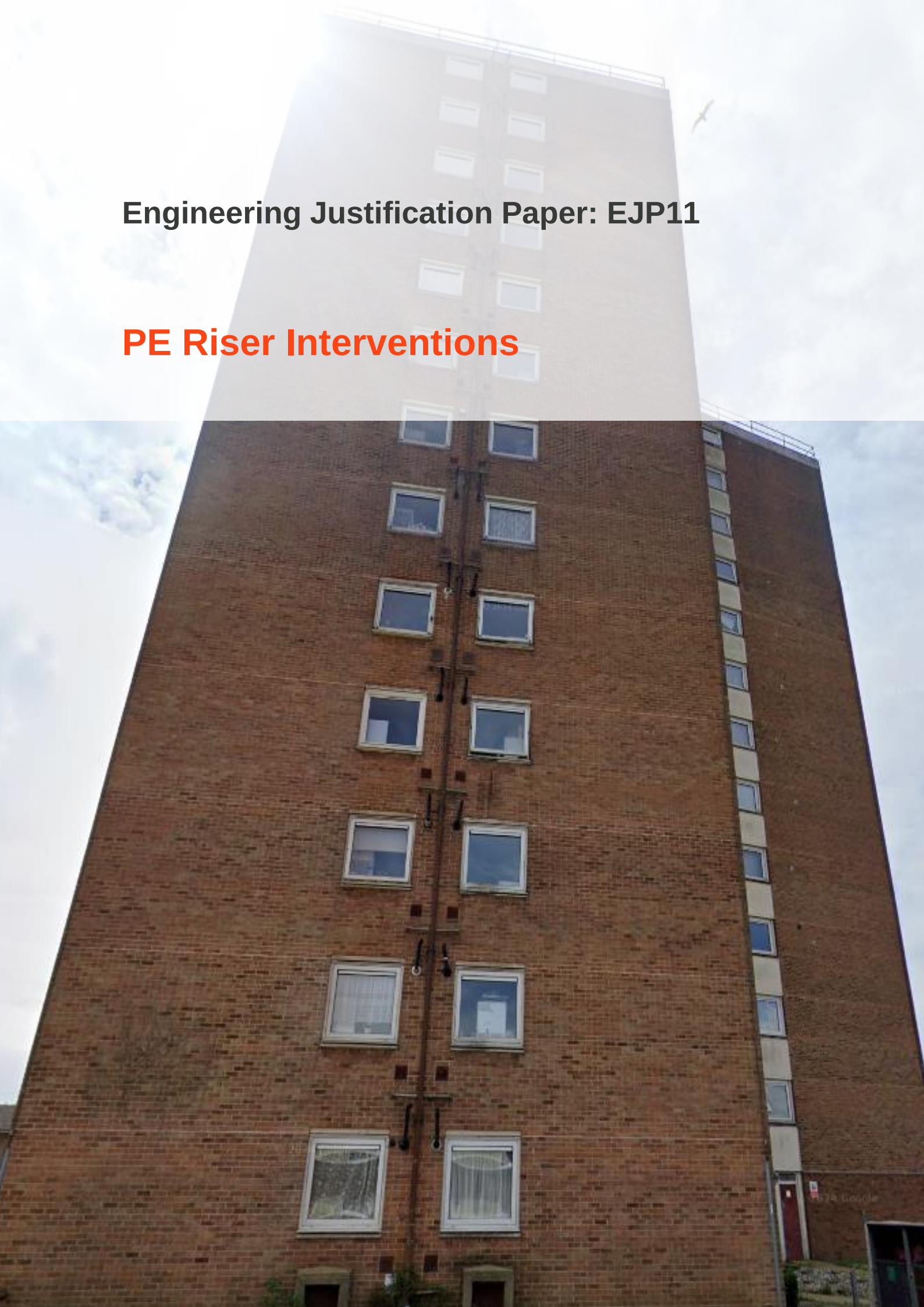

Engineering Justification Paper: EJP11

PE Riser Interventions

Cadent
Your Gas Network

Contents

Table of Figures

Table of Tables

CADENT - CONFIDENTIAL

1 Summary Table

Name of Project	MOBs PE Riser Interventions		
Programme Reference	EJP11		
Primary Investment Driver	Safety		
Project Initiation Year	2026		
Project Close Out Year	2031		
Total Repex proposed in RIIO-2	[Cost Information Redacted]		
Cost Estimate Accuracy (%)	+/- 5%		
Project Spend to date (£)	N/A		
Current Project Stage Gate	N/A		
Reporting Table Ref	CV6.09		
Outputs included in RIIO-2 Business Plan	No		
Spend apportionment for RIIO-3 Plan	GD2	GD3	GD4
	[Cost Information Redacted]	[Cost Information Redacted]	[Cost Information Redacted]
Proposed Regulatory Treatment	NARMS		

Table 1: Summary Table

Prices are pre-efficiency and are in 2023/24 price base. This investment case does not satisfy the criteria for late competition or early competition and pursuing these activities would not be in the interests of the customer. We recognise the benefits that competition can bring to customers through efficiency and innovation. We continue to challenge ourselves as a business to ensure that we are harnessing competitive forces where they can provide these benefits. For specific detail on how we have assessed competition, please see Chapter 6 of the Workforce and Supply Chain Strategy (Appendix 17).

2 Executive Summary

We convey gas to multiple meter points by means of Polyethylene (PE) pipes attached to the external walls of 31 High Rise residential buildings (HRB) and 813 Medium Rise residential buildings (MRB). Pipeline systems within MOBs are often referred to as riser pipes or riser pipe systems and are used to pipe gas to some or all units within the building, supplying gas for heating, hot water and/or cooking.

Changes in building regulations mean that PE risers may not be located on buildings >18m in height, as a result they must be removed. We will replace all of our PE Risers on HRBs. The reason is that we are obligated to act lawfully and the continued presence of PE risers on high rise buildings is unlawful. This investment case covers the work to replace the PE riser pipe systems in all HRBs covered by the legislation see section 5.1.

While the legislature has taken decisive action on PE Risers on HRB, the picture is more diffuse on MRBs. While PE Risers are still permissible on such buildings, there has been a change in the code of practice IGEM/G5 to reflect the risk to properties arising from PE Risers on such dwellings. Whilst IGEM codes of practice are not legally enforceable, they are instrumental in guiding industry professionals towards compliance with legal standards and can serve as evidence of best practice in legal contexts. We have chosen to invest to remove the risk of low probability, high consequence events on a risk priority basis as the consequence of failure is severe, see section 5.3.

We have developed a safety risk assessment process for MRB PE Risers enabling targeted replacement. In respect of these proposals, we have modelled three scenarios:

- Replacement of just the highest risk PE risers on MRBs
- Replace a larger proportion of the PE risers on MRBs including all the highest and medium risk installations
- Replace All PE Risers on MRBs
- PE risers do not deteriorate in the same way as metallic risers and are considered low probability, high consequence assets. Metallic risers corrode and may leak gas, which requires intervention. PE Risers are flammable and therefore unlawful in HRBs, in some circumstances the risk in MRBs is too high and we are choosing to intervene. The AIM model is based on predictable deterioration of assets and cannot predict the catastrophic failure modes to which PE is susceptible. For this reason, we are planning a separate programme of work to metallic risers, detailed in EJP10-MOBs Risers. There is no overlap between the two programmes

Following evaluation our preferred programme is to only replace the highest risk MRB risers during RIIO-3 because we do not believe it to be appropriate to allocate resource to medium risk PE risers on MRBs due to other investment priorities. We will continue to monitor the risk across the asset base through inspections and review our priorities for GD4.

This results in an overall programme to replace [Commercially Sensitive Information Redacted].

3 Introduction

This document covers the engineering justification for Multiple Occupancy Buildings (MOBs) PE Risers in High Rise (HRB) and Medium Rise buildings (MRB). We convey gas to multiple meter points by means of pipes attached to the external walls with 19,266 risers on HRB and 95,034 on MRB (correct as of October 2024).

This asset health engineering justification paper addresses the replacement of PE on HRB which are not lawful, see section 5, and high safety risk MRB. PE is still permitted for use on MRB but is a safety risk including where in proximity to doors & windows or areas of fire risk.

While the legislature has taken decisive action on PE Risers on HRB, the picture is more diffuse on MRBs. While PE Risers are still permissible on such buildings, there has been a change in the code of practice IGEM/G5 to reflect the risk to properties arising from PE Risers on such dwellings. Whilst IGEM codes of practice are not legally enforceable, they are instrumental in guiding industry professionals towards compliance with legal standards and can serve as evidence of best practice in legal contexts.

PE Risers are flammable and are more susceptible to catastrophic failure in case of a building fire - such events have the potential to endanger lives. At Cadent, the safety of our customers is our foremost concern. [Commercially Sensitive Information Redacted]. For these reasons, we are of the view that a risk-based intervention strategy on MRBs is in the interest of our customers. We do not currently have a risk and deterioration model that fully reflects the risks posed by PE risers, to service and to society.

We have developed a qualitative risk-based methodology to prioritise all PE riser risks and identified the highest to lowest safety risk PE risers for intervention. We have selected a programme of work that addresses the highest risk PE risers within RIIO-3, based on deliverability and affordability limits. It is not yet possible to produce a CBA to help optimise the selected programme of work for RIIO3.

4 Equipment Summary

This section sets out the assets covered by this Engineering Justification Paper (EJP) and a summary of the number of assets across the regions.

4.1 Overview of the assets

Multi-Occupancy Buildings Network Pipeline Systems are defined as the pipework operated by the gas transporter upstream of the customer's emergency control valve (ECV), including laterals (Including lateral isolation valve (LIV), risers, and the approach mains that connect the building with the main in the street, see figure 1.

This EJP concerns the replacement of PE Risers in both HRB and MRB. Risers are defined as an arrangement of pipes (horizontal or vertical), which supply more than 2 supply meter points (excluding meter banks) in an individual building containing residential units. A pipe is considered a riser once it enters the building (for internal risers) or emerges from below ground level (for external risers).

4.2 Detailed Equipment Summary

Table 2 provides a summary of the total number of HRB risers and MRB risers across operating areas split by material type.

MRB and HRB exist across all our operating areas and have a range of different riser materials based on age and location. The use of PE for risers is rare and makes up a small proportion of the total riser population. Amounts of PE vary based on previous network preference for material use.

	Eastern	North London	North West	West Midlands	Total Number
HRB Risers – Total	1,094	16,360	474	1,338	19,266
HRB – PE Risers	29	22	34	6	93
% HRB PE Risers	2.65	0.13	7.17	4.5	0.47

Table 2: Summary HRB Risers (correct as at Oct. 2024)

	Eastern	North London	North West	West Midlands	Total Number
MRB Risers - Total	20,517	52,177	12,813	9,527	95,034
MRB PE Risers	389	47	645	991	2,072
% MRB PE Risers	1.9	0.09	5.3	10.5	2.3

Table 3: Summary MRB Risers (Correct at Oct 2024)

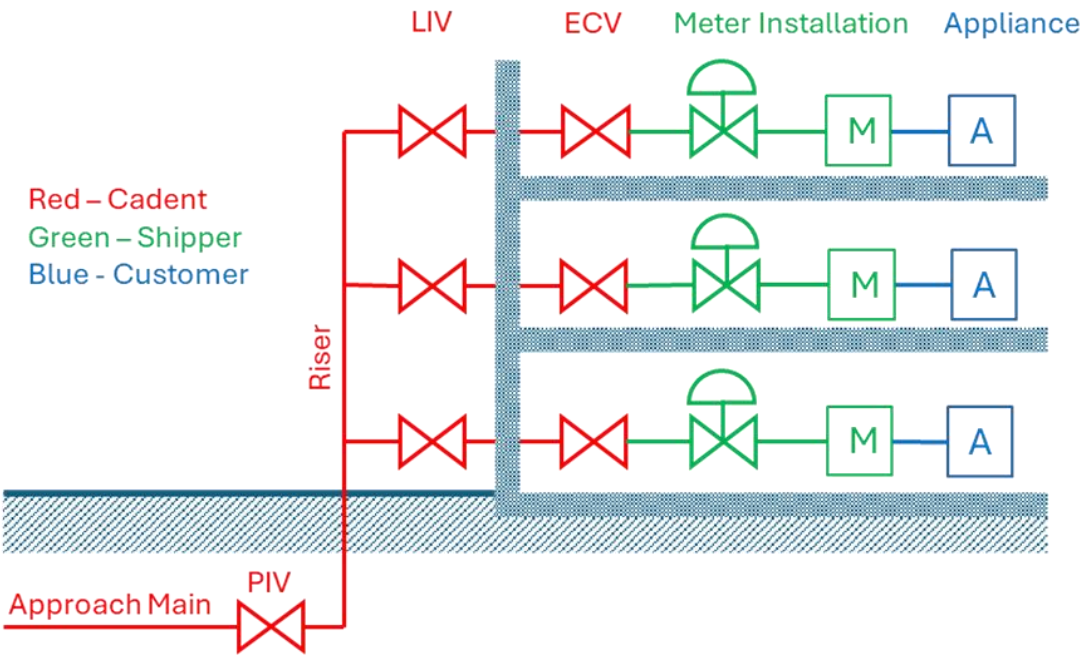

Figure 1: Diagram of simple riser system

5 Problem Statement

This investment for replacing PE risers on HRB & MRBs is due to the risk of a low probability, high consequence event occurring, which compromises the PE Riser.

PE makes up [sensitive data] of our total MOBs risers asset base. PE risers do not deteriorate in the same way as metallic risers and require a different approach to manage the safety risk. Metallic risers corrode and may leak gas, which requires intervention. For this reason, we are planning a separate programme of work to metallic risers, see EJP10–MOBs Risers.

5.1 High Rise Buildings

PE Risers are flammable and are unlawful in HRBs. Changes in building regulations mean that PE risers may not be located on buildings >18m in height, as a result they must be removed. We will replace all of our PE Risers on HRBs. The reason is that we are obliged to act lawfully and the continued presence of PE risers on high rise buildings is unlawful. This investment case covers the work to replace the PE riser pipe systems in all HRBs covered by the following legislation.

- The Building Safety Act 2022: provides a broad regulatory framework working together with building regulations and other guidance (below)
- The Building (Amendment) Regulations 2018 regulation 7 bans all combustible materials on high rise buildings
- The Building Regulations 2010 Part B (fire safety) and Part L (Conservation of fuel and power) require that all materials used in gas installations in HRB be non-combustible or meet rigid fire safety standards (BS 8491:2008 – Fire testing for risers for use in buildings) which PE gas rises do not meet

5.2 Medium Rise Buildings

MRBs have been subject to a change in code of practice IGEM/G5 which that was updated following the Grenfell Tower fire. It introduced restrictions on the location of PE risers in proximity to building features including windows and doors. We consider that the risk of failure in these circumstances presents a significant risk to the public and we have chosen to invest to remove the safety risk on a priority basis in RIIO-3, see section 5.5 for real life example of failure.

The AIM model used to develop EJP10–MOBs Risers programme is based on predictable deterioration of assets and cannot predict the catastrophic failure modes to which PE is susceptible. For this reason, we have brought MRB PE & HRB together into this separate EJP.

5.3 What happens if we do nothing

Not intervening to replace PE risers to reduce the safety risk across the asset base has the following service risks:

5.3.1 High Rise Buildings

- Regulatory compliance: We will be breaking the law, see section 5.1
- Safety: PE Risers pose a risk of failure during fire which in turn would lead to release of gas from the mains, and potential for gas build-up within buildings, leading to possible explosions. Failure to replace these risers presents a risk to public safety
- Security of supply: Failures of distribution mains could result in customer interruptions

5.3.2 Medium Rise Buildings

Whilst MRB are still acceptable, we consider the safety risk in some cases is unacceptable, presenting an increased risk to public safety and should be addressed.

- Regulatory compliance: We will be operating outside of agreed codes of practice, see section 5.2. Whilst still legal, we believe that where PE is in poor condition or located near key building features it is a serious risk to the public in the event of failure and we must act to remove the highest safety risks
- Safety: As per HRB
- Security of supply: As per HRB

5.4 Key outcomes and understanding success

[Commercially Sensitive Information Redacted]

5.5 Real-life example of problem

[Commercially Sensitive Information Redacted]

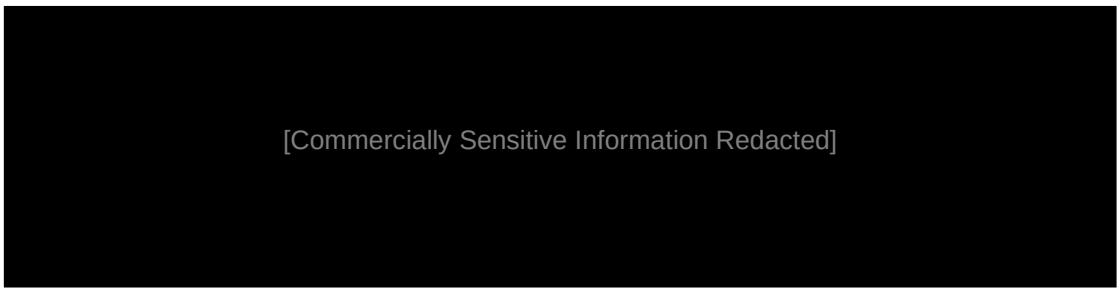

Figure 2: [Commercially Sensitive Information Redacted]

5.6 Project Boundaries

[Commercially Sensitive Information Redacted]

6 Probability of Failure

[Commercially Sensitive Information Redacted]

6.1 High Rise Buildings

[Commercially Sensitive Information Redacted]

6.2 Medium rise Buildings

[Commercially Sensitive Information Redacted]

6.3 Failure modes

[Commercially Sensitive Information Redacted]

6.4 Probability of Failure Data Assurance

[Commercially Sensitive Information Redacted]

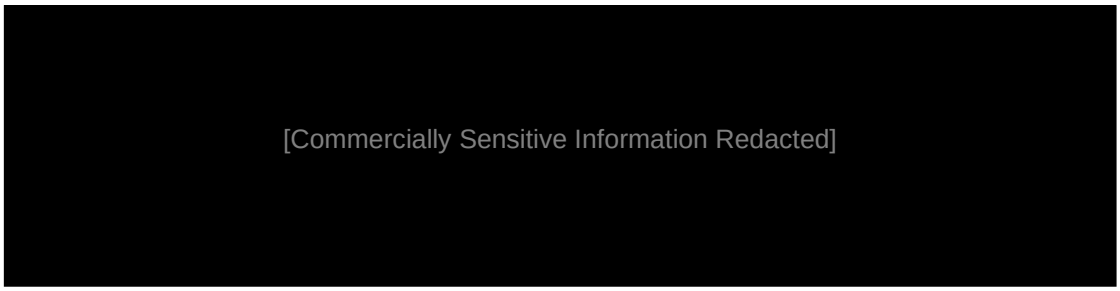

Figure 3: PE Specific risk scoring questions

[Commercially Sensitive Information Redacted]

7 Consequence of Failure

[Commercially Sensitive Information Redacted]

8 Options Considered

8.1 How we have structured this section

[Commercially Sensitive Information Redacted]

8.2 Modes of Interventions

[Commercially Sensitive Information Redacted]

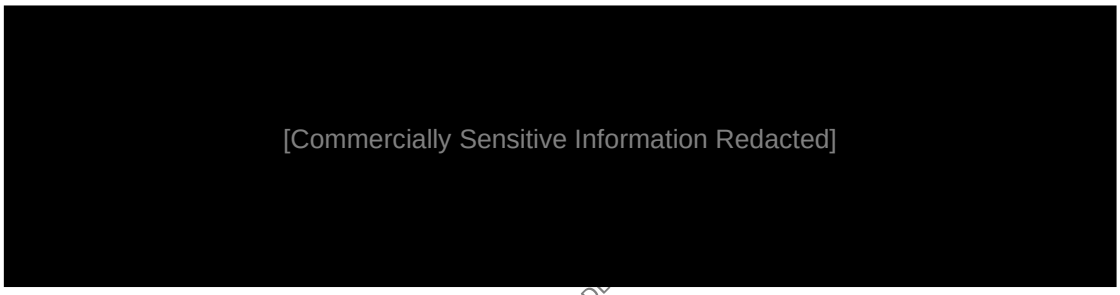

Table 4: Intervention Modes

[Commercially Sensitive Information Redacted]

8.2.1 Do Nothing

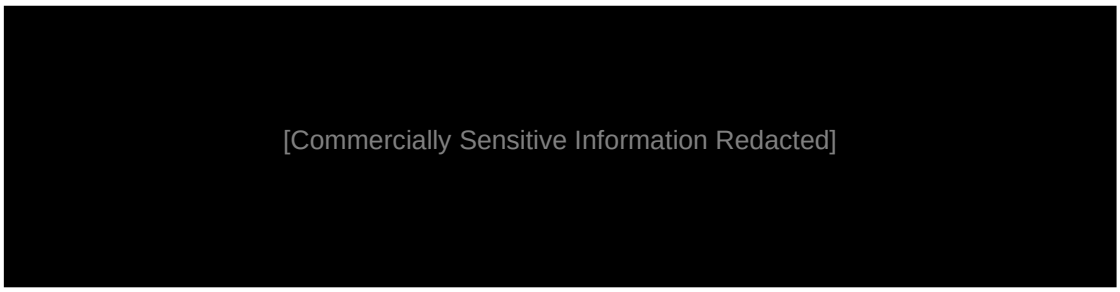

Table 5: Do nothing option commentary

8.2.2 PE Riser Replacement

[Commercially Sensitive Information Redacted]

Table 6: Proactive replacement of PE risers option commentary

[Commercially Sensitive Information Redacted]

8.3 Timing choices

[Commercially Sensitive Information Redacted]

8.4 Options

[Commercially Sensitive Information Redacted]

[Commercially Sensitive Information Redacted]

Table 7: Intervention modes and timing choices optimised by our risk assessment methodology

[Commercially Sensitive Information Redacted]

[Commercially Sensitive Information Redacted]

Table 8: Summary of programme scenarios

8.4.1 Programme Scenario 1: All HRB PE Only

[Commercially Sensitive Information Redacted]

[Commercially Sensitive Information Redacted]

Table 9: Programme Scenario 1 Summary

8.4.2 Programme Scenario 2: All HRB PE & High Risk MRB PE

[Commercially Sensitive Information Redacted]

[Commercially Sensitive Information Redacted]

Table 10: Programme Scenario 1: Summary

8.4.3 Programme Scenario 3: All HRB PE, Medium and High Risk MRB PE

[Commercially Sensitive Information Redacted]

[Commercially Sensitive Information Redacted]

Table 11: Programme Scenario 2: Summary

8.4.4 Programme Scenario 4: All HRB PE and All MRB PE

[Commercially Sensitive Information Redacted]

[Commercially Sensitive Information Redacted]

Table 12: Programme Scenario 3: Summary

8.4.5 Technical Summary Table: Programme Scenarios

[Commercially Sensitive Information Redacted]

Table 13: Programme Scenarios Summary

9 Business Case Outline and Discussion

9.1 Key Business Case Drivers Description

[Commercially Sensitive Information Redacted]

9.2 Business Case Summary

[Commercially Sensitive Information Redacted]

[Commercially Sensitive Information Redacted]

Table 14: Cost Benefit Summary

9.3 Discussion of results

[Commercially Sensitive Information Redacted]

9.3.1 Scenario 1: HRB Risers Only

[Commercially Sensitive Information Redacted]

9.3.2 Scenario 2: All HRB PE Risers replaced and all high risk MRB PE Risers

[Commercially Sensitive Information Redacted]

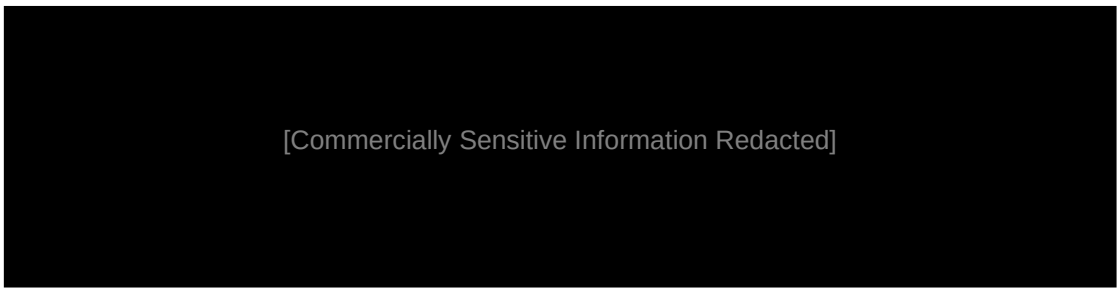

Figure 4: Scenario 1: Cumulative cost Vs Cumulative Risk

[Commercially Sensitive Information Redacted]

9.3.3 Scenario 2: All HRB PE Risers replaced and all medium and high risk MRB PE Risers

[Commercially Sensitive Information Redacted]

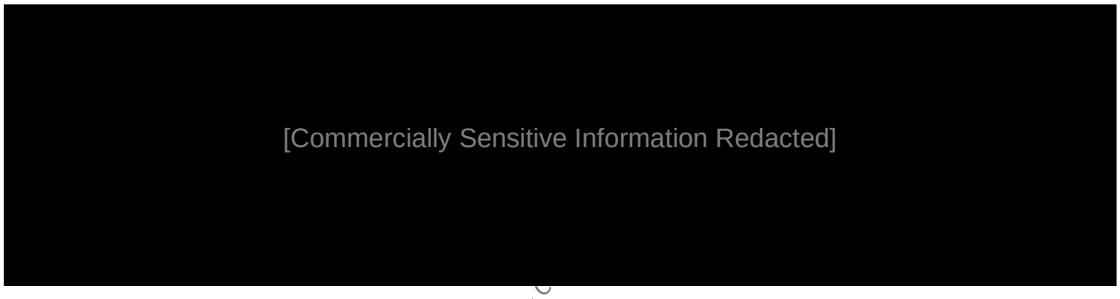

Figure 5: Scenario 2: Cumulative Cost vs Cumulative Risk

[Commercially Sensitive Information Redacted]

9.3.4 Scenario 3: All HRB PE Risers replaced and all MRB PE Risers

[Commercially Sensitive Information Redacted]

9.4 Sensitivity tests

[Commercially Sensitive Information Redacted]

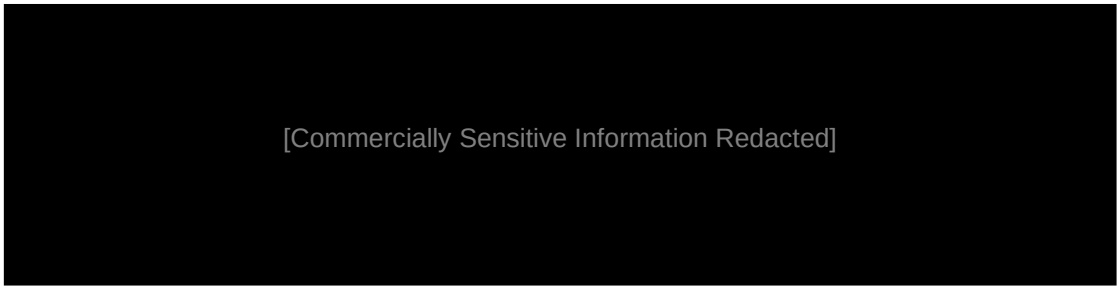

Table 15: Sensitivity tests

10 Preferred Option Scope and Project Plan

10.1 Preferred Option

[Commercially Sensitive Information Redacted]

10.2 Asset Health Spend Profile

[Commercially Sensitive Information Redacted]

Table 16: RIIO-3 expenditure by Network (PE HRB)

[Commercially Sensitive Information Redacted]

Table 17: RIIO-3 expenditure by network (PE MRB)

[Commercially Sensitive Information Redacted]

Table 18: RIIO-3 HRB Riser replacements by Network

[Commercially Sensitive Information Redacted]

Table 19: RIIO-3 MRB Riser Replacements by Network

10.3 Investment Risk Discussion

[Commercially Sensitive Information Redacted]

[Commercially Sensitive Information Redacted]

Table 20: Key business risks

10.4 Project Plan

[Commercially Sensitive Information Redacted]

10.5 Key Business Risks and Opportunities

[Commercially Sensitive Information Redacted]

10.6 Outputs included in RIIO-2 Plans

[Commercially Sensitive Information Redacted]

11 Regulatory Treatment

[Commercially Sensitive Information Redacted]

12 Glossary

Term	Definition
CBA	Cost Benefit Analysis
EJP	Engineering Justification Paper
FES	Future Energy Scenarios
HRB	High Rise residential buildings
MOBs	Multiple Occupancy Buildings
MRB	Medium Rise residential buildings
PE	Polyethylene

Table 21: Glossary table