

Network Output Measures Close Out Report

RIIO-GD1 2013 - 2021

July 2021



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1.0 Executive Summary

The Network Output Measure is the primary incentive mechanism for assessing if our actual interventions in our network assets have delivered equivalent consumer benefits compared to the Business Plan. The assessment is based on us delivering the monetised risk target.

Our investments are complex and encompass works of varying magnitudes from replacing assets on our high-pressure offtake sites to renewing a service pipe. It is the power of Network Output Measures (NOMs) that enables us to express in a concise way the benefits of these vastly different investments to consumers and Ofgem. The NOMs have encouraged us to be flexible in our approach to network investments, responding to the latest available data and information, and have enabled us to quickly assess the benefits of different interventions to ensure we still deliver on our promises to consumers.

Our approach to managing our network assets has been to focus on ensuring we maximise benefits to consumers and our stakeholders in the short, medium and long term, whilst ensuring we meet our statutory and legislative obligations. Despite the impact of the COVID-19 pandemic on our investment programme in all our networks we have delivered the Network Output against the assumed threshold indicated throughout RIIO-1. In London we have delivered a greater monetised risk benefit than the threshold due to both carrying out more interventions on Steel Mains, Services and Pre-heaters when compared to the original Business Plan and optimising interventions in other assets. Using the valuation methodology set out in Section 7 these additional consumer benefits have been valued in the region of £56.12m.

Table 1 – Network Performance Summary

Network	RIIO-GD1 NOMs Normalised Target Delta (R£m)	RIIO-GD1 NOMs Normalised Outturn Delta (R£m)	Percentage difference
Eastern (EN)	34.02	34.06	0.12%
London (LON)	30.11	32.61	8.33%
North West (NW)	28.90	29.02	0.42%
West Midlands (WM)	20.52	19.92	-2.96%

2.0 Asset & Intervention Definitions

This section sets out the Asset Definitions, Intervention Definitions and known assumptions.

2.1 LTS Pipelines – Piggable and Non-Piggable

LTS Pipelines - Piggable

Transmission pipelines operating at pressures above 7 bar gauge (barg) but not exceeding 100 barg. Includes all pipelines that can be inspected using internal inspection vehicles (OLI1) or other internal inspection technique and includes pig trap installations.

LTS Pipelines – Non-Piggable

Transmission pipelines that cannot be inspected internally due to changes in diameter, tight radius bends or other limiting features. Operate at pressures above 7 barg but not exceeding 100 barg. Inspection method is OLI4.

Interventions

- **Refurbishment** of Cathodic Protection (CP) system.
- **Sleeve refurbishment:** Refurbishment of the sleeve.

2.2 Mains

A main is a below ground pipe, laid as an extension of, or change to, the system that supplies, or has the capability to supply, more than 2 primary meter installations operating at below 7 barg. It is constructed of either Iron, Steel, Polyethylene (PE) or Other (Asbestos).

Interventions

- **Replacement** of an existing main which is either metallic or PE material with a PE main.
- **Refurbishment:** deployment of Cast Iron Sealing Bot (CISBOT) which remediates the joints (Iron only).

2.3 Services

A service, as an individual asset, is defined as a pipe from a main up to and including the outlet of the 1st Emergency Control Valve (ECV) to an individual meter installation.

This definition may occasionally include a dual service, supplying up to two primary meter installations in one or two buildings, with no other potential connections. The service may be constructed of steel, PE, Iron or other material.

The service asset base is split between domestic and non-domestic services. Non-domestic services are fully digitised whereas historically the domestic service asset base has been partially digitised. Therefore, for NOMs reporting we have used assumptions to construct the domestic service asset base. The method used to construct the service asset base is set out in NOMs Methodology – Appendix B.¹

Interventions

- **Replacement:** replace existing service (either metallic or PE) with a PE service. In some instances, the existing service pipe may be replaced with a steel service pipe, however, for NOMs reporting the new asset is assumed to be PE.

2.4 Risers

Risers refers to our gas transporting assets that are present on or in Multiple Occupancy Buildings (MOBs). MOBs contain multiple individual dwellings and are typically residential tower blocks or flats. The building must be three storeys or higher or two storeys with basement. The gas transporting assets are essentially the riser and lateral pipes.

Interventions

- **Replacement:** replacement of riser and associated laterals with pipes of the same material as the existing asset or with PE.
- **Refurbishment:** Refurbishing of risers and associated laterals that improve the overall condition of the asset, this could be, for example, replacing a severely corroded section of pipe.
- **Permanent isolation:** planned permanent isolation has been applied where the occupants have been compensated through the energy exchange programme and the risers have subsequently been isolated.

2.5 Offtake & PRS Filters

Filter systems comprising two or more gas filters are normally installed within an Offtake or Above 7 barg PRS typically upstream of the pressure control system in order to filter out dust

¹ https://www.ofgem.gov.uk/sites/default/files/docs/2017/09/noms_methodology_version_no_v3.2.pdf

or debris from the gas flow. Such filtration serves to ensure a supply of clean gas is provided to the downstream system and protects the regulators and control valves from damage.

Interventions

- **Replacement:** replacement of entire filter system.
- **Refurbishment:** painting to prevent corrosion defect.

2.6 Offtake & PRS Slam-shuts / Regulators

These Asset Categories refer to multiple assets which are:

- The pressure control system within an Offtake or Above 7 barg PRS is designed to provide a flow of gas at the necessary operational pressure into a downstream system to provide safe, reliable supply to consumers. They typically comprise of two or more parallel streams of regulators controlling the pressure to the downstream system. Each stream includes a safety device; typically, a slam shut valve or other actuated valve, upstream of the regulators or control valves to protect the downstream system from over-pressurisation.
- The kiosk / housing which contains the pressure control system.
- The ancillary assets which control the pressure regulating systems (electrical and instrumentation assets).

Interventions

- **Replacement:** replacing the pressure control system (slam shuts and regulators); the kiosk / housing which contains the pressure control system; the ancillary assets that control the pressure regulating systems (electrical and instrumentation assets).
- **Refurbishment:** painting to prevent corrosion defect.

2.7 Offtake & PRS Pre-heating

A pre-heating asset heats the gas prior to pressure reduction to mitigate the effect of low outlet temperatures, due to the Joule-Thomson effect (a gas temperature drop as a result of pressure reduction). This pre-heating is required to avoid a loss of control or possible failure of downstream pressure regulating equipment.

Interventions

- **Replacement:** replacement of entire pre-heating system.
- **Refurbishment:** replacement of component(s) within a pre-heating system e.g. package boiler within a modular boiler system.

2.8 Odourisation & Metering

Within this Asset Category the risk benefit within the Target does not relate to interventions on gas metering systems, it is only for the Odourisation units. This asset introduces odorant to the gas flow prior to its entry into the distribution network.

Interventions

- **Refurbishment:** replacing the expansion tank, which is classified as a refurbishment intervention as it does not involve replacing the asset in its entirety.

2.9 District, I&C & Service Governors

There are two assets within these Asset Categories:

- **District governor:** pressure regulating installation operating with inlet pressures below 7 barg and supplying an intermediate, medium or low-pressure system; or for I&C supplying large individual non-domestic consumer.
- **Service governor:** A pressure regulating installation with inlet pressures above 75 mbar and up to 7 barg supplying domestic or smaller commercial and industrial consumers.

Civil assets – kiosk / housings, are included within our NOMs. Kiosks / housings are not directly within the asset base-data; however, they are inferred through the kiosk replacement intervention which reduces the probability of failure for the housed equipment(s). This equipment is within the base-data.

Interventions

- **Replacement:** replacing the entire pressure reduction unit and the kiosk/housing. For service governors this is the only applicable intervention.
- **Component Replacement:** replacing components of the pressure reduction system only, such as the regulator or slam-shut equipment. Applicable to District and I&C governors.
- **Kiosk / housing replacement:** where replacement involves either replacing Glass Reinforced Plastic (GRP) kiosks, or roof / doors of a brick building.
- **Refurbishment:** painting the governor to prevent corrosion defects.

3.0 General Assumptions

In this section we set out an additional assumption, not disclosed elsewhere in the narrative, that has been applied to populate the NOMs Closeout Data Template.

3.1 Population movements between metallic and PE mains

As an outcome of replacing metallic mains with PE, within the NOMs Closeout Data Template, the metallic mains population should decrease and the PE population increase when comparing the start and end point. It has been identified that in the signed off rebased template the mains which should move from metallic to PE in the “with intervention” scenario aren’t reflecting the full 8 year profile as they are related to the final year only. This has been corrected in subsequent RRP Table 7.3 submissions and we have assumed it is satisfactory for this to be corrected in the NOMs Close Out Data template. It does not affect the monetised risk delta at a network level and therefore we have not classified this as a Relevant Risk Change (RRC).

4.0 RIIO-1 Targets

All RIIO-GD1 Targets were signed off as part of the rebase process which concluded in 2019 with a decision from Ofgem to approve and direct the rebased network outputs for gas distribution network operators². The Targets are affected by some of the Relevant Risk Changes (RRC) and the impact of each change on the target is set out in the RRC section 6.0.

The RIIO-GD1 Target refers to the network level Target which was arrived at through inputting workloads into risk models and grouping these workloads into Asset Categories. To facilitate risk trading between asset categories, performance is assessed at the network level.

4.1 LTS Pipelines – Piggable and Non-Piggable

The specific interventions for Pipelines that would take place in RIIO-GD1 were unknown when the Business Plan was submitted therefore, to rebase the Target, assumptions were made. For CP interventions it was assumed that interventions could not take place on sections of LTS pipeline where the CP was known to be in good condition. For sleeves, the volume within the target was split between sleeve filled material type: nitrogen or other to maintain consistency with the original NOMs targets.

4.2 Mains

The mains which were to be replaced in RIIO-GD1 were unknown at the time of setting the Business Plan and as such the target was derived using a cohort approach. The cohorts were derived in line with the NOMs Methodology and are based on Tier (diameter groupings) and material. The Final Proposals did not specify the materials and diameters of mains that would be replaced and therefore as part of the rebasing process assumptions were made – for example, the volume of Tier 1 Iron that would be ductile iron.

4.3 Services

As outlined in Section 2.3, and as per the NOMs Methodology, we have used assumptions to derive the service density of each main. Services were split into the relevant cohort, based on service material and service type (e.g. domestic or non-domestic). “Service relays associated with mains replacement” were modelled proportionally across the population of non-PE services. “Service relays following a gas escape” were split across the cohorts based on

² https://www.ofgem.gov.uk/sites/default/files/docs/2019/06/190612_gd_rebasingdecision_final_0.pdf

historic failure rates and “other service relays” were divided into 2 categories – meter alterations and selective renewals. Meter alterations were modelled proportional to the service population and selective renewals were proportional to the non-PE population.

We have identified on the Ofgem published rebased Targets that the ‘with’ and ‘without’ intervention values for Services have been derived from an early version of the risk models within Microsoft Excel. For all other Asset Categories, the values within the rebased file have been derived from the output from the Asset Investment Manager (AIM) software. We have assumed that the correct Target is the Target derived from AIM. Table 2 summarises the difference between the Targets, which is immaterial based on the difference between them being to two decimal places.

Table 2 – Impact on the Target of Services Error Correction

Network	Target Delta derived from Excel	Target Delta derived from AIM	Percentage difference
Eastern (EN)	34.18	34.18	0.01%
London (LON)	30.11	30.11	0.02%
North West (NW)	29.62	29.62	-0.01%
West Midlands (WM)	20.41	20.41	-0.01%

4.4 Risers

The volumes within the Final Proposals referred to the number of buildings. The number of risers and laterals can vary from one building to another. As part of the rebase process the building numbers were used to estimate the number of risers and associated lateral volumes.

The complete Riser asset stock was not modelled to derive the baseline position, as the ongoing building survey process was only partially complete at the time. As described in the data cleanse for Risers this has now been updated. A cohort approach was used to derive the Target and the same approach has been used to report back the monetised risk benefit of interventions in RIIO-GD1.

4.5 Offtake & PRS Filters

The exact filter assets which would be intervened on during RIIO-GD1 were not known at the time of setting the Business Plan, however, to reflect the intent of the Final Proposals the assets selected in the Target had to be of condition score 3 or worse.

4.6 Offtake & PRS Slam-shuts / Regulators

The exact pressure control assets which would be intervened on during RIIO-GD1 were not known at the time of setting the Business Plan, however, to reflect the intent of the Final Proposals the interventions selected in the Target for replacement had to be obsolete assets (installed year in or prior to 2013) and for refurbishments the assets had to have a condition score 3 or worse.

4.7 Offtake & PRS Pre-heating

The exact pre-heat assets which would be intervened on during RIIO-GD1 were not known at the time of setting the Business Plan, however, to reflect the intent of the Final Proposals the assets selected in the Target had to be condition score 3 or greater.

4.8 Odourisation & Metering

The Business Plan stated we would intervene on all Odourisation tanks and this was subsequently reflected in the Target.

4.9 District, I&C & Service Governors

The exact governor assets which would be intervened on during RIIO-GD1 were not known at the time of setting the Business Plan and therefore assumptions were made when modelling the workload volumes. Table 3 summarises the basis for asset selection within the Target.

Table 3 – Summary of criteria for Governor intervention selection

Intervention	Basis for asset selection
Painting interventions	Condition Score ≥ 3
Kiosk / housing interventions	Kiosk Condition Score ≥ 3
Governor installation and regulator replacement interventions	Obsolete Year ≤ 2013

5.0 RIIO-1 – Delivery

Our delivery of the Network Output, in keeping with the intent of the NOMs Incentive Methodology, is as a result of us optimising the interventions required. This has been to ensure we are continuously making decisions that are in consumer interests, that allow us to discharge our legislative responsibilities and are decisions made in response to the latest data and information.

In our Business Plan we set out a mix of interventions that would deliver a safer and more reliable network for consumers. Our delivered interventions have ensured we maintained that commitment. On average across our networks we have reduced the safety incident rate by 29%. Consumers are benefiting from a more reliable service, the risk of supply interruptions across our networks is on average 27% lower as a result of our investment.

In our Network Summary section, we set out key highlights of our networks' performance, subsequently we show how trade-offs have allowed us to maintain a balanced portfolio of network risk. Finally, where applicable we describe our approach to trading off between interventions within an Asset Category.

5.1 Network Summary

For Eastern, North West and West Midlands we have delivered the Network Output Measure. The normalised outturn delta is within the 5% materiality threshold (deadband). In London, we have delivered a risk benefit which is 3.33% beyond the 5% materiality threshold (see Table 4). Table 5 summarises the variances of the risk associated with an Asset Category compared to the outturn.

Table 4 - Network Performance Summary

Network	RIIO-GD1 NOMs Normalised Target Delta (R£m)	RIIO-GD1 NOMs Normalised Outturn Delta (R£m)	Percentage difference
Eastern (EN)	34.02	34.06	0.12%
London (LON)	30.11	32.61	8.33%
North West (NW)	28.90	29.02	0.42%
West Midlands (WM)	20.52	19.92	-2.96%

In our London, North West and West Midlands networks we have replaced significantly more services - 94,840 - alongside our mains replacement programme compared to the original RIIO-GD1 Business Plan. This has been due to actual service density from the work delivered

being higher than the assumptions within the Business Plan. These service interventions are a result of our mains replacement approach, which has been driven by reducing incident risk. By choosing to over deliver on services we have ensured that the long-term cost of the iron mains replacement programme remains more balanced. In all our networks we have delivered a greater monetised risk benefit due to encountering a greater number of service failures than anticipated. Upon service pipe failure it has been necessary to intervene to restore supplies to consumers or to ensure gas was being supplied safely.

For our Iron Mains across all networks the monetised risk benefit achieved is not as high as planned due to the impact of the Covid-19 pandemic on our operations, which reduced our ability to replace the volume of iron mains in line with our plan.

To maintain our legal and safety obligations with the Health & Safety Executive (HSE) it is necessary to replace small diameter (less than or equal to 2") steel mains alongside our Tier 1 Iron Mains replacement. Our approach to Tier 1 Iron mains replacement has been driven by targeting mains replacement to reduce incident risk. Therefore, in achieving our iron mains incident risk objectives, the associated steel mains density across our networks has varied and as a result we have delivered a greater monetised risk benefit in Steel mains in Eastern, London & West Midlands and a lower than anticipated benefit in the North West.

Across all networks our overall risk benefits delivered by investment in pre-heaters was higher than originally planned. This has been driven by us addressing the increasing threat of obsolete equipment relating to the modular boiler supply chain. The reduction in spare parts availability means we cannot repair these assets upon failure. Therefore, we took the decision to proactively replace them in order to maintain security of supply to a large number of consumers.

In Eastern, London & North West we have delivered a greater monetised risk benefit from District Governor investments. We have intervened on higher risk assets compared to the assets selected within the Target as well as intervening on more kiosks than planned.

Our risk benefit delivered from our Riser interventions is higher than originally planned in Eastern, North West & West Midlands due to the number of interventions we have carried out. Proactive intervention has been needed, in response to data from surveys, to ensure that the safety risk these assets pose remains manageable while still intervening to restore gas supplies after asset failures.

Table 5 – Monetised Risk Variance of outturn compared to target (post normalisation)

Asset Category	EN (R£m)	LON (R£m)	NW (R£m)	WM (R£m)
LTS Pipelines - Piggable	0.00	0.00	0.00	0.00
LTS Pipelines - Non Piggable	0.00	0.00	-0.01	0.00
Iron Mains	-0.45	-0.13	-0.78	-0.76
PE Mains	0.01	0.04	0.02	0.01
Steel Mains	0.25	0.38	-0.90	0.30
Other Mains	0.00	0.00	0.07	0.00
Services	0.13	2.06	0.59	0.10
Risers	0.05	-0.22	0.28	0.32
Offtake Filters	0.09	-0.02	-0.04	-0.03
PRS Filters	0.32	-0.29	-0.20	-0.09
Offtake Slam-shut/ Regulators	-0.10	-0.01	0.00	-0.03
PRS Slam-shut/ Regulators	-0.82	-0.16	-0.29	-0.55
Offtake Pre-heating	0.21	0.02	0.18	0.30
PRS Pre-heating	0.65	0.84	0.96	-0.12
Odourisation & Metering	-0.22	-0.06	-0.02	-0.01
District Governors	0.07	0.20	0.28	-0.02
I&C Governors	0.00	0.00	0.00	0.00
Service Governors	-0.14	-0.14	-0.01	-0.03
Total	0.04	2.51	0.12	-0.61

5.2 The Impact of Trade-Offs on Asset Performance

Our changes to our intervention mix have left us with a manageable level of network risk overall and a manageable level of risk within any Asset Category. This is because our decisions on trade-offs have ensured the risk across our portfolio of network assets is balanced. We have not left any anomalously high risks untreated. This is illustrated for each network through Figures 1 – 4.

Fig. 1: Impact of Risk Trades in Eastern

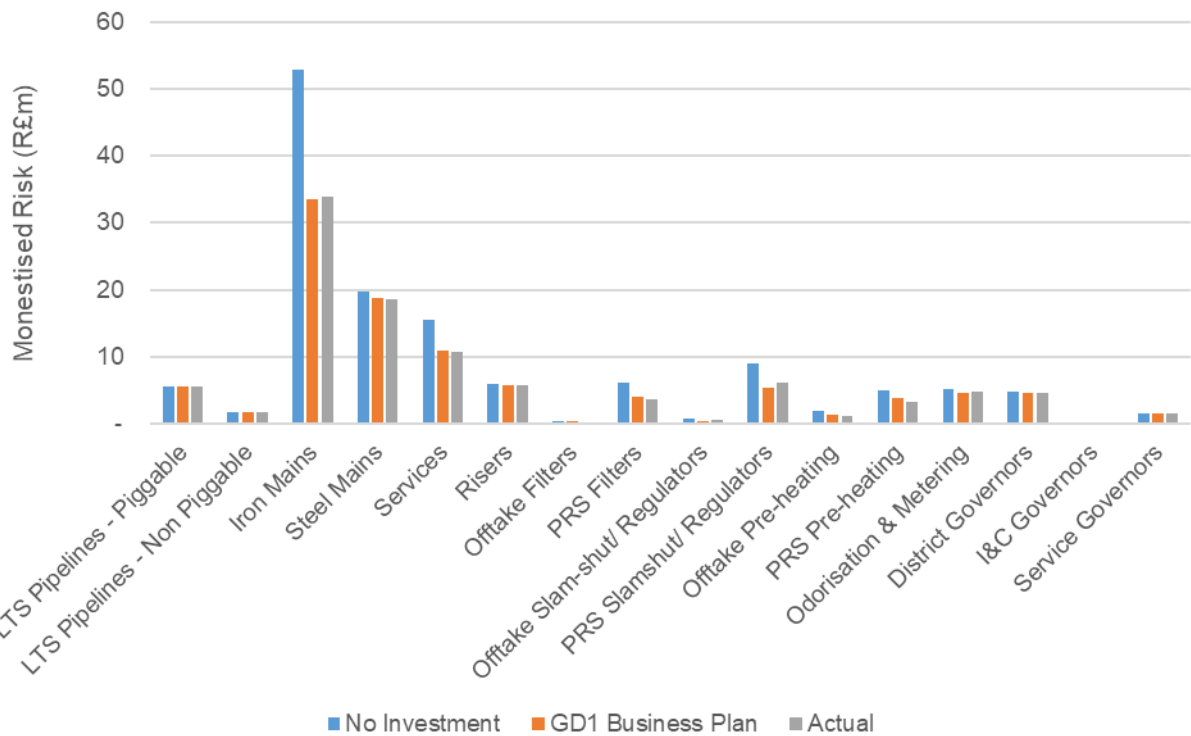


Fig. 2: Impact of Risk Trades in London

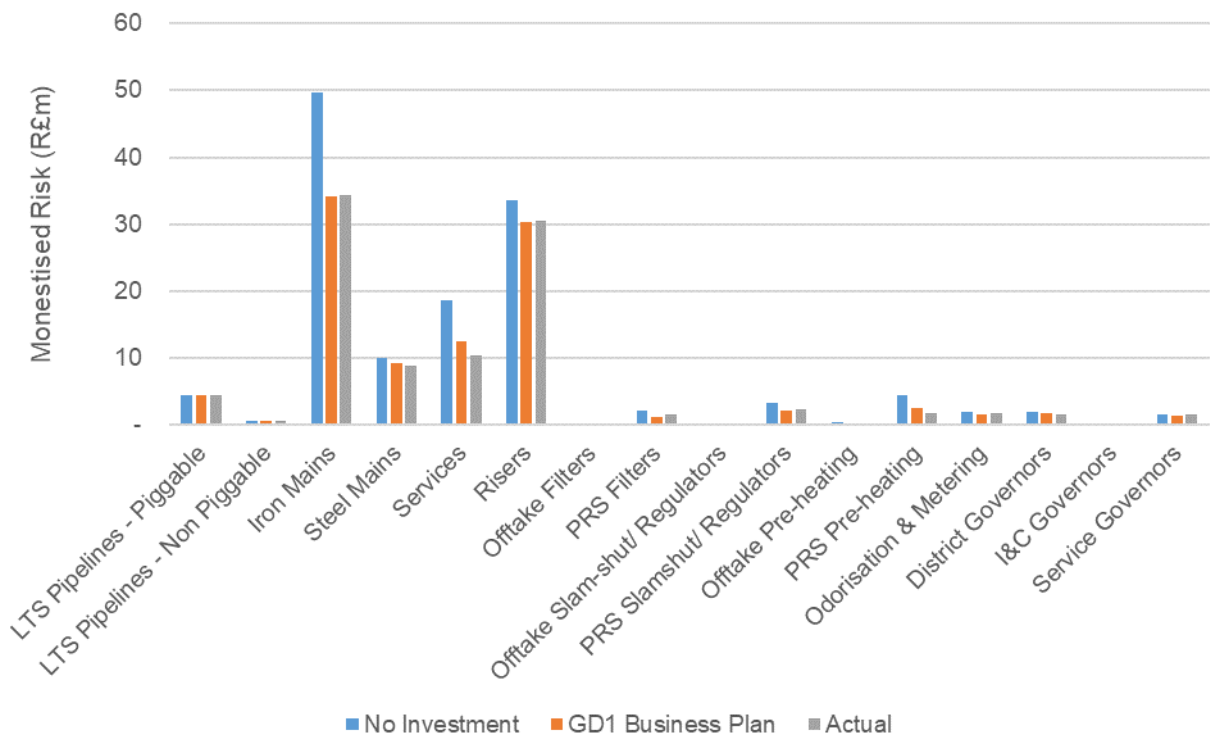


Fig. 3: Impact of Risk Trades in North West

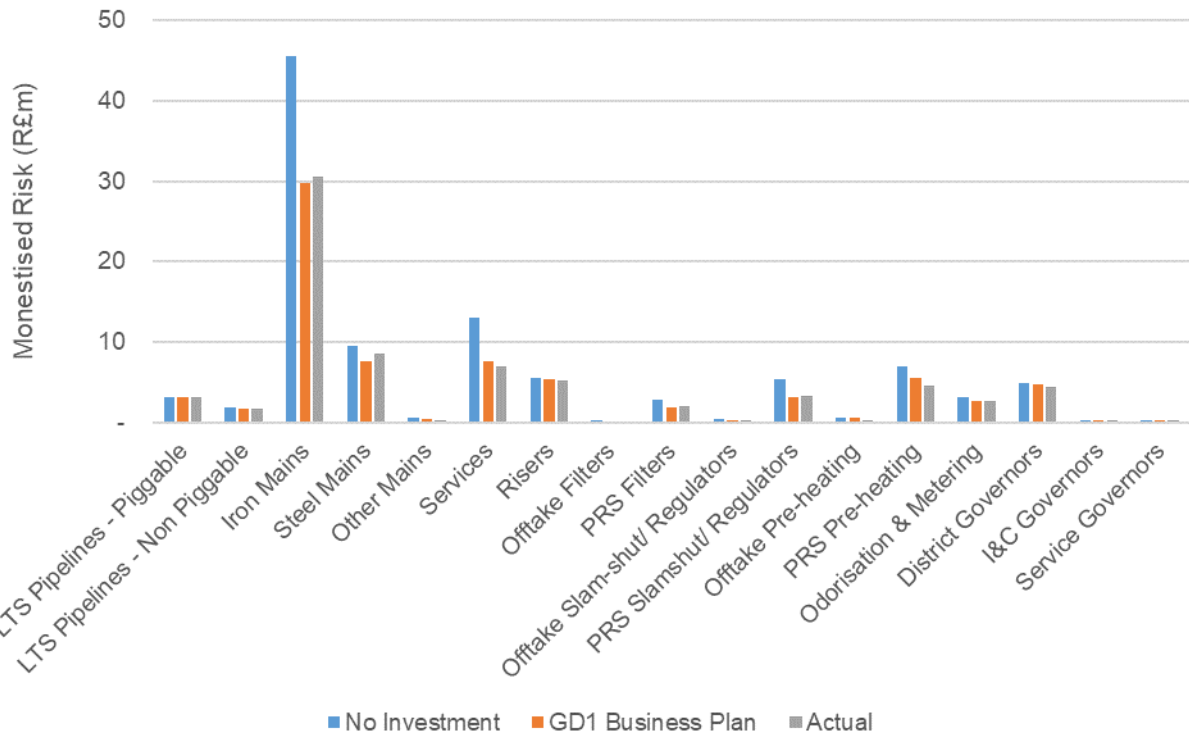
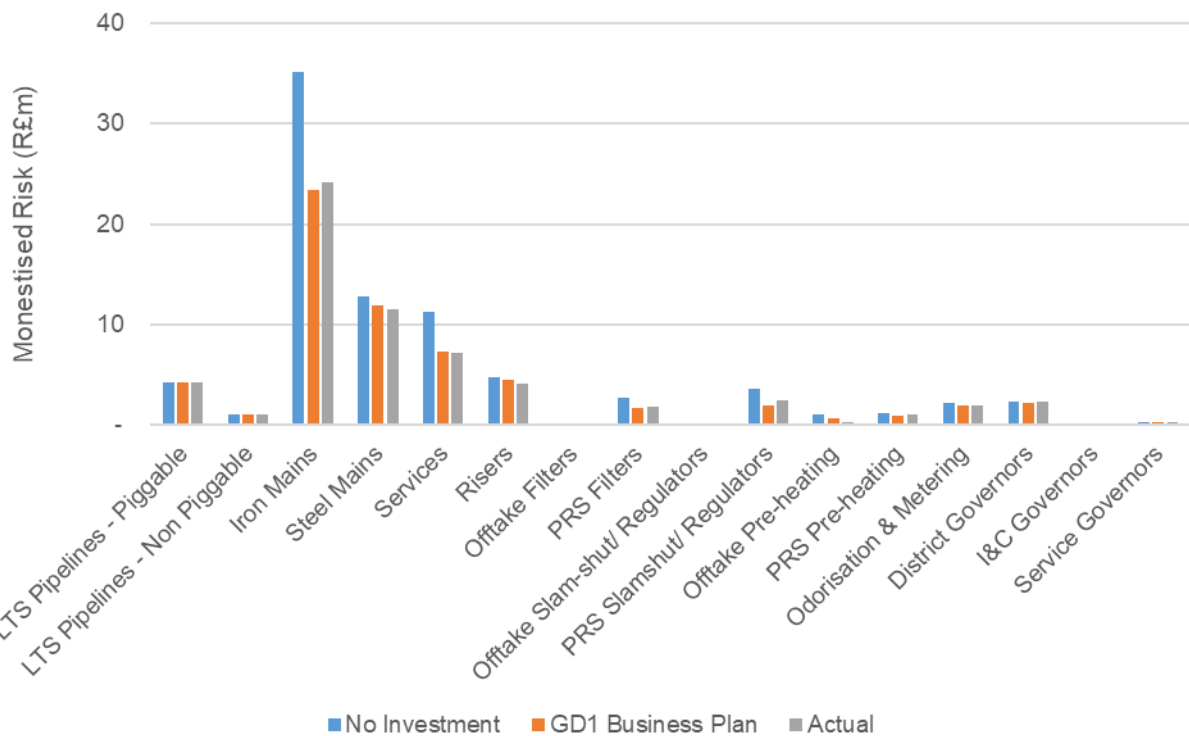


Fig 4: Impact of Risk Trades in West Midlands



5.3 Trade-offs between Interventions

Our decision making has been driven by delivering the strategy we set out in the Business Plan for the Asset Categories, whilst adapting the plan where appropriate to respond to the latest survey data or other information not anticipated at the time of setting the Business Plan. We have also ensured that when trading off that our interventions have been proportional to identified risks.

5.3.1 LTS Pipelines – Piggable and Non-Piggable

The Cathodic Protection (CP) system refurbishment intervention has been undertaken to remediate deteriorated components, whereas the sleeve remediation is carried out to rectify a defect in an existing sleeve. Both interventions reduce the overall risk of the LTS pipeline assets, and we have carried them out to treat specific issues identified in the latest survey data or other information.

5.3.2 Mains

For Iron, Steel and Other mains the only interventions are replacement and for Tier 3 Iron we have also used the Cast Iron Sealing robot (CISBOT) to renew joints. Challenges were identified with access to replace large diameter mains in London and it was also recognised pipe barrel failures were infrequent and had a low probability of occurring on larger diameter cast iron. Through innovation and collaboration, we developed the CISBOT intervention to overcome delivery challenges of replacing the larger diameter mains, whilst allowing us to still address the main asset risk. The CISBOT intervention when modelled does not result in as great a risk benefit as replacement as it is not renewing the pipe barrel. The CISBOT intervention also has benefits not captured in the monetised risk model as it minimises public disruption from the remediation works as less excavation is required and is favoured by the Highway Authorities. The trade ultimately allows us to overcome delivery challenges, treat the actual risk thereby extending the asset life whilst delivering further benefits to the public.

5.3.3 Services

The only applicable intervention is replacement.

5.3.4 Risers

Replacement and refurbishment have been targeted to address specific asset issues identified through either asset failure or survey results. Our actions taken in response to the specific issues have been on the basis of us treating the risk for the least cost solution. For instance,

only a section of a riser may be severely corroded and therefore it is only that section that is replaced and not the entire riser and lateral system. Throughout RIIO-1 we have been looking at innovative ways to reduce risk through our interventions and respond to consumer demands to deliver benefits to consumers. In 2018, through workshops, we developed our energy exchange programme which enabled us to offer consumers the choice to exchange their gas connection for use of electricity. This enabled us to decommission and remove the risk that the riser & laterals posed.

5.3.5 Offtake & PRS Filters

We stated in our Business plan that interventions would be targeted to address specific asset issues which would be identified as a result of our inspections or surveys. In line with the Business Plan Filters have been replaced after failing the Pressure Systems Safety Regulations (PSSR) inspection. They have been refurbished when it has been identified that painting is required to protect the asset from corrosion. Volumes of refurbishments and replacements have subsequently varied when compared to the plan in response to the findings from the relevant survey or inspection. Our choice in intervention in response to the survey findings results in us extending the asset life for the lower cost solution e.g. not replacing the whole installation when a refurbishment (painting) is only required.

5.3.6 Offtake & PRS Slam-shuts / Regulators

In our Business Plan we stated we would target obsolete regulators as manufacturers of certain regulators were no longer able to support the products with soft or hard spare components. Therefore, we have utilised the replace intervention to target these assets however we identified fewer numbers than originally assumed in the Business Plan. Kiosk replacements and pressure reduction system refurbishments (paintings) have been, as per the Business Plan, carried out based on the condition informed by the latest health survey. As a result of the surveys our kiosk assets and pressure reduction systems were shown to be in better condition than assumed than when setting the Business Plan leading us not carrying out as many interventions. Our choice in interventions has allowed us to treat the specific asset issues whilst minimising costs by keeping the treatment proportional to the issue.

For E&I the original Business Plan set out expenditure for E&I interventions for pressure reduction installations, however, it was not clear whether these interventions would relate entirely to above or below 7 bar installations. At the time of rebase the interventions were modelled for above 7 barg sites; we have carried out fewer interventions compared to the volume in the Target. However, instead we have intervened on below 7 barg sites, for example,

sites designed to operate at high pressure but operating at intermediate pressure which do not contribute to our NOMs position. Our monetised risk models are not configured to be able to model the risk reduction from these interventions on below 7 barg.

5.3.7 Offtake & PRS Pre-heating

Within the pre-heating Asset Categories there are different types of pre-heating units and subsequently different interventions. We stated in our Business Plan that we would prioritise interventions in Water-Bath Heaters (WBHs) based on their condition. Through improvements in water chemistry we were able to extend the asset life of WBHs that were in satisfactory condition. In our Business Plan we stated that we would target Modular Boiler Heaters (MBH) to address challenges with the MBH supply chain which did not support replacement parts for assets older than 15 years. Engagement with manufacturers determined that this obsolescence timeframe was reducing, and a more accurate estimate was 10 years. Therefore, on the basis that we had mitigated the risk posed by our WBH and to address the obsolescence risk from MBH we increased our investment in MBH.

An assessment was made of the asset to determine whether a full replacement was required or whether individual boilers within in the system could be replaced. Within a modular boiler system, the individual package boilers deteriorate at different rates linked to the operational cycle of each unit. When gas demand is low only some of the boilers within a system will be in continuous operation. As the gas throughput increases the required number of boilers to heat the gas increases, which results in different operational profiles and different respective deterioration rates between boilers. This means that replacement of the more deteriorated obsolete package boilers was the lower cost solution to address the asset risk.

5.3.8 Odourisation & Metering

The only intervention within the Target and outturn is the refurbishment intervention referring to the replacement of the expansion tank.

5.3.9 District, I&C & Service Governors

The intervention mix within governors, like interventions within other Asset Categories, has been driven by delivering on the strategy set out in the Business Plan whilst adapting the plan to respond to the latest data and information. Full installation replacements are lower across all networks compared to the Business Plan assumption and this has been driven by delivery challenges such as works being held up due to land negotiations. Full replacement has also

been slowed as we moved away from replacing buried modules on a like for like basis due to findings around increased deterioration rates for buried modules. Our preferred option therefore was to replace with above ground modules, and this added increased complexity around land costs and negotiations. To address these delivery challenges in some networks we moved towards component replacement and focused on addressing our most critical governors.

Similar to our decisions for interventions in PRS Slam-shuts/ Regulators, kiosk and governor refurbishments interventions have been proportional to the actual risks identified through our latest surveys. Therefore, the outturn volumes of these interventions differ in our networks compared to the assumptions with the Business Plan, in some networks they are therefore higher and in others lower.

6.0 Relevant Risk Change

To enable an appropriate assessment as to whether our investments within RIIO-GD1 for our NOMs assets have yielded value for consumers, in line with the NOMs Incentive Methodology, we have proposed 6 Relevant Risk Changes (RRC) that need to be considered in the assessment of our performance. There is one other RRC for Mains Data Cleanse, which due to the cohort reporting method does not impact our performance. In this section, we set out the rationale for these changes with proposals for how they are treated. We also provide a rationale for where we have no information to disclose against the other RRC categories.

6.1 Methodology Change

We have set out one RRC for Methodology change below, all other remaining calculations remain the same in the model and base-data that was used to derive the Target and Outturn risk positions.

6.1.1 Negative Risk Benefits

We have identified that for certain interventions within Pressure Control and Filtration of Above 7 Bar Pressure Reduction Systems (PRS), which includes Offtakes, that when the intervention is applied it shows that the investment has increased the monetised risk value of the asset. This logic is contradictory to the intention of the Methodology and the Network Output Measures, since the implication from the model is that the investment has had a detrimental impact upon the network, which is not the case.

This error is affecting the intervention calculation within the original rebased Target and the outturn position for Filters, Pre-heat, Regulator and Slam-shut Categories. Our proposal is that, for these interventions within the rebased Target *and* the Outturn position, the failure rate should be applied so that post intervention it is *less than or equal to* the failure rate pre-intervention. Without this change the failure rate post intervention is higher than pre-intervention. The impact of this change is set out in Table 6 and has been incorporated into our outturn position. It shows that once this correction is applied the Target Delta becomes more challenging in all four networks.

Table 6 – The impact on the original Target Delta of the Negative Risk Benefits correction

Network	Original Target Delta (R£m)	Target Delta post corrections (R£m)	Percentage impact on network delta
EN	34.18	34.46	0.8%
LON	30.11	30.56	1.5%
NW	29.62	29.82	0.7%
WM	20.41	21.00	2.9%

6.2 Data Cleanse

We have carried out a data cleanse on the assets within scope of the NOM to ensure our outturn position is more accurately reflecting our efforts to deliver consumer value. Where the Asset Category has not been listed below no relevant changes have been identified.

6.2.1 Mains

Over the course of RIIO-GD1 there have been changes in the mains asset base not due to intervention. For the purpose of NOMs reporting we have focussed on changes to pipe material as this is a key component in determining the monetised risk of the asset. The two changes in pipe material relate to historical data capture of metallic mains from when they were originally laid or the downgrading of high-pressure pipelines. This change has not had an impact on the Target or Outturn delta as per the NOMs Methodology we have applied a cohort approach to derive both, however, it does impact the monetised risk remaining on the network and therefore the risk of this change has been robustly estimated and is included as a RRC. The material changes are summarised in Table 7.

Table 7 – Summary of mains material changes between Iron & Steel

Network	Asset Category	Population in original base-data	Increase / decrease to population not due to intervention	Percentage change to population
EN	Iron	12,725.7	9.9	0.08%
	Steel	3,107.1	44.9	1.45%
LON	Iron	7,595.5	7.1	0.09%
	Steel	1,031.4	53.9	5.23%
NW	Iron	9,269.6	-16.0	-0.17%
	Steel	1,513.1	4.4	0.29%
WM	Iron	7,559.7	-69.2	-0.92%
	Steel	1,586.8	56.5	3.56%

6.2.2 Risers

When the base-data was constructed for Risers not all buildings had been surveyed. Following the survey programme additional assets have been identified and a small number have been removed from the base-data. The volume changes are summarised in Table 8. The with intervention, without intervention and delivered risk removed have been derived from the updated base-data.

Table 8 – Changes to Riser populations

Network	No. of risers in original base-data	No. of risers added	No. of risers to remove	Percentage increase (risers)
EN	12,736	4,288	72	34%
LON	44,912	14,677	216	33%
NW	10,822	3,531	101	33%
WM	7,059	4,637	56	66%

6.2.3 Offtake & PRS Filters

It has been identified that asset records for filters had been erroneously omitted from the original base-data. This has only affected Eastern network, the number of assets added in is summarised in Table 9. These assets were intervened on and therefore to accurately represent our monetised risk removed to consumers they need to be included in the base-data.

Table 9 – Changes to Filter populations

Network	No. of filters in original base data	No. of Additional Filters	Percentage Increase (%)	New totals of Filters
EN	298	4	1.3%	302

6.2.4 Offtake & PRS Slam-shuts / Regulators

It has been identified that asset records for Slam-shuts / Regulators had been erroneously omitted from the original base-data. This has only affected Eastern network and the number of assets added in is summarised in Table 10. These assets were intervened on and therefore to accurately represent our risk removed to consumers they need to be included in the base-data.

Table 10 – Changes to Regulator populations

Network	No. of regulators in original base data	No. of Additional Regulators	Percentage Increase (%)	New totals of Regulators
EN	354	5	1.4%	359

6.2.5 District, I&C & Service Governors

Through Asset Data quality improvement works over RIIO-GD1 we have improved our records of our governors and therefore 600 governors have been added into the base-data to reflect these asset changes, as summarised in Table 11. This represents a 1.2% increase in our governor asset records. Some of these assets have been intervened on and therefore to accurately represent our monetised risk removed to consumers they need to be included in the base-data.

Table 11 – Changes to Governor Populations

Network	No. of Governors in original base data	No. of Additional Governors	Percentage Increase (%)	New totals of Governors
EN	23,815	209	0.9%	24,024
LON	15,012	45	0.3%	15,057
NW	6,913	259	3.7%	7,172
WM	6,178	87	1.4%	6,265

6.3 Other Mechanisms

6.3.1 Below 7 Bar Mains Diversions

We have detected that the workload from the Final Proposals for below 7 bar mains diversions has been included when setting the network Target. We propose the risk removed associated with this workload should be removed from the Network Risk Output, because the costs associated with diversions are rechargeable to those requesting the work and therefore a positive adjustment to revenues on the basis of delivering more diversions than planned would not be in the consumers' interests. We have also identified that no other Gas Distribution Network (GDN) has rechargeable diversions with their NOMs and therefore for consistency it should be removed from Cadent's NOMs.

We propose that the risk associated with the Diversions length be removed from the Target and that no risk removed due to diversions is reported in the Outturn. To support this proposal, we have outlined the method used for removing Diversions from the Target Delta in Appendix

1. The impact of this change is summarised in Table 12 and has been reflected in both the Normalisations Target and Normalisations Delivery Tabs.

Table 12 – Impact of removing rechargeable diversions from the Target Delta.

Network	Original Target Delta	Target Delta post removal of Diversions	Percentage Change
EN	34.18	33.74	-1.3%
LON	30.11	29.65	-1.5%
NW	29.62	28.70	-3.1%
WM	20.41	19.93	-2.3%

6.4 Other Categories of Relevant Risk Change

This section provides explanation for the zero values submitted in the RIIO-GD1 NOMs Close Out Data Collection Template across the Asset Categories and 7 types of RRC.

6.4.1 Consequence of Failure change

We have made no changes to the consequence of failure changes within the risk models for deriving the Target and Outturn risk positions.

6.4.2 Deterioration

We have made no changes to the deterioration coefficients within the risk models for deriving the Target and Outturn risk positions. Changes have been made to deterioration assumptions for GD2 to reflect the expected performance of the assets post RIIO-GD1 interventions.

6.4.3 Pre-RIIO-1 Changes

The rebasing process addressed planned and actual delivery of works in 2011/12 and 2012/13 and therefore no further adjustments are required.

6.4.4 Impact of change in Asset Base over RIIO-1

The data disclosed does not include any assets added due to network growth.

6.4.5 Change covered by other mechanisms

No changes have been made to the Target or Outturn positions due to other mechanisms.

7.0 Methodology for deriving Associated Costs

In this section we set out our approach for valuing under or over delivery of risk points outside of the threshold. In the summary section we set out the approach and the rationale for it, as only London has delivered above the threshold, we show how the methodology is used to calculate the allowance adjustment for London.

7.1 Summary of Methodology

1. Protecting consumers from over-paying

To ensure the effects of trade-offs are captured and the complexity of the investment programme is considered we propose that the baseline unit cost per risk point should be used at a network level to determine the monetary value of London's over delivery.

2. Protecting consumers from over-paying

We propose to use allowances instead of outturn costs to protect consumers from over-paying for risk removed where networks have spent more than the allowed expenditure. Furthermore, we have modelled scenarios which show that in London we have not achieved the NOM through targeting interventions at the lowest cost highest monetised risk removed. Instead, as set out in this report we have focused on making the right asset management decision. Therefore, using allowances or expenditure at an Asset Category level would result in a higher remuneration.

3. Symmetrical Mechanism

We also propose, to ensure the mechanism is symmetrical, that the same method should be used to determine the monetary value for under and over delivery, if both are required. This means using the baseline unit cost per risk point at a network level for both over and under delivery. It also means that when determining over delivery the value of a risk point should be set prior to the valuing of all risk points removed. This is the same principle for under delivery, i.e. the value of under delivery is not determined based on actual risk points removed but rather the Target.

Summary of calculation and steps to value risk points:

1. Calculate the allowances for delivering the NOM.
2. Determine the Baseline Network Target Delta post normalisation.
3. Calculate the value of a risk point by dividing the Network Level Allowances by the Baseline Network Target Delta.
4. Identify the additional risk points delivered or the risk points not delivered and multiply them by the value of a risk point, as calculated in step 3.

7.2 Valuing London's over-delivery

In this section we show the application of the proposed method to London's delivered risk removed.

1. Calculate the allowances for delivering the NOM.

In certain instances, allowances were not given at a level that was granular enough to be able to distinguish between works in scope of the NOM. For instance, the allowance for Tier 1 Iron Mains and Associated Services does not split out service relays and service transfers. Service relays are within the NOM whereas transfers are not. Therefore, to overcome these issues we have made informed judgements and we fully expect to agree the details of this Methodology with Ofgem post submission. Table 13 summarises our estimates of the NOM Allowance.

Table 13 – Summary of London NOM Allowance (20/21 Price Base)

Asset Category	Post Normalisation Target (R£m)	Post Normalisation Outturn (R£m)	Uplifted Allowance (20/21 Price Base) £m
LTS Pipelines - Piggable	0.00	0.00	10.57
LTS Pipelines - Non Piggable	0.00	0.00	1.08
Iron Mains	15.52	15.39	1,075.63
PE Mains	-0.33	-0.29	-
Steel Mains	0.79	1.18	67.37
Other Mains	-	-	-
Services	6.15	8.21	328.98
Risers	3.24	3.01	168.92
Offtake Filters	0.03	0.01	0.07
PRS Filters	0.97	0.68	0.90
Offtake Slamshut/ Regulators	0.02	0.01	0.32
PRS Slamshut/ Regulators	1.13	0.97	7.38
Offtake Pre-heating	0.12	0.14	1.66
PRS Pre-heating	1.96	2.80	4.63
Odourisation & Metering	0.21	0.15	0.06
District Governors	0.15	0.35	17.82
I&C Governors	0.00	0.00	0.60
Service Governors	0.14	0.00	1.44
Totals	30.11	32.61	1,237.71

2. The post normalised risk target for London is:

R£ 30.11m

3. The calculation to determine London's value of a risk point:

$$\frac{\pounds 1,237.71 \text{ m}}{\text{R£ } 30.11} = \pounds 56.05$$

4. The risk points delivered above the deadband are:

R£ 1.51m

Therefore, the value of London's Over Delivery is

£56.05 * R£ 1.51m = £56.12m

Appendix 1 – Mains Diversions

This appendix sets out the method for removing the monetised risk benefit associated with below 7 bar mains diversions.

In the “RIIO-GD1: Final Proposals - Supporting document - Cost efficiency” the km of rechargeable diversions is set out in Appendix 3 within the section titled: “*Other non-discretionary mains and associated services*”. Table A3.10: RIIO-GD1 other non-discretionary mains shows the workload to be removed from the Target for rechargeable diversions for each network. See Figure 5.

Figure 5 – Volumes of rechargeable diversions as per the Final Proposals

Table A3.10: RIIO-GD1 other non-discretionary mains

Other non-discretionary abandon lengths (km)									
	EoE	Lon	NW	WM	NGN	Sc	So	WWU	Total
Submitted ¹	94.2	78.5	240.3	92.2	128.0	60.3	62.9	3.4	759.9
Submitted adjusted ²	94.2	78.5	240.3	92.2	128.0	60.3	62.9	3.4	759.9
Allowed workload	94.2	78.5	240.3	92.2	128.0	60.3	62.9	3.4	759.9
<i>Non-standard Materials</i>	0.0	0.0	62.5	0.0	0.0	0.0	0.0	2.4	64.9
<i>Non-chargeable Diversions</i>	0.5	0.5	2.0	0.4	0.0	5.1	2.5	0.9	12.0
<i>Rechargeable Diversions</i>	93.7	78.1	175.8	91.8	128.0	55.2	60.4	0.0	682.9
Disallowed workload ³	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
% Disallowed	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

¹Workload submitted by company in October 2012 via repex supplementary question.

²Includes workload transfers between activities eg transfer of capitalised replacement from capex to repex.

³Difference between submitted adjusted workload and Ofgem allowed workload.

When these volumes were translated into cohorts they were split as per Table 14.

Table 14 – Summary of rechargeable diversion broken down into cohorts

Cohort (material / tier)	km Modelled in the original Target			
	EN	LON	NW	WM
Cast Iron / 1	19.1	25.1	69.1	35.4
Cast Iron / 2	6.3	2.1	13.0	6.9
Cast Iron / 3	0.4	0.7	4.7	2.3
Ductile Iron / 1	4.0	4.1	4.7	1.4
Ductile Iron / 2	2.6	0.5	0.6	1.0
Ductile Iron / 3	0.1	0.1	0.5	0.1
Spun Iron / 1	37.3	26.5	53.6	24.6
Spun Iron / 2	3.4	7.8	2.1	2.7
Spun Iron / 3	0.6	0.0	1.9	0.9
Steel / 1	17.2	7.8	23.7	13.4
Steel / 2	2.4	1.2	0.5	1.8
Steel / 3	0.4	2.3	0.5	1.3
Asbestos / 1	0.0	0.0	0.8	0.0
Asbestos / 2	0.0	0.0	0.0	0.0
Total	93.7	78.1	175.8	91.8

The scenarios have been re-modelled with the reduction in length for each cohort to reproduce the without and with intervention scenarios. The outcome is summarised in Table 15.

Table 15 – Impact of removing rechargeable diversions from the Target Delta.

Network	Target Delta	Target Delta post removal of Diversions	Percentage Change
EN	34.18	33.74	-1.3%
LON	30.11	29.65	-1.5%
NW	29.62	28.70	-3.1%
WM	20.41	19.93	-2.4%

To assess if the outcome is fair the average risk removed for each cohort has been determined and this has been multiplied by the length to be removed. This is summarised below in Table 16. As can be seen from Table 17 there is little difference between the two methods c. 0.77% and we have progressed the output from the Asset Investment Manager (AIM) software so that it is consistent with other RRC approaches.

Table 16 – Summary of cohort method for determining risk to remove from rechargeable diversions

Cohort	Avg. risk removed per cohort (R£/km)			
	EN	LON	NW	WM
Cast Iron / 1	102,042	163,828	347,260	173,892
Cast Iron / 2	52,558	25,993	99,866	56,623
Cast Iron / 3	7,237	15,782	78,458	39,099
Ductile Iron / 1	6,545	8,674	7,053	2,134
Ductile Iron / 2	4,651	1,053	729	1,830
Ductile Iron / 3	238	852	1,005	384
Spun Iron / 1	125,190	107,411	196,591	80,456
Spun Iron / 2	12,677	33,087	10,113	8,501
Spun Iron / 3	1,663	43	12,804	5,639
Steel / 1	107,218	76,387	148,297	104,859
Steel / 2	6,887	8,627	2,246	13,382
Steel / 3	5,125	15,768	5,547	6,881
Asbestos / 1	0	0	3,278	0
Asbestos / 2	0	0	881	0
Sum	432,032	457,506	914,129	493,681

Table 17 - Difference between two methods for removing rechargeable diversions

Network	Average risk removed	Remodel using AIM	Difference
EN	432,032	436,211	4,179
LON	457,506	451,990	-5,516
NW	914,129	917,887	3,758
WM	493,681	478,335	-15,346