



Network Asset Risk Metrics Commentary

Published in December 2024

Contents

1. Executive Summary	3
2. Definitions And Assumptions	4
3. RIIO-3 Forecast NRO Delivery	7
4. Non-NARM Intervention Risk and Population Changes	10
5. RIIO-3 True-Up Risk and Population Changes	11

Legal Notice

This paper forms part of Wales & West Utilities Limited Regulatory Business Plan. Your attention is specifically drawn to the legal notice relating to the whole of the Business Plan, set out on page 3 of Document 1 of WWU Business Plan Submission. This is applicable in full to this paper, as though set out in full here

1. Executive Summary

Our NARM BPDT submission reflects our preferred intervention scenarios put forward in the C&V BPDT and associated CBAs. The work represented in the NARM BPDT is a reflection of stakeholder requirements for our plan to broadly maintain risk overall, at best value for money for investment spend, whilst keeping levels of safety and reliability high and preventing emissions from increasing through proactively maintaining asset health and performance.

Our plan delivers on these requirements, and we are pleased to be able to put forward the associated data to reflect the impact on NARMs during RIIO-GD3.

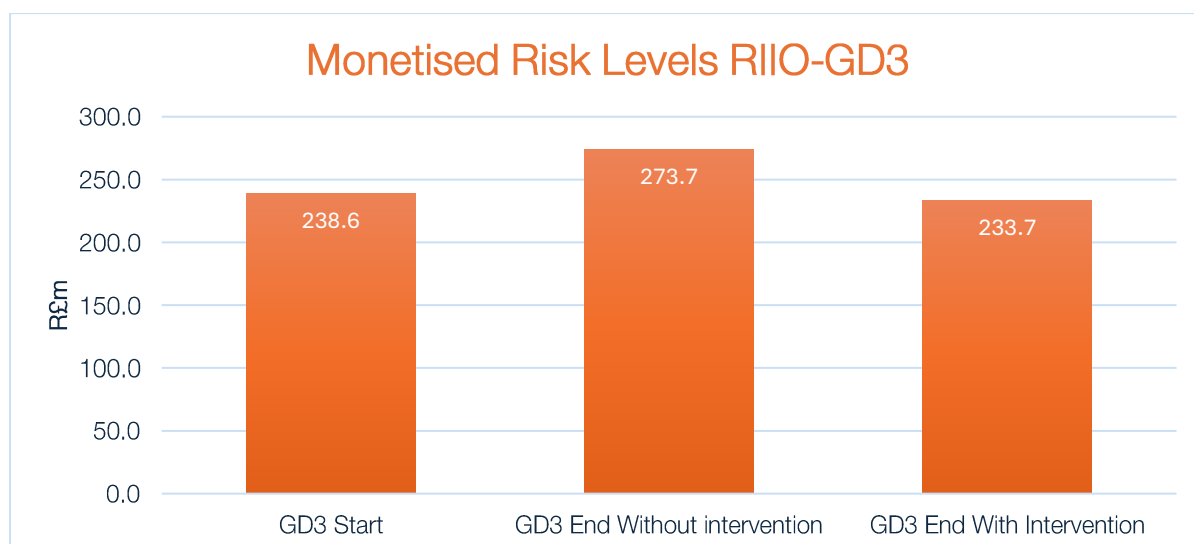


Figure 1: Chart showing monetised risk levels being broadly maintained

Over the last year or so, we have worked closely with the other GDNs and Ofgem on improving modelling of long-term risk within the NARM framework. In particular, we have implemented new risk models, with accompanying deterioration updates, for a number of NARM asset groups:

- Mains
- Filters
- Slamshut/Regulators
- Pre-heating
- Odourisation & Metering
- Governors

For all asset groups, base data has been refreshed to be the latest view of asset condition, health etc.

We are pleased to be able to deliver on Ofgem's requirement for a robust view of the impact of NARM interventions on long-term risk, with values presented in sheet N1.3 Project Listing under column P, *RIIO-3 Long Term Benefit Output (R£m)*.

Note: As per the guidance, all values are reported using 23/24 base year prices. This includes the single use of RIIO-GD2 risk which occurs in sheet N2.3 RIIO3 Risk And Volumes under column BU, *RIIO-2 Closeout Position*, where values for outturn/forecast positions as per the latest RIIO-GD2 NARM RRP submission have been uplifted from 18/19 prices used for RIIO-GD2 reporting to 23/24 prices used for RIIO-GD3 submissions.

2. Definitions And Assumptions

Assets have been defined at the Asset Category level, in line with NARM asset categories and the overall NARM methodology.

For the site models these are defined broadly as follows:

Asset Definitions

- Offtakes and PRIs
 - Filters – a single modelling unit represents the entire filter subsystem, not just a single filter
 - Slamshut/Regulators – a single modelling unit represents the entire subsystem, not just a single slamshut or regulator. This includes all slamshuts and regulators of the subsystem, as well as associated components and pipework
 - Pre-heating – a single modelling unit represents the entire subsystem, including any/all boilers and heat exchangers
 - Odourisation & Metering – a single modelling unit here represents either a fiscal metering subsystem on an offtake i.e. a pair of fiscal meters and associated parts, or an odourisation subsystem on an offtake, including the LGT tank and associated parts
- Governors
 - A single modelling unit here represents a governor in its entirety i.e. pipework, slamshuts, regulators, filters etc.

Intervention Definitions

- Refurbishment – work that brings the condition/performance of the subsystem or governor unit back to a good state, but not as performant as a replacement
- Replacement – work that brings the condition/performance of the subsystem or governor unit to an as-new state
- LTS Pipelines
 - In NARM terms, the LTS Pipelines dataset contains all pipe, sleeve and valve sections on the Above 7 bar pressure network. Valves have been defined as individual assets with a length of 1m.
 - For LTS Pipeline interventions, Pipe, Sleeve and Valve Refurbishments have been set to only apply to the relevant asset subtype. CP System Refurbishment has been applied at a rate of 10km per CP defect, on the assumption that there is a defect found for every 10km of surveying undertaken via CIPS surveys.
- Distribution Mains
 - The Distribution Mains dataset contains all pipes in the low pressure, medium pressure and intermediate pressure networks, with the population taken to be the reported population in the 23/24 RRP submission with forecasted interventions in 24/25 and 25/26 applied.
 - For Distribution Mains interventions, the Replacement intervention assumes a 1:1 ratio of abandon to lay.
- Services
 - The Services dataset contains the population of services attached to all distribution mains, with the services attached to metallic mains determined using geospatial analysis. These have been cohorted into 4 groups – Domestic PE, Domestic Non PE, Non Domestic PE, and Non Domestic Non PE.
 - For services interventions, the volume has been determined from the number of services attached to distribution mains selected for intervention in RIIO-GD3, with a 50/50 split applied to account for services being transferred as well as relaid.
- Risers

- The Risers dataset consists of all vertical pipes feeding multi occupancy buildings and their associated lateral pipes. The dataset is based on the reported population in the 23/24 RRP submission.
- For riser interventions, they are applied to the riser and associated lateral pipework together. Riser Replacement assumes replacement with new stainless steel pipework, Riser Refurbishment assumes that corrosion protection is applied to the pipework, and Riser Removal assumes that the pipework is removed from risk.

General Points

- All work has been modelled at end of RIIO-GD3 (2031 in our risk modelling software)
- In sheet N1.3 Project Listing, under column J, *Forecast Delivery*Year, we have used 2031 in line with the above point and the guidance
- For the site models, these are maintainable assets that are replaced at end-of-life and refurbished periodically during their working lives to keep them on the optimum deterioration curves. As a result, these assets have been deemed to have an intervention life of 10 years for the purposes of modelling *RIIO-3 Long Term Benefit Output (R£m)* under column P in sheet N1.3 Project Listing
- For Distribution Mains and Services these are non maintainable assets that are replaced either due to the mandated iron mains replacement programme or on a condition based assessment. The replacement PE mains have been deemed to have an intervention life of 50 years for the purposes of modelling *RIIO-3 Long Term Benefit Output (R£m)* under column P in sheet N1.3 Project Listing
- For Risers, the replacement stainless steel risers have been deemed to have an intervention life of 50 years, and corrosion protection to have a lifespan of 15 years
- For LTS Pipelines, the refurbishment interventions have been deemed to have a lifespan of 15 years, and the replacement and abandonment interventions have been deemed to have a lifespan of 50 years
- Risk and Health bands in sheet N2.2 Risk and Health Bandings were chosen in line with the guidance to give a good spread across the 1-10 pots, based on the start of RIIO-GD3. Equal width bandings have been used to keep things transparent and in line with the approach used in RIIO-GD2.

Health/Probability of Failure Information

For the site models, there is no applicable concept of probability of failure (PoF) as we don't tend to deal with end-of-life failures on these maintainable assets. Therefore, what we have is expected annual failure rates/consequences.

These failure types and the associated consequences are not in any mutually compatible set of units and so calculating a Health/PoF value is not particularly robust.

However, as requested, we have carried out health/PoF calculations to the best of our abilities and the contributing factors (taken as a sum to give the Health/PoF value) for each model are as follows:

Asset group	Failure type
Filters	Release of Gas, High Outlet Pressure, Low Outlet Pressure, Capacity, General Failure
Slamshut/Regulators	Release of Gas, High Outlet Pressure, Low Outlet Pressure, Capacity, General Failure
Pre-heating	Release of Gas, Low Outlet Temp, High Outlet Temp, General Failure, Capacity
Odourisation & Metering	Release of Odorant, General Failure, Release of Gas, Under Meter Reading, Over Meter Reading, H_Odorant, L_Odorant

Governors	Corrosion, Failure Open, Failure Closed
LTS Pipelines	Corrosion, Ground Movement, General Failure, Mechanical Failure
Distribution Mains	Corrosion, Joint, Fracture
Services	Corrosion, Joint, Fracture
Risers	Corrosion, Joint, Interference

3. RIIO-3 Forecast NRO Delivery

Asset Category	RIIO3 Start Position in Monetised Risk (R£m)	RIIO3 End Forecast Deterioration (R£m)	RIIO3 End Position Without Intervention - Normalised (R£m)	Movements due to A1 Interventions (R£m)	RIIO3 End Position With Intervention - Normalised (R£m)	Non-NARM intervention Risk Movements (with intervention) (R£m)	Replacement Volume (km / no of)	Refurbishment Volume (km / no of)
LTS Pipelines	73.4	1.8	75.2	-0.0	73.7	-1.4	47.7	253.5
Mains	65.4	13.7	79.2	-5.3	61.5	-12.41	2149.9	0
Services	20.9	3.1	24.0	-1.0	19.3	-3.7	78822	0
Risers	2.8	0.5	3.3	-1.7	1.6	-	1544	4
Filters	19.1	3.1	22.1	-1.9	20.3	-	10.0	109.0
Slamshut/Regulators	31.3	7.7	39.0	-8.6	30.3	-	19.0	206.0
Pre-heating	4.9	1.6	6.5	-1.5	5.0	-	51.0	63.0
Odourisation & Metering	2.7	0.8	3.5	-1.0	2.5	-	5.0	11.0
Governors	18.1	2.8	20.9	-1.5	19.4	-	418.0	825.0
Totals	238.6	35.0	273.7	-22.5	233.7	-17.5		

The table above is taken directly from N2.3, with the Replacement Volume and Refurbishment Volume columns being totals taken from N1.3.

Comments for each site-based asset group are as follows:

Filters - Across GD3, risk goes from £19.1m to £22.1m with no proactive NARM interventions; however, with our plan risk finishes at £20.3m based on the intervention volumes shown in the table

Slamshut/Regulators - Across GD3, risk goes from £31.3m to £39m with no proactive NARM interventions; however, with our plan risk finishes at £30.3m based on the intervention volumes shown in the table

Pre-heating - Across GD3, risk goes from £4.9m to £6.5m with no proactive NARM interventions; however, with our plan risk finishes at £5.0m based on the intervention volumes shown in the table

Odourisation & Metering - Across GD3, risk goes from £2.7m to £3.5m with no proactive NARM interventions; however, with our plan risk finishes at £2.5m based on the intervention volumes shown in the table

Governors - Across GD3, risk goes from £18.1m to £20.9m with no proactive NARM interventions; however, with our plan risk finishes at £19.4m based on the intervention volumes shown in the table

LTS Pipelines - we are expecting to see a monetised risk reduction of £1.4m as a result of our intervention plan compared to the Without Intervention position at the end of RIIO-GD3. This reduction is made up of:

	£m
1.7km of pipeline sleeve refurbishment	-0.001
3.3km of pipeline diversions	-0.008
1.7km of pipeline refurbishment	-0.007
44.4km of pipeline abandonment	-1.430
0.4km of pipeline crossing refurbishment	-0.002
Intervention	-1.448

Distribution Mains - we are expecting to see a monetised risk reduction of £17.7m as a result of our intervention plan compared to the Without Intervention position at the end of RIIO-GD3. This reduction is made up of:

	£m
368km of <2" Steel replacement	-4.3
15.8km of Tier 2 Cast and Spun Low Pressure replacement	-0.2
7.4km of Tier 2 Ductile Low-Pressure replacement	-0.023
0.97km of Tier 3 Cast and Spun Low Pressure replacement	-0.019
0.09km of Tier 3 Ductile Low-Pressure replacement	-0.001
6.01km of Over 30m Cast and Spun replacement	-0.1
3.35km of Over 30m Ductile replacement	-0.013
73.7km of >2" Steel replacement	-0.7
1675km of Tier 1 replacement	-12.41
Intervention risk reduction	-17.7

Services - we are expecting to see a monetised risk reduction of £4.7m as a result of our intervention plan compared to the Without Intervention position at the end of RIIO-GD3. This reduction is made up of:

Replacement of:	£m
60,631 Tier 1 Domestic services	-3.5
861 Tier 1 Non-Domestic services	-0.2
80 Tier 2 Domestic services	-0.005
2 Tier 3 Domestic services	-0.0001
2 Iron >30m Domestic services	-0.0001
16,134 <=2" Steel Domestic services	-0.9
230 <=2" Steel Non-Domestic services	-0.048
872 >2" Steel Domestic services	-0.1
10 >2" Steel Non-Domestic services	-0.002
Intervention risk reduction	-4.7

Risers - we are expecting to see a monetised risk reduction of £1.7m as a result of our intervention plan compared to the Without Intervention position at the end of RIIO-GD3. This reduction is made up of:

	£m
Replacement of 1,087 3-5 storey risers	-0.621
Refurbishment of 2 3-5 storey risers	-0.001
Removal of 95 3-5 storey risers	-0.089
Replacement of 139 6-9 storey risers	-0.215
Refurbishment of 2 6-9 storey risers	-0.001
Removal of 72 6-9 storey risers	-0.143
Replacement of 85 10+ storey risers	-0.298
Removal of 66 10+ storey risers	-0.323
Intervention risk reduction	-1.7

4. Non-NARM Intervention Risk and Population Changes

For the site models, there are no applicable non-NARM intervention risk/population changes.

We have 3 asset groups where we are expecting to see changes to monetised risk as a result of non-NARM interventions. These are:

- LTS Pipelines – 44.4km of pipeline risk removal
- Distribution Mains – Tier 1 mains replacement
- Services – Replacement of services attached to Tier 1 mains.

LTS Pipelines pipeline - risk removal is being classed as an A3 project due to the size of the investment, and as such it is classed as a non-NARM intervention. The impact of this intervention has been calculated using the same risk map, models and base dataset as the A1 interventions for LTS Pipelines.

Distribution Mains - Tier 1 mains replacement workload is part of the HSE mandated Iron Mains Risk Reduction Programme, and is considered to be mandatory work. As a result, we have classified this as A3 work which is classed as a non-NARM intervention. The impact of this intervention has been calculated using the same risk map, models and base dataset as the A1 interventions for Distribution Mains.

Services replacement - workload associated with Tier 1 mains replacement is considered to be mandatory work as we have to replace all metallic services when the associated main is replaced. As a result, we have classified this as A3 work which is classed as a non-NARM intervention. The impact of this intervention has been calculated using the same risk map, models and base dataset as the A1 interventions for Services.

5. RIIO-3 True-Up Risk and Population Changes

Below is the information related to the RIIO3 true-up for the site-based models.

RIIO-3 True-up					
Asset Category	RIIO-2 position	Closeout	RIIO-2 to RIIO-3 Methodology Change	RIIO-GD3 Position	Start
RISK (R£m)					
Filters		12.6	6.4		19.1
Slamshut/ Regulators		14.7	16.6		31.3
Pre-heating		6.2	-1.3		4.9
Odourisation & Metering		4.9	-2.1		2.7
Governors		19.6	-1.4		18.1
POPULATION					
Filters		332.0	-4.0		328.0
Slamshut/ Regulators		362.0	-2.0		360.0
Pre-heating		213.0	-1.0		212.0
Odourisation & Metering		34.0	-		34.0
Governors		17,217.0	-538.0		16,679.0

The changes to risk have come about as a result of three things:

1. New risk model formulas and deterioration curves for all site-based models following the national Long-Term Risk Modelling project with the other GDNs in conjunction with Ofgem
 - a. For slamshut/regulators and filters, the long-term risk modelling work has had the effect of increasing risk of a typical asset during its usual working life, but with much lower deterioration in the long-term than in the original model, especially at end-of-life
2. Updated carbon costing for RIIO-GD3, based on the latest Ofgem CBA template
3. Refreshed base data to match the new NARM methodology in the transition from RIIO-GD2 to RIIO-GD3, including some very small adjustments to populations, and a slightly larger adjustment to the governor population based on the service governor survey programme

LTS Pipelines

We are expecting to see an increase in monetised risk of £1.2m for LTS Pipelines. This is made up of a decrease of £1.4m due to changes in methodology between RIIO-GD2 and RIIO-GD3 models, and £2.7m can be attributed to data cleansing activities.

The change in monetised risk due to methodology changes is driven predominantly by a change in risk model start date from 2015 to 2024, which reflects the year that the RIIO-GD3 base data was generated. This has the effect of moving assets earlier in deterioration curves, which results in a reduction in risk. This affects failure nodes and also cost of carbon.

In terms of data cleansing, the primary difference between RIIO-GD2 and RIIO-GD3 datasets is the Age Effective field, which has now increased by 12 years on average across all assets within LTS Pipelines. This feeds into the formulas for Corrosions and Mechanical Failures and therefore has an effect on a number of risk nodes further along the LTS Pipelines risk map. This increase is sufficient to outweigh the impact of the population decreasing by approximately 28km in length, through downrating and abandonment of pipelines in RIIO-GD1 and RIIO-GD2.

Distribution Mains

We are expecting to see a decrease in monetised risk of £23.3m for Distribution Mains. This is made up of a decrease of £23.9m due to changes in methodology between RIIO-GD2 and RIIO-GD3 models, and an increase of £0.5m due to data cleansing activities.

The changes in monetised risk due to methodology changes are driven mainly by the change of risk model start year from 2015 to 2024, and a change in the formula for general emissions which has reduced the output compared to RIIO-GD2. The Distribution Mains model is more sensitive to year on year changes compared to the LTS Pipelines model, so any changes due to the start year are more pronounced. Similarly, general emissions in the Distribution Mains model are more significant compared to other asset groups, so the change to the formula has a greater impact on monetised risk. Additionally, as part of the work on determining Long Term Risk Benefit, ICS Consulting provided updated deterioration rates for the failure modes for all mains materials (Joint Failure, Corrosion, and Fractures), which were lower than the rates used in RIIO-GD2. This reflects additional years of failure data across all GDNs.

In terms of data cleansing, there is an increase of 23km between RIIO-GD2 and RIIO-GD3 datasets – this is made up of 3km of PE mains and 20km of metallic mains. This difference is primarily due to corrections being made over the course of RIIO-GD2 as mains are found to not exist or extend further than previously thought based on old records.

Services

We are expecting to see a decrease in monetised risk of £6.3m for Services. This is made up of a decrease of £7.2m due to changes in methodology between RIIO-GD2 and RIIO-GD3 models, and an increase of £0.9m due to data cleansing activities.

The changes in monetised risk due to methodology changes are driven mainly by the change of risk model start year from 2015 to 2024. This has the effect of resetting the position of assets along deterioration curves to 9 years earlier, which impacts on all failure modes, general emissions and cost of carbon.

In terms of data cleansing, there is an increase of 57,374 services within the RIIO-GD3 dataset compared to the RIIO-GD2 dataset. This increase is made up of 54,429 PE services, 1,022 non-PE domestic services and 1,923 non-PE non domestic services. The increase in PE services is driven by new connections and replacements carried out due to service failures in RIIO-GD2. The increase in non-PE services is due to a revision in the number of expected services on metallic mains. This was determined through a geospatial analysis of metallic mains in the network compared with properties within 30m of the mains.

Risers

We are expecting to see an increase in monetised risk of £1.1m for Risers. This is made up of an increase of £0.3m due to changes in methodology between RIIO-GD2 and RIIO-GD3 models, and an increase of £0.7m due to data cleansing activities.

The changes in monetised risk due to methodology changes are driven predominantly by t scalars applied to the formulas applied to the Corrosion and Joint failure nodes in the Risers Risk Map. These scalars have been applied in order to bring the forecasted number of repairs in the risers population more in line with actual experienced failure volumes. This has outweighed the change of model start year from 2015 to 2024 which has the effect of resetting the position of assets along deterioration curves to 9 years earlier, which impacts on all failure modes, general emissions and cost of carbon.

In terms of data cleansing, there has been a complete refresh of the risers NARM dataset for RIIO-GD3. This is to incorporate findings from the large surveying programme which has taken place over the course of a number of years. The results of this refresh are a reduction in the total population of risers by 180, and an increase in risk for the total population. The reduction in total population stems from a number of isolations, cut-offs and buy outs which have taken place in RIIO-GD2. The increase in overall risk is supported by the findings of the survey programme, which has improved our knowledge and the accuracy of the asset base.