Cadent
Your Gas Network

Appendix 9.01

Introduction to our Investment Decision Packs

Table of Contents

2. Introduction

This document gives an overview of the **Investment Decision Packs** submitted in December 2019.

In addition to submitting the standard Cost Benefit Analysis (CBA) template and Engineering Justification Pack (EJP) required by Ofgem, we have also submitted more comprehensive investment decision documents ('Enhanced EJPs') for; Transforming the experience for 'Multiple Occupancy Building Customers: Risers' and 'Distribution Mains & Associated Services (Iron, PE, Steel & Other)'.

The hierarchy of submitted documents is shown below:

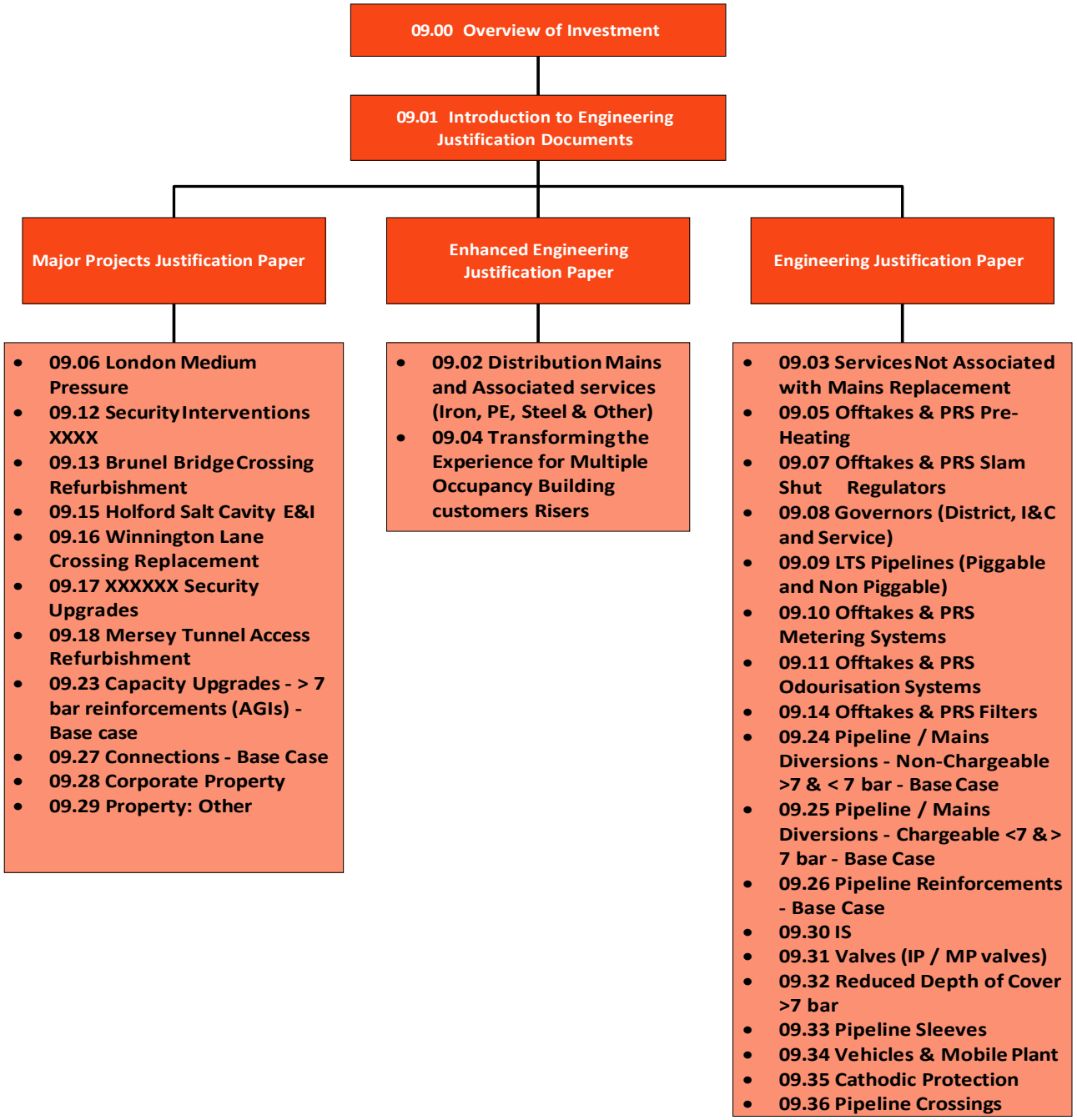

Figure 1: Document Hierarchy

3. Options Development, CBA and NARMS Reporting

As outlined in 9.00 we have a robust investment planning and cost benefit analysis process focused on delivering the right outcomes for our customers.

We have completed NARMs and CBA tables for all elements required by Ofgem for the December submission. Our CBA tables show the range of options we have considered at this time. We have used the final Ofgem CBA templates published on 20th September for our December submission**.**

Our submitted NARMs tables show a preferred option for each investment area. We have completed the elements required by Ofgem as agreed at the industry meeting on 18th November.

To develop options for some investment areas of the RIIO-2 business plan (e.g. Heaters) we have run models based on an enhanced NARMs/CBA approach in order to identify an optimal solution (Model Optimised).

For other areas (e.g. filters) we have developed solutions based on compliance with safety requirements and then fed this solution through the NARMs reporting tool and the CBA. In some cases, we have also used **s**witching analysis, as set out the in the HM Treasury Green Book, to illustrate the level of benefits that would justify our proposed investments.

In the later examples, the NARM or CBA report is being used to illustrate the impact of the work undertaken in a standardised way, not as a justification that the work needs to be completed.

In line with HM Treasury Green Book Five Case Model, our plans reflect the right balance between the drivers of investment. CBA underpins our assessment of value for money. Alongside this, we have explicitly considered other drivers of investment in assessing and justifying our plans, most notably around legislative (safety) compliance – and this has had a significant role in assessing the right levels of investment for RIIO-2. We have also considered acceptability, affordability, deliverability and financeability, and we are confident we have the right balance in our plans.

Our December plan has been tested and endorsed by customers as part of acceptability testing.

4. Enhanced Engineering Justification Papers

We have submitted two Enhanced EJPs. These Appendices cover the most material areas of our plan; they have a significant impact on customer service and bills.

4.1. Distribution Mains and Associated Services (Iron, PE, Steel & Other)

This area contains three elements of work.

- The Iron Mains Risk Reduction Programme (IMRRP). This work is safety driven and underpinned by enforcement from the HSE. The programme must be completed by 2032, but we have choices about the order in which the work is delivered. We have used our enhanced NARMs optimisation models to consider different scenarios and have consulted with customers to develop the final work programme presented in this Appendix.
- Safety driven work outside of the IMRRP. We have an absolute duty to comply with the Pipeline Safety Regulations (1996), where we identify a pipe which breaches the minimum safety standard it must be replaced. We have fed our safety mandated solution through the NARMs and CBA models to quantify the wider impact of this work.
- We have identified a volume of additional work driven by Cost Benefit Analysis (CBA). We have used our optimisation models to identify what work will be undertaken and to understand and assess the benefits this delivers for customers.

Preferred option	Model Optimised	Safety Mandated
9.02 IMRRP	Phasing Optimised	Yes
9.02 Safety Driven Work	No	Yes
9.02 CBA work	Yes	No

Figure 2: IMRRP Programme

4.2. Transforming the Experience for Multiple Occupancy Building Customers: Risers

This area contains two elements of work.

- We have used our NARMs/CBA models to consider a range of options around managing risk on our riser and lateral assets. However, the primary driver for this investment is process safety.
- Investment to comply with building regulations standards, this work is mandatory opex and is not reported via NARMs or CBA.

Preferred option	Model Optimised	Safety Mandated
9.04 Risers	Part	Yes
9.04 Building Regs (opex)	No	Yes

Figure 3: MOBs Programme

5. Engineering Justification Papers: Major Projects

For **December** we have included eleven projects using the Major Projects template:

1. **Appendix 09.06: London Medium Pressure (LMP) project - *XXXX***

This investment continues activity begun in RIIO-1 and will deliver improved safety and reliability to the heart of the capital. We have completed a CBA building on the approach used for RIIO-1. We have included this work in our NARMs tables.

2. **Appendix 09.12: Security Interventions *XXXXXXXX***

XXXXXXXX

3. **Appendix 09.13: Brunel Bridge Crossing Refurbishment (Lon)- *XXXX***

4. **Appendix 09.16: Winnington Lane Crossing Replacement (NW) - *XXXX***

We routinely refurbish crossings to maintain protective coatings – a cost effective means of extending asset life – and ensure suitable Access Deterrent Measures (ADM) are in place to comply with our obligations under the Occupiers' Liability Act (1957). These two crossing have engineering challenges which means they will cost in excess of *XXXX* and as such be named projects in our BPDTs. The work is safety driven but also shows a positive NPV.

5. **Appendix 09.15: Holford Salt Cavity E&I refurbishment - *XXXX***

In the North West, will ensure we can continue to effectively operate our salt cavity storage facility, an essential part of resilience and reliability on our network. The work will cost in excess of *XXXX* and, as such, is a named project in our BPDTs. A switching analysis has been used to support the investment case.

6. **Appendix 09.17: *XXXX* Security Upgrades. - *XXXX***

XXXXXXX

7. **Appendix 09.18: Mersey Tunnel Access Refurbishment - *XXXX***

This site is a key resilience link in our NW network. We must invest to maintain safe access and egress and have assessed different options to achieve this using a CBA. Essential repair and maintenance on lighting, ventilation, strategic isolation valves and pipework coatings are required to ensure safe, continued operation.

8. Appendix 09.23: Capacity upgrades above 7 bar – Base Case - *XXXX*

We have an obligation under our license conditions to design our networks and above ground sites to be able to supply gas up to and including a 1-in-20 year peak gas demand. As part of our annual demand forecasting process, we identified a number of sites where no suitable network solution, to mitigate increases in local demand, was possible and increased site capacity was required.

A study was undertaken to scope and cost the necessary upgrades; a number of solution-options were considered.

Our preferred programme-option and phasing for this base-case, has identified capacity-upgrades at 13 sites that at which the primary stream is already under-capacity in 2019 and will deliver these upgrades over a 4 year period, for an associated capex investment of *XXXX*.

We have developed an uncertainty mechanism to cover the scenario of identifying further sites during RIIO-2 which required capacity upgrades to meet future change.

9. Appendix 09.27 Connections & unauthorised connections – Base Case - *XXXX*

We have an obligation under Section 9 of the Gas Act 1986, to connect new customers in a timely, reliable and efficient manner. We have developed an investment case for new domestic and industrial connections, and replacement of unauthorised connections, based on the lowest observed demand year in RIIO-1. We will then look to a volume driver, as part of the uncertainty mechanism (UM) process, to enable us to recoup costs for delivery of connections above this base case level. If the UM is removed, we would need to revisit the base case.

This provides a fair mechanism for recovering costs in RIIO-2. It protects our customer from any over stated forecasts we make due the uncertainty in the connections market. It also offers protection for us from any potential uplift in connection workload beyond our base case levels from changing demand. Our base plan assumes a net-investment of *XXXX* for new domestic and industrial connections. In addition, *XXXX* of investment has been included to address unauthorised connections – making safe connections which have been made illegally by third parties.

10. Appendix 09.28 Corporate Property - *XXXX*

We are undergoing a significant transformation programme in RIIO-2 to reduce costs and improve service to our customers. This programme will include a reduction in the number of centrally-based office staff: from 1,850 to 1,300. As a result, the floor area currently provided by the 3 corporate offices will be approximately 40% more than required. This presents an opportunity to right size our office portfolio to match future needs – driving further cost reductions in future periods.

We have considered five overall programme options and completed cost benefit analysis. Our preferred, lowest whole-life cost option comprises a new office in the Hinckley / Coventry area; maintaining and upgrading one of our sites and disposing of two sites. The RIIO-2 capex investment for this option is *XXXX*.

11. Appendix 09.29: Other Property - *XXXX*

By the end of RIIO-2 we will have 64 depots across our 4 networks. The asset stock by network is EoE 47%, Lon 11%, and NW and WM 21% each.

During RIIO-1 we have completed a comprehensive range of condition surveys to identify any deficiencies in asset condition and non-compliances with both the Health and Safety at Work Act (1974) and The Workplace (Health, Safety & Welfare) Regulations 1992, which put our employees and our subcontractors at risk and reduces overall staff welfare and wellbeing. The surveys also identified any condition issues which could put us in breach of our leasehold arrangements (60% of sites are leased). We have developed a planned programme of building remediation to address these issues.

We will be 50% through our planned programme of depot remediation by the end of RIIO-1, and this work will continue throughout the first three years of RIIO-2, with us carrying out planned remediation at 33 of our office-depots. Overall our capex investment in RIIO-2 for maintaining our “other property” is *XXXX*, a lower per annum rate than in RIIO-1.

Summary of Major Projects:

	Model Optimised	Safety Mandated	CBA completed
9.06 London Medium Pressure	No	Part	Yes
9.12 Security Interventions *XXXX*	No	Part	Yes
9.13 Brunel Bridge Crossing Refurbishment	No	Yes	Yes
9.15 Holford Salt Cavity E&I	No	No	Yes
9.16 Winnington Lane Crossing Replacement	No	Yes	Yes
9.17 *XXXX* Security Upgrades	No	No	No
9.18 Mersey Tunnel Access Refurbishment	No	Yes	Yes
09.23 Capacity Upgrades - > 7 bar reinforcements (AGIs) - Base case	No	No	No
09.27 Connections & unauthorised connections - Base Case[1]	No	Part	No
09.28 Corporate Property	No	No	Yes
09.29 Other Property	No	Part	No

Figure 4: Major Projects Justification Papers

[1] The investment case for "connections" has been written using the Major Project justification paper because it is not driven by Asset Health, and therefore Template A was felt to have more appropriate headings. It isn't however a Major Project.

6. Asset Health Engineering Justification Papers

We have submitted eighteen Asset Health Engineering Justification Papers in our December business plan.

1. Appendix 09.03: Services Not Associated with Mains Replacement - *XXXX*

We replace a number of services (the connection between the distribution main and the customer's home) which are not associated with mains renewal. This work is customer driven, either following a suspected gas-leak or other performance issue or because the customer requires the service-pipe to be modified due to their own home-improvements. We are mandated to perform this work; our do-minimum option of reactively fixing following a failure or as a result of a customer request is our chosen option for all work-types except Bulk Steel Service Re-lays. For Bulk steel service re-lays we are proposing a proactive approach to improve delivery efficiency.

The workload is not predicted by the NARMs models and therefore the model cannot be used as a predictor of replacement volumes. We have used RIIO-1 actuals (as reported in RRP) to forecast the RIIO-2 volumes and have then used these volumes in the NARMs models to forecast risk reduction.

2. Appendix 09.05: Offtakes & PRS Pre-heating - *XXXX*

We have 884 gas pre-heating units (spread over 413 sites), which prevent freezing of downstream equipment when the gas pressure is reduced. This includes electrical heaters, modular boilers and Water Bath Heaters (WBH).

We have modelled the performance of our preheating units, including forecast failures, performance and operating costs. This shows we will need to continue to invest in these assets in order to manage ongoing issues such as: poor performance linked to asset deterioration; compliance with environmental legislation (Medium Combustion Plant Directive); environmental input; efficiency; compliance with PSSR; and potential interruptions to supply in the event of failures. If we do not invest, the risk of failures and other services impacts (e.g. supply interruptions, leakage and ignitions) will rise quickly.

We have considered multiple scenarios and have chosen an option which maximises whole life benefits within a 15 to 20-year payback with a proposed investment of *XXXX* capex.

3. Appendix 09.07: Offtakes & PRS Slam shut / Regulators - *XXXX*

We have assessed a number of options for investment in these assets, either based on detailed engineering studies or via computerised monetised risk models. The key options are:

- A targeted range of interventions based on a comprehensive review of all equipment, conducted with an independent expert. The aim of the review was to identify equipment that is unreliable and obsolete and hence has a higher likelihood of failure (high PoF)
- The minimum level of investment to maintain stable risk (as identified from modelling)
- The level of investment that would maximise whole life benefits (as identified from modelling)

We have presented all three options in our CBA. Our analysis shows that a targeted investment into specific components, resulting from engineering consultant analysis is optimum. This option selects assets for intervention with the highest failure rates to provide the best balance between ensuring asset health is maintained, while being affordable and deliverable. The chosen option is significantly NPV positive.

4. Appendix 09.08: Governors (District, I&C and Service) - *XXXX*

We have assessed a number of options for investment in these assets, either based on detailed engineering studies or via computerised monetised risk models. The key options are:

- A targeted range of interventions based on a comprehensive review of all equipment, conducted with an independent expert. The aim of the review was to identify equipment that is unreliable and obsolete and hence has a higher likelihood of failure (high PoF)
- The minimum level of investment to maintain stable risk (as identified from modelling)
- The level of investment that would maximise whole life benefits (as identified from modelling)

We have presented all three options in our CBA. Our analysis shows that a targeted investment into specific components, resulting from engineering consultant analysis is optimum. Our chosen option is a "stripped-back", highly targeted programme of work designed to minimise costs whilst maintaining service. It will allow monetised risk to increase during the period whilst improving key safety metrics. The chosen option is significantly NPV positive.

5. Appendix 09.09: LTS Pipelines (Piggable and non-piggable) - *XXXX*

This work is mandated by the pressure systems safety regulations (PSSR, 2000).

We have considered a number of initial options for investment; there is only one option that feasibly deliver the required outcomes of compliance with our legal obligations: **Pre-emptive repair**. We have developed this option using the volumes of pipeline interventions generated from our internal and external pipeline inspection programmes during RIIO-1, to forecast future intervention volumes in RIIO-2.

To assess this investment case further, we used our NOMs model, to assess seven different investment options. None of these options generated a positive NPV, using the benefits and deterioration rates within the industry agreed model. This result reflects weaknesses in the NOMs modelling approach, rather than an absence of positive benefits in the real world.

The chosen option, to continue the engineering assessment approach and pre-emptively repair, delivers the minimum level of investment required to meet legal obligations and has the highest NPV (though still negative). This scenario effectively continues the approach adopted for managing these assets in RIIO-1,

6. Appendix 09.10: Offtakes & PRS Metering Systems - *XXXX*

This investment case covers the Flow Weighted Average Calorific Value (FWACV) systems, which are critical in determining consumer's gas bills and in ensuring our continued compliance with regulations including safe dosing of odourant.

A large proportion of our meters are now obsolete and have no redundancy. This lack of resilience, combined with the asset condition (assets are over 50 years old) is resulting in a higher probability of a metering-system failure, which has an immediate impact on our ability to meter our gas at these offtake sites.

We have carried out a failure mode and effects analysis and a CBA across a number of programme options; we have considered both reactively and proactively replacing individual components and/ or the entire FWACV system.

Our analysis shows that it is most cost-beneficial to proactively replace FWAC systems at targeted sites (i.e. the 18 sites with the lowest level of resilience). This option delivers better value for money and ensures we can deliver a cost-effective and well-planned upgrade to our meters, rather than spending more money delivering emergency works following a meter failure.

7. Appendix 09.11: Offtakes & PRS Odourisation Systems - *XXXX*

We have used the NOMs model to assess maintaining the current performance of these assets. In addition, we have conducting an engineering review for these assets to assess failure history and consequential risk. Our engineering study has concluded that these assets will continue to perform well through RIIO-2 without material intervention, but that investment will be required in RIIO-3. As such we are proposing that our activity in RIIO-2 will be focused on preparing for RIIO-3 replacements – specifically we will trial new, less environmentally damaging, equipment at two sites. This is a low-cost area of the plan. Our CBA shows the results from both options.

8. Appendix 09.14: Offtakes & PRS Filters - *XXXX*

This work is mandated by the pressure system safety regulations (PSSR, 2000).

The NARMS Filters model does not capture this failure type and as such cannot be used as a predictor of PSSR replacement volumes. For comparison we have run the NARMs model to indicate the cost required to hold total monetised risk flat.

We have presented all three options in our CBA.

9. Appendix 09.24: Mains Diversions non-chargeable below 7 bar – Base Case - *XXXX*

Where third party activity occurs over or adjacent to gas mains or other network asset, we may need to divert or relocate those assets, to remove risk. This investment case covers the non-chargeable diversions, required because of inadequate legal rights. This work is customer driven and mandatory in order to meet our obligations under the Pipeline Safety Regulations, 1996.

We have proposed a conservative workload (80% of minimum RIIO-1 workload) as the basis for our RIIO-2 base-case, along with an uncertainty mechanism to address any variation beyond this minimum level. If the UM is removed, we would need to revisit the base case.

10. Appendix 09.25: Mains Diversions Chargeable below 7 bar – Base Case - *XXXX*

Where third party activity occurs over or adjacent to gas mains or other network asset, we may need to divert or relocate those assets, to remove risk. This investment case covers the chargeable diversions. This work is customer driven and mandatory in order to meet our obligations under the Pipeline Safety Regulations, 1996.

We have proposed a conservative workload (80% of minimum RIIO-1 workload) as the basis for our RIIO-2 base-case, along with an uncertainty mechanism to address any variation beyond this minimum level.

Our base-plan assumes 76.2km of diversion, for a total expenditure of *XXXX*; we assume we will receive *XXXX* of third party contributions and therefore propose a net expenditure of *XXXX*. If the UM is removed, we would need to revisit the base case.

11. Appendix 09.26: Mains reinforcement below 7 bar – Base Case - *XXXX*

This investment case covers reinforcement to meet growth in demand and reinforcement to enable insertion (to enable the iron mains replacement programme IMRRP).

Our base case for reinforcement (for growth), has been derived using a conservative view using 80% of the minimum workload in RIIO-1. We have proposed an uncertainty mechanism to adjust the level of funding if the actual level exceeds this minimum. If the UM is removed, we would need to revisit the base case.

In addition, we conducted an options appraisal to assess how to minimise the overall IMRRP cost. We identified the optimum length of reinforcement to enable pipe-insertion as a mains-renewal method, to deliver an overall IMRRP of minimum net cost.

Our base plan assumes 25.4km of reinforcement to meet growth in demand at an investment of *XXXX*. Our base plan also assumes 48.4km of reinforcements to enable pipe-insertion at an investment of *XXXX*.

12. Appendix 09.30: Technology, IT and Telecoms - *XXXX*

Technology is critical to Cadent. It is a core component of how we undertake our work in all areas, and enables us to do our work in efficient, repeatable, reliable ways. It also has the power to transform how we do our work and how the energy industry operates. Technology is ubiquitous, more interconnected, and offers affordable services and solutions than ever before.

Our technology plan underpins our ambitious business plan for RIIO-2, our cyber security strategy and our digitalisation and data strategy.

We have built a portfolio of proposed investments to support our technology strategy, maintain the health of our IT assets, and exploit new technology opportunities for our customers, our business and our partners.

We have assessed four programme options using CBA. Our chosen option has balanced the maintenance of the essential IT services, yet also taking advantage of the opportunities that technology will offer us during RIIO-2 to realise efficiency savings during RIIO-2 and beyond. The associated capex investment for this plan is *XXXX*.

13. Appendix 09.31: Pipeline isolation valves - *XXXX*

Our strategic pipeline isolation valves allow us to isolate specific areas of our network in case of pipeline failure, or to deliver maintenance work. Safe and effective operation of these valves ensures Cadent's compliance with Pipeline Safety Regulations (PSR) 1995, in particular Regulation 6 and 13.

We have used the learning from our RIIO-1 survey work and remediation, to inform our RIIO-2 programme. We are now beginning a programme of more detailed survey work including excavation of buried assets to better understand these issues, this work will continue into RIIO-2.

We have considered various programme options, looking at both reactive and proactive options across 5 and 10 years. The chosen option, a 10-year proactive programme of remediation, is the only option which allows us to comply with legislation and is deliverable. The associated capex investment for this plan is *XXXX*.

14. Appendix 09.32: Reduced Depth of Cover > 7 bar - *XXXX*

We have an obligation to manage and maintain our gas pipelines under the Pipeline Safety Regulations (PSR, 1996) and Health and Safety and Work Act 1974 and manage activity that may pose a risk to pipeline integrity. Reduced depth of cover (RDoC) on pipelines within arable farmland is one of the highest risks to pipeline integrity through damage from third parties. We have a regulatory mandate to proactively manage these risks through temporary or permanent solutions.

We have used CBA for illustrative purposes only, to show that even without our regulatory mandate, a proactive approach is optimum.

Our preferred option is therefore to continue to proactively intervene on RDoC risks for RIIO-2 for an investment of *XXXX* totex (*XXXX* capex).

15. Appendix 09.33: Pipeline Sleeves - *XXXX*

Cadent has contributed to industry wide work on improving the integrity management of sleeves. This has been facilitated by the UK Onshore Pipeline Operators Association (UKOPA) and resulted in the development of an industry good practice guide (Managing Pipeline Sleeves – UKOPA/GP/005 dated January 2016). This approach forms the basis for managing sleeve integrity within Cadent.

Our pipeline integrity surveys, combined with this UKOPA model has been used to inform this investment case, and gives us a reasonable understanding of the relative likelihood of sleeves failing and potential impacts.

We have used CBA for illustrative purposes only, to show that even without our regulatory mandate, a proactive approach is optimum.

The only feasible option that allows us to comply with our specific obligations under the Pipeline Safety Regulations (PSR) and Health and Safety and Work Act 1974, is our chosen option, to continue to proactively

intervene on pipeline sleeves as soon as reasonably practicable. This will achieve a lower-risk profile by the end of RIIO-2 for investment of *XXXX*.

16. Appendix 09.34: Corporate Vehicles - *XXXX*

We have developed a whole-life cost model for our corporate operational vehicles and have thus identified the optimum replacement frequency for the primary vehicle types in our asset-stock. By the end of RIIO-1, we will have a back-log in vehicle replacements which has driven the programme options investigated.

We have developed two options; our baseline option applies our optimum replacement frequency across all years of RIIO-2; our preferred option takes a more pragmatic approach to the replacement age of each vehicle. This option looked at individual vehicle performance and chose to retain those with the lowest maintenance costs for one or two years longer. Our replacement programme will be based on the optimised average lowest whole life cost of ownership, with a small number of lower failure-rate vehicles being run for longer.

The associated capex is *XXXX*

17. Appendix 09.35: Cathodic Protection - *XXXX*

Our Cathodic Protection (CP) assets, prevent corrosion of our metal pipes. CP is therefore one of the methods by which we can ensure legislative compliance with our Pipeline Safety Regulations 1996 (Regulation 13) in ensuring the pipeline's integrity is maintained.

Following receiving an improvement notice by the Health and Safety Executive (HSE) in 2015, we have agreed a programme of work to deliver a legislatively compliant CP system.

We have used CBA for illustrative purposes only, to show that even without our regulatory mandate, a proactive approach is optimum.

Our chosen option is a targeted proactive repair option and has been developed using remediation volumes and costs driven from our rolling programme of CP surveys undertaken in RIIO-1, to estimate likely workload in RIIO-2. The associated capex is *XXXX*.

18. Appendix 09.36: Pipeline Crossings - *XXXX*

The investment driver for crossing inspection and maintenance is to provide robust protection to exposed pipelines (complying with Pipelines Safety Regulations 1996, Reg. 13) from the risk of corrosion, damage and to ensure the risk associated with the public accessing the pipe crossing is reduced / mitigated in line with HSE guidance. Our investment programme is driven by safety requirements.

Following the fatality at Dugdale Bridge in 2014 we have improved our approach to investment in crossings. We enhanced our inspection criteria and undertook a full survey of pipeline crossings, assessing accessibility and asset health. This approach has identified all crossings with a high risk of unauthorised access where suitable protection access deterrent measures (ADMs) are required to be installed. The higher risk crossings will be remediated in RIIO-1 and the lower risk crossings will be remediated in RIIO-2, along with remediation of any significant asset-health risks.

We have carried out a CBA to assess our baseline (reactive repair or replace upon failure) against a proactive maintenance option. Our preferred proactive option has been developed using a bottom-up assessment of the pipeline crossings requiring intervention following inspections (based on asset condition / risk).

The associated spend is *XXXX*

Summary

Preferred Option	Model Optimised	Safety Mandated	CBA completed
09.03 Services Not Associated with Mains Replacement	No	Yes	Yes
09.05 Offtakes & PRS Pre-heating	Yes Including mandatory F-Schedules	Part	Yes
09.07 Offtakes & PRS Slam shut / Regulators	Yes	Yes	Yes
09.08 Governors (District, I&C and Service)	Yes	Yes	Yes
09.09 LTS Pipelines (Piggable & Non Piggable)	No	Yes	Yes
09.10 Offtakes & PRS Metering Systems	No	No	Yes
09.11 Offtakes & PRS Odourisation Systems	No	Yes	Yes
09.14 Offtakes & PRS Filters	No	Yes	Yes
09.24 Mains Diversions non-chargeable below 7 bar – Base Case	No	Yes	No
09.25 Mains Diversions Chargeable below 7 bar – Base Case	No	Yes	No
09.26 Mains reinforcement below 7 bar	No	No	Part
09.30 Technology, IT and Telecoms	No	No	Yes
09.31 Pipeline isolation valves (IP & MP)	No	Yes	No
09.32 Reduced Depth of Cover >7 bar	No	Yes	Yes
09.33 Pipeline Sleeves	No	Yes	Yes
09.34 Corporate Vehicles & Mobile Plant	No	No	Yes
09.35 Cathodic Protection	No	Yes	Yes
09.36 Pipeline Crossings > 7 bar	No	Yes	Yes

Figure 5: Engineering Justification Packs