

Engineering Justification Paper

CPM5295 Cliffsend CGS (Thanet IPMP)

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2 Introduction

Reinforcement has been identified within the Thanet IPMP Grid, specifically relating to anticipated Capacity failure at Cliffsend 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

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

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

Where capacity constraints are identified which are likely to impact on our ability to ensure security of supply to all customers, Network Planning will look to establish optimum cost-efficient reinforcement strategies to mitigate this 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.

We have 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 us with confidence the sites identified will progress to development, subsequently reinforcement will be required.

2.2 Site Specific Background

Security

highlighted to us a Capacity Issue will occur at Cliffsend CGS, Ramsgate, requiring reinforcement or replacement of CGS within RIIO-GD2 period (2021-26).

Identified drivers for the CGS replacement are numerous as listed in Table 1:

Table 1: Development Summary

| Development Name | Site Usage | Site Status | Confidence |
|----------------------------------|--|--|-----------------------------------|
| Westwood Centre, Ramsgate | 1,000 homes | Planning Permission Granted, site connected and underway | Highly probable (>90% confidence) |
| Thanet Earth | Greenhouse No.7, similar to No.6 @ 1,508scmh | Planning Permission Granted | Highly probable (>90% confidence) |
| Haine Road, Ramsgate | 700 homes plus a school | Planning Permission Granted | Highly probable (>90% confidence) |
| West of Old Haine Road | 1,200 homes plus a school | Outline Planning consent Pending | Probable (>75% confidence) |
| Westwood | 1450 homes | Outline Planning consent Pending | Probable (>75% confidence) |
| Manston Business Pk. | 45 workshops and 80 offices | Outline Planning consent Pending with part granted | Probable (>75% confidence) |
| Eurokent | 350 homes, with commercial development | No planning granted | Good prospects (>50% confidence) |

(See Appendix A – Development Trajectory Summary for more detail)

Please see Appendix B of this document which gives further details of the criteria applied when determining the attributable ‘confidence’ level of the above sites progressing to development.

Through this determination we have deemed the requirement for this reinforcement within RIIO-GD2 as ‘Low’ and have therefore included the funding request in our Base Growth and High Growth scenarios.

3 Equipment Summary

Thanet IPMP Grid is integrated within the South East IPMP Grid;
Security

The Thanet IP system is sourced locally from Monkton IP PRS @ 4.8bar, supplying eastward to the IP Inlet of Cliffsend CGS. The integrated Thanet MP system is sourced from East Kent MP (2.0bar) to south, Monkton MP PRS (1.9bar) to west and Cliffsend CGS (1.85bar) to east.

Two Biomethane sites also supply into the integrated Thanet MP system: St. Nicholas Court Farm to north-west of Monkton and Ibbsfleet Farm to the south of Cliffsend. Both Biomethane sites feed into the MP System at a pressure which will maintain their Maximum injection rate of flow, up to MP system MOP = 2.0bar.

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 our 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, we will deliver a reinforcement ensuring a safe and secure network, meets stakeholder aspirations and ensures developments progress timeously.

On completion of the proposed reinforcement, we 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 proposed development sites up to 2026 and existing committed development growth, inlet pressures at Cliffsend CGS will fall below Design Minimum Inlet Pressure (2.76bar) which will be required to maintain CGS capacity during GD2 period.

Table 2. Showing Failing Inlet Pressures as future growth increases CGS Flow.

| Demand Scenario (years) | 1 in 20 IP Inlet Pressure (bar) | 1 in 20 Flow (scm/hr) |
|-------------------------|---------------------------------|-----------------------|
| 2019/20 (GD1) | 3.18 | 25,674.436 |
| 2021/22 (GD2) | 2.98 | 27,003.713 |
| 2023/24 (GD2) | 2.36 | 30,290.141 |

Capacity breach at Cliffsend CGS will result in reduced Outlet pressure (droop), to such an extent Security of Supply to committed development within MP section of Thanet IPMP Grid will be compromised.

In addition to the Capacity driver, Cliffsend CGS is currently located to rear of domestic gardens, with access for maintenance or significant repair obtained through a ploughed field, creating the need for any new CGS to be relocated to a more suitable site.

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.

Security

4.2 Spend Boundaries

The spend associated with these reinforcement works is limited to providing sufficient capacity within the Thanet IPMP system to support projected development during RIIO-GD2.

5 Probability of Failure

The existing south-east IPMP model predicts a failure of Cliffsend CGS to maintain its outlet pressure on the Thanet IPMP system at >90% of 1 in 20 Demand during 2023/24, within RIIO-GD2. This is due to proposed developments identified in the Thanet Local Plan reducing IP Inlet pressure to CGS.

Reduction in IP inlet pressure below Design Minimum Pressure (2760mbar) will affect available capacity through the CGS and cause a subsequent drop in MP outlet pressure. This creates a risk where we fail 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 our Safety Case and is a fundament of our Licence to Operate.

Validation ensures 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 the models continue to be accurate and fit for purpose.

The Thanet area of the south-east IPMP model was sense checked during the last major demand event 'The Beast from the East' on 1 March 2018 (99% Demand Scenario).

By use of logger data at five MP DG Inlets within our Thanet MP system we found the MP network model tied-in very closely to charted data.

Table 3: System Performance Review – 1st March 2018 (99% peak demand)

| System | Site | System Pressure (99%) | | System Pressure (1 in 20) | |
|-----------|----------------------|-----------------------|-----------|---------------------------|-----------|
| | | Actual | Predicted | Min. Required | Predicted |
| Thanet MP | Minnis Road DG | 0.945bar | 0.861bar | 0.345bar | 0.861bar |
| Thanet MP | Coffin Corner DG | 1.228bar | 1.088bar | 0.345bar | 1.088bar |
| Thanet MP | Summerfield Road DG | 0.862bar | 0.718bar | 0.345bar | 0.718bar |
| Thanet MP | West Dumpton Lane DG | 0.85bar | 0.704bar | 0.345bar | 0.704bar |
| Thanet MP | Stirling Way DG | 1.3bar | 1.247bar | 0.345bar | 1.247bar |

Security

Network Growth

The Thanet Local Development Plans and associated documents have been reviewed and an assessment made as to the probability of sites contained therein progressing to construction.

(see Fig. 1 and Appendix A – Development Trajectory Summary for more detail).

6 Consequence of Failure

Loss of Supply to Customers

The Thanet IPMP network will be unable to support both committed growth as well as proposed developments identified within the Thanet Local Plan, beyond 2023, in direct violation of our license obligations to maintain Security of Supply of committed customer development.

Ultimately this will result in the failure of Cliffsend CGS due to insufficient inlet pressure and the loss of supply to approximately 40,000 existing/new customers and a failure to meet our Licence Conditions, attracting adverse publicity and damage to the company's reputation.

Security

Affected customers will include The Queen Elizabeth The Queen Mother Hospital, Spencer Private Hospital, Bethesda Medical Centre, Thanet Crematorium as well as a number of high-profile new Industrial & Commercial developments in Haine & Westwood.

Table 4: Lowest Pressure Location in 2025/26

| Lowest Pressure Location | Required Minimum Pressure | Minimum Failing Pressure |
|--|---------------------------|--------------------------|
| Manston Court Road DG, Ramsgate | 345mbar | -1847mbar |

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 Thanet Local Development Plans. We would be deemed to have blocked local development, effecting the growth of the local economy.

Safety Impact of Failure

Reinforcement of the Thanet 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 our employees, 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 in use for the reinstatement of public highways following the conclusion of these works.

7 Options Considered

7.1 Options

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 Thanet MP system.

Repair on Failure

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

Pre-emptively Replace

Replace the system prior to network failure. This option has been discounted as it is impracticable to replace Thanet MP system.

Pre-Emptively Repair

Mains reinforcement based on model data prior to network failure, four options considered for further investigation: *(see Sections 6.1, 6.2, 6.3 and 6.4 for details)*

Do Nothing

Not considered practicable as Cliffsend CGS is close to capacity, with MP Outlet being unable to maintain MP Security of Supply contrary to license conditions. CGS is also in a poor location with limited access for maintenance vehicles, so needs to be moved.

7.2 First Option Summary - Move Cliffsend CGS to Windsor Road.

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

Lay 500M x 12"ST IP or 400mmHDPE IP mains to a new CGS Location at Canterbury Road West / Windsor Road, Cliffsend. Existing 12"ST IP mains to Clive Road, are to be downrated to MP and tied back into MP system. Includes abandonment and removal of existing CGS site and subsequent uprating of Monkton IP PRS from 4.8bar to 6.9bar.

The basis for cost estimate/unit cost

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

The perceived benefits of the option

New CGS location 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 2023/24 to avoid anticipated capacity issues.

Key assumptions made

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

Any other items that differentiate the option from the others considered

New location is closer to demand, allowing lower 1.8bar Setting (increasing available network capacity).

7.3 Second Option Summary - Move Cliffsend CGS to Cliffsend Roundabout.

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

Locate new CGS on embankment at Cliffsend Roundabout. Existing 12" ST IP mains to be downrated to MP and tied into a new 500M x 400mmMDPE MP Reinforcement link in Canterbury Road West and to existing 12"ST MP mains in Clive Road with 10M x 355mmMDPE. To Include for all abandonment and removal of existing CGS site and subsequent uprating of Monkton IP PRS from 4.8bar to 6.9bar.

The basis for cost estimate/unit cost

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

The perceived benefits of the option

New CGS location 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 2023/24 to avoid anticipated capacity issues.

Key assumptions made

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

Any other items that differentiate the option from the others considered

Area is very elevated from road making access for maintenance difficult. Site is 2km further from demand growth, requiring Maximum 2bar Outlet setting to maintain MP network capacity.

7.4 Third Option Summary - Raise Pressures

Elevating IP pressure at Monkton PRS from 4.8bar to 6.9bar to alleviate Capacity issue was considered. However, immediate IP Inlet has insufficient test records to allow uprating. CGS will need to be moved from current poor location.

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, we have the option to offer a tender for interruptible contracts to customers to offset the need to invest for capacity.

Interruptible consumers receive discounted transportation charges for the flexibility they provide to the system for demand side management at times of high demand.

There are no sites eligible for interruptible contracts within Thanet IP/MP network.

7.6 Options Technical Summary Table

Table 5: Summary of RIIO-GD2 Costs

| Option | First Year of Spend | Final Year of Spend | Volume of Interventions | Design Life (years) | Total (£M) |
|--|---------------------|---------------------|---|---------------------|------------|
| 1/ Move Cliffsend CGS to Windsor Road | 2023/24 | 2023/24 | 500M x 400mmHDPE IP Main | 10 | £1.734 |
| | | | Build New CGS | | |
| | | | Downrate Remaining 12" ST IP main to MP and connect with 2 x 355mmMDPE MP connections | | |
| | | | Uprate Monkton IP system to 6.9bar | | |
| | | | Abandon / Remove old CGS | | |
| | | | Land Purchase for CGS | | |
| 2/ Move Cliffsend CGS to Cliffsend Roundabout | 2023/24 | 2023/24 | 500M x 400mmMDPE MP Main | 10 | £1.200 |
| | | | Build New CGS | | |
| | | | Downrate Remaining 12" ST IP main to MP and connect with 2 x 355mmMDPE MP connections | | |
| | | | Uprate Monkton IP system to 6.9bar | | |
| | | | Abandon / Remove old CGS | | |
| | | | Land Purchase for CGS | | |

7.7 Options Cost Summary Table

Table 6: Options Cost Summary Table

| Option | Volume of Interventions | Cost Breakdown (£M) | Total (£M) |
|--|---|---------------------|------------|
| 1/ Move Cliffsend CGS to Windsor Road | 500M x 400mmHDPE IP Main | *£1.734 | £1.734 |
| | Build New CGS | | |
| | Downrate Remaining 12" ST IP main to MP and connect with 2 x 355mmMDPE MP connections | | |
| | Uprate Monkton IP system to 6.9bar | | |
| | Abandon / Remove old CGS | | |
| | Land Purchase for CGS | | |
| 2/ Move Cliffsend CGS to Cliffsend Roundabout | 500M x 400mmMDPE MP Main | *£1.200 | £1.200 |
| | Build New CGS | | |
| | Downrate Remaining 12" ST IP main to MP and connect with 2 x 355mmMDPE MP connections | | |
| | Uprate Monkton IP system to 6.9bar | | |
| | Abandon / Remove old CGS | | |
| | Land Purchase for CGS | | |

*Note: Both options above are very similar in terms of works required. The difference in cost can be mostly attributed to differing pressure tiers of main lay required.

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 Thanet 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 90% pk demand by winter 2023/24, putting at risk supplies to 40,000 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.

Option 1. involves significant mains laying within the main street through Cliffsend Village = 500M x 400mmHDPE, rated at IP.

The IP extension is required to position a new CGS Location at Canterbury Road West / Windsor Road, Cliffsend to replace existing over Capacity CGS, located to rear of residential gardens in Clive Road, with sole access available via farmers ploughed land.

Project costs also include for the removal of the replaced CGS and redundant pipework from this site as well as downrating of residual 12"ST IP mains feeding to MP, to be tied back into MP System as further reinforcement.

Subsequent uprating of Monkton IP system allowing PRS to be increased from 4.8bar to 6.9bar will then proceed as 12"ST IP section with insufficient test records will have been downrated to MP.

Pre-emptively Repair: Option 2

Option 2. involves positioning a new CGS at Cliffsend Roundabout, Cliffsend, to replace existing over Capacity CGS, located to rear of residential gardens in Clive Road, with sole access available via farmers ploughed land.

Additional significant mains laying within the main street through Cliffsend Village = 500M x 400mmMDPE, rated at MP, required to reinforce pressures at MP system extremities.

Project costs also include for the removal of the replaced CGS and redundant pipework from this site as well as downrating of residual 12"ST IP mains feeding to MP, to be tied back into MP System as further reinforcement.

Subsequent uprating of Monkton IP system allowing PRS to be increased from 4.8bar to 6.9bar will then proceed as 12"ST IP section with insufficient test records will have been downrated to MP.

Resilience

Option 1. moves CGS 1km closer to demand growth area, providing an increase in available network capacity for ongoing future developments in later years. This additional capacity allows existing Outlet Setting Bias of 1.85bar to be maintained, which assists existing Biomethane sites in their injection into the network at more manageable pressures.

Thanet network experiences pressures > 2bar MOP during Low demand conditions, due to its natural Geography as being in an elevated clifftop location at the end of the MP Network.

Option 2. Moves CGS location 1km further from demand growth area, requiring 2bar Outlet setting to maintain network capacity in GD2 with further reinforcement required for future development up to end of 2031 Local Plan. 2bar setting will also have an adverse impact on existing Biomethane sites, with injections to the network being required to overcome a much more challenging pressure during low demand conditions.

Table 6: Summary of Key Value Drivers

| Option No. | Desc. of Option | Key Value Driver |
|------------|--|--|
| 1 | Move Cliffsend CGS to Windsor Road, Cliffsend. | Provides available capacity for future growth within Thanet MP system, allowing for reduced setting of 1.8 bar to the benefit of biomethane injection in the area. CGS site easily accessible for maintenance. |
| 2 | Move Cliffsend CGS to Cliffsend Roundabout. | Provides available capacity for future growth within Thanet MP system. 2 bar setting required leaving limited options for growth in the long term, and adversely impacting biomethane injection in the area. No easy access to CGS site. |

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 Summary

| | Move Cliffsend CGS to Windsor Road, Cliffsend. | Move Cliffsend CGS to Cliffsend Roundabout. |
|--------------------------------|--|---|
| Capex (£m) | 1.734 | 1.200 |
| Number of Interventions | New CGS at Windsor Rd site, land purchase, 500m x 400mm HDPE IP main, downrate existing 12" IP to MP with 2 x 355mm PE MP connections, uprate Monkton IP system to 6.9 bar, abandon/remove old CGS. | New CGS at Cliffsend Roundabout site, land purchase, 500m x 400mm HDPE MP main, downrate existing 12" IP to MP with 2 x 355mm PE MP connections, uprate Monkton IP system to 6.9 bar, abandon/remove old CGS. |
| Design Life | 10 Years | 10 Years |
| Positive Benefit (Pros) | Maintains SGN license Obligations to maintain Security of Supply whilst accommodating notified growth up to 2031. Reduced 1.8bar Setting will assist Biomethane Injection. Significant cost implications of laying IP mains extension. Site is easily accessed off side road in farmers field corner plot. | Maintains SGN license Obligations to maintain Security of Supply whilst accommodating notified growth up to 2031. Significant cost benefit of not laying IP mains extension. |
| Negative Impact (Cons) | Significant cost implications of laying IP mains extension. | Maximum 2bar setting will adversely impact Biomethane Injection. Site is difficult to access off busy roundabout on elevated embankment. |

All costs inclusive of Overheads and Efficiencies.

9 Preferred Option Scope and Project Plan

9.1 Preferred option

Pre-emptively repair - Option 1: 500M x 400mmHDPE IP and New Cliffsend CGS in Windsor Road.

9.2 Asset Health Spend Profile

Existing Cliffsend CGS expected to breach capacity by end of 2023, requiring CGS relocation to Windsor Road to allow IP uprating to be completed by 01/10/2023, to ensure Security of Supply.

Subsequently all spend is expected within Financial Year 2023/24, with all 0.5km mains workload laid in 2023.

Table 8: Summary of Scheduled Spend

| Asset Health Spend Profile (£m) | | | | | | |
|---------------------------------|-------|-------|--------------|-------|-------|----------|
| Pre GD2 | 21/22 | 22/23 | 23/24 | 24/25 | 25/26 | Post GD2 |
| 0.0 | 0.0 | 0.0 | 1.734 | 0.0 | 0.0 | 0.0 |

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 period 2021-26, with new CGS design providing for future capacity needs beyond 2026 to the limit of the Local Plan in 2031.

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. We have proposed volume driver funding mechanism to de-risk underspend/overspend for these works and further details of our proposal could 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 Governments targets, our long-term target is to achieve net-zero emissions by 2045. This means a decarbonisation of the energy network and supporting the transition to an environmentally sustainable low-carbon energy system. Indeed, we recognise there have been preliminary government targets set facilitating a move toward a renewable or low carbon heat solutions by the end of RIIO-GD2. As such, throughout RIIO-GD2 we will continue to closely monitor this emerging heat strategy with a view to refining any potential impact on current growth forecasts.

Costs for replacement CGS may rise dependent on factors outside 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.

10 List of Acronyms

| Acronym | Backronym (spelled out acronym) | Definition / explanation |
|-----------------------|--|--|
| Pressure Tiers | | |
| ○ HP | ○ High Pressure | ○ High Pressure i.e. above 7bar LTS (NTS) |
| ○ IP | ○ Intermediate Pressure | ○ Intermediate Pressure i.e. 2 – 7bar |
| ○ MP | ○ Medium Pressure | ○ Medium Pressure i.e. up to 2bar |
| ○ LP | ○ Low Pressure | ○ Low Pressure i.e. up to 75mb |
| CSEP | Connected System Exit Point | Third party connection to Gas network from an iGT or UIP |
| DG | District Governor | Pressure regulator primarily used for reducing pressures from IP and MP tiers to LP. |
| DPG | Distribution Pressure Governor | Pressure regulator primarily used for reducing pressures from IP tier to MP. |
| HDPE | 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. |
| iGT (GT) | Independent Gas Transporter | Third party supplier of gas and infrastructure to closed developments, not generally adopted by SGN. |
| LTS | Local Transmission System | High Pressure system feeding from National Offtakes to P(T)RS Inlets |
| MDPE | 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. |
| MOP | Maximum Operation Pressure | Highest design pressure for a mains system, however regulator may be set lower than this but not higher. |
| NTS | National Transmission System | High Pressure system feeding National Offtakes from Terminals |
| PMAC | 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. |
| P(T)RS | Pressure (Transmission) Regulator Station | Pressure regulator primarily used for reducing pressures from HP (LTS/NTS) tier to IP / MP or LP. |
| UIP | Universal Infrastructure Provider | Provides and connects infrastructure to gas network but does not supply gas. UIP infrastructure is generally adopted by SGN. |
| RIIO-GD1 | Revenue=Incentives + Innovation + Outputs – Gas Distribution 1 | 8-Year price control period (2013-2021) |
| RIIO-GD2 | Revenue=Incentives + Innovation + Outputs – Gas Distribution 2 | Proposed 5-Year price control period (2021-2026) |
| SHP | SHP File Format | SHP is a file extension for a Shapefile shape format used in geographical information systems (GIS) software. |
| ST | 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. |
| 1:20 | 1:20 Demand Conditions | Designing a network to operate whilst experiencing demand conditions historically only seen every 20 years, during severe weather events. |

Appendix A - Development Trajectory Summary

| Domestic | | | Demand (dwellings) | | | | |
|-------------|--|---------------------|--------------------|-----------|-----------|-------|-------|
| Town | Site | SiteReference | GD1 Total | GD2 Total | GD3 Total | Total | |
| Birchington | Between Manston and Birchington | (blank) | 0 | 0 | 1500 | 1500 | |
| | Birchington | S498 | 200 | 200 | 200 | 600 | |
| | | S501 | 200 | 200 | 200 | 600 | |
| | | S515,S498,S499 | 100 | 200 | 100 | 400 | |
| Broadstairs | North of Albert Road | (blank) | 0 | 0 | 50 | 50 | |
| | North-east of Reading Street Road | (blank) | 0 | 0 | 70 | 70 | |
| Manston | Jentex site Canterbury Rd West | S426, OL/TH/15/0020 | 56 | 0 | 0 | 56 | |
| | North of Cottington Rd (2) | (blank) | 0 | 0 | 100 | 100 | |
| | North of Hengist Way | (blank) | 0 | 0 | 350 | 350 | |
| | Site South side of A253, Cliffsend | S468, OL/TH/17/0152 | 60 | 0 | 0 | 60 | |
| | South of Cottington Rd, Cliffsend | (blank) | 0 | 0 | 60 | 60 | |
| | West of Preston Road, Manston | (blank) | 0 | 0 | 150 | 150 | |
| | | | | | | | |
| Margate | North and South Shottendame Road | AD15 | 100 | 200 | 200 | 500 | |
| | Ramsgate Road, Margate | (blank) | 0 | 0 | 242 | 242 | |
| | Yoakley House | (blank) | 30 | | 150 | 180 | |
| Minster | Foxborough Lane | (blank) | 0 | 0 | 130 | 130 | |
| | Monkton Road, Minster | (blank) | 0 | 0 | 120 | 120 | |
| | Tothill Street Minster | S512/S436/S85 | 110 | 0 | 0 | 110 | |
| Monkton | Land at Manor Rd, | F/TH/15/1204 | 50 | 0 | 0 | 50 | |
| Ramsgate | Haine Road, Manston Green | SS33, OL/TH/14/0050 | 200 | 250 | 250 | 700 | |
| | Boundary Road, Ramsgate | S168 | 0 | 96 | 0 | 96 | |
| | Cavendish Street | S164 | 87 | 0 | 0 | 87 | |
| | Eurokent | S522 | 350 | 0 | 0 | 350 | |
| | Former Manston Allotments | S452 | 62 | 0 | 0 | 62 | |
| | Land adjacent to 12 Kings Road | S107 | 89 | 0 | 0 | 89 | |
| | Manston Road Industrial Estate | OL/TH/15/0187 | 120 | 0 | 0 | 120 | |
| | P08117148 | S160 | 229 | 0 | 0 | 229 | |
| | Pleasurama, Ramsgate | S162 | 117 | 0 | 0 | 117 | |
| | Ramsgate Garden Centre | SR57 | 20 | 20 | 20 | 60 | |
| | St Stephens Haine Road | OL/TH/16/1374, SR60 | 100 | 0 | 0 | 100 | |
| | West of Chilton School | (blank) | 0 | 0 | 100 | 100 | |
| | West of Old Haine Road | OL/TH/18/0261 | 300 | 400 | 500 | 1200 | |
| | Westgate on Sea | P17142612 | S159 | 132 | 133 | 66 | 331 |
| | | S515 | (blank) | 0 | 0 | 130 | 130 |
| | | Westgate on Sea | ST1, ST2 | 350 | 650 | 1000 | 2000 |
| Westwood | Dane Valley Industrial Estate - Part of national grid land | SS37 | 60 | 0 | 0 | 60 | |
| | Laleham School | S527 | 72 | 0 | 0 | 72 | |
| | land adj. Westwood Centre | S141 | 460 | 260 | 280 | 1000 | |
| | Land Adjacent To Salmestone Grange Nash Road MARGATE Kent | S540 | 150 | 100 | 0 | 250 | |
| | Land of Northwood Road | S536 | 45 | 0 | 0 | 45 | |
| | Thanet Reach Southern Part | SS34 | 70 | 0 | 0 | 70 | |
| | Westwood | S511,S553, S447 | 300 | 550 | 600 | 1450 | |
| | Grand Total | | | 4219 | 3259 | 6568 | 14046 |

* It should be noted the GD1 growth levels quoted in the Domestic Summary, are for period 2013 – 2021, so many of these sites will already be firm demands included on the network.

It should be noted there are Significant Non-Domestic sites, other than those listed below, which are being connected to our systems that are not included within the Local Authority Plans (e.g. Thanet Power Peaking plant load is connecting at Westwood during 2019 = 5000scmh).

As such, these demand summaries are reflective of The Thanet Local Plan growth only.

| Non-Dom | | | Demand | | | |
|-----------------|-----------------------------|---------------------|-----------|-----------|-----------|--------|
| Town | Site | Site Reference | GD1 Total | GD2 Total | GD3 Total | Total |
| Birchington | Birchington | S515, S498, S499 | 0 | 0 | 86.5 | 86.5 |
| Manston | Manston Business Park | (blank) | 150 | 221 | 371 | 742 |
| Manston Green | Haine Road, Manston Green | SS33, OL/TH/14/0050 | 0 | 0 | 86.5 | 86.5 |
| Monkton | Thanet Earth - Greenhouse 7 | F/TH/12/0327 | 0 | 1508 | 0 | 1508 |
| Ramsgate | Chilton School, Ramsgate | (blank) | 0 | 0 | 50 | 50 |
| | Eurokent | S522 | 0 | 116.6 | 0 | 116.6 |
| | Newington Road | SS40 | 65 | 0 | 0 | 65 |
| | West of Old Haine Road | OL/TH/18/0261 | 0 | 87.4 | 0 | 87.4 |
| Westgate on Sea | Westgate on Sea | ST1, ST2 | 0 | 0 | 86.5 | 86.5 |
| Grand Total | | | 215 | 1933 | 680.5 | 2828.5 |

Appendix B - Categorisation of Potential Load Growth

The following Table sets out the manner in which identified potential load growth has been categorised and applied, leading to customer driven reinforcement, when looking to establish the optimum investment strategy for our networks.

| DEFINITION TABLE | | | | |
|---|---|--|-------------|-------------|
| Confidence | Definition | Factors to be considered | Base Growth | High Growth |
| Highly probable (>90% confidence) | Connection expected in RIIO-GD2 for all sites | <ol style="list-style-type: none"> 1. Quotation accepted but not yet on stream 2. Building is in progress. 3. Detailed planning permission granted. 4. Economic conditions indicate that sites for consumers of a particular type are likely to be developed, e.g. <ol style="list-style-type: none"> a. Domestic sites where there is a high demand for housing and there is a shortage of land available. b. Interest has been shown in having a connection made to a non-domestic site and economic factors suggest development will go ahead. | ✓ | ✓ |
| Probable (>75% confidence) | Connection Likely in RIIO-GD2 for majority of sites | <ol style="list-style-type: none"> 1. Outline planning consent has been granted. 2. Recent development has been carried out in the area. 3. The land is a prime site for development, but no connection enquires have yet been received. 4. Adopted Local Plan Site | ✓ | ✓ |
| Good prospects (>50% confidence) | Connection expected for some sites in RIIO-GD2 | <ol style="list-style-type: none"> 1. Proposed Local Plan Site 2. No indication of planning permission being granted for the site. 3. The site is outside existing gas supply areas. 4. The site would involve physical problems in delivering a gas supply. 5. The site would require substantial additional infrastructure, e.g. additional roads, schools. 6. Site marked “reserve” in Local Plan. 7. Site is known to be contaminated ground. 8. Site has “protection” orders served over it – e.g. SSSI. | | ✓ |
| Poor prospects (<50% confidence) | Significant time or investment required to progress | <ol style="list-style-type: none"> 1. Does not meet the above planning criteria. 2. Site has been deemed as ‘speculative’. 3. The site would require significant additional infrastructure, e.g. additional roads, schools. | | |