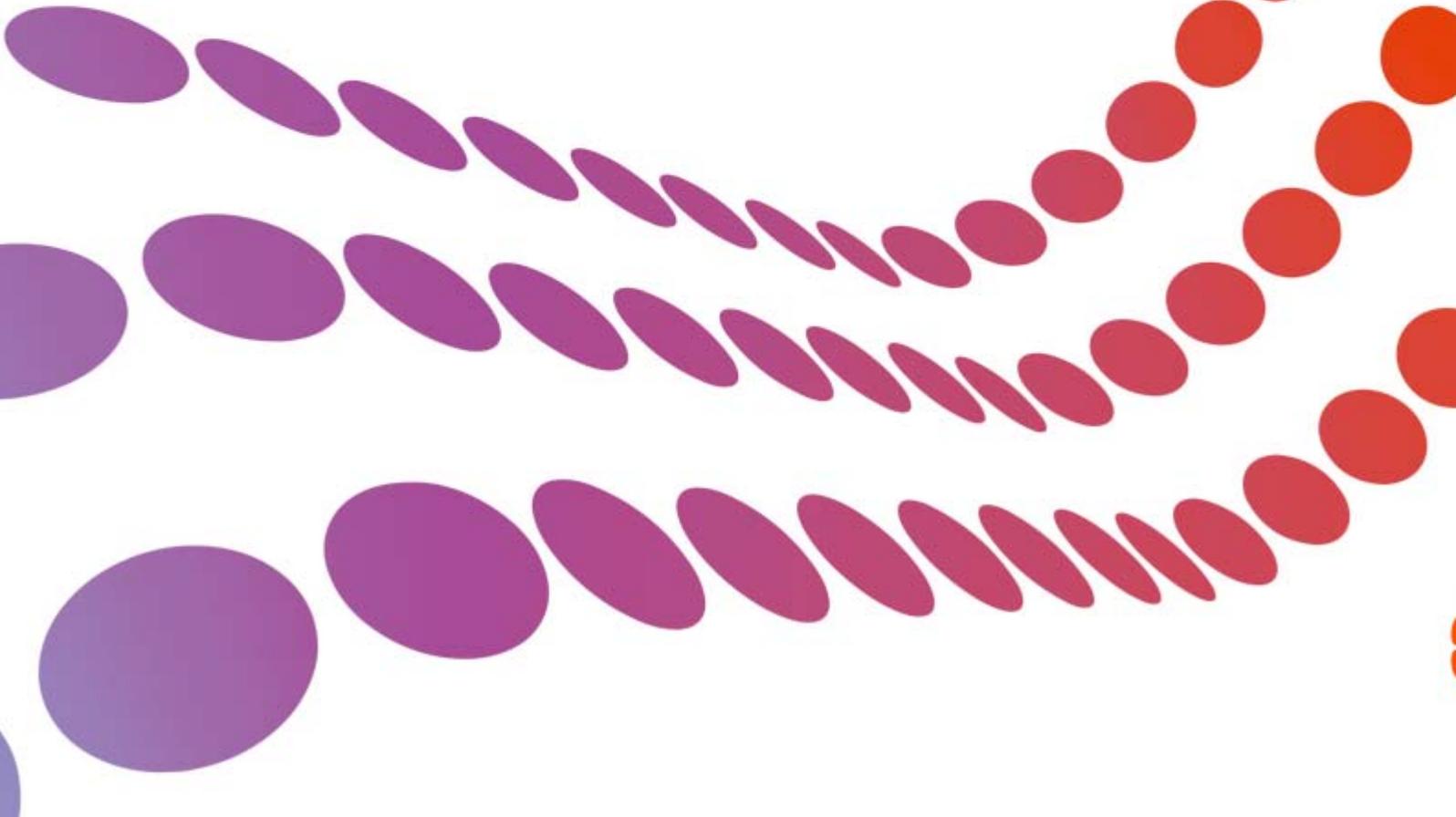


# CPM5290 Mitcham Depot CGS (South London IPMP)

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Classification: Highly Confidential



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## 2 Introduction

Reinforcement has been identified within South London IPMP Grid, specifically relating to anticipated Capacity failure at Mitcham Depot CGS. This project is part of a wider programme of reinforcement associated with the RIIO-GD2 Business Plan Appendix covering Capacity Management.

### 2.1 General Background

The SGN distribution system is built to ensure security of supply for all of our customers. Our networks operating at pressures below 7bar are designed to meet a peak six-minute demand level that could be experienced under 1:20 conditions, supporting a safe, secure and reliable service to those customers and meeting requirements in compliance with our Licence Condition, (including, but not limited to, Condition 16 contained therein).

Link: [Gas Transporters Licence – Standard Conditions](#)

Where capacity constraints are identified that are likely to impact on SGNs ability to ensure security of supply to all customers, Network Planning will look to establish optimum cost-efficient reinforcement strategies to mitigate that risk. Such constraints may arise as a result of a number of factors, but the most common is increased demand levels, often resulting from new connections.

SGN has initiated an extensive programme of stakeholder engagement, working closely with Local Authorities, both in Scotland and the south of England, to establish a fully informed and independently sourced picture of planned development.

This engagement has provided SGN with confidence that the sites identified will progress to development, to support this level of growth, SGN has developed a programme of reinforcement across its network.

### 2.2 Site Specific Background

Table 1: London Ten Year Housing Targets by Type (2019/20 – 2028/29)

Planning Authority	Large Sites	Small Sites	Non-Self Contained	Total
<b>Bexley</b>	3,777	8,650	30	12,457
<b>Bromley</b>	3,920	10,290	30	14,240
<b>Croydon</b>	14,380	15,110	0	29,490
<b>Greenwich</b>	25,010	6,810	220	32,040
<b>Kingston upon Thames</b>	7,340	6,250	50	13,640
<b>Lambeth</b>	9,210	6,540	140	15,890
<b>Lewisham</b>	12,880	8,290	0	21,170
<b>Merton</b>	6,540	6,710	30	13,280
<b>Richmond</b>	1,770	6,340	0	8,110
<b>Southwark</b>	17,530	8,000	10	25,540
<b>Sutton</b>	2,010	7,380	0	9,390
<b>Wandsworth</b>	15,280	7,740	80	23,100
<b>Total for South London</b>	<b>119,647</b>	<b>98,110</b>	<b>590</b>	<b>218,347</b>

Significant domestic developments are anticipated across South London IPMP Grid. Proposed housing developments within Croydon & Merton alone amounts to 21,000 new homes within GD2 (2021–26) as per London Ten Year housing Targets extracted from ‘London Plan’ and SHLAA.

GD2 Growth identified in these plans has been included in our network model forecasts, which have highlighted to us that a capacity issue will occur at Mitcham Depot CGS, requiring reinforcement or replacement of CGS within RIIO-GD2 period (2021-26).

### 3 Equipment Summary

South London IPMP Grid is integrated within the South East IPMP Network;

#### Security

Mitcham Depot CGS IP Inlet is sourced from the London IP System, primarily Croydon PRS station, with support from PRS stations at Hooley, St. Mary Cray and the Wilmington Boundary Control at Welling. These PRS stations feed into London IP at 6.9bar.

Mitcham Depot CGS Outlet feeds into an isolated MP System at 1.4bar MOP and is the sole supply.

### 4 Problem Statement

**a) Why are we doing this work and what happens if we do nothing?**

New connections to our networks reduce available capacity and when pressures are predicted to fall below minimum acceptable levels it is necessary to reinforce or increase pressures to facilitate increased capacity in the system.

**b) What is the outcome that we want to achieve?**

Maintain SGN’s licence conditions to ensure security of supply, avoid becoming a blocker to development and support the economic prosperity of this area.

c) **How will we understand if the spend has been successful?**

At a customer level, SGN will deliver a reinforcement that ensures a safe and secure network, meets stakeholder aspirations and ensures developments progress timeously.

On completion of the proposed reinforcement, SGN will monitor system performance to ensure expected system pressures are maintained. This will take the form of regular system performance checks and localised pressures surveys to ensure the successful outcome is delivered.

#### 4.1 Narrative Real-Life Example of Problem

As a result of the development proposed up to 2026 and existing committed development growth, Inlet Pressure at Mitcham Depot CGS will drop, affecting available CGS capacity during GD2.

Table 2: Summary Table of Capacity (based on projected 1 in 20 demands @ Mitcham Depot CGS)

Year	Inlet Pressure (bar)	Flow (scm/hr)	Capacity (scm/hr)	% Capacity
<b>2019/20 (GD1)</b>	6.459	48,926	52,500	93.2
<b>2021/22 (GD2)</b>	6.103	50,234	49,800	100.9
<b>2022/23 (GD2)</b>	<b>6.059</b>	<b>50,524</b>	<b>49,700</b>	<b>101.7</b>
<b>2025/26 (GD2)</b>	<b>5.906</b>	<b>52,892</b>	<b>48,300</b>	<b>109.5</b>

Table data projects that Mitcham Depot CGS Capacity will be exceeded, in relation to IP Inlet pressure of 6.1bar, within RIIO-GD2 (2021- 2026).

A recent example of good planning to meet customer expectation, whilst also ensuring security of supply, occurred following the acceptance of a quotation to supply a new development at Milton Heights, Milton, Abingdon, Oxfordshire (P18143337).

Network analysis confirmed a requirement to reinforce SGN's system in advance of connecting the fully developed site load. However, network analysis also confirmed an interim load/connection of 72 new properties in advance of reinforcement, thereby meeting the GT/Developer's schedule of works.

Reinforcement to supply the full development was subsequently planned and completed in advance of connections beyond the interim load, ensuring security of supply to approximately 500 new/existing customers

#### 4.2 Spend Boundaries

The project spend is limited to the replacement of the Mitcham Depot CGS. The existing site will be reused due to the site undergoing rationalisation of gas holder equipment, with large portions of freed land being released by National Grid for development. Site rationalisation design includes Mitcham Depot CGS remaining within current enclosure, in an above ground installation.

Additional CGS Capacity is included within the spend, to ensure that any replacement CGS is suitably designed to provide for expected growth in demand.

## 5 Probability of Failure

The existing South East IPMP model predicts a failure of Mitcham Depot CGS to maintain its Outlet pressure on the Mitcham MP system in >92 % of 1 in 20 demands during 2022/23 (RIIO-GD2 period 2021- 26) due to expected build-up of proposed developments identified in the GLA 'London Plan' and SHLAA.

Continual growth will impact on IP Inlet pressure, affecting available Capacity through the CGS and cause a subsequent droop in MP Outlet pressure, creating a risk of failure to maintain Security of Supply to existing and proposed customers on the MP system extremities.

### 5.1 Probability of Failure Data Assurance

#### Model Validation

To ensure the accuracy of Network Analysis models, validation is carried out in line with the published requirement under Section 17 of SGN's Safety Case and is a fundament of SGN's Licence to Operate.

Validation ensures that the current models are an accurate representation of the actual gas transportation system and can be used to predict network behaviour under a variety of conditions, including the 1 in 20 design condition.

In addition to the validation programme, a robust model maintenance process and annual system performance checks ensures that the models continue to be accurate and fit for purpose.

The existing modelled data within South London IPMP section of South East IPMP model, was sense checked using existing DG Inlet logger data as well as charts taken from SGN's DNCS (Distribution Network Control System) after the extreme weather seen at the end of February and early March 2018, known colloquially as "The Beast from the East".

This sense check proved the suitability of our current year models for design purposes, whilst providing essential data regarding the probability of capacity failure at Mitcham Depot CGS by 2022/23. (see Figures 3, 4 & 5 for chart evidence taken from 1st March 2018).

During 1 March 2018 ‘Beast from the East’ demand scenario, South East demand levels were considered to be commensurate with our 1:20 Demand scenario used in our worst-case modelling and some areas a 1:50 demand event occurred, beyond our worst-case models.

The following charts in Figures 3, 4 & 5 show charted results on Mitcham Depot Inlet (IP) & Outlet (MP) as well as PMAC charts from Inlet (MP) & Outlet (LP) of Heybridge Road DG, located on the Isolated Mitcham MP extremity, shown in Figure 5.

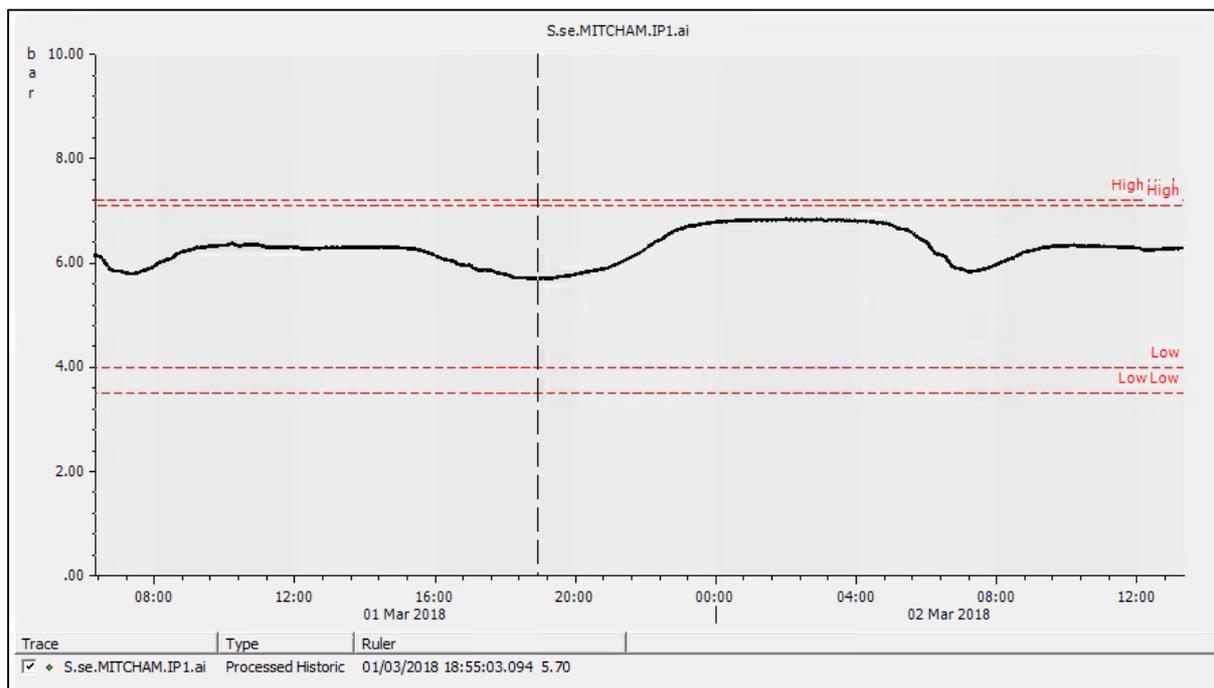
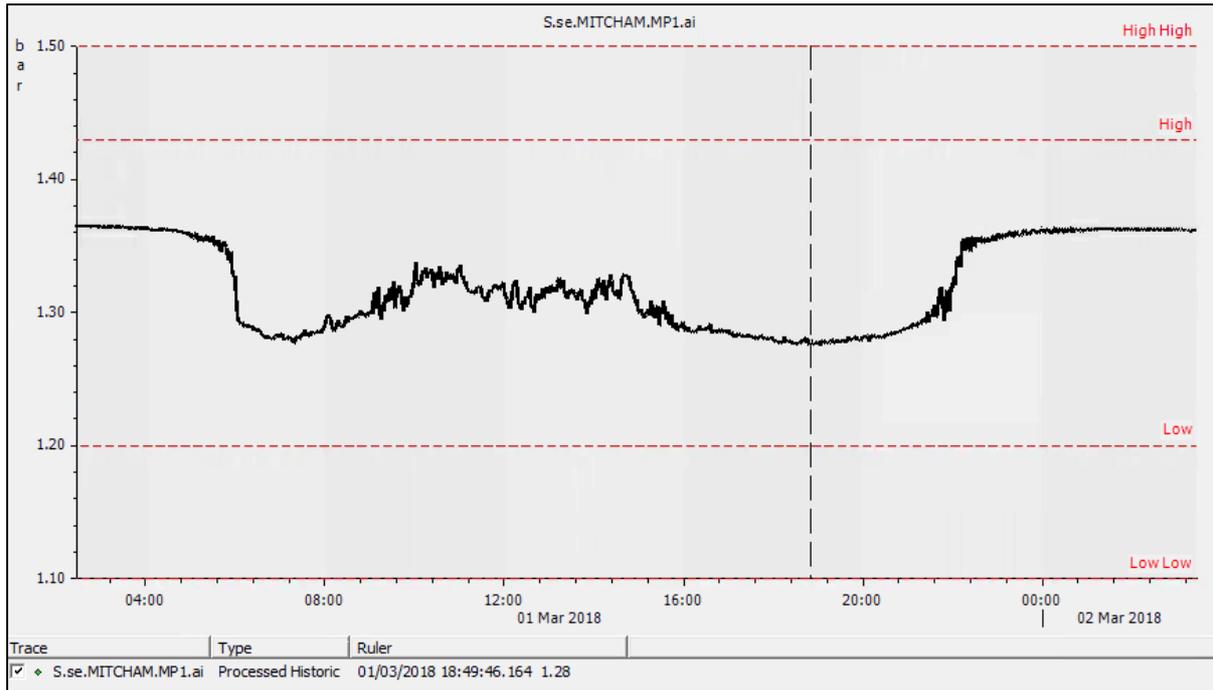


Figure 3. DNCS chart showing Mitcham Depot CGS Minimum IP Inlet pressure of 5.7bar at 18:50 on 1st March 2018. The IP Inlet chart shows 5.7bar on 1 March 2018, although this drop was not caused by general growth but was due to higher than planned downstream settings in 1 in 20 demand conditions, which were subsequently rectified to raise IP Inlet pressures.

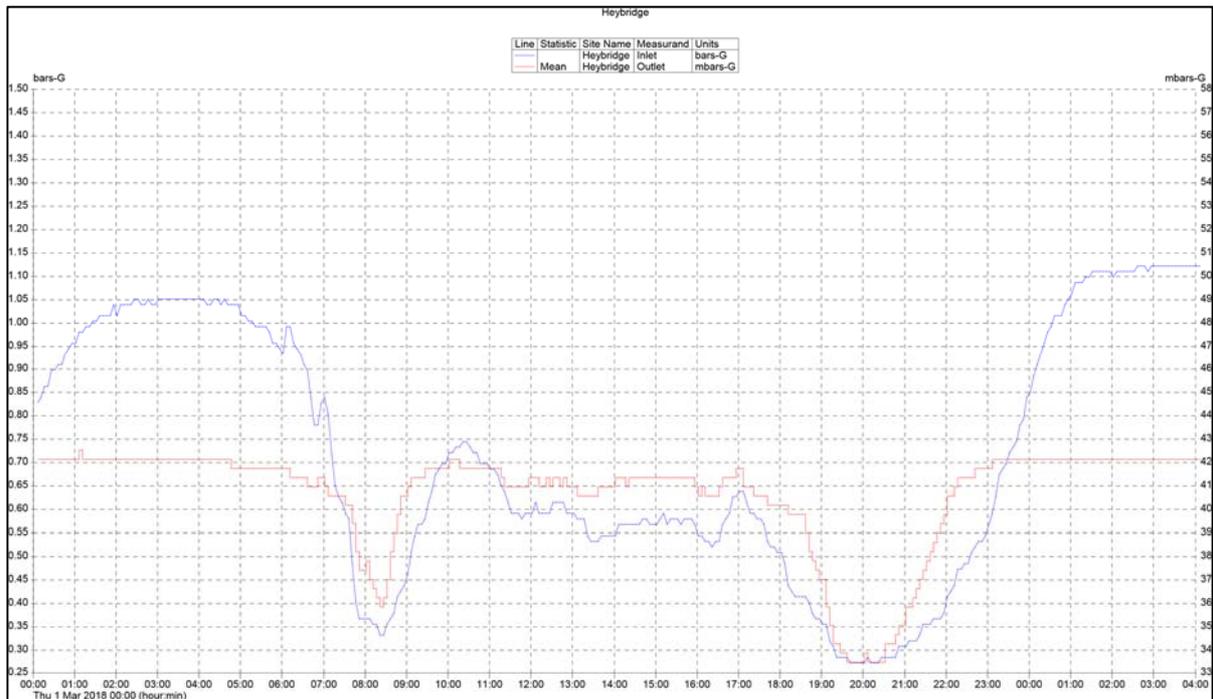
Actual IP pressures are predicted to fail by 2022/23, as per above Table 2 which is predicting CGS will be at Maximum capacity in 2021/22 during 1 in 20 conditions with 6.1bar IP Inlet pressure.

Figure 4. DNCS chart shows Outlet Pressure at Mitcham Depot CGS at 18:50 on 1st March 2018 Drooping to 1.28bar



This MP chart is from Mitcham Depot CGS Outlet, showing a pressure droop from the 1.4bar Outlet setting over morning between 06:00-10:00hrs / daytime 10:00hrs -15:00hrs / evening 15:00 – 21:00hrs peak periods. Pressure drops to 1.28bar in both the morning and evening peak periods, providing concrete supporting evidence that Mitcham Depot CGS Outlet will experience droop should IP Inlet pressure fall significantly.

Figure 5. PMAC chart shows Heybridge Avenue DG Inlet (Blue) & Outlet (Red) Drooping at 8am & 8pm on 1st March 2018.



The MP Outlet droop on Mitcham Common CGS impacts on the downstream Isolated Mitcham MP system, especially on the DG located at the system extremity, at Heybridge Avenue.

Heybridge Avenue DG Inlet Chart (Blue), shows minimum MP Inlet pressures below design minimum (345mbar) on 1<sup>st</sup> March 2018, dropping to 0.275bar at 8pm.

Heybridge Avenue DG Outlet Chart (Red), is showing signs of pressure droop due to the failing MP Inlet pressure, the Outlet impact on this DG is not as severe as chart suggests due to Heybridge Avenue DG being on fixed 37mbar setting.

MP Inlet droop therefore causes only a small reduction in Outlet pressure (3.5mbar @ 8pm on 1<sup>st</sup> March 2018), which did not cause an immediate impact on Security of Supply to LP consumers, due to the heavily integrated South London LP network.

However, with additional growth expected in GD2 this MP Inlet is expected to fail completely by 2022/23, without reinforcement to replace Mitcham Depot CGS.

With the high demand conditions experienced on 1st March 2018, evident throughout the South East MPIP Grid, having exceeded the 1 in 20 demand condition used in our Forecast Modelling (possibly a 1 in 50 demand condition), we have obtained further confidence of the probability of Mitcham Depot CGS capacity failure by 2022/23.

Reinforcement completion is therefore required in 2022/23, to maintain Security of Supply to MP extremities of isolated section of Mitcham MP Network, which is within RIIO-GD2 (2021-26).

## 6 Consequence of Failure

### Loss of Supply to Customers

The South London IPMP network will be unable to support both committed growth as well as proposed developments identified within London Plan during GD2. This is in direct violation of SGN’s license obligations to maintain Security of Supply of committed customer development.

Ultimately this will result in the failure of Mitcham Depot CGS to supply MP system extremities, due to insufficient inlet pressures and the loss of supply to approximately 6,000 existing/new customers, which is a failure to meet SGN’s Licence Conditions, attracting adverse publicity and reputational damage.

Affected customers will include West Norwood Crematorium, more than 10 Schools including St Joseph’s College, as well as several commercial properties along the Streatham High Road.

Financially, after the first 24 hours, affected householders will be compensated for time without gas. Domestic customers will receive £41 for each 24-hour period without gas, small businesses will receive £69 for each 24-hour period without gas.

Failure to invest in reinforcement would also prevent gas from becoming a part of the energy mix at any growth areas identified within the London Plan. SGN would be deemed to have blocked local development, effecting the growth of the local economy.

Table 3: Projected Pressures (2025/26) without Reinforcement

Lowest Pressure Location	Required Minimum Pressure	Minimum Failing Pressure
Fircroft Primary School, Tooting	21mbar	15.6mbar

## Security

### **Safety Impact of Failure**

Reinforcement of the South London IPMP system is necessary to meet the requirements of our Licence Condition.

In this instance, a failure to reinforce will result in a system failure during peak winter conditions. The resulting loss of supply may have serious health and safety implications for vulnerable customers who rely on gas for essential heating and cooking facilities.

### **Environmental Impact**

A system failure on this scale will result in a major recovery exercise. Environmental impacts will include increased travel to site by SGN operatives, leading to an increase in greenhouse gas emissions and disruption to the public.

On site, the use of fossil fuels to power plant and equipment required in the restoration of supplies will further increase greenhouse gas emissions, as will subsequent travel/plant used for the reinstatement of public highways following the conclusion of these works.

## **7 Options Considered**

### **7.1 Options Summary**

In accordance with the guidelines set out in the Ofgem guidance document ‘Engineering Justification Paper Frameworks for RIIO-GD2 and RIIO-GT2’ – Appendix B (Section 7), the following options have been considered:

#### **Replace on Failure**

Wait until the network fails then replace the system. This option has been discounted as it is impracticable to replace South London IPMP system.

### **Repair on Failure**

Mains reinforcement after the network has failed. This option has been discounted due to non-compliance with SGN's Licence Condition.

### **Pre-Emptively Replace**

Replace the system prior to network failure. This option has been discounted as it is impracticable to replace South London IPMP system.

### **Pre-Emptively Repair**

Mains reinforcement based on model data prior to network failure, four options considered for further investigation: *(See Sections 7.1, 7.2, 7.3 & 7.4 for details)*

### **Do Nothing**

Discarded as Mitcham Depot CGS is already shown to be close to capacity, as seen from charted DNCS & PMAC evidence from 1 March 2018, and is forecast to exceed design capacity by 2022/23, in direct contravention to SGN's Licence Condition to maintain Security of Supply to existing and proposed customers.

## **7.2 First Option Summary- Replace Mitcham Depot CGS.**

**The technical detail of option i.e. capacity, system rating, availability etc.**

Replace Mitcham Depot CGS with larger capacity CGS.

### **The basis for cost estimate/unit cost**

Cost estimate for the replacement CGS is based on average contracted rates supplied by depot, validated against known costs for similar, completed projects.

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

Larger Capacity CGS will accommodate known forecast growth within RIIO-GD2 (2021-2026), whilst being designed to provide for known growth up to a 10 year horizon (2022–2032).

### **Delivery timescales**

New CGS is required to be delivered before winter 2022/23 to avoid anticipated capacity issues.

### **Key assumptions made**

It is assumed that known potential demand growth both within RIIO-GD2 period and beyond will require the same level of gas supply as that currently experienced.

### **Any other items that differentiate the option from the others considered**

Replacement CGS will be sited within an above ground compound within the current Mitcham Depot site (See Figure 2 for site location), therefore saving on any easement or traffic management costs.

## **7.3 Second Option Summary - 1.865km x 500mmMDPE Reinforcement.**

**The technical detail of option i.e. capacity, system rating, availability etc.**

Mains link reinforcement to integrate currently isolated Mitcham MP system to Integrated London MP system, removing Capacity issue by transferring nearly 20% of flow from Mitcham Depot CGS to Mitcham Common CGS.

### **The basis for cost estimate/unit cost**

Cost estimate for the reinforcement is based on average contracted rates supplied by depot, validated against known costs for similar, completed projects.

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

Integration also improves operational activity on the previously isolated network by enabling back feeds and seasonal manipulation of Settings.

### **Delivery timescales**

Reinforcement link is required to be completed prior to winter 2022/23 to avoid CGS Capacity issue.

### **Key assumptions made**

It is assumed that known potential demand growth both within RIIO-GD2 and beyond will require the same level of gas supply as that currently experienced.

### **Any other items that differentiate the option from the others considered**

Mains Reinforcement Link is required in a single phase and is routed through busy London Streets that are also on Transport for London Bus routes, incurring significant lane rental charges (see Figure 7 for route).

## **Security**

### **7.4 Third Option Summary - Increase Mitcham Depot CGS Setting**

This was considered as being impracticable, as Mitcham Depot CGS is the sole supply to Mitcham MP system, increasing the CGS outlet setting would not alleviate the CGS Capacity issue and pressure would continue to droop accordingly (See Figure 4 for an example of Outlet Pressure Droop).

## 7.5 Fourth Option Summary - Interruption

In addition to the above, consideration was given to interruption. As part of interruption reform, also known as the Mod 90 process, SGN has the option to offer a tender for interruptible contracts to customers to offset the need to invest for capacity.

There are a number of sites within the South London IPMP Network that meet the criteria for an interruptible supply. However, interruption at all of these sites would only offer a short delay in the requirement for reinforcement and has been discounted due to additional expense required for such a short-term measure.

## 7.6 Options Technical Summary Table

Table 4 – Options Technical Summary

Option	First Year of Spend	Final Year of Spend	Volume of Interventions	Equipment Investment / Design Life	Total Cost (£m)
Replace Mitcham Depot CGS	2022	2022	New CGS	10 Years	1.538
Integrated Mains Link	2022	2022	1.865km x 500mmPE MP	10 Years	1.531
Increase CGS Setting	n/a	n/a	n/a	n/a	n/a
Interruption	n/a	n/a	n/a	n/a	n/a

## 7.7 Options Cost Summary Table

Table 5 – Cost Summary

Option	Cost Breakdown	Total Cost (£m)
Replace Mitcham Depot	Materials = <input type="text"/> Labour = Commercial Confidentiality Design = <input type="text"/> Traffic Management = <input type="text"/>	1.538
Integrated Mains Link	Material = <input type="text"/> Labour = <input type="text"/> Traffic Management = <input type="text"/> Lane Rental Charges = <input type="text"/>	1.531

\*Costs for the options considered have been prepared using average contracted rates at depot level and validated against known costs for similar, completed projects. All costs inclusive of Overheads and Efficiencies.

## 8 Business Case Outline and Discussion

Validation of the network analysis model, a robust model maintenance process and system performance checks have confirmed the accuracy of the South London IPMP model for use in network analysis.

A full review of the relevant Local Development Plans and associated documents, followed by close engagement with stakeholders, has provided confidence in the level of development expected during RIIO-GD2.

The development outputs have been applied to the validated network model which predicts a failure at 93% pk demand by winter 2022/23, putting at risk supplies to 6,000 customers.

To mitigate this risk and meet Licence Conditions it will be necessary to pre-emptively reinforce the network during the RIIO-GD2 period.

There have been no external costs incurred in assessing the options considered as these have been prepared by the in-house Network Planning and Design teams.

### 8.1 Key Business Case Drivers Description

#### Pre-emptively Repair: Option 1 – Replace Mitcham Depot CGS

Option 1. Involves replacement of Mitcham Depot CGS with a larger capacity rig, within existing Mitcham Depot grounds, in the existing above ground installation.

#### Pre-emptively Repair: Option 2 – Integrated Mains Link

Option 2. Involves laying 1.865km x 500mmMDPE MP mains linking isolated Mitcham Depot MP system to integrated London MP system.

Table 6 – Summary of Key Value Drivers

Option No.	Desc. of Option	Key Value Driver
1	Replace Mitcham Depot CGS	Provides available capacity for future growth within Mitcham Depot MP system, with no additional expense of working in public roads or grounds due to site being within grounds of Mitcham Depot.
2	Lay 1.865km x 500mmPE MP Link main to London MP	Provides integration of Mitcham Depot MP system into London MP system, sharing downstream flow growth with Mitcham Common CGS in future years. Requires significant works in public highways which will incur Lane Rental Charges from Transport for London

## 8.2 Business Case Summary

This project is driven by the requirement to maintain Security of Supply to our existing and proposed customers, throughout the RIIO-GD2 period 2021- 2026.

Table 7 - Business Case Matrix

	Replace CGS Unit	Lay MP Link to London MP
<b>Capex (£m)</b>	1.538	1.531
<b>Number of Interventions</b>	New CGS within existing Depot site	Lay 1.865km of main in public highway
<b>Design Life</b>	10 Years	10 Years
<b>Positive Benefit (Pros)</b>	Maintains SGN licence Obligations to maintain Security of Supply whilst accommodating notified growth up to 2031. Site is to remain within Mitcham Depot grounds for ease of works / access	Maintains SGN licence Obligations to maintain Security of Supply whilst accommodating notified growth up to 2031. Removes Isolated MP system and increases London MP integration for greater control
<b>Negative Impact (Cons)</b>	Mitcham Depot MP system will remain an isolated system, with future growth limited by the capacity of any regulator supply.	Significant mains laying works will cause disruption within busy London area, incurring additional expense and damage to SGN reputation.

All costs inclusive of Overheads and Efficiencies.

## 9 Preferred Option Scope and Project Plan

### 9.1 Preferred option

Pre-emptively repair: Option 1. Reinforce Mitcham Depot CGS Capacity by replacement on existing site with a larger CGS.

### 9.2 Asset Health Spend Profile

Existing Mitcham Depot CGS expected to breach capacity by 2022/23, requiring CGS Reinforcement by replacement to be completed by 1 October 2022, to ensure Security of Supply.

Subsequently all spend is expected within Financial Year 2022/23, with all CGS workload in 2022/23.

Table 8: Asset Health Spend Profile (£m)

Asset Health Spend Profile (£m)						
Pre GD2	2021/22	2022/23	2023/24	2024/25	2025/26	Post GD2
0	0	1.538	0	0	0	0

All costs inclusive of Overheads and Efficiencies.

### 9.3 Investment Risk Discussion

Gas demand growth has been based around current Local Plan projections for new housing within RIIO-GD2 (2021-26) with a new CGS design providing for future capacity needs beyond 2026 to the limit of the Local Plan in 2031.

SGN has prepared costs using average contracted rates at depot level and have validated them against known costs for similar, completed projects. Nevertheless, whilst all reasonable steps have been taken

to ensure accuracy of costs outlined in this paper, it is recognised that external variables may change and subsequently impact on actual costs at the time of construction. Examples of such could include unforeseen increases in contractor rates driven by a surplus of market demand for labour or cost increases for materials.

Costs for replacement CGS may rise dependent on factors outside of our control due to the restricted choice of gas plant providers. Large CGS Plant is currently supplied via Honeywell Bryan Donkin, which recently moved production from the U.K. to Germany.

Factors such as market driven demand linked to the economy, the UK's potential exit from the European Union, emerging decarbonisation strategies and industry innovation can potentially impact on the scope of works outlined in this paper. SGN has proposed a volume driver funding mechanism to de-risk underspend/overspend for these works. Further details of this proposal can be found in Section 6.2 in the RIIO-GD2 Business Plan Appendix for Capacity Management.

As stated in our Environmental Action Plan, and in line with current UK Government targets, SGN's long term target is to achieve Net Zero emissions by 2045. This means decarbonisation of the energy network and supporting the transition to an environmentally sustainable low-carbon energy system. Indeed, SGN recognise that there have been preliminary government targets set to facilitate a move toward renewable or low carbon heat solutions by the end of the RIIO-GD2 period. As such, throughout the RIIO-GD2 period SGN will continue to closely monitor this emerging heat strategy with a view to refining any potential impact on current growth forecasts.

## Appendix A - Acronyms

Acronym	Backronym (spelled out acronym)	Definition / explanation
<b>Pressure Tiers</b>		
○ <b>HP</b>	○ High Pressure	○ High Pressure i.e. above 7bar LTS (NTS)
○ <b>IP</b>	○ Intermediate Pressure	○ Intermediate Pressure i.e. 2 – 7bar
○ <b>MP</b>	○ Medium Pressure	○ Medium Pressure i.e. up to 2bar
○ <b>LP</b>	○ Low Pressure	○ Low Pressure i.e. up to 75mb
<b>CSEP</b>	Connected System Exit Point	Third party connection to Gas network from an iGT or UIP
<b>DG</b>	District Governor	Pressure regulator primarily used for reducing pressures from IP and MP tiers to LP.
<b>DPG</b>	Distribution Pressure Governor	Pressure regulator primarily used for reducing pressures from IP tier to MP.
<b>HDPE</b>	High Density Polyethylene	Material standard for plastic pipe – High density allows for use at > 2bar operation due to thicker pipe wall. Reduced internal diameter increases weight of pipe, is not suitable for use < 2bar. Cheaper material and jointing than Steel.
<b>iGT (GT)</b>	Independent Gas Transporter	Third party supplier of gas and infrastructure to closed developments, not generally adopted by SGN.
<b>LTS</b>	Local Transmission System	High Pressure system feeding from National Offtakes to P(T)RS Inlets
<b>MDPE</b>	Medium Density Polyethylene	Material standard for plastic pipe – Medium density allows for greater internal diameter for extra capacity required at lower tiers, but thinner pipe wall thickness is not considered safe for operation at >2bar. Cheap material and jointing due to electro fusion welding.
<b>MOP</b>	Maximum Operation Pressure	Highest design pressure for a mains system, however regulator may be set lower than this but not higher.
<b>NTS</b>	National Transmission System	High Pressure system feeding National Offtakes from Terminals
<b>PMAC</b>	Pressure Management and Control	Third Party monitoring system which communicates live data via BT Comms link, facilitates remote control of pressure settings and profiles on SGN Plant, used at all Plant levels.
<b>P(T)RS</b>	Pressure (Transmission) Regulator Station	Pressure regulator primarily used for reducing pressures from HP (LTS/NTS) tier to IP / MP or LP.
<b>UIP</b>	Universal Infrastructure Provider	Provides and connects infrastructure to gas network but does not supply gas. UIP infrastructure is generally adopted by SGN.
<b>RIIO-GD1</b>	Revenue=Incentives + Innovation + Outputs – Gas Distribution 1	8-Year price control period (2013-2021)
<b>RIIO-GD2</b>	Revenue=Incentives + Innovation + Outputs – Gas Distribution 2	Proposed 5-Year price control period (2021-2026)
<b>SHP</b>	SHP File Format	SHP is a file extension for a Shapefile shape format used in geographical information systems (GIS) software.
<b>ST</b>	STEEL	Steel pipe material is used where PE cannot i.e. protection from heavy traffic or bridge crossings, Regulator outlets where excessive gas cooling may be experienced at pressure reduction. Steel pipe laying can be expensive due to welded joints.
<b>1:20</b>	1:20 Demand Conditions	Designing a network to operate whilst experiencing demand conditions historically only seen every 20 years, during severe weather events.