondly have multi-sourcing arrangements for strategic purchases e.g. PE pipe and fittings, where contracts are held with two suppliers who are capable of meeting their requirements.

A3.4 LABOUR SHORTAGES

Security of supply for Labour is primarily provided through the use of Alliance, Term and Agency contracts which enable flexible access to skilled resources within the competitive constructor market. NGG also plans to recruit apprentices and adult recruits. In 2007 they also plan to establish two Competence and Assessment Centres for new and existing employees. This will mean an initial investment of £5m and an annual operating cost of £450k.

The number of apprentices planned is 300 from 2007 to 2013 taking on 50 per year. Adult recruits is planned to be a total of 500 during the same period with varying numbers each year.

These plans show a positive approach to increasing the skilled labour in the industry.

A3.5 SUMMARY

NGG have a strong well established procurement process. The evidence provided has demonstrated their ability to test the market and implement new and innovative ways of reducing costs through effective procurement.

Where possible they have stated that they are using their group purchasing power to gain benefits. In other areas where they were once in a very powerful position as the only buyer, they now have to look for other ways to encourage continuous improvement and cost reduction. This has been demonstrated by the contracts they have in place for mains & service laying and PE pipe & fittings.

APPENDIX 4 GTMS/SOMSA EXIT PLANS

A4.1 INTRODUCTION

In February 2003, NG announced a 2-year program of Gas Distribution Control centralisation from 4 centres into a single UK control centre at Hinckley. The activity was to be carried out as part of the Control Centre Development Project (CCDP) an encompassing program that moved the gas national control centre to a new purpose built facility in Warwick.

The Distribution National Control Centre (DNCC) was opened in summer 2005 with full UK gas distribution control undertaken from Hinckley.

The Gas Transportation Management System (GTMS) is the Supervisory Control & Data Acquisition (SCADA) System that Controls the combined UK Distribution Networks. Originally, the System was to be replaced as a part of the roll out of the Transmission Control System; the iGMS project. However, a new iGMS for Distribution Control was removed from the program. The logic of the curtailment was entirely due to a change in focus of the NG business. Originally seen as a fully integrated system involving UK gas control, the company faced business separation issues as a result of Network sales, which rendered iGMS, for distribution, as an unfeasible option.

Given the backdrop of the issues of business separation the decision was then taken to alter the business ownership of DNCC moving management responsibility to Distribution, Network Strategy. The function of Distribution control is performed from Hinckley, which is wholly owned and operated by National Grid, with an agreement to operationally service all independent networks under a contract. That contract, known as SOMSA – System Operation Managed Service Agreement – is for all Operating services required for any given network.

A4.2 GMTS REPLACEMENT

GTMS is old technology based upon a Logica system dating from the mid 1980's. The System has been enhanced in house by NG over the years since its inception and has been used in its current form since 1996. However, one of the drivers for iGMS was the age of the GTMS product. GTMS spares availability is limited and there are issues of unsupported software by the manufacturer. NG undertook and completed work to establish the viability of continued running & support; the outcome was that it was considered unsustainable beyond 2009 and that a new System must be sought as a matter of some urgency. Investigation was undertaken into the possibly of moving the system to new computer hardware. Unfortunately, GTMS programmes are also embedded into the Operating System; a system that is not supported by the manufacturer.

A project was therefore established to keep GTMS functioning until 2009, the Prolonged Active Life (PAL) and a second project to replace GTMS was given approval in autumn 2005. Work was undertaken to provide a replacement specification on a modern platform, put the specification to market and engage a suitable contractor. After some 10 months of work SERCK controls was chosen from a shortlist of 4 companies.

The Distribution National Control System (DNCS) Project aims to replace GTMS with a like for like System but on a modern and sustainable platform and at the least possible cost to the industry as a whole.

A4.3 NETWORK SALES

The sale of distribution networks had a profound effect on gas distribution control for all parties, Distribution Networks and Control staff.

It was clear at the outset that given the safety elements associated with gas control and the difficulties to unpick control operations that handling distribution control for the newly

formed businesses would be extremely difficult. An agreement (contract) was developed, referred to earlier as SOMSA. A team was established at Hinckley who constructed, trained staff on and issued industry standard procedures for use by Network and control staff alike. The agreements were established between NGG and all other network owners. However, the SOMSA has always had a finite lifespan and a clear condition of the sale was that control should pass to the new owners. The costs associated with this transfer being factored into the sales process. To allow for the planning of the transfer post sales, Ofgem allowed a relinquishment of operational control for an initial period until March 2008, with the possibility of an extension beyond this stage subject to clear exit planning.

The agreement includes the provision of data and access to Systems to facilitate the transfer of control; however, it specifically excludes the provision of a SCADA System.

A4.4 AGREEMENT TO WORK TOGETHER

Following sales all owners reviewed the options for the provision of a new SCADA system to enable control to be passed back to the new owners. The owners all came to the conclusion that a collaborative approach to replacing the GTMS was the best way forward. Having considered the options available we would support this approach, although risk management is essential to ensure such a collaborative approach does not have difficulties in management and decision-making. It can be stated that we feel some of the risk factors are mitigated by a like for like arrangement in that the specification will be clear.

The approach was to replace the system, initially at Hinckley, and once proved robust further phases would establish the same system at the new owner locations and transfer from Hinckley would then be made.

A governance process has been adopted with an overarching program board to cover all activities associated with SOMSA exit of which GTMS replacement was one of several activities and has it's own project board and governance.

It is clear from the governance structure that SOMSA Exit is the goal with GTMS replacement as an enabler.

Network Owners need to provide their own project management delivery organisation to dovetail into the collaborative project.

Each owner has expressed a wish to exit. Early indications are a timetable as follows:

- Summer 2008 SGN
- Spring 2009 NGN
- Autumn 2009 WWU

However, there are no detailed transfer plans in place with NG for the transfer of operation. The owners continue to jointly work together to identify and understand the exact extent of the activities that would have to be completed by all participants.

APPENDIX 5 REFERENCE UNIT COST OF DIURNAL STORAGE

This appendix sets out the basis for the reference unit cost of diurnal storage used in the PB Power cost assessment.

Based on the unit pipeline costs set out in Appendix 6, the following graph shows the typical unit cost of linepack storage over a notional pressure range of 20 bar. The actual pressure range for a diurnal storage project can be higher or lower than 20 bar depending on the particular circumstances and location.

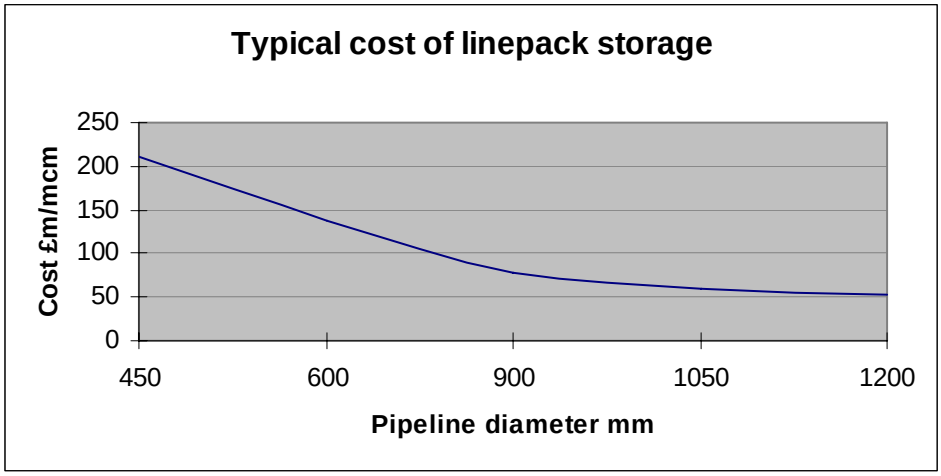

Figure A5- 1

The graph shows that the unit cost of diurnal storage reduces with pipeline diameter. The NTS uses larger diameter pipelines almost exclusively and so the cost of diurnal storage from the NTS will be around the £50m per mcm shown for a 1200mm diameter pipeline.

The GDN plans also show a movement towards larger diameter pipelines and so there will tend to be some convergence between the unit costs of storage from the LTS and from the NTS. However, the unit cost of pipeline construction for NTS project may be less than for LTS projects because of economies of scale, and so units cost of NTS storage may well be below the £50m/mcm in some cases.

Also in some cases the pressure cycling range of LTS (or NTS) projects can be substantially in excess of the 20 bar assumed here in which case the unit cost of LTS (or NTS) storage can be well below the £50m/mcm level.

We believe that a reference unit cost of £50m/mcm is reasonable for the assessment of GDN diurnal storage projects.

Economic storage

Based on the above analysis we have classified diurnal storage projects as follows:

- Economic: Projects with a unit cost of £50m/mcm or less. (The classification of a project as economic does not mean that there is necessarily a need for the project)
- Marginally economic: Projects with a unit cost of between £50m/mcm and £100m/mcm.
- Not economic: Generally, projects with a unit cost of over £100m/mcm. However, there may be exceptional local transmission constraints which might justify including projects in this category in the plan if evidence of such circumstances is provided.

APPENDIX 6 LTS PIPELINE UNIT COSTS

We have reviewed the costs of LTS pipeline projects over the period 2002/03 to 2012/13 which were reported in the BPQ submissions by the GDNs to establish unit costs of different diameter pipeline projects for cost projection purposes.

The following graph shows the data points derived from the BPQ submissions and used in the analysis. It also shows the PB Power unit costs assumptions.

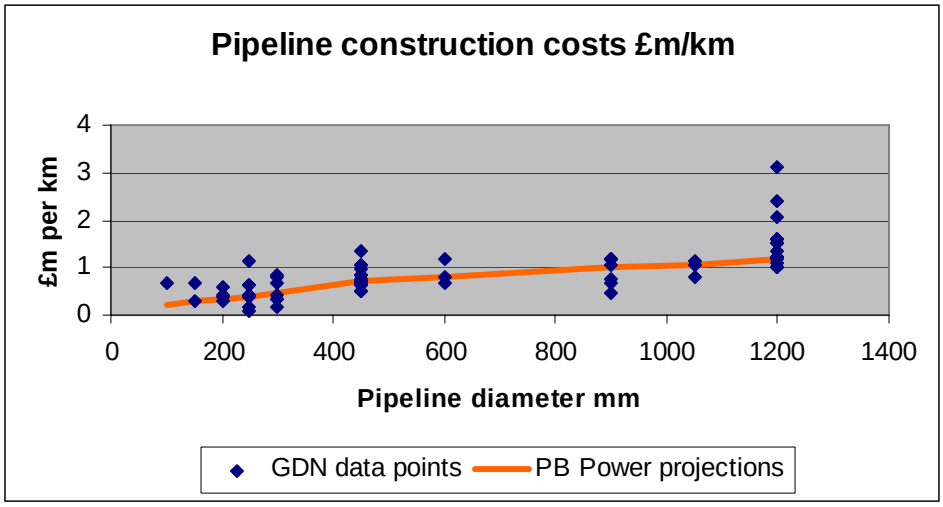

Figure A6 - 1

All the data points have been adjusted to 2005/06 price levels and RPEs assumptions have been removed from future project costs.

In selecting our proposed unit costs, we have taken the median values at each pipe diameter and made adjustments to give an increasing trend in unit costs consistent with the step changes in diameter. For the largest pipe diameter (1200mm) we have taken the lower quartile value since the data set included projects with particular route difficulties where individual adjustments for such factors would be appropriate.

We recognise that individual project costs will reflect specific features of the route such as road, rail and river crossings. We also recognise that some project costs have included additional plant such as PRSs. We have removed costs in certain cases but the analysis has not been detailed enough to ensure full consistency. The PB Power projections may therefore represent pipelines with route features giving project cost above average.

The following table shows the PB Power unit costs by pipe diameter used for cost projection purposes.

Pipeline diameter (mm)	PB Power projection (£m/km)
200	0.35
300	0.45
450	0.70
600	0.80
900	1.00
1050	1.05
1200	1.20

Table 6A - 1

The cost are at 2005/06 prices and exclude the PB Power RPE effects which are added separately in the expenditure assessment.

APPENDIX 7 REGIONAL FACTORS

A7.1 BCIS REGIONAL & COUNTY FACTORS

The Regional and County Factors is published by BCIS, a trading Division of the Royal Institute of Chartered Surveyors (RICS). The figures published in October 2006 have been adapted in order to generate a suitable regional factor index for each GDN for comparison purposes for the review.

The county indices have been modified to remove Orkney Islands Area, Shetland Islands, Northern Ireland and the Channel Islands from the figures. Counties have been allocated to GDNs and where they fall between two GDNs and estimate of the spilt between the GDNs has been made.

The table below lists the Counties which have been split between GDNs and the allocation which has been assumed for each GDN.

COUNTY	WW	No	So	EoE	Lon	NW	WM
Cumbria		70%				30%	
South Yorkshire		50%		50%			
Essex				70%	30%		
Hertfordshire				90%	10%		
Berkshire			75%		25%		
Buckinghamshire			75%		25%		
London Postal Districts			50%		50%		
Outer London			35%	30%	35%		
Hereford and Worcester	20%						80%
Cheshire						80%	20%

Table A7- 1

The regional factor for the GDN is calculated as a weighted average of the total county factors based on the sample sizes. The BCIS data includes a sample size for each county together with the factor for that county. Where the Counties are considered to fall into one or more GDN footprint we have estimated the proportion of the County sample which should be allocated to each GDN. (For example the sample size for London Postal Districts in the BCIS data is 528, we have estimate that this County should be split 50% to each of London and Southern GDNs, therefore sample sizes of 264 have been allocated to each GDN)

For each GDN a weighted average factor is then calculated. The resulting tables used to produce the GDN indices are given below.

Wales & West	Network/ County Factor	Sample Size
Avon	1.02	92.0
Cornwall	0.99	103.0
Devon	0.99	163.0
Gloucestershire	1.02	73.0
Somerset	0.99	74.0
Hereford and Worcester	0.94	23.8
Clwyd	0.87	50.0
Dyfed	0.94	36.0
Gwent	0.92	52.0
Gwynedd	0.89	23.0
Mid Glamorgan	0.91	54.0
POWYS	0.90	23.0
South Glamorgan	0.93	46.0
West Glamorgan	0.89	31.0
Network Value	**0.96**	**843.8**

Table A7- 2

Northern	Network/ County Factor	Sample Size
Cleveland	1.02	62.0
Cumbria	1.05	44.1
Durham	1.01	113.0
Northumberland	1.04	46.0
Tyne Wear	1.01	172.0
Humberside	1.00	104.0
North Yorkshire	1.03	92.0
South Yorkshire	1.01	63.5
West Yorkshire	1.00	212.0
Network Value	**1.01**	**908.6**

Table A7- 3

Scotland	Network/ County Factor	Sample Size
Borders Scotland	0.99	18.0
Central Scotland	0.98	32.0
Dumfries & Galloway	0.93	23.0
Fife	0.96	62.0
Crampian	0.90	134.0
Highland	0.93	42.0
Lothian	1.02	131.0
Strathclyde	1.03	363.0
Tayside	0.98	85.0
Network Value	**0.99**	**890.0**

Table A7- 4

Southern	Network/ County Factor	Sample Size
Kent	1.05	215.0
Surrey	1.10	151.0
East Sussex	1.05	119.0
West Sussex	1.04	118.0
Berkshire	1.04	100.5
Buckinghamshire	1.03	135.8
Hampshire	1.01	293.0
Isle of Wight	1.00	18.0
Oxfordshire	0.99	104.0
London Postal Districts	1.18	264.0
Outer London	1.10	112.0
Dorset	1.02	96.0
Wiltshire	1.01	94.0
Network Value	**1.06**	**1820.3**

Table A7- 5

East of England	Network/ County Factor	Sample Size
South Yorkshire	1.01	63.5
Derbyshlre	0.94	120.0
Leicestershire	0.94	92.0
Lincolnshire	0.94	81.0
Northamptonshire	1.00	123.0
Nottinghamshire	0.93	135.0
Cambridgeshire	1.04	185.0
Norfolk	0.98	102.0
Suffolk	1.01	109.0
Bedfordshire	1.02	71.0
Essex	1.02	152.6
Hertfordshire	1.06	117.0
Outer London	1.10	96.0
Network Value	**1.00**	**1447.1**

Table A7- 6

London	Network/ County Factor	Sample Size
Essex	1.02	65.4
Hertfordshire	1.06	13.0
Berkshire	1.04	33.5
Buckinghamshire	1.03	45.3
London Postal Districts	1.18	264.0
Outer London	1.10	112.0
Network Value	**1.11**	**533.2**

Table A7- 7

North West	Network/ County Factor	Sample Size
Cumbria	1.05	18.9
Cheshire	0.92	127.2
Greater Manchester	0.93	297.0
Lancashire	0.93	167.0
Merseyside	0.94	175.0
Network Value	**0.93**	**785.1**

Table A7- 8

West Midlands	Network/ County Factor	Sample Size
Hereford and Worcester	0.94	95.2
Shropshire	0.93	79.0
Staffordshire	0.91	133.0
Warwickshire	0.96	96.0
West Midlands	0.94	318.0
Cheshire	0.92	31.8
Network Value	**0.94**	**753.0**

Table A7- 9

APPENDIX 8 DATA TABLES & REGRESSION

A8.1 INTRODUCTION

Much of the data entered into the BPQs submitted in October 2006 has been transferred to a database format within Microsoft Excel.

The format allows the data to be manipulated in a number of ways to enable PB Power to determine the appropriate analysis mechanism for each activity.

The sections below give explanations and worked examples of the data calculations use on our analysis. All of the Worked examples are for East of England network.

A8.1.1 ANALYSIS USED

There are three principal forms of analysis which have been carried out to make the projections for our proposals.

The first uses regression analysis to carry out comparisons between the costs and workloads of each GDN. The projection is based on a base year of either 2005/06 or 2006/07 using workloads to project our proposals for the full control period. The GDN's own proposals are used as a test against our own projections.

The second method makes use of the GDN's own proposals across the whole period. In order to use the GDN's proposals we first remove the GDN's own assumptions for RPEs. We then form a view on the workloads and costs applying adjustments we consider appropriate. Finally PB Power's assumptions for RPE are then applied to create the final proposal.

Finally PB Power has also made use of bottom-up analysis where regression was not appropriate or to support the use of regressions.

A8.1.2 REGIONAL FACTORS

Regional factors have been considered to impact the costs of activities carried out in the network, unless specifically stated otherwise. Costs are disaggregated into the four categories of Contractors, Direct Staff/Overheads, Materials and Other. Regional factors have been applied to Contractor and Direct Staff costs. No regional factors have been applied to materials or other expenditure.

A8.1.3 RPE ADJUSTMENTS

NGG's assumptions for RPEs used in the analysis are shown in the table below.

GDN	Activity	Contractors	Direct Staff	Materials	Other
London	LTS	3.75%	2.00%	1.64%	0.00%
	Other			2.20%	
Others	LTS	2.20%		1.64%	
	Other			2.20%	

Table 8A - 1

PB Power assumptions for RPEs used in the analysis are shown in the table below

Contractors	Direct Staff	Materials	Other
2.25%	1.00%	1.00%	0.00%

Table 8A - 2

A8.2 WORKED EXAMPLE

A worked example is given below for the Connections work activity. Many of the principles of the data calculations are similar for other work activities, where different techniques are used these are detailed under the appropriate activity heading.

A8.2.1 EXPLANATION OF THE COSTS AND VOLUME INPUTS TO THE REGRESSION ANALYSIS.

For Connections the regression analysis has been carried out on the 2006/07 data although for other activities 2005/06 has been used as the base year. Full details of the reasoning behind the choice of base year are given in the main report under each activity.

Steps for tracking the data – example Connections

From the BPQ the Connections costs submitted have been taken as below

Gross + Overheads

£m	Gross	Overheads	Total
District Governors	0.00	0.00	0.00
Existing Housing Mains>180mm	0.00	0.00	0.00
Existing Housing Services	6.71	1.60	8.31
Feeder Mains >180mm	0.00	0.00	0.00
New Housing Mains >180mm	0.00	0.00	0.00
New Housing Services	2.35	0.00	2.35
Non-Domestic Mains >180mm	0.00	0.00	0.00
Non-Domestic Services	2.02	0.00	2.02
Service Governors	0.00	0.00	0.00
Specific Reinforcement Mains >180mm	0.70	0.00	0.70
New Housing Mains <=180mm	7.06	0.00	7.06
Existing Housing Mains <=180mm	2.88	0.00	2.88
Non-Domestic Mains <=180mm	2.02	0.00	2.02
Feeder Mains <=180mm	0.00	0.00	0.00
Specific Reinforcement Mains <=180mm	0.10	0.00	0.10

Table 8A - 3

Using both the appropriate regional factors (RF) and the expenditure analysis the figures have been disaggregated into expenditure for Contractors, Direct + Overheads, Materials and Other

GDN Regional Factor	Contractor	Direct
East of England	1.00	0.98

Table 8A - 4

Direct	Contract	Materials	Other
0%	80%	20%	0%

Table 8A - 5

e.g. **7.71 x 0.8 / 1.0 = 5.37**

£m	RF Contractor	RF Direct/ Overheads	RF Materials	RF Other	RF Total
District Governors	0.00	0.00	0.00	0.00	0.00
Existing Housing Mains>180mm	0.00	0.00	0.00	0.00	0.00
Existing Housing Services	5.37	1.64	1.34	0.00	8.35
Feeder Mains >180mm	0.00	0.00	0.00	0.00	0.00
New Housing Mains >180mm	0.00	0.00	0.00	0.00	0.00
New Housing Services	1.88	0.00	0.47	0.00	2.35
Non-Domestic Mains >180mm	0.00	0.00	0.00	0.00	0.00
Non-Domestic Services	1.61	0.00	0.40	0.00	2.02
Service Governors	0.00	0.00	0.00	0.00	0.00
Specific Reinforcement Mains >180mm	0.56	0.00	0.14	0.00	0.70
New Housing Mains <=180mm	5.64	0.00	1.41	0.00	7.06
Existing Housing Mains <=180mm	2.30	0.00	0.58	0.00	2.88
Non-Domestic Mains <=180mm	1.61	0.00	0.40	0.00	2.02
Feeder Mains <=180mm	0.00	0.00	0.00	0.00	0.00
Specific Reinforcement Mains <=180mm	0.08	0.00	0.02	0.00	0.10
					25.46

Table 8A - 6

Natural Log of this **ln(25.46) = 3.24**

This cost figure is used in the regression analysis along with the equivalent values for other GDNs (See table 8A-10).

A8.2.2 WORK DRIVER

The workload is weighted by a standard monetary unit value for each activity :

Activity	Unit Value	Units
Existing Housing Mains>180mm	0.14	£ 000s/m
Existing Housing Mains <=180mm	0.11	£ 000s/m
Feeder Mains >180mm	0.16	£ 000s/m
Feeder Mains <=180mm	0.12	£ 000s/m
District Governors	0.02	£ m/Governor
Service Governors	0.002	£ m/Governor
New Housing Mains >180mm	0.11	£ 000s/m
New Housing Mains <=180mm	0.085	£ 000s/m
Non-Domestic Mains >180mm	0.14	£ 000s/m
Non-Domestic Mains <=180mm	0.11	£ 000s/m
Specific Reinforcement Mains >180mm	0.25	£ 000s/m
Specific Reinforcement Mains <=180mm	0.15	£ 000s/m
Existing Housing Services	0.0009	£ m/Service
New Housing Services	0.0005	£ m/Service
Non-Domestic Services	0.0015	£ m/Service

Table 8A - 7

Multiply by workload volumes

e.g. New Housing Services **9360 x 0.0005 = 8.42**

The workload volume for each activity is multiplied by the unit cost listed above and summed. For Connections gives a total weighted workload driver of 20.03

Natural Log of this **ln(20.03) = 3.00**

Again this figure has been used in the regression analysis.

A8.2.3 REGRESSION TABLE

The complete Connections regression table is given below:

GDN	2006/07	
	Volume	Cost
EoE	3.00	3.24
Lon	2.48	2.85
No	2.88	3.05
NW	2.34	2.72
Sc	3.15	3.20
So	3.20	3.30
WM	2.06	2.39
WW	2.99	3.11

Table 8A - 8

On all regression charts the volume driver is plotted along the x-axis and cost against the y-axis.

From this regression table the regression line is obtained and an upper quartile benchmark calculated as the target.

The regression formula takes the form ***Slope*** x ln(***Volume***) + ***Intercept*** = ln (***Cost***)

Regression Formula **0.729785 x ln(Volume) + 0.967332 = ln(Cost)**

Benchmark Formula **0.729785 x ln(Volume) + 0.926086 = ln(Cost)**

A8.2.4 COST PROJECTIONS

Having calculated the benchmark regression formula for the base year, the ***intercept*** of this formula is reduced each year by the PB Power assumptions for productivity improvements.

Year	Intercept
2005/06	0.93
2006/07	0.93
2007/08	0.90
2008/09	0.87
2009/10	0.83
2010/11	0.80
2011/12	0.77
2012/13	0.74

Table 8A - 9

The formula is then used each year, with the work driver, to calculate the regionally adjusted cost for the total workload. This total is broken back into the individual activities in proportion to the weighted workload driver for each activity.

	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
Weighted Workload	20.032	19.304	20.355	19.688	19.342	19.415	19.575
Benchmark	22.500	21.243	21.418	20.277	19.416	18.885	18.428
Baseline	25.462	24.040	24.238	22.946	21.972	21.372	20.855
Gap	2.962	2.797	2.820	2.670	2.556	2.487	2.426
Line A	30%	42%	53%	65%	77%	88%	100%
Line B	100%	88%	77%	65%	53%	42%	30%
Convergence	2.962	2.471	2.162	1.735	1.363	1.036	0.728
Proposed (Ex RPE & RF)	25.462	23.714	23.580	22.012	20.779	19.921	19.156

Table 8A - 10

In the example of Connections the 2006/07 calculation is performed as follows:

0.729785 x ln(20.03) + 0.926086 = ln(22.50)

A similar calculation is performed for each year and also for the baseline performance.

The gap between the baseline performance and the benchmark performance is calculated and a convergence is calculated using the percentages in either Line A or Line B in table 8A-12. If the gap figure is negative line A percentages are used; if the gap figure is positive line B percentages are used. The convergence element is added to the benchmark figure to produce the proposed cost (prior to regional factors and RPE adjustments being applied).

In order to reapply regional factors and PB Power's assumptions for RPEs the average of 2nd and 3rd placed GDNs breakdown expenditure percentages for Contractors, Direct/Overheads, Materials and Other has been used.

A8.3 LTS CAPEX

A8.3.1 ANALYSIS USED

Regression analysis was not deemed appropriate for the LTS Capex expenditure analysis. Our proposed projections are derived from a review of the specific projects costs plus and a review of the overall expenditure required to meet load growth (called the capacity adjustment).

A8.3.2 DATA USED IN THE ANALYSIS

Regional factors have not been used in pipeline projects as we believe these projects are procured from nationally (rather than regionally) based contractors and hence are not expected to have a key regional pricing difference.

The expenditure analysis for LTS Capex has been used to split the Net Capex into the four components of Contractors, Direct/Overheads, Materials and Other.

Direct	Contract	Materials	Other
0%	70%	30%	0%

Table 8A - 11

From this breakdown adjustments have been made to remove the RPEs assumed by NGG.

For selected pipeline projects a standard unit cost for construction has been used to benchmark the costs (see appendix 6). These unit costs are shown below:

Pipeline diameter (mm)	PB Power projection (£m/km)
200.0	0.35
300.0	0.45
450.0	0.7
600.0	0.8
900.0	1.0
1050.0	1.05
1200.0	1.2

Table 8A - 12

At the end of the analysis process PB Power's assumptions for RPEs have then been applied to reach our final proposals.

A8.4 CONNECTIONS

A8.4.1 ANALYSIS USED

Analysis for Connections has been carried out for the total work activities. The base year for Connections was 2006/07.

A8.4.2 DATA USED IN THE ANALYSIS

Please refer to the worked example in section A1.1 for details of the Connections tables and values for the separate analysis.

A8.4.3 REGRESSION TABLE

The Total complete Connections regression table is given below:

GDN	2006/07	
	ln(Volume)	ln(Cost)
EoE	3.00	3.24
Lon	2.48	2.85
No	2.88	3.05
NW	2.34	2.72
Sc	3.15	3.20
So	3.20	3.30
WM	2.06	2.39
WW	2.99	3.11

Table 8A - 13

All of the analysis for Connections has been carried out on gross expenditure. Once the gross proposal has been calculated the amount of proposed income for the activities needs to be calculated. These percentages have been reached following an assessment of all of the returns made by the GDNs to reach a single assumption for all networks.

Domestic Load Connection Allowance (DLCA) Percentage of Gross Services Costs				Employer Ordered Works (EOW) Percentage of Gross Connections costs (Services, Mains & Governors)		
Existing Housing	New Housing	Non Domestic	Existing Housing MOB[12]	Existing Housing	New Housing	Non Domestic
58%	5%	0%	0%	6%	6%	6%

Table 8A - 14

A8.5 REINFORCEMENT MAINS

A8.5.1 ANALYSIS USED

Regression analysis has been used for Reinforcement Mains. The regression as been carried out for all pipe sizes with workload volumes being adjusted into a weighted average based on standard unit costs. The base year for Reinforcement Mains is 2005/06.

A8.5.2 DATA USED IN THE ANALYSIS

The expenditure analysis for Reinforcement Mains Capex has been used to split the Net Capex into the four components of Contractors, Direct/Overheads, Materials and Other.

Direct	Contract	Materials	Other
0%	70%	30%	0%

Table 8A - 15

A8.5.3 WORK DRIVER

The workload is weighted by a standard monetary value for each activity. These unit costs have been derived from an average of the unit costs as supplied by all GDNs.

Activity	Unit Value	Units
Total above 180mm	254	£/m
Total up to 180mm	124	£/m

Table 8A - 16

[12] MOB – Multiple Occupancy Buildings

A8.5.4 REGRESSION TABLE

The reinforcement regression table is given below:

GDN	2005/06	
	ln(Volume)	ln(Cost)
EoE	0.47	0.24
Lon	-0.41	-0.30
No	0.93	0.99
NW	-0.62	-0.69
Sc	1.02	0.90
So	1.23	1.25
WM	-1.83	-1.99
WW	1.64	1.72

Table 8A - 17

Due to the workload drivers and costs in £ million sometimes being less that one, the natural logs for these value are negative.

A8.6 GOVERNORS

A8.6.1 ANALYSIS USED

Regression analysis was not deemed appropriate for this activity. GDN proposals have been reviewed for RPEs, workload and unit costs.

A8.6.2 DATA USED IN THE ANALYSIS

The expenditure analysis for Governors Capex has been used to split the Net Capex into the four components of Contractors, Direct/Overheads, Materials and Other.

Direct	Contract	Materials	Other
0%	50%	50%	0%

Table 8A - 18

A8.7 OTHER OPERATIONAL CAPEX

A8.7.1 ANALYSIS USED

Regression analysis was not deemed appropriate for this activity. As this category contained a wide range of activities and not all these activities were used by every GDN, they were treated as a basket of costs which could be reprioritised by the GDN according to workload and operational needs.

A8.7.2 DATA USED IN THE ANALYSIS

The expenditure analysis for Other Operational Capex has been used to split the Net Capex into the four components of Contractors, Direct/Overheads, Materials and Other. The split has been done for the purpose of calculation of RPE effects.

Direct	Contract	Materials	Other
0%	50%	50%	0%

Table 8A - 19

A8.8 NON OPERATIONAL CAPEX

A8.8.1 ANALYSIS USED

Regression analysis has not been used. Most of the analysis carried out has been carried out at Project level.

A8.8.2 DATA USED IN THE ANALYSIS

Extracts from the BPQ sheets have been repeated in the data extract tables. These have been linked through to PB Powers proposals.

A8.9 REPEX MAINS & SERVICES

A8.9.1 ANALYSIS USED

Regression analysis has been used for selected Repex mains and services activities. Activities associated with multiple occupancy buildings have been excluded from this regression analysis. The base year for the regression was 2005/06.

A8.9.2 DATA USED IN THE ANALYSIS

The expenditure analysis for Mains and Services Repex has been used to split the Net Repex into the four components of Contractors, Direct/Overheads, Materials and Other.

Pipe Size/Service	Direct	Contract	Materials	Other
<=75mm	4%	79%	14%	3%
>125mm to 180mm	3%	85%	10%	2%
>180mm to 250mm	4%	73%	21%	3%
>250mm to 355mm	3%	76%	18%	3%
>355mm to 500mm	1%	80%	15%	3%
>500mm to 630mm	0%	87%	10%	3%
>630mm	0%	86%	11%	3%
>75mm to 125mm	7%	76%	14%	3%
Non-domestic service replacement	20%	71%	0%	10%
Other domestic services	94%	0%	6%	0%
Purge & relight after domestic service work	76%	14%	11%	0%
Relaid services associated with mains replacement	6%	86%	7%	1%
Renew risers (< 40m length) to multiple occupancy buildings	0%	90%	10%	0%
Renew service connections - multiple occupancy buildings, including laterals (riser > 20m length)	0%	88%	12%	0%
Service test & transfer to new or other main	3%	85%	11%	1%
Services relaid after escape	40%	47%	13%	0%

Table 8A - 20

The unit costs used to calculate the weighted average workload drivers in the Repex regression have been developed where possible from contract schedules. The costs used are listed below:

Activity	Unit Value	Units
<=75mm	43.36	£/m
>75mm to 125mm	50.00	£/m
>125mm to 180mm	75.17	£/m
>180mm to 250mm	120.10	£/m
>250mm to 355mm	147.60	£/m
>355mm to 500mm	211.20	£/m
>500mm to 630mm	254.35	£/m
>630mm	400.00	£/m
Purge & relight after domestic service work	0.010	£ 000s/Service
Service relay domestic meterwork	0.090	£ 000s/Service
Service test & transfer to new or other main	0.147	£ 000s/Service
Other domestic services	0.296	£ 000s/Service
Relaid services associated with mains replacement	0.296	£ 000s/Service
Relaid services not associated with mains replacement (bulk relays)	0.296	£ 000s/Service
Reposition domestic meter - service relays	1.185	£ 000s/Service
Services relaid after escape	0.296	£ 000s/Service
Non-domestic service replacement	0.900	£ 000s/Service

Table 8A - 21

A8.9.3 REGRESSION TABLE

The complete Repex regression table is given below:

	2005/06	
GDN	ln(Volume)	ln(Cost)
EoE	4.03	4.60
Lon	2.98	3.76
No	3.70	4.15
NW	3.73	4.36
Sc	3.13	3.80
So	3.91	4.59
WM	3.46	3.94
WW	3.45	4.00

Table 8A - 22

A8.10 LTS REPEX

A8.10.1 ANALYSIS USED

Rechargeable LTS Repex was not subject to this analysis as actual verifiable costs will be recovered. Non rechargeable projects were treated as for LTS Capex - Pipelines.