

# LTS HP Pipelines

Engineering Justification Paper (SGN-GD3-EJP-LTS-006)

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Transmission Asset Management SGN



**SGN**

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# 1 Summary Table

Table 1: Ofgem Project Summary Table

Name of Project	LTS Pipeline Projects		
Scheme Reference	SGN-GD3-EJP-LTS-006		
Primary Investment Driver	Compliance		
Project Initiation Year	2026		
Project Close Out Year	2031		
Total Installed Cost Estimate (£)	£12.39m		
Cost Estimate Accuracy (%)	+- 15%		
Project Spend to date (£)	0m		
Current Project Stage Gate	Stage 1		
Reporting Table Ref	LTS Storage and Entry 5.01		
Outputs included in RIIO-GD2 Business Plan	No		
Spend apportionment	GD2	GD3	GD4
	£0	£10.7m CAPEX £1.69m OPEX £12.39m TOTEX	£0

All expenditure above 23/24 prices

## 2 Executive Summary

- 1 SGN owns and operates over 3150km of high-pressure transmission pipelines in Scotland and Southern Gas Networks. These high-pressure pipelines operate at pressures between 7barg and 75barg. A total of £12.39m has been requested for the significant works on the High Pressure LTS pipelines across Southern Gas Networks area, to allow SGN to manage the assets in compliance with Pipeline Safety Regulations 1996.
- 2 Carrying out the work proposed in this Engineering Justification Paper, will allow SGN to comply with the guidance on Pipeline Safety Regulation 1996 and reduce the potential harm to members of the public by replacing, removing and downrating Major Accident Hazard Pipelines within the network.
- 3 These interventions are compliance work and as such a CBA is not required. An ex-ante payment is our preferred funding mechanism for these interventions.
- 4 The programme is currently in the Project Initiation Stage (Stage 1). At this stage, initial project scopes have been sent to delivery partners for costing, and a preliminary project schedule and risk register are being developed. This phase is focused on defining the scope, costs, and risks associated with the delivery of the programme.
- 5 Table 2 highlights the proposed workload in GD3 with no work carried out in GD2 as per Table 3.

**Table 2: GD3 Project Expenditure Profile in 24/24 Prices**

Year	26/27	27/28	28/29	29/30	30/31	Total
Forecast Cost (£m) Capex	2.22	3.96	3.31	1.21	0.00	10.70
Forecast Volume Capex	0	1	1	0	0	2
Forecast Cost (£m) Opex	0	0.27	0.8	0.61	0	1.68
Forecast Volume Opex	0	0	2	1	0	3

**Table 3: GD2 FD Allowances and Volumes in 23/24 Prices**

Year	21/22	22/23	23/24	24/25	25/26	Total
Forecast Cost (£m) Capex	0	0	0	0	0	0
Forecast Volume Capex	0	0	0	0	0	0
Forecast Cost (£m) Opex	0	0	0	0	0	0
Forecast Volume Opex	0	0	0	0	0	0

- 6 As we look to form our plans and develop our strategy for the next price control GD3, we have engaged with support from our Independent Stakeholder Group (ISG) with a wide range of our customers and stakeholders to better understand what their needs are and what they expect from us. We have responded, challenging ourselves to focus on the projects that prioritise safety and resilience, while delivering most value to our customers. This document should be read in conjunction with our GD3 Business plan, section C2 Customer and Stakeholder priorities. This section provides a greater level of detail of our approach to customer and stakeholder engagement.

### 3 Project Status and Request Summary

- 7 Pipelines operating above 7barg are classified as the Local Transmission System (LTS) and are identified as hazardous and covered by additional regulation in Pipeline Safety Regulations 1996 (PSR). Under PSR these pipelines are classified as Major Accident Hazard Pipelines (MAHP), due to the pipeline carrying *“A fluid which is flammable in air and is or is to be conveyed in the pipeline as a gas at above 8 bar absolute.”*
- 8 These pipelines typically transport the gas from offtake from the National Gas UK transmission system to pressure reducing installation (PRI's) on the outskirts of major towns, where the pressure is reduced further to either intermediate or medium pressure mains. This supplies further PRI's that reduce the pressure to the low-pressure distribution network.
- 9 Due to the elevated level of potential harm from these MAHPs there are additional duties placed on the user of the pipeline. These include notifications preconstruction and commissioning, production of a Major Accident Prevention Document, and Emergency Plan with the local authority.
- 10 The work on the SGN transmission system is required to comply with Pipeline Safety Regulations 1996 and will reduce the societal risk.
- 11 The projects include design, land and legal costs, materials and main works contractors and remediation of the redundant pipelines and land.
- 12 It is important to note that there has been no spend regarding this project during the GD2 price control period. Further assessment and integration of the project will be needed by carrying out feasibility studies before the project development progresses.
- 13 There are different interventions being proposed in this paper.
- 14 Diversion of a section of pipeline P005 Braishfield to Austins Copse (CAPEX). This pipeline has micro biological corrosion and poor coating. Significant number of excavations have been undertaken over the years, as well as an additional cathodic protection system installed. The diversion will facilitate compliance with Pipeline Safety Regulations - Regulation 13.
- 15 Downrating of pipeline from Hooley to Port Greenwich to 6.9barg (CAPEX). This pipeline runs near properties and operates as a Major Accident Hazard Pipeline for Piggings operations. This work will facilitate compliance with Pipeline Safety Regulations - Regulation 6.
- 16 Isolation of the pipelines Jail Lane to Biggin Hill High Pressure storage to Sheepbarn Lane and Anchor farm to SCA Aylesford (OPEX). These three sections of MAHP are redundant and the isolation from the network removes the exposure of societal risk. This work will facilitate compliance with Pipeline Safety Regulations – Regulation 14.

#### P005 – Braishfield to Austins Copse

Pipeline Details					
Length (km)	Diameter (mm)	Commission Year	MOP (barg)	Design Standard/ Class	Comments
9.9km	914.4mm	1977	26.6barg	API 5LX 60	Coal Tar Coating

- 17 P005 - Braishfield to Austins Copse – the pipeline named: “Braishfield and Austins Copse”, near Romsey is critical to the South LDZ's Local Transmission System. The pipeline was commissioned in 1977 and is 9.9km in length and 914.4mm in diameter (36”) with a nominal wall thickness of 12.7mm and a coal tar enamel coating system.

Figure 1: Shows Braishfield to Austins Copse pipeline schematic

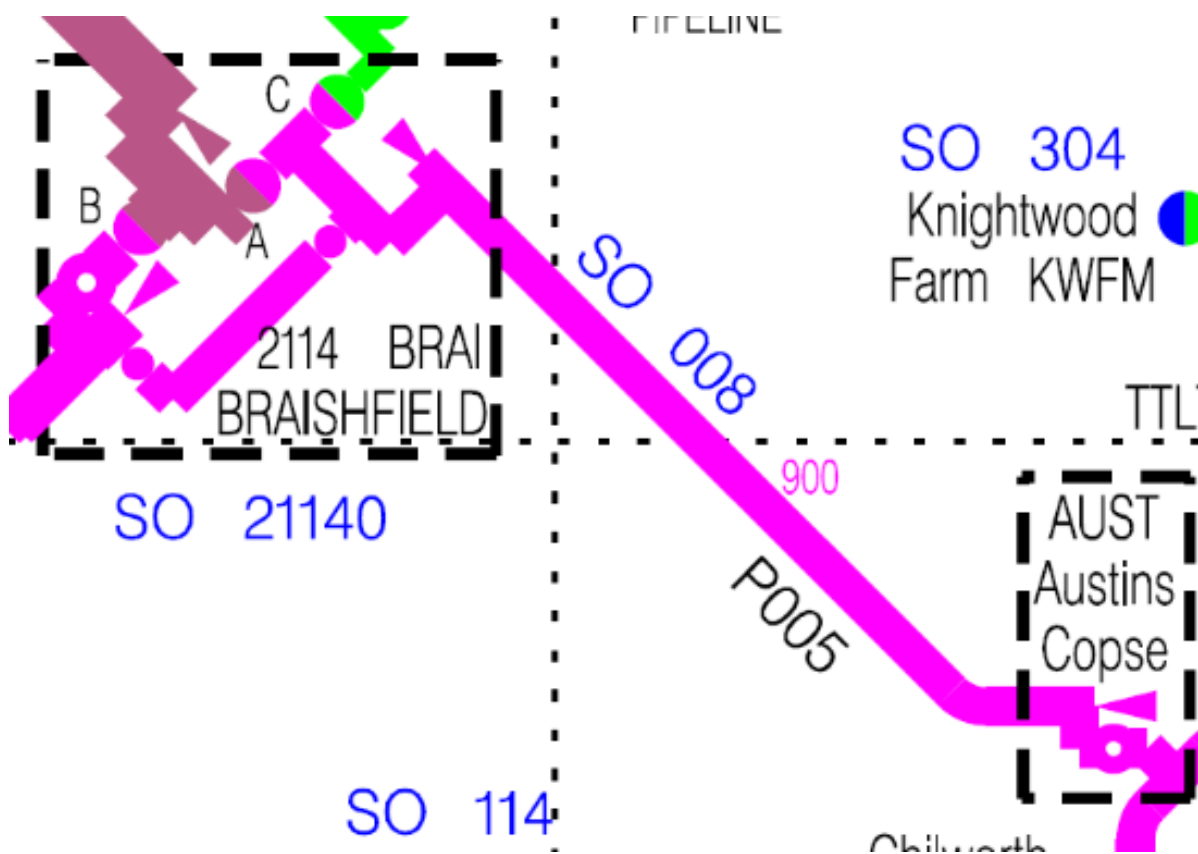
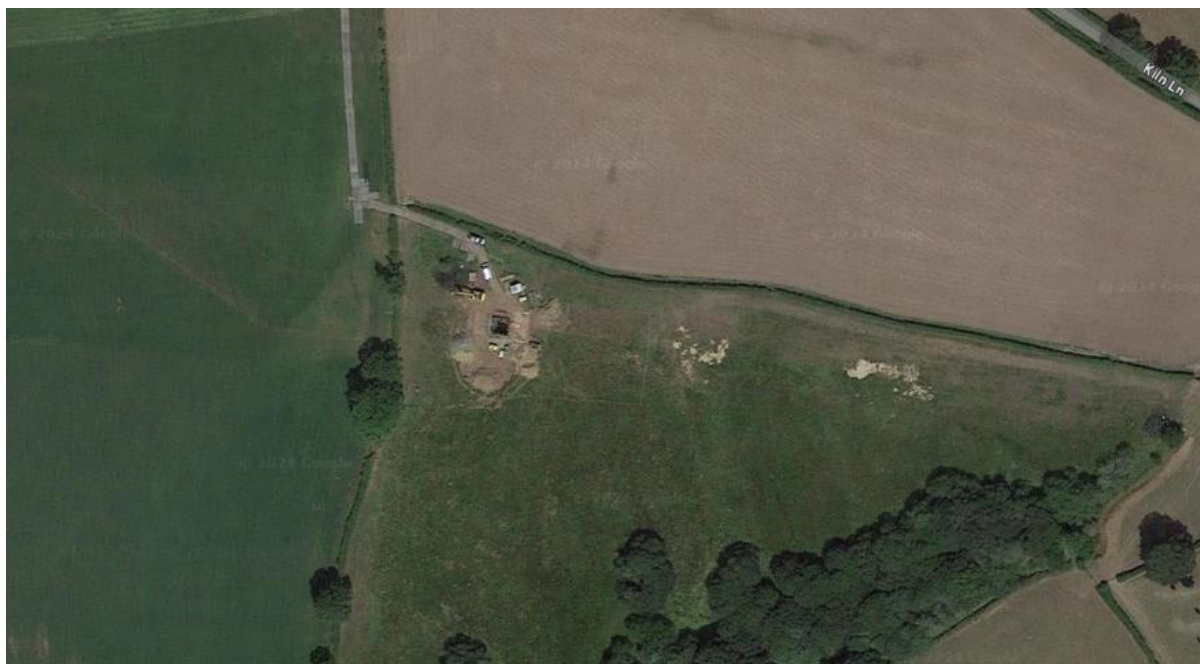
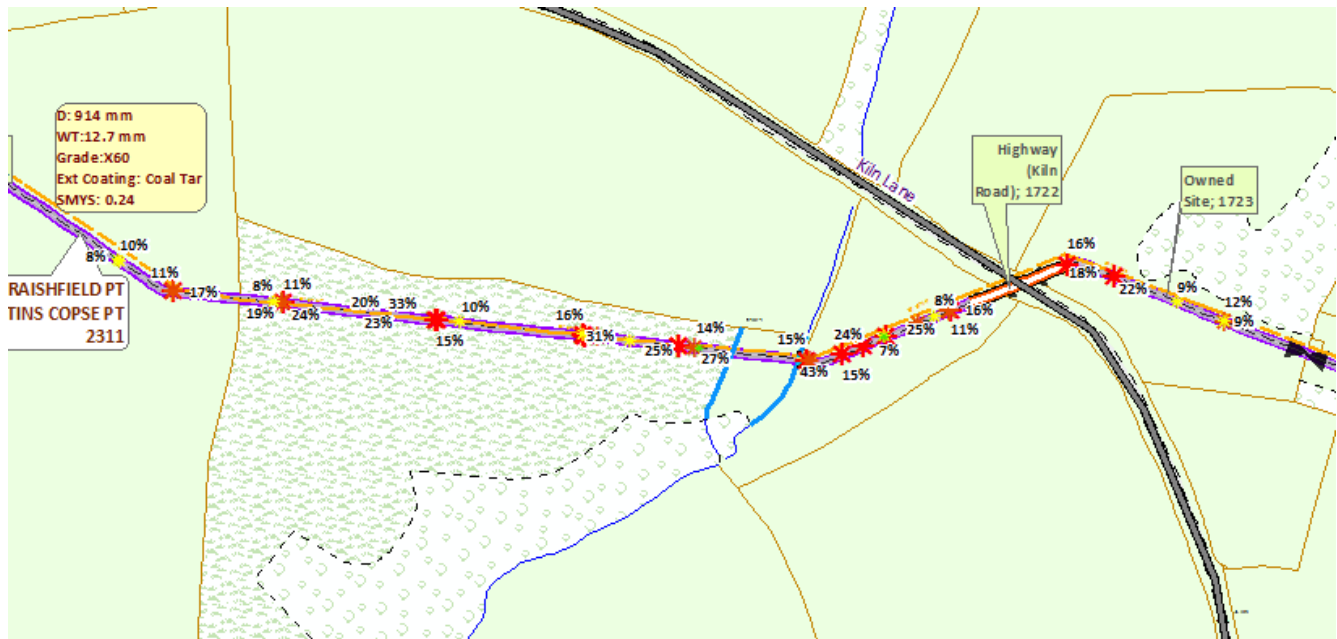


Figure 2: Shows aerial photo of fields with excavations going on



18 As many as ten excavations have been carried out in recent years to address corrosion issues along a section of pipeline to the west of Fairbourne Farm and south of Kiln Lane. This section is 680m long and extends between girth weld (GW) 880 and GW 1,910.

Figure 3 – corrosion defects on pipeline P005



- 19 On-Line Inspection (OLI) run has identified 28 defects along this section ranging from superficial to extreme with loss of wall thicknesses of up to 55%, these are shown in figure 3. Most notable is significant increase in metal loss between the 2019 OLI run and an earlier assessment in 2012. A further OLI run is planned for 2024. A redesign of the pipeline CP system was undertaken in 2019, and a new Transformer Rectifier was added to the pipeline in Kiln Lane. This increased the level of protection offered to the pipeline. However, the pipeline is still below the limits specified for pipelines effected by microbiologically influenced corrosion (MIC) and the Institute of Corrosion Level 5 Cathodic Protection Engineer recommendation is to divert the pipeline through an area of land that is not subject to MIC.
- 20 There is a 680m section of this pipeline that has been subjected to MIC. This is particularly aggressive and has significantly high corrosion growth rates in these concentrated areas. Numerous excavations have been completed over the years, normally following online inspections. This has identified that the coal tar coating has become disbonded, resulting in corrosion and associated metal loss. Addressing these defects has required 28 repairs, including one epoxy shell. The Cathodic Protection system was upgraded in 2020 which has increased the levels of protection on the pipeline. However, they are still below the criteria set in SGN/PM/ECP/2 (Management Procedure for Cathodic Protection of Buried Steel Systems) for the ground conditions the pipe is located in.

**Figure 4: Photograph of disbanded wrapping**



- 21 Microbiologically influenced corrosion (MIC) is caused by microbes whose actions initiate the corrosion cycle. There are several types of microbes that, while producing different effects, have been found to promote either external or internal corrosion. The main types are sulphate-reducing bacteria (SRB) and acid-producing bacteria (APB).
- 22 Bacteria can promote external corrosion by depolarising the pipe through the consumption of hydrogen gas formed at the pipe surface by the cathodic protection currents. Once the pipe is depolarised, corrosion can take place. Corrosion may occur where bacteria forming an acidic biofilm traps electrolytes and acids. Internal MIC is more common in liquid pipelines than in gas pipelines.
- 23 SRB microbes are commonly found in areas undergoing MIC and emit a strong odour (like that of spoiled eggs) that is easily detected in the excavation. Visual assessment of the environment in which the pipeline is located may also provide clues as to the likelihood of MIC development. External MIC requires a source of nutrients. Bogs, landfills, refuse sites, and similar areas offer sufficient nutrients to promote MIC development, if the other necessary elements are also present.
- 24 The driver for this work is compliance with Pipeline Safety Regulations 1996- regulation 13: *“This regulation deals with the requirement to maintain the pipeline to secure its safe operation and to prevent loss of containment. Maintenance is essential to ensure that the pipeline remains in a safe condition and is fit for purpose.”* and *“The operator needs to consider maintenance and inspection requirements for the pipeline. Examination and monitoring of the pipeline are part of routine maintenance. The operator needs to consider both how and when the pipeline should be surveyed and examined to validate and maintain it in a safe condition”.*



Therefore, as part of the project it is proposed to instal a temporary pig trap facility at Hooley. This will allow SGN to carry out OLI inspections from Esher to Hooley at 38Barg, ensuring the integrity of the Major Accident Hazard Pipeline and keep the system from Hooley to Port Greenwich below 7Bar thus reducing the amount of risk that society is exposed to and removing a Major Accident Hazard pipeline from London.

- 27 This removes a Major Accident Hazard Pipeline from the London boroughs of Croydon, Bromley, Lewisham and Greenwich. This will ensure compliance in accordance with IGEM/TD/1 Edition 6<sup>1</sup> *“Where significant growth / creep in development there are parts of the pipeline route. These are classified as Type T areas and a pipeline in a Type T area shall be designed and, constructed and operated and maintained in accordance with IGEM/TD/3<sup>2</sup>.”*
- 28 There is a section of this pipeline 280m that runs parallel with the London to Orpington train line. This pipeline is 6m from the high-speed line at the closet point. Reducing the maximum operating pressure of the pipeline reduces the consequences of an incident. This is shown in photo 5 and 6 below.

Figure 6: Pipeline above ground near the London to Orpington high speed rail track 1



Figure 7: Pipeline above ground near the London to Orpington high speed rail track 2



<sup>1</sup> IGEM/TD/1 Edition 6 – Steel Pipelines for High Pressure Gas Transmission (2016).

<sup>2</sup> IGEM/TD/3 Edition 5 – Steel and PE Pipelines for Gas Distribution (2014).

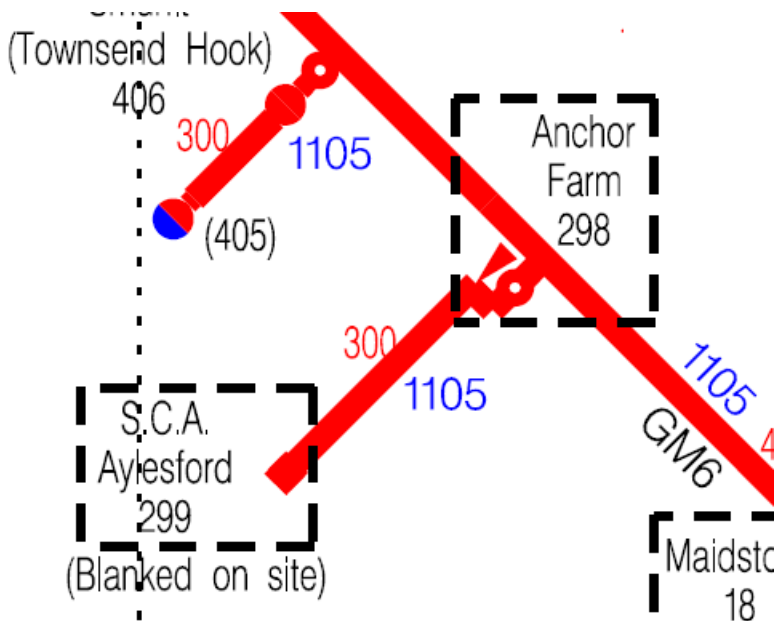
- 29 In addition to this, the project will remove a pig trap at Port Greenwich, and it is proposed to rebuild both Hayes and Whyteleafe PRI's, with below 7barg district governors. These above 7barh PRISs need intervention due to the PSSR faults, IGEM/TD/13 compliance and obsolesce issues with some of the ancillary equipment.
- 30 The driver for this work is compliance with Pipeline Safety Regulations - Regulation 6: *“The operator shall ensure that no fluid is conveyed in a pipeline unless it has been provided with such safety systems as are necessary for securing that, so far as is reasonably practicable, persons are protected from risk to their health or safety”* In accordance with IGEM/TD/1 Edition 6 *“here significant growth / creep in development there are parts of the pipeline route. These are classified as Type T areas and a pipeline in a Type T area shall be designed and, constructed and operated and maintained in accordance with IGEM/TD/3.”*

**GM06 Anchor Farm to SCA Aylesford**

Table 5: Anchor Farm to SCA Aylesford Pipeline Details

Pipeline Details					
Length (km)	Diameter (mm)	Commission Year	MOP (barg)	Design Standard/ Class	Comments
3.52km	323.8mm	1993	38.0	API 5LX 52	Coal Tar Coating

Figure 8: Shows Anchor Farm to SCA Aylesford Pipeline Schematic



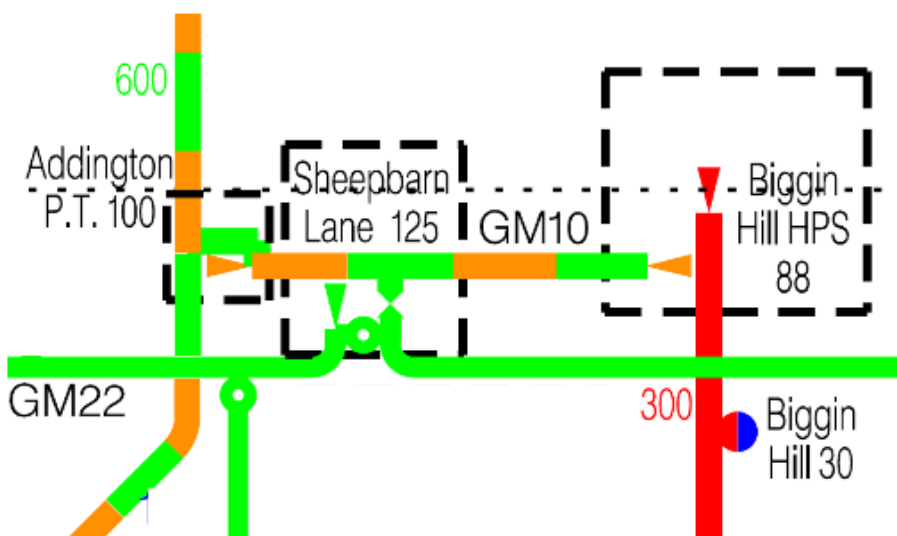
- 31 GM06 – Anchor Farm to SCA Aylesford. The proposal is to isolate 3.52km of the 323.8mm (12”) pipeline. The supply to SCA Aylesford was closed off in 2015 and the pipeline is redundant and needs to be decommissioned to remove the risk from the presence of this Major Accident Hazard Pipeline, along with the pig trap at Anchor Farm. This will involve isolating the pipeline at Anchor farm, purging the section of pipeline to air and filling with grout.
- 32 The driver for this work is compliance with Pipeline safety regulations regulation 14: *“Pipelines should be decommissioned in a manner so as not to become a source of danger. Once a pipeline has come to the end of its useful life, it should be either dismantled and removed or left in a safe condition.”*

**GM10 Biggin Hill (Jail Lane) to Sheepbarn Lane**

Table 6: Biggin Hill (Jail Lane) to Sheepbarn Lane Pipeline Details

Pipeline Details					
Length (km)	Diameter (mm)	Commission Year	MOP (barg)	Design Standard/ Class	Comments
4.2	323.8	1971	38.0	API 5LX 52	Coal Tar Coating
2.6	457.2	1971	14.0	API 5LX 52	Coal Tar Coating

Figure 9: Shows Biggin Hill (Jail Lane) to Sheepbarn Lane Pipelines schematic.



- 33 GM10 – Biggin Hill (Jail Lane) to Sheepbarn Lane via Biggin Hill High Pressure Storage. The proposal is to isolate 4.2km of 323.8mm (12”) High pressure pipeline operating at 38 Barg and 2.6km of the 457.2mm (18”) pipeline, operating at 14 Barg. This project will also remove three pig traps, two at Biggin Hill High Pressure Storage and one at New Addington valve site.
- 34 In 2018 the high-pressure gas facility at Biggin Hill was decommissioned, disconnected from the network and purged to air.

Figure 10: Shows the route of the pipelines route around the airport



- 35 The driver for this work is compliance with Pipeline safety regulations regulation 14 *“Pipelines should be decommissioned in a manner so as not to become a source of danger. Once a pipeline has come to the end of its useful life, it should be either dismantled and removed or left in a safe condition.”*

## 4 Problem/Opportunity Statement

### Why are we doing this work and what happens if we do nothing?

- 36 The primary objective of these projects is to reduce the risk to comply with Pipeline Safety Regulations 1996 and reduce the risk members of the public are exposed to.
- 37 To manage the risks, it is proposed to intervene on five pipelines over the GD3 period. With specific interventions for each pipeline.
- 38 P005 – Braishfield to Austen’s Copse - diversion of 680m HP pipeline which has significant microbiologically influenced corrosion (MIC) affecting the pipeline. Driver – compliance with PSR Regulation 13.
- 39 GM1 – Hooley to Port Greenwich – down rating of the 14 barg pipeline to 6.9 barg. Managing the risk associated with development along the pipeline, including multi occupancy buildings and the Odeon leisure park. As part of this project both Hayes and Whytleafe Above 7barg PRIs will be rebuilt as Below 7Barg district governors. Driver – compliance with PSR Regulation 6
- 40 GM06 – Anchor Farm to SCA Aylesford – isolation of a redundant high pressure gas pipeline that was used to supply gas to SCA Paper Mill until its closure in 2017. Driver – compliance with PSR Regulation 14
- 41 GM10 – Biggin Hill Jail Lane to Sheepbarn Lane via Biggin Hill High Pressure Storage. - Isolation of a redundant high pressure gas pipeline that previously supplied HP gas at pressures up to 38Barg to Biggin Hill High Pressure Storage and the outlet of Biggin Hill High Pressure Storage which operates at up to 14 Barg. Driver – compliance with PSR Regulation 14

### Under what circumstances would the need or option change for this project?

- 42 The need for this project is considered essential, with no foreseeable circumstances that would alter its necessity. The intervention outlined as the preferred option remains the only viable solution to effectively mitigate the associated risks.

### What are we going to do with this project?

- 43 To manage / reduce the safety risks associated with these pipelines the proposal is to divert, isolate or reduce the operating pressure as described above.

### What makes this project difficult?

- 44 With all pipeline projects securing land for routing and construction will be the most difficult part of the project. Consequently, nine months has been allowed for in the project plan for each of these pipeline projects.

### What are the key milestone dates for project delivery?

- 45 Given the complexity of these projects, the expected duration is spread over four years. This timeline allows sufficient time for initial stages such as feasibility studies, land acquisition and securing planning permissions, detailed design, procurement of materials, construction and collecting records. A detailed breakdown of the project delivery timescales is available in Section 8, providing a clear view of the phases and milestones throughout the project’s lifecycle.

### How will we understand if the project has been successful?

- 46 As part of our internal investment review process, we assess the benefits of our investments through a Post Investment Appraisal (PIA) process. This helps identify both tangible and intangible benefits, which define the success criteria for the GD3 integrity programme. This approach ensures a comprehensive evaluation of the programme's impact.
- 47 Examples of these benefits include:
- a. **Tangible benefits:** Reduction of risk to members of the public, compliance with Pipeline Safety Regulation 1996.

- b. **Intangible benefits:** A more resilient security of supply due to the increased pipeline integrity and compliance with the SGN Safety Management System (SMF).

## 4.1 Related Projects

48 There are no related projects to these pipeline projects.

## 4.2 Project Boundaries

49 The proposed capital investment of £12.39m TOTEX, (£10.7m CAPEX, £1.69m OPEX) for these projects and includes the following key activities:

### CAPEX

- **Suitable land acquisition:** Identifying and purchasing appropriate land for the new site location.
- **Local Authority consultation:** Engaging with authorities to secure the required planning permissions.
- **P005 - Braishfield to Austins Copse**
  - Installation of a new section of pipeline.
  - Decommissioning of the existing section of pipeline that is subject to significant levels of Microbiologically influenced corrosion.
- **GM01 Hooley to Port Greenwich**
  - Downrating of the pipeline between Hooley PRI and Port Greenwich PRI to operate at 6.9barg
  - Installation of a new pig trap facility on the site at Hooley PRI,
  - Rebuild of the existing above 7 barg PRIs at Hayes and Whyteleafe with two new district governors.
  - Removal of the two pig traps at Whyteleafe and one pig trap at Port Greenwich.
- **GM06 Anchor Farm to SCA Aylesford.**
  - Isolation and decommissioning of the high-pressure pipeline between Anchor Farm and SCA Aylesford.
- **GM10 Biggin Hill Jail Lane to Sheep Barn Lane**
  - Isolation and decommissioning of the High-pressure pipeline from Jail Lane (Biggin Hill) to Biggin Hill High Pressure Storage.
  - Isolation and decommissioning of the High-pressure pipeline from Biggin Hill High Pressure Storage to Sheepbarn Lane.
  - Removal of two pig traps at Biggin Hill High Pressure Storage and one at New Addington Pig Trap Site

# 5 Project Definition

## 5.1 Supply and Demand Scenario Discussion and Selection

50 Taking lessons from GD2 projects, it is important to recognise that a project of this scale and type is influenced by various supply and demand scenarios, some of which are outlined below:

51 **Planning and Design:** Designers approved for gas asset refurbishment, replacement, remediation and repair undergo a rigorous selection process by an independent authority, ensuring they meet high standards. However, this limits the pool of available designers, increasing demand and potentially extending project timelines. Delays in planning or approvals can further impact costs and schedules as detailed design work must align with other project elements.

- 52 **Project Services:** Coordinating with multiple stakeholders such as local authorities, designers and contractors requires careful planning to avoid bottlenecks. Effective communication and planning help mitigate delays and additional costs that can arise during the project.
- 53 **Land and Legal:** Acquiring suitable land for the project is a significant expense, particularly in urban areas where land is scarce and often designated for other developments. Navigating the legal and regulatory hurdles involved in land acquisition can further complicate the process, adding layers of complexity and potentially causing delays. These challenges, combined with high demand for limited land, can also drive-up costs, impacting the overall project budget and timeline.
- 54 **Materials:** During GD2, manufacturing costs fluctuated due to long lead times between design and equipment procurement, often exceeding expectations due to economic and political conditions. The limited manufacturing base for gas apparatus, combined with a compressed purchasing timeline during the five-year price control period, especially in years four and five, can result in supply constraints and potential project delays.
- 55 **Main Works Contractor (MWC):** Specialist contractors responsible for executing the main works are highly experienced but in limited supply. As demand for their services peaks during the fourth and fifth years of the price control period, costs tend to rise due to the increased competition to secure these contractors. This surge in demand, combined with the urgency to complete projects on time, drives up costs, making it more expensive to deliver projects within the desired timeline.
- 56 In summary, these factors illustrate the complexities and challenges associated with delivering large-scale infrastructure projects within a defined price control period, emphasising the need for proactive planning and management to navigate potential risks.

## 5.2 Project Scope Summary

- 57 The project goal for these pipeline projects is to manage and reduce the risks associated with operating these of a Major Accident Hazard Pipelines. Ensuring the Local Transmission System is fit for purpose and safe to operate and supply its 5.9million customers.
- 58 A summary of the project is detailed below.

**Table 7: Programme Summary**

Site	Scope of Works
<b>P005</b>	<ul style="list-style-type: none"> <li>Isolation &amp; decommissioning of 680m of High-Pressure pipeline</li> <li>Commissioning of new section of pipeline between 600m and 1100m in length depending on the final route selection.</li> </ul>
<b>GM01</b>	<ul style="list-style-type: none"> <li>Down rating of 35km of High-Pressure pipeline</li> <li>Rebuilding of the existing above 7bagr PRIs at Whyteleafe and Hayes with new district governors</li> <li>Installation of pig traps at Hooley</li> <li>Removal of pig traps at Whyteleafe and Port Greenwich</li> </ul>
<b>GM06</b>	<ul style="list-style-type: none"> <li>Isolation and decommissioning of the High-Pressure pipeline</li> </ul>
<b>GM10</b>	<ul style="list-style-type: none"> <li>Isolation and decommissioning of the two High Pressure pipeline</li> <li>Removal of pig traps at Biggin Hill High Pressure Storage and New Addington.</li> </ul>

## 6 Options Considered

59 The preferred options for GM01, GM06 and GM10 are as laid in Section 3 of this paper and are the only viable options for these interventions. P005 – Braishfield to Austins Copse is in the feasibility phase and has several potential options as laid out below

### 6.1 Preferred Option – P005 – Braishfield to Austins Copse - Pipeline diversions

#### The technical detail of the option

60 Three options are being considered for the diversion. The final decision will be made following ground investigation and discussions / negotiations with landowners.

61 **Diversion Option 1** Divert to the South is approximately 1,060m in length

62 Diverting the Braishfield to Austins Copse pipeline to avoid the land parcel where accelerated corrosion is evident will take the pipeline away from obvious land issues. A route to the south, see Figure 11, presents itself as a largely non-sensitive corridor. Much of the corridor is grazing pasture and appears different solubility to the current Braishfield to Austins Copse pipeline easement.

63 Sensitive receptors will be encountered after crossing Kiln Lane to the north of Fairbourne Farm. These include established trees, possibly protected and subject to a root protection zone, unknown ecology receptors, high-voltage overhead electric cables, other utilities and speculative land development.

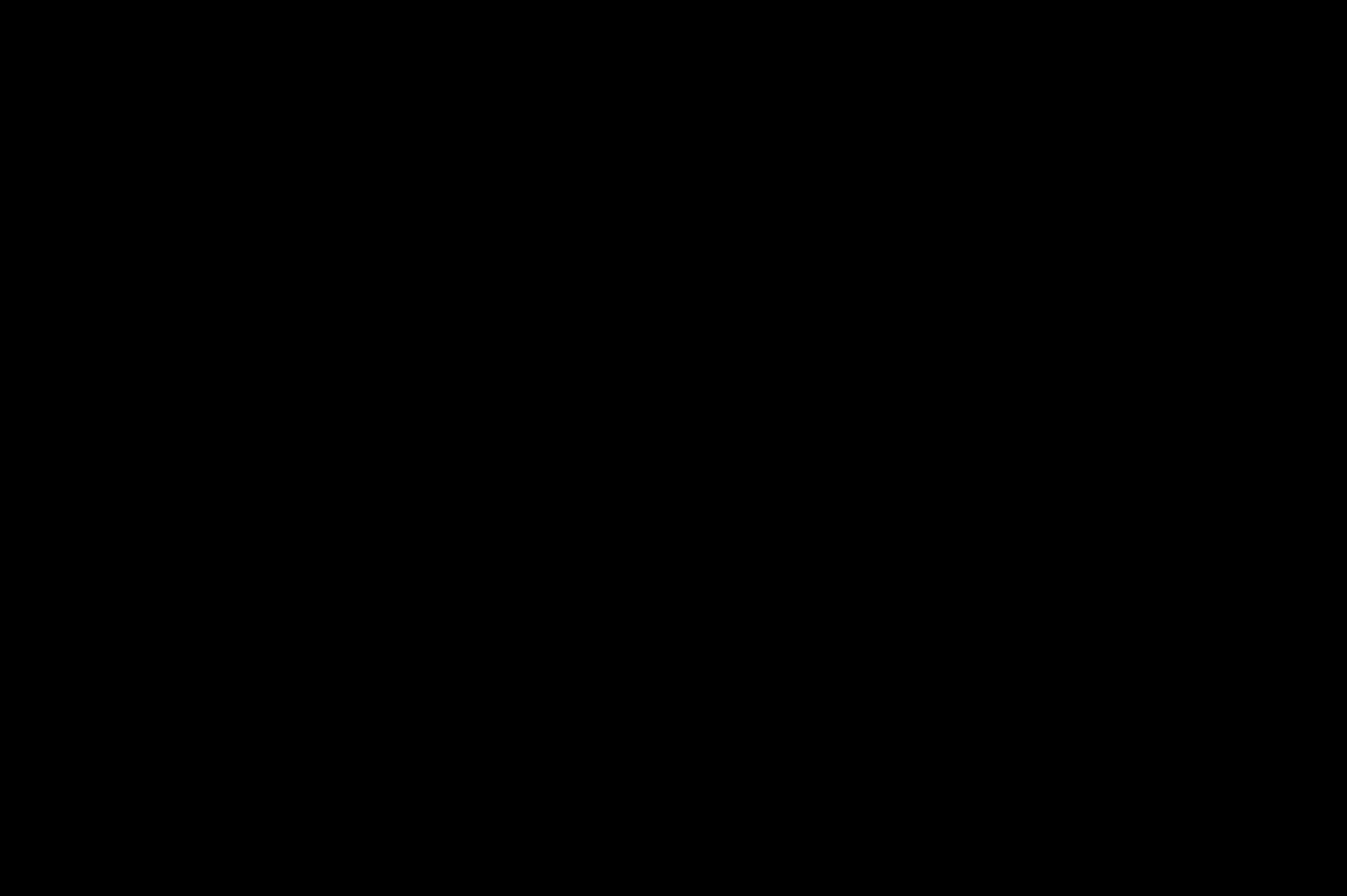
64 The landscape is favourable to cross-country pipe laying; however, the true ground conditions are not known. The land encountered does not demonstrate the characteristics of marsh evident along the existing easement, but it cannot be discounted that the same ground conditions will be encountered leading to the same problems with the new pipeline.

65 It is speculated that the stream running northeast to southwest potentially denotes different strata but is uninformed at this stage. Excavating a pipe trench to standard depths of cover would typically see pipeline inverts at a level matching the existing land parcel and potentially encounter the same ground conditions.

- 66 The absolute worst case is a scenario where otherwise productive agricultural land becomes unusable and attracting further compensation claims. Indeed, such issues would be concerns of the landowner and may prevent consent.
- 67 Notwithstanding the above concerns, a diversion to the south of the existing Braishfield to Austins Copse pipeline appears the most favourable and the obvious difference in topography offers the greatest chance of avoiding potential recurring soil issues. Any route development will need to be informed by thorough site investigation (SI) to determine soils, acidity / alkalinity levels and SRB occupation. Boreholes taken along the existing pipeline route should be taken as control conditions and used to assess the risk of the corrosion issues being repeated. The SI should be tasked with mapping hydrology to understand water levels, pathways and water migration.
- 68 **Diversion Option 2** Closely North Route is approximately 615m in length
- 69 Any close diversion to the existing Braishfield to Austins Copse pipeline has the potential to encounter the same ground conditions as the problem section and therefore route selection will need to be informed by targeted SI. The field to the immediate north of the Braishfield to Austins Copse pipeline easement was seen to be ploughed during the walkover survey. Standing water was evident at the southernmost extents suggesting the ground saturation is present beyond the existing pipeline easement. Ploughing would only entail shallow surface breaking and a pipeline trenching exercise has greater potential for encountering saturated soils. As such a route further north and away from the existing easement would be advocated, see Figure 12.

- 70 It would be prudent for SGN to monitor the field as the crop emerges. The field had not been worked after ploughing when visited but a visual record of the field condition would provide an indicator of the soil structure. Should rushes emerge then land disturbance can be seen as a significant promoter of detrimental reinstatement. Emerging water pathways could also denote an underlying aquifer that is easily released when penetrated.
- 71 Fields beyond the track off Kiln Lane and adjoining Walnut Tree Cottage have been subject to several planning applications including 'schemes for protecting trees'. No specific tree preservation orders (TPO) have been identified but it may be expected for routes through this area to meet opposition.

- 72 Proposals have been lodged for an agricultural storage building immediately off the stoned track to the south of Walnut Tree Cottage.
- 73 Once beyond Kiln Lane the route corridor narrows and passes through a narrow depression in which the existing Braishfield to Austins Copse pipeline passes. The closeness of the Braishfield to Austins Copse pipeline will hamper operations and notably defects have been identified within this area inferring that the soils could be acidic and / or prone to MIC.
- 74 **Diversion Option 3** - Northerly Diversion is approximately 990m in length
- 75 A northerly diversion around the perimeter of Walnut Tree Cottage and Newport Lane, see Figure 13, would largely avoid low-lying land where saturated soils may be present. An obvious depression runs north to south through the area of interest hence it is possible that this has a hydrological connection to the existing problem area, and it cannot be ruled out that corrosion may affect any replacement route. Deviating further north could avoid this but will bring the pipeline closer to the village of Braishfield.

- 
- 76 The potential for encountering ecology is more pronounced as several hedgerows will be encountered along with linear tree copses lining hedgerow boundaries.
- 77 Relaying the Braishfield to Austins Copse pipeline does not address the current issues of drainage and loss of use of the existing easement. Reinstatement and soil restoration will need to be addressed.

#### **The perceived benefits of the option**

- 78 The final routing selection for the proposed diversion on P005 will be made once the feasibility study and ground investigation has been completed. The selected route will then be the best option for our customers and deliverable in the timelines of GD3 will take the least cost option once the ground investigation and landowners engagement has been completed.

#### **The basis for the cost estimate**

- 79 The costs for these projects have been based on previous work completed within SGN Delivery timescales

- 80 Given the complexity of these project, the expected duration is spread over a 5-year period, with the goal of completing the projects by year 5. This timeline allows for sufficient time to address initial stages such as feasibility studies, land acquisition, and securing planning permissions.
- 81 By allowing for this comprehensive approach, we aim to minimise risks and ensure a successful project delivery that meets safety and operational standards.

#### **Key assumptions made**

- 82 The projects plans are based on several key assumptions:
- 83 **Land Acquisition:** It is assumed that suitable land for the route can be identified at a reasonable price. This is critical to the project for P005 as this will determine the length of the diversion. Directly impacting on the cost of the diversion
- 84 **Planning consent:** It is assumed that all necessary planning permissions will be granted without delays or complications, allowing the projects to proceed as scheduled. Any disruption or delays in obtaining permissions could impact timelines and potentially increase costs, making this assumption integral to the overall planning strategy.
- 85 **Cost Estimates:** The cost estimates provided are based on current prices and do not include provisions for inflation over the project duration. Any fluctuations in costs due to economic conditions would need to be managed separately.
- 86 **Hydrogen Compatibility:** The cost projections do not account for any future considerations related to hydrogen blending or hydrogen compatibility. Should there be requirements or adjustments needed to accommodate hydrogen in the future, they would need to be addressed separately, potentially impacting both the scope and overall costs of the projects.

## **6.2 Do More**

### **The technical detail of the option**

- 87 The projects highlighted in this paper address the non-compliance issues that SGN has currently identified on the high-pressure pipelines hence there is not a do more option

## **6.3 Do Less**

### **The technical detail of the option**

- 88 As this is compliance there is not a do less option

## **6.4 Do Nothing – Defer to GD4**

### **The technical detail of the option**

- 89 The only viable option is to complete the work. The work is for compliance and cannot be deferred to GD4

## 6.5 Options Technical Summary Table

Table 8: Options Summary Table

	LTS Pipeline works	Defer to GD4
<b>Project Start</b>	2026	N/A
<b>Project Commissioning</b>	2031	N/A
<b>No. of Interventions</b>	5	0
<b>Project Design Life</b>	50 years	N/A
<b>Benefits</b>	Mitigation of safety and societal risk Improved asset integrity	Reduced Capex
<b>Risks</b>	Risks addressed through projects Uncertainty over land availability	<p>P005 - Safety and societal risk increase as further growth of the corrosion features on P005</p> <p>Continued deterioration of assets</p> <p>GM01 – Increased consequence in the event of an incident, Non-compliance with Pipeline Safety Regulations and TD/1.</p> <p>GM06 - is an asset that is redundant / stranded. Society is exposed to risk unnecessarily risk. This project removes the risk. Non-compliance with Pipeline Safety Regulations</p> <p>GM10 - is an asset that is redundant / stranded. Society is exposed to risk unnecessarily risk. This project removes the risk. Non-compliance with Pipeline Safety Regulations</p>
<b>Total Cost</b>	£12.39m	Not costed due to unfeasible option

## 7 Business Case Outline and Discussion

### 7.1 Key Business Case Drivers Description

90 The driver for these projects is compliance with Pipeline Safety Regulations 1996.

91 GD3 cost contingency, No contingency in the costing for these projects

### 7.2 Supply and Demand Scenario Sensitivities

92 The supply and demand scenarios described in section 5 are a key consideration to deriving the project scope. This understanding allows the scope to be relevant and identifies any effects on the business case drivers.

93 The project management process and the equipment employed within SGNs transmission system is routine and clearly understood by a competent team. Taking the learnings from GD2 none of the supply and demand scenarios identified would derail or dramatically change the project scope or impact on the project drivers, but if realised would influence the NPV.

94 The sensitivity of the supply and demand scenarios and the degree to which they impact on the NPV are summarised in table below.

### 7.3 Business Case Summary

Table 9: Business Case Summary Table

	LTS Pipeline woks	Defer to GD4
<b>Project Start</b>	2026	N/A
<b>Project Commissioning</b>	2031	N/A
<b>No. of Interventions</b>	5	0
<b>Design Life</b>	50 years	N/A
<b>Benefits</b>	Complete risk mitigation	No immediate capital investment – delayed until GD4
<b>Risks</b>	Increased capital investment Uncertainty over land availability for pipeline routes.	Continued deterioration of asset Risk to safety of public remains.
Sensitivity to supply and demand scenarios		
<b>Infrastructure Manufacturing Cost sensitivity</b>	Medium	N/A

<b>Competent Design Appraisers</b>	Medium	N/A
<b>Infrastructure Supply</b>	Medium	N/A
<b>Main Works Contractor (MWC) Cost Increases</b>	Low	N/A
<b>Land Acquisition</b>	High	N/A
<b>Total installed Cost</b>	£12.39m	Not costed as it does not mitigate the risk
<b>Project NPV</b>		
<b>Cost estimate accuracy</b>	+/- 15%	N/A

## 8 Preferred Option Scope and Project Plan

### 8.1 Preferred Option

95 The preferred option for this investment is to carry out the LTS HP intervention plan as described.

### 8.2 Project Spend Profile

Table 10: Proposed GD3 Spend Profile

	Year 1	Year 2	Year 3	Year 4	Year 5
CAPEX	2.22	3.96	3.31	1.21	0.00
OPEX	0	0.27	0.8	0.61	0
TOTEX	2.22	4.23	4.11	1.82	0

### 8.3 Efficient Cost

96 We aim to drive project efficiencies through several key strategies:

97 **Enhanced Planning and Coordination:** Implementing detailed project planning and coordination with stakeholders allows us to identify potential risks early on and mitigate them proactively. This included working closely with contractors and local authorities to ensure timely approvals and minimise delays.

98 **Optimised Project Scheduling:** By prioritising more complex and time-sensitive projects earlier in the GD3 period, we can spread out resource needs and avoid bottlenecks, allowing for smoother project delivery and better resource allocation.

99 **Continuous Improvement:** Lessons learned from previous projects in GD2 informed our approach in GD3, allowing us to refine processes and adopt best practices. This iterative process helps reduce project duration and associated costs while maintaining a high standard of quality and safety.

### 8.4 Project Plan

100 The proposed project plan for the pipeline projects is shown below in figure 14.

Figure 14: Proposed Project Plan



Project	2026-27				2027-28				2028-29				2029-30				2030-31			
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20
P005 Braishfield to Austins Copse (KiIn Lane)		Land negotiations																		
GM1 Hooley to Port Greenwich (incl WHYT & HAYS)																				
GM10 Biggin Hill HPS to Addington PT					Land negotiations															
GM10 Biggin Hill HPS to Westerham					Land negotiations															
GM6 Great Buckland to High Halden									Land negotiations											

### 8.5 Key Business Risks and Opportunities

101 Some of the key business risks are shown below in a Risk Register in Appendix C.

### 8.6 Outputs included in RIIO-GD2 Plans

102 The outputs proposed as part of the preferred option were not included in the GD2 plans. Additionally, there has been no deferral or substitution of any projects within the GD2 price control period, ensuring that the proposed interventions for the GD3 period are new and necessary for the current network needs.

## Appendix A – Acronyms

Acronym	Meaning
APB	Acid Producing Bacteria
CAPEX	Capital Expenditure
CP	Cathodic Protection
ECP2	SGN Policy on Management of CP
GW	Girth Weld
HSE	Health and safety Executive
LTS	Local Transmission System
MAHP	Major Accident Hazard Pipeline
MIC	Microbiologically Influenced Corrosion
MOP	Maximum Operating Pressure
MPI	Magnetic Particle Inspection
MWC	Main works Contractor
NARM	Network Asset Risk Measure
NPV	Net Present Value
NTS	National Transmission System
OLI	On Line Inspection
OPEX	Operational Expenditure
PIA	Post Investment Appraisal
PRI	Pressure Reduction Installation
PSR	Pipeline Safety Regulations
SI	Scientific Investigation
SMF	Safety Management Framework
SRB	Sulphate Reducing Bacteria
TPO	Tree Preservation order
TR	Transformer Rectifier

## Appendix B – References

Pipeline Safety Regulations (PSR) (1996).

Pressure System Safety Regulations (PSSR) (2000).

Health and Safety at Work Act (HASWA) (1974).

IGEM/TD/1 Edition 6 – Steel Pipelines for High Pressure Gas Transmission (2016).

IGEM/TD/3 Edition 5 – Steel and PE Pipelines for Gas Distribution (2014).

IGEM/TD/13 Edition 3 – Pressure Regulating Installations for Natural Gas, Liquefied Petroleum Gas and Liquefied Petroleum Gas/Air (2023).

SGN/PM/ECP/2 – Management Procedure for Cathodic Protection of Buried Steel Systems (2023).

## Appendix C – Risk Register

Table 11: Risk Register

Description	Impact	Likelihood	Mitigation/Controls
Late delivery of project designs	Potential increased costs and delayed project delivery	>40% & ≤60%	Regular engagement with designers is required. Possibly shorten construction tender
Availability of PS/6 approvers and appraisers	Delays to design, MCW tender and project delivery	>20% & ≤40%	Start detailed design process earlier with regular reviews in place
Long lead times on materials and assets	Delays in construction phase could lead to time and cost impact	>40% & ≤60%	Regular engagement with suppliers. Early identification of possible delays
Changes to outage window	Possibility of delayed project delivery	≤20%	Early engagement with Network Planning required with early completion of NRO production
Availability of suitable land for relocation	Increased project costs and delays in project delivery	≤20%	Early feasibility studies in place to identify suitable locations. Engagement with Local Authority through design phase
Unavailability of competent MWC and/or Subcontractors	Delayed project delivery or possible project deferral	≤20%	Early contractor engagement and phasing workload across 5-year period
Inability to install distribution mains under road and/or rail	Increased costs and delayed project delivery	≤20%	Early feasibility studies in place to identify suitable locations. Engagement with Local Authority through design phase
Unforeseen ecological issues including presence of protected species	Delayed project delivery and potential increased costs for protective measures	≤20%	Complete ecological surveys early and include any findings in detailed design
Failed connections or inoperable valves	Delays to construction activities and project delivery. Increased costs to remediate issue	≤20%	Ensure a detailed assessment is carried out prior to site works. Site records and drawings made available to designers