DD Supporting Evidence: EJP12

Pipeline Integrity

Contents

1 Context 4
2 Executive summary 6
3 Purpose of Document 7
4 Introduction 7
5 Our Asset Management Approach 8
5.1 Process Flow Summary 8
6 Our Inspection Programme 9
7 Identifying Faults 11
7.1 Common Asset Health Tiering 12
7.2 The Basis for Intervention 13
8 Deriving Forecast Workload 15
8.1 Pipelines 15
8.2 Crossings 16
8.2.1 Above Ground Crossings 17
8.2.2 Underwater River Crossings 18
8.2.3 Crossings Workload Summary 19
8.3 PIG Traps 20
9 Blended Unit Cost Methodology 22
9.1 Pipelines 22
9.2 Crossings 23
9.2.1 Above Ground Crossings 23
9.2.2 Underwater River Crossings 23
9.2.3 Crossing Summary 23
9.3 Pig Traps 24
10 Summary of our RIIO3 Deliverables 25
11 Conclusion 26
12 Appendix 27

CADENT - CONFIDENTIAL

Table of Figures

Figure 1: Process flow from inspection to intervention forecasting for Pipeline Integrity (EJP12) 8

Table of Tables

Table 1: Specific EJP12 feedback from the RIIO-3 Draft Determinations Cadent Annex 5

Table 2: Summary of RIIO-2 / 3 intervention volumes and expenditure for Pipeline Integrity ... 7

Table 3: RIIO-3 Inspection programme for Pipeline Integrity 10

Table 4: How faults are categorised for pipeline assets 11

Table 5: Intervention mode summary 12

Table 6: Health tiering for pipeline asset fault classification 13

Table 7: Asset population by category at July 2025 13

Table 8: RIIO-2 and RIIO-3 forecast inspection and intervention volumes 15

Table 9: RIIO-2 and RIIO-3 forecast pipeline inspection and intervention volumes 16

Table 10: RIIO-2 and RIIO-3 forecast crossing inspection and intervention volumes 17

Table 11: RIIO-2 and RIIO-3 forecast above ground crossing inspection and intervention volumes 18

Table 12: RIIO-2 and RIIO-3 forecast underwater river crossing inspection and intervention volumes 19

Table 13: RIIO-2 and RIIO-3 forecast pig trap inspection and intervention volumes 20

Table 14: How RIIO-2 has informed the RIIO-3 unit cost for pipeline defects 22

Table 15: RIIO-2 above7 bar above ground crossings intervention volumes, costs and average unit costs 23

Table 16: RIIO-2 below7 bar above ground crossings intervention volumes, costs and average unit costs 23

Table 17:Investment summary for EJP12 25

Table 18: Appendix 27

CADENT - CONFIDENTIAL

1 Context

This annex provides the additional evidence requested by Ofgem in Table 34 of the July 2025 Draft Determination, addressing concerns regarding cost uncertainty and the lack of defined deliverables in Cadent's Pipeline Integrity investment case (EJP12). It provides the basis for our RIIO-3 maintenance volumes by providing a summary of the structured methodology linking maintenance inspection outputs to intervention forecasts and the cost estimates used to develop our proposed investments. All costs in this annex are in 2023/24 prices.

To address Ofgem's queries, we will:

1. Explain Our Workload Forecasting Process: We will step through the process flow from inspection to fault identification to forecasted intervention volumes, demonstrating how each stage informs the next.
2. Clarify the Link Between Inspection and Intervention: We will define the relationship between maintenance activities and resulting interventions, showing how inspection outputs translate into deliverables for RIIO-3.
3. Provide Supporting Evidence and Methodologies: We will submit additional information to substantiate our proposed volumes and costs. This will include, our maintenance inspection programme, inspection outputs, inspection to intervention narrative, our health tiering methodology and our blended unit cost methodology.

For clarity, the feedback provided by Ofgem for EJP12 (Pipeline Integrity) is shown below in **Error! Reference source not found.**.

Feedback Source	Needs Case	Optioneering	Scope Confidence	Comments
RIIO-3 Draft Determinations – Cadent **Table 34: Summary of Cadent Engineering Recommendations**	Justified	Justified	Medium confidence	While the need for ongoing pipeline maintenance is explained in general, there is a lack of detail on the methodology for establishing workload volumes, resulting in uncertainty on the amount of maintenance required. As there are no defined deliverables, this submission is unjustified until further information is provided to support the proposed volume of maintenance activity in RIIO-3 for each intervention type to ensure the cost is reflective of the workloads completed
22nd July Ofgem Engineering – Cadent Bilateral	• The session focused on explaining how inspection data informs pipeline integrity interventions and how RIIO-2 delivery data supports unit cost forecasting.			

Feedback Source	Needs Case	Optioneering	Scope Confidence	Comments
	• The need for pipeline maintenance is acknowledged but the methodology for workload volumes needs clarifying using the process flow presented. • Additional information is needed to support volumes, deliverables and cost alignment			

Table 1: Specific EJP12 feedback from the RIIO-3 Draft Determinations Cadent Annex

CADENT - CONFIDENTIAL

2 Executive summary

This annex provides the additional evidence requested by Ofgem in Table 34 of the July 2025 Draft Determination, addressing concerns regarding cost uncertainty, workload justification, and the absence of defined deliverables in our pipeline integrity investment case (EJP12). It sets out a clear, data driven methodology that links maintenance inspection outputs to intervention volumes and cost forecasts, underpinned by statutory compliance and engineering best practice.

Cadent's pipeline integrity programme for RIIO-GD3 is built on a rolling maintenance inspection regime and proactive intervention strategy, targeting assets identified as 'deteriorated' or 'critical' through standardised health tiering. The preferred option (Option 0) proposes [redacted] interventions at a forecast cost of £[redacted] (2023/24 prices), covering high-pressure pipelines, crossings, and PIG traps. Forecast volumes are derived from historical inspection data, fault rates, and asset condition assessments.

While RIIO-2 unit costs have been used to inform the RIIO-3 forecast spend, overall expenditure is higher in RIIO-3. This increase is driven by a rise in forecast intervention volumes across multiple asset classes, primarily due to increased maintenance inspection volumes. A notable contributor is the increased focus on below7 bar underwater river crossings. These cost drivers are explored in detail in Section 8 of this annex. The use of RIIO-2 unit costs is considered appropriate given the similarity in intervention types and delivery mechanisms, supported by competitively tendered frameworks, which remain in place into RIIO-3.

This submission provides:

- A structured process flow from maintenance inspection to intervention forecasting.
- Defined deliverables by asset class, including intervention modes and volumes.
- A unified health tiering framework to prioritise risk-based interventions.
- Blended unit cost methodology using RIIO-2 actuals, adjusted for regional and asset-specific variation.

In summary, this annex demonstrates that Cadent's pipeline integrity programme is justified, deliverable, and cost reflective. It provides the transparency and evidence base required to support Ofgem's reassessment of the investment case and ensures alignment with regulatory expectations for safety, resilience, and long-term asset stewardship.

3 Purpose of Document

This document provides additional information in response to Ofgem's engineering review comments in Table 34 of the Draft Determination (July 2025). It addresses concerns regarding cost uncertainty, lack of workload detail, and absence of defined deliverables for pipeline integrity interventions in RIIO-3. The response outlines our methodology for forecasting intervention volumes, inspection to intervention logic, health tiering, and unit cost derivation, supported by historical data and engineering analysis.

4 Introduction

Cadent's pipeline integrity programme is underpinned by statutory obligations set out in the Pipeline Safety Regulations (1996) and Pressure Systems Safety Regulations (2000). These require regular inspection and maintenance of approximately 4,931 km of high-pressure pipelines, including associated features such as PIG traps and crossings. Our approach ensures compliance, safety, and network resilience through proactive interventions based on inspection findings.

The preferred investment option (Option 0) reflects the minimum level of intervention required to maintain compliance and asset health. It proposes [redacted] interventions over RIIO-3 at a forecast cost of £[redacted] with delivery planned across all networks. This option is expected to maintain fault rates at current levels and aligns with Cadent's Network Asset Management Strategy (Appendix 10).

This annex demonstrates that Cadent's pipeline integrity programme is justified, deliverable, and cost-reflective, addressing Ofgem's concerns and supporting a safe, resilient, and compliant gas network.

During the preparation of this annex, we identified an error in the RIIO-2 intervention volumes previously submitted in EJP12. We have cross referenced the correct figures with our BPDT submission and now present the accurate RIIO-2 volumes for completeness and alignment with the submitted regulatory data.

Price Control Period	Volumes (count)	Capex (£m)
RIIO-2	[redacted]	[redacted]
RIIO-3		

Table 2: Summary of RIIO-2 / 3 intervention volumes and expenditure for Pipeline Integrity

Although RIIO-2 unit costs have been used as a basis for informing the RIIO-3 forecast, the overall projected expenditure for RIIO-3 is higher. This increase is largely attributed to a rise in anticipated intervention volumes, primarily driven by a greater number of maintenance inspections as well as the inclusion of a focussed workstack in below 7 bar. Further detail underlying this increase can be found in Sections 8 and 9.

5 Our Asset Management Approach

The following process flow illustrates how Cadent's maintenance inspection data underpins the pipeline integrity investment case. It demonstrates the logical sequence from inspection to intervention, aligned with Ofgem's expectations for transparency, defined deliverables, and data-driven justification.

Section 5.1 is a summary of the process flow in figure 1, with detailed explanations for each step outlined in the subsequent sections.

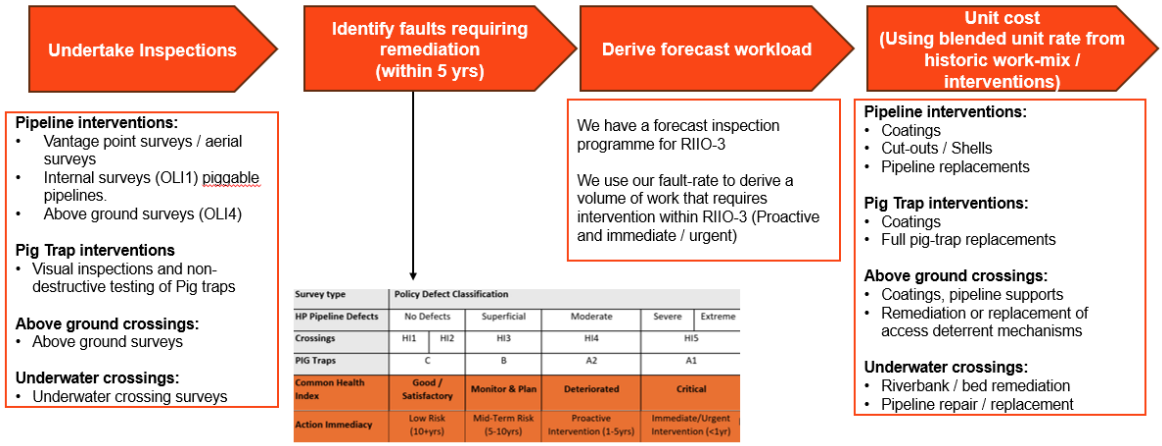

Figure 1: Process flow from inspection to intervention forecasting for Pipeline Integrity (EJP12)

5.1 Process Flow Summary

1. Undertake Maintenance Inspections
    - Internal inspections for piggable pipelines
    - Overland inspections for non-piggable pipelines
    - Visual and NDT inspections for PIG traps
    - Above ground and underwater crossing inspections
2. Review Maintenance Inspection Records for Identified Faults Requiring Remediation
    - Faults are classified using standardised health tiering
    - Only faults requiring remediation within 5 years are considered for intervention (e.g. P/11, HI4/HI5, A2)
3. Derive Forecast Workload
    - Applied defect fault rates (pipelines)
    - Asset health condition assessment outputs (crossings and pig traps)
    - This produces a forecast of intervention volumes by asset class and network
4. Apply Unit Cost
    - Pipelines: average unit rate of the combined Cadent regions
    - above7 bar above ground crossings: average RIIO-2 unit rate of the individual Cadent regions
    - below7 bar above ground crossings: average RIIO-2 unit rates of individual regions

- above7 bar underwater river crossings: unit rate of the individual Cadent regions
- below7 bar underwater river crossings: used unit rates for above7 bar underwater river crossings
- Pig traps: average RIIO-2 unit rate of the Cadent total expenditure.

This approach ensures that the proposed RIIO-3 workload is evidence-based, risk-prioritised, and compliant with statutory obligations under PSR (1996) and PSSR (2000). More information on our approach to deriving workloads can be found in Section 6.

6 Our Inspection Programme

Our maintenance inspection programme is aligned with statutory requirements under PSR (1996) and PSSR (2000) and follows IGEM/TD/1 guidance. It includes:

- **Piggable Pipelines**: Internal inspections using pipeline inspection gauges every 10 years.
- **Non-Piggable Pipelines**: Overland inspections every 5 years.
- **Crossings**: Visual inspections every 5 years for below 7 bar, general inspections every 2 years for above 7 bar.
- **PIG Traps**: Visual (6-year) and non-destructive testing (NDT, 12-year) inspections.

		2026/27	2027/28	2028/29	2029/30	2030/31	Total
Pipelines	EoE	[redacted]					
	NL						
	NW						
	WM						
Crossings	EoE						
	NL						
	NW						
	WM						
Pig Traps	EoE						
	NL						
	NW						

		2026/27	2027/28	2028/29	2029/30	2030/31	Total
	WM	[redacted]					
Cadent Total	Total						

Table 3: RIIO-3 Inspection programme for Pipeline Integrity

For completeness we have provided our detailed 5-year maintenance inspection programme for the [redacted] inspections in Appendix A.

CADENT - CONFIDENTIAL

7 Identifying Faults

Faults are categorised using standardised health indices or defect codes (please refer to section 6 of EJP12 – Pipeline Integrity for fault categorisation descriptions). The below table summarises the health assessment methodology for each asset class within EJP12 and table 4 details the modes of intervention.

Asset Class	Primary Health Metric	Health Category and Description	What it Triggers (mode of intervention)	Data Source
HP Pipelines	Defect Types & Prevalence	Categorised Defects (Extreme to Superficial, Age-related Failure Trends)	Repair (Mode 1), Minor/Major/Full Replacement (Modes 2-4) on 'significant & threshold defects'	Pressure Systems Database (PSDB). Intervals. LTS Asset Model.
Crossings	Health Index (HI)	HI0-HI5 (Qualitative Definitions: New, Good, Deterioration, Intervention, Urgent)	Minor/Major Replacement (Modes 2-3) primarily on HI4 & HI5	PSSR (VS/02) inspections via Mobile Data Capture forms. Regions then complete asset prioritisation/ promotion
PIG Traps	Fault Categorisation	A1-C (Categorical Definitions: Imminent, Significant, Less Significant, Satisfactory)	Repair (Mode 1), Minor/Major Replacement (Modes 2-3) on A1 & A2 faults	Pressure Systems Database (PSDB)

Table 4: How faults are categorised for pipeline assets

Intervention Mode	Overview of the Intervention Mode	Pipeline	Pig Trap	Crossing
1: Repair	There is no proactive capex investment, resulting in rising fault rates and associated risks, along with the risk	Enhanced inspection frequency and minimum 'make safe' interventions that might include reducing pressure, fitting of dressings, repair to supports etc		

Intervention Mode	Overview of the Intervention Mode	Pipeline	Pig Trap	Crossing
	of being non-compliant.			
2: Minor replace / refurbish	Minor remedial intervention to superficial defects or minor components	Coating repairs, and dressing	Replace locking ring	Repair to supports, pipeline or access deterrents
3: Major replace / refurbish	Major repair or replacement to pipeline and its features	Epoxy shell, hot tap tee, snug fitting shell, standoff shell, cut out pipe section	Repair weld defects	Replacement of supports and access deterrents, corrosion prevention
4: Full system replacement	Full asset replacement	Major cut out / diversion	Replace pressure vessel or cut off and fit flange	Major cut out and/or decommission and removal of asset

Table 5: Intervention mode summary

7.1 Common Asset Health Tiering

We have translated the health scoring for each asset type in to unified health tiers to:

- Provide Holistic Health Overview: This enables a high-level, consistent understanding of the overall health of the entire asset portfolio, regardless of the specific underlying assessment method.
- Strategic Prioritisation: This facilitates clearer strategic decision-making and resource allocation based on comparable levels of urgency and risk across diverse asset types.
- Improved Communication: This simplifies communication of complex asset health data and investment justifications to non-technical stakeholders
- Performance Tracking: This Provides a framework for tracking improvements or degradations in asset health across the entire network over time using a unified lens.

By using these unified tiers, the EJP can maintain its asset-specific technical detail while providing a more accessible and comparable overview of the overall pipeline integrity status and proposed interventions.

Survey type	Policy Defect Classification					
HP Pipeline Defects	No Defects		Superficial	Moderate	Severe	Extreme
Crossings	HI1	HI2	HI3	HI4	HI5	

PIG Traps	C	B	A2	A1
Common Health Index	Good / Satisfactory	Monitor & Plan	Deteriorated	Critical
Action Immediacy	Low Risk (10+yrs)	Mid-Term Risk (5-10yrs)	Proactive Intervention (3-5yrs)	Immediate/Urgent Intervention (below1yr)

Table 6: Health tiering for pipeline asset fault classification

7.2 The Basis for Intervention

To enable consistent risk-based decision making across the asset types, our health tiering framework standardises condition assessment outputs, despite differing methodologies. These four tiers provide the basis for intervention urgency and asset integrity risk. Our strategy for RIIO-3 is to target that fall within the 'Deteriorated' and 'Critical' indices.

Survey type	Asset Population			
HP Pipeline Defects	[redacted]			
Crossings				
PIG Traps[1]				
TOTAL				
Common Health Index	Good / Satisfactory	Monitor & Plan	Deteriorated	Critical
Action Immediacy	Low Risk (10+yrs)	Mid-Term Risk (5-10yrs)	Proactive Intervention (3-5yrs)	Immediate/Urgent Intervention (below1yr)

Table 7: Asset population by category at July 2025

The health distribution of our assets presented in the table above, reflects the position as of July 2025 and should be viewed as a dynamic snapshot. The total population in any given health tier is continually evolving, influenced by the volume and frequency of maintenance inspections undertaken, as well as the volume and frequency of interventions in response to inspection outputs. As such, the distribution across health categories is expected to fluctuate throughout the RIIO-3 period.

Assets assessed as 'Deteriorated' or 'Critical' will be selected for intervention within the RIIO-3 period, in line with our risk-based asset management approach. While the number of critical assets identified is currently [redacted], this figure is not static and therefore is not the same as the intervention workload volume. It is directly linked to the pace and scope of our maintenance

[1] Volumes provided are based on a sample of inspections undertaken between 2019-2024 to represent a five-year period

inspection programme; i.e. more inspections may uncover additional critical assets. However, we are committed to ensuring that these assets do not accumulate unchecked and therefore prioritise these assets for timely intervention to mitigate risk and maintain network integrity.

CADENT - CONFIDENTIAL

8 Deriving Forecast Workload

Forecast volumes are derived using:

- Historical maintenance inspection data from inline (OLI/1) and overland (OLI4) inspections to estimate the proportion of defects likely to require excavation and multiplied by the number of planned inspections in RIIO3 to forecast total investigation/intervention volumes
- Asset health condition assessment outputs for RIIO-2 workstacks for crossings and PIG traps, deemed representative of the ongoing work mix for these assets.

Each inspection output is assessed using engineering procedures, with interventions being triggered by the severity of defect, asset criticality and compliance requirements.

This ensures interventions are targeted, justified, and proportionate to risk. The below table outlines the RIIO-2 and RIIO-3 maintenance inspection and intervention volumes.

Network	RIIO-2 Total Inspections	RIIO-2 Total Interventions	RIIO-2 Ratio	RIIO-3 Total Inspections	RIIO-3 Total Interventions	RIIO-3 Ratio	Ratio Variance
EE	[redacted]						
NL							
NW							
WM							
Total							

Table 8: RIIO-2 and RIIO-3 forecast inspection and intervention volumes

8.1 Pipelines

Historical maintenance inspection data from in-line (OLI/1) and overland (OLI/4) inspections was used to estimate defect investigation volumes for RIIO-3. A defects-per-inspection approach was adopted, and defects were categorised based on P/11 classifications, and assumptions were applied to estimate the proportion of superficial defects likely to require excavation. The assumptions were 15% for OLI/1 and 50% for OLI/4, based on historical investigation trends. These estimates were then multiplied by the number of planned inspections to derive total forecast investigation per network.

Network	RIIO-2 Total Number of Inspections	RIIO-2 Total Interventions	RIIO-3 Total Number of Inspections	RIIO-3 Total Interventions
EE	[redacted]			
NL				
NW				
WM				
Total				

Table 9: RIIO-2 and RIIO-3 forecast pipeline inspection and intervention volumes

Across the networks, the maintenance inspection and intervention volumes show notable shifts between RIIO-2 and RIIO-3.

East of England (EE): Inspections increase from [redacted] to [redacted], while interventions more than double from [redacted] to [redacted]. This sharp increase in both metrics suggests a higher defect yield per inspection, likely driven by asset ageing or enhanced detection capabilities, resulting in more actionable findings.

North London (NL): Inspection volumes increased modestly from [redacted] to [redacted], and interventions rise from [redacted] to [redacted]. This indicates a moderate increase in defect severity or frequency, potentially reflecting localised deterioration or refined intervention criteria.

North-West (NW): Inspections increase from [redacted] to [redacted] while interventions slightly decrease from [redacted] to [redacted]. The NW continues to demonstrate a high inspection-to-intervention ratio, driven by its ageing asset base. Historical inspection data and predictive modelling using the LTS risk model (aligned with NARM methodology) highlight a strong correlation between asset age and defect prevalence, particularly corrosion-related failures. The legacy of transporting older gas types, such as town gas, may also contribute to internal stress corrosion and accelerated deterioration.

West Midlands (WM): Inspections more than double from [redacted] to [redacted], while interventions rise from 8 to 15. This increase in inspections, coupled with a modest rise in interventions, may reflect a strategic focus on higher-risk pipelines in the PSDB schedule, yielding a greater number of actionable defects.

Overall, total inspections across all networks increased significantly from [redacted] in RIIO-2 to [redacted] in RIIO-3, while total interventions rose from [redacted] to [redacted]. This shift indicates a growing intervention workload relative to inspection activity, likely driven by ageing infrastructure, improved fault categorisation, and a strategic emphasis on proactive remediation. Predictive modelling using historical defect rates and excavation (“dig”) data supports this trend, forecasting increased intervention needs to maintain asset health and regulatory compliance.

8.2 Crossings

Cadent has maintained a consistent, risk-based approach to river crossing interventions across RIIO-2 and RIIO-3. While RIIO-2 focused on a broad distribution of above7 bar river crossings, RIIO-3 sees a shift toward below7 bar river crossings, which now represent the

highest forecast intervention volume. This reflects both ageing infrastructure and increased maintenance inspection coverage. Intervention volumes have been derived using historical performance and inspection data, ensuring targeted investment in the most critical assets.

A summary of the total crossing forecast inspection and intervention volumes is presented in the table below.

Network	RIIO-2 Total Number of Inspections	RIIO-2 Total Interventions[2]	RIIO-3 Total Number of Inspections	RIIO-3 Total Interventions
EE	[redacted]			
NL				
NW				
WM				
Total				

Table 10: RIIO-2 and RIIO-3 forecast crossing inspection and intervention volumes

8.2.1 Above Ground Crossings

As part of our strategic asset management approach, we have undertaken a comprehensive analysis of our asset health condition across the network. This analysis has enabled us to assess the current state of our infrastructure.

Through this process, we have pinpointed assets that are both deteriorated and critical to the safe and reliable operation of our services (HI4 and HI5). These assets have been prioritised for intervention during RIIO-3 based on their condition, criticality, and the potential impact of failure.

The outcome of this analysis forms the foundation of our intervention strategy for RIIO-3, ensuring that investment is targeted where it is most needed to maintain network resilience, safety, and performance.

A summary of the above ground crossing forecast maintenance inspection and intervention volumes is presented in the table below.

Network	RIIO-2 Total Number of Inspections	RIIO-2 Total Interventions[3]	RIIO-3 Total Number of Inspections	RIIO-3 Total Interventions
EE	[redacted]			
NL				

[2] Actual delivery data for years 1 to 4, with projected outcomes for year 5

[3] Actual delivery data for years 1 to 4, with projected outcomes for year 5

Network	RIIO-2 Total Number of Inspections	RIIO-2 Total Interventions[3]	RIIO-3 Total Number of Inspections	RIIO-3 Total Interventions
NW	[redacted]			
WM				
Total				

Table 11: RIIO-2 and RIIO-3 forecast above ground crossing inspection and intervention volumes

8.2.2 Underwater River Crossings

Across the RIIO-2 period and going into the RIIO-3 period, we have maintained a consistent and risk-based approach to asset intervention, targeting priority areas that present the greatest risk to safety, reliability, and network integrity.

During RIIO-2, investment was broadly distributed across the above7 bar underwater river crossing category, reflecting an effort to address a wider range of asset conditions and associated risks.

As part of our RIIO-2 activities, we undertook a review to identify all in scope river crossings operating at below7 bar. This work has resulted in a comprehensive list, which has been distributed to each region for planning and delivery. The intention is to complete any remaining assessments and interventions on 'critical' assets identified across the remainder of RIIO-2, with any other remediation identified as necessary scheduled for delivery in RIIO-3.

Our asset data shows that below7 Bar underwater river crossing intervention emerges as a dominant area of activity in the RIIO-3 period. This shift reflects the growing need to address ageing infrastructure and deteriorating condition profiles in this category, which now represents the highest forecast intervention volume across all networks. The planned increase in below7 Bar underwater river crossing activity underscores Cadent's commitment to maintaining safe and reliable service delivery through targeted investment in the highest priority assets.

We have derived our intervention volumes for underwater river crossings by:

- **above7 Bar river crossings:** our high-risk assets identified through us undertaken during RIIO-2.
- **below7 Bar river crossings:** an assumption that 20% of the asset's inspected during the RIIO-3 period will require intervention. This is in line with our RIIO-2 intervention rate of 22% for above ground crossings.

A summary of the underwater river crossing forecast maintenance inspection and intervention volumes is presented in the table below.

Network	RIIO-2 Total Number of Inspections	RIIO-2 Total Interventions[4]	RIIO-3 Total Number of Inspections	RIIO-3 Total Interventions
EE	[redacted]			

[4] Actual delivery data for years 1 to 4, with projected outcomes for year 5

Network	RIIO-2 Total Number of Inspections	RIIO-2 Total Interventions[4]	RIIO-3 Total Number of Inspections	RIIO-3 Total Interventions
NL	[redacted]			
NW				
WM				
Total				

Table 12: RIIO-2 and RIIO-3 forecast underwater river crossing inspection and intervention volumes

8.2.3 Crossings Workload Summary

Our strategic asset management approach has enabled a comprehensive assessment of crossing asset health across the networks. This analysis has identified deteriorated and critical assets (those rated HI4 and HI5) as priority candidates for intervention. The resulting strategy ensures investment is targeted to maintain safety, resilience, and performance.

- **Above Ground Crossings**

Maintenance inspection volumes for above ground crossings are forecast to increase from [redacted] in RIIO-2 to [redacted] in RIIO-3, while interventions also rise from [redacted] to [redacted]. This reflects a maturing inspection strategy, where improved asset data and condition profiling enable broader and more targeted inspection coverage, supporting proactive asset management.

East of England (EE): Inspections increase significantly from [redacted] to [redacted], and interventions rise from [redacted] to [redacted]. This growth aligns with a rolling programme targeting deteriorated assets, supported by enhanced condition data and prioritisation frameworks.

North London (NL): Inspections surge from [redacted] to [redacted], while interventions remain relatively stable ([redacted] to [redacted]). This suggests a substantial expansion in inspection coverage, with a reduced defect yield per inspection.

North-West (NW): Inspections increase markedly from [redacted] to [redacted], while interventions rise slightly from [redacted] to [redacted]. This trend indicates intensified inspection efforts, likely focused on ageing or high-risk assets, with a relatively stable defect rate.

West Midlands (WM): Inspections more than double from [redacted] to [redacted], while interventions rise modestly from [redacted] to [redacted]. This reflects intensified inspection efforts, possibly due to asset ageing or strategic prioritisation of critical crossings.

These volumes are considered appropriate for RIIO-3 as they reflect a risk-based prioritisation of assets requiring remediation, supported by historical performance and condition data.

- **Underwater River Crossings**

Maintenance inspection volumes for underwater river crossings are forecast to increase significantly from [redacted] in RIIO-2 to [redacted] in RIIO-3, with interventions rising sharply from [redacted] to [redacted]. This substantial uplift reflects a strategic focus on below 7 bar assets, which now represent the highest forecast intervention volume. Key drivers include:

- A comprehensive review during RIIO-2 identifying a full population of below7 bar crossings, now scheduled for assessment and remediation.

- Intervention volumes for below7 bar crossings are based on a 20% defect rate assumption, aligned with RIIO-2 above7 bar performance.
- **East of England (EE)** and **North London (NL)** show the largest increases in inspections and interventions, reflecting ageing infrastructure and deteriorating condition profiles.
- **North West (NW)** also shows a notable increase in inspections from [redacted] to [redacted], with interventions rising from [redacted] to [redacted], indicating a broader inspection scope and a steady defect yield.
- **West Midlands (WM)** sees inspections increase from [redacted] to [redacted], and interventions from [redacted] to [redacted], suggesting improved asset visibility and prioritisation of previously under-assessed assets.

This increase is justified by the need to address emerging risks in previously under-assessed asset categories and supports Cadent's commitment to maintaining safe and reliable service delivery.

8.3 PIG Traps

To inform our RIIO-3 submission, we extracted data from our PSDB (Pressure System Database). This extract provided the latest PSSR fault categorisation for PIG trap assets across the network.

The analysis identified [redacted] A2 faults associated with pig traps. Under our asset health classification, A2 faults represent a significant deterioration level that require remediation within a five-year timeframe to maintain safety and operational integrity.

As such, these [redacted] A2 faults have been used as the basis for our RIIO-3 pig trap workload. This ensures that our intervention plan is directly aligned with the latest condition data and prioritises remediation of assets that pose the greatest risk if left unaddressed.

Network	RIIO-2 Total Number of Inspections	RIIO-2 Total Interventions[5]	RIIO-3 Total Number of Inspections	RIIO-3 Total Forecast Interventions
EE	[redacted]			
NL				
NW				
WM				
Total				

Table 13: RIIO-2 and RIIO-3 forecast pig trap inspection and intervention volumes

The maintenance inspection and intervention volumes for pig trap assets across Cadent's networks show varied trends between the RIIO-2 and RIIO-3 periods, reflecting differences in asset condition, inspection outcomes, and strategic prioritisation.

[5] Actual delivery data for years 1 to 4, with projected outcomes for year 5

In the **East of England (EE)** network, the number of inspections increased from [redacted] in RIIO-2 to [redacted] in RIIO-3. However, forecast interventions decreased significantly from [redacted] to [redacted]. This variance suggests that while inspection coverage expanded, fewer actionable faults were identified, potentially due to improved asset condition.

In **North London (NL)**, inspections rose sharply from [redacted] to [redacted], while interventions remained stable at [redacted]. Similar to EoE, this variance may be attribute to relatively few findings requiring intervention, possibly due to a younger or better maintained asset population.

The **North- West (NW)** network presents a contrasting trend to EE and NL, with inspections increasing from [redacted] to [redacted] and interventions rising substantially from [redacted] to [redacted]. This parallel growth indicates a higher defect yield and may be driven by ageing infrastructure or more rigorous inspection standards

In the **West Midlands (WM)**, both inspections and interventions increased; inspections from [redacted] to [redacted] and interventions from [redacted] to [redacted]. This indicates a growing workload driven by either asset deterioration or higher inspection coverage in the period.

Overall, total inspections across all networks nearly doubled from [redacted] in RIIO-2 to [redacted] in RIIO-3, while total forecast interventions increased from [redacted] to [redacted]. This shift indicates that a greater proportion of inspections are identifying actionable faults, possibly due to ageing assets, evolving inspection standards, or improved fault detection methods. It also reflects a strategic move toward proactive intervention, aiming to manage moderate, deteriorated faults before they escalate.

9 Blended Unit Cost Methodology

Unit costs are based on RIIO-2 actuals and reported in the 2023/24 RRP. These are blended by:

- **Asset type** (pipeline, crossing, PIG trap)
- **Intervention type** (minor, major, full replacement)
- **Network region** (EE, NL, NW, WM)

9.1 Pipelines

Our pipeline intervention programme is based on an average unit rate of the combined Cadent Networks. The unit rate applies is approximately £[redacted] per intervention, derived from RIIO-2 delivery data. This unit cost has been validated through internal commercial review and deliverability assessments, and through our RRP process.

Network		RIIO-2 Volume	RIIO-2 Cost (£m)	Unit Cost
EoE	EA	[redacted]		
	EM			
NL				
NW				
WM				
Cadent				

Table 14: How RIIO-2 has informed the RIIO-3 unit cost for pipeline defects

We consider the use of RIIO-2 unit costs to forecast RIIO-3 workload to be appropriate given the comparable nature of maintenance inspection and intervention volumes across both periods. These unit costs are calculated as the total cost of delivery divided by the volume of interventions, recognising that the RIIO-2 actual costs encompass varying intervention modes (ranging from coat and wrap to shelling and cut-outs). As this is a rolling health programme, we expect a similar work mix in RIIO-3, driven by asset deterioration observed between inspection cycles. While we acknowledge the opportunity to improve granularity in cost capture per intervention type during RIIO-3 to better support future investment cases (ie. for RIIO-4), the current unit costs are underpinned by works delivered through competitively tendered framework agreements, providing assurance of cost efficiency and market validation.

9.2 Crossings

9.2.1 Above Ground Crossings

Our preferred above7 bar above ground crossing programme has been derived based on a Cadent average blended-unit rate per intervention during RIIO-2. The RIIO-2 programme will have delivered:

	RIIO-2 Total Number of Interventions	RIIO-2 Total Cost (£m)	Average Cost Per Intervention (£k)
Above7 Bar Crossings	[redacted]		

Table 15: RIIO-2 above7 bar above ground crossings intervention volumes, costs and average unit costs

However, due to outliers across the regions affecting the blended Network average cost for below7 bar interventions, average costs per region have been used:

Region	RIIO-2 Total Number of Interventions	RIIO-2 Total Cost (£m)	Average Cost Per Intervention (£k)
EoE	[redacted]		
NL			
NW			
WM			

Table 16: RIIO-2 below7 bar above ground crossings intervention volumes, costs and average unit costs

9.2.2 Underwater River Crossings

Our preferred river crossing programme cost (above and below 7 bar) has been derived based on a Cadent average blended-unit rate per above7 bar intervention during RIIO-2. The RIIO-2 programme will have delivered [redacted] above7 bar river crossing interventions for £[redacted] giving an average cost of £[redacted].

9.2.3 Crossing Summary

For above7 bar above ground crossings and underwater river crossings (all tiers), we consider the use of RIIO-2 unit costs to forecast RIIO-3 spend to be appropriate, given the comparable nature of inspections and interventions being undertaken through both periods. Unit costs have been calculated as the total cost of RIIO-2 delivery divided by the number of interventions, capturing a range of intervention types and regional variations.

For below7 bar above ground crossings, regional average costs have been applied due to outliers affecting the blended Cadent average. This ensures more accurate forecasting and reflects cost diversity across networks.

As this is a rolling health programme, we expect a similar mix of work types in RIIO-3, driven by asset deterioration observed between maintenance inspection cycles. While there is scope to improve cost granularity per intervention type in RIIO-3 to support future investment cases, the current unit costs are underpinned by competitively tendered framework agreements, providing assurance of cost efficiency and market validation.

9.3 Pig Traps

Our preferred pig trap intervention unit cost for RIIO-3 has been derived from the Cadent average unit rate during RIIO-2, where [redacted] interventions were delivered at a total cost of £[redacted], resulting in an average cost of £[redacted] per intervention.

This approach is considered appropriate due to the consistent nature of pig trap interventions and the rolling programme of maintenance inspections that inform remediation needs. The RIIO-3 forecast reflects both asset condition deterioration and increased inspection coverage, particularly in regions such as the West Midlands and Northwest.

As with pipelines and crossings, we recognise the opportunity to improve cost granularity in RIIO-3 to better support future investment planning. However, the current unit rates are based on competitively procured delivery frameworks, providing assurance of cost efficiency and market validation.

10 Summary of our RIIO3 Deliverables

Cadent's pipeline integrity strategy for RIIO-3 is built on a rolling programme of maintenance inspections and proactive interventions to maintain asset health, ensure compliance with PSR (1996) and PSSR (2000) to uphold network safety and reliability. The preferred option in EJP12 (Option 0) involves proactive refurbishment or replacement based on inspection findings, using RIIO-2 unit costs to forecast RIIO-3 spend due to comparable work mix and volumes.

A summary of our proposed plan linking both EJP12 and this supplementary annex:

Summary Item	Summary Detail
Total forecast intervention volume	[redacted] interventions
Total forecasted spend	[redacted]
Interventions modes	1. Repair 2. Minor (coating repairs / replace locking ring / pipeline supports 3. Major (shell / weld defects / corrosion prevention) 4. Full (major cut outs / replace pressure vessel)
Delivery Period	2026 - 2031
Primary investment driver	Safety & Compliance (PSR, 1996, reg 13 and PSSR, 2000, regs 8 & 12)

Table 17:Investment summary for EJP12

The deliverables for this programme of work in RIIO-3 encompasses targeted interventions across three key asset types (HP pipelines, pipeline crossings, and PIG trap vessels) that are categorised as 'deteriorated' or 'critical.'

- For HP pipelines, both piggable and non-piggable, we will intervene on all significant and threshold superficial defects identified through PSSR inspections, applying appropriate remedial actions ranging from coating repairs to shell fittings and cut-outs.
- For pipeline crossing (above ground and riverbed) we will address assets rated HI4 and HI5 identified under PSSR inspection, through the repair or replacement of supports, access deterrents, and corrosion protection measures.
- For PIG trap vessels, we will act on all category A2 faults identified under PSSR inspections, undertaking component repairs or replacements.

These interventions are designed to uphold statutory compliance, maintain asset health, and ensure the continued safety and reliability of the gas distribution network.

11 Conclusion

This submission presents comprehensive and substantiated evidence in support of the proposed pipeline integrity investment, as requested by Ofgem. It clearly articulates the relationship between maintenance inspection findings, projected intervention volumes, and associated cost forecasts. The proposal is grounded in statutory compliance requirements, reinforced by historical performance data, and supported by a rigorous, industry-recognised engineering methodology. Together, these elements provide a transparent and credible justification for the investment, ensuring alignment with regulatory expectations and long-term asset integrity objectives.

12 Appendix

Appendix	File Names
A: RIIO-3 Annual Maintenance Plans, demonstrating forecast maintenance inspection volumes for pipelines, crossings and pig traps[6].	[redacted]

Table 18: Appendix

[6] We recommend that EoE and EM are reviewed together to align to the provided EoE values in this document