Cadent
Your Gas Network

DAS/EX/000
June 2025

Detailed Analysis Study

Contents

Power Generation Example

Document Purpose

The aim of this document is to provide ‘Your company / customer’ the findings of the Detailed Analysis Study (DAS) undertaken for the proposed Power Generation site.

Detailed analysis has been carried out to understand the capability of the network in relation to the customer’s request to connect and reserve capacity. This study is a reflection of the network at the time delivered and is **not** a guarantee of gas flow or capacity due the changing dynamics of the gas distribution network.

Before a connections offer can be made, design studies will need to be completed in the first instance for options 3.2.1 and 3.2.2 contained within the DAS, please refer to section 5.1. where more information is available to help you choose how to progress forwards with a request for connection onto the Cadent Network.

Statement of Requirements

‘Your company / customer’ have requested a Detailed Analysis Study (DAS) to identify where capacity is available within the Cadent Gas network at Westoning, Bedford. The proposed connection is for a Power Generation site.

1. Site Location

The proposed site location is on the A5120.

The site address provided by ‘Your company / customer’ is:
Land adj. to A5120,
Westoning,
Bedford,
MK45 5AB

Figure 1 below shows the anticipated site location highlighted.

Figure 1 – Google Map image showing the site location.

1.1. Anticipated Flow and Pressure Requirement

'Your company / customer' has a total maximum preferred gas load of 100,000kwh (9,230.77scmh) which is expected to be taken during times of peak demand as outlined in figure 2. Due to the nature of the gas network our 1:20 winter demand conditions fall in line with the expected times of gas usage – therefore capacity will be available at any time of year once reserved.

The Demand profile has been captured in figure 2 and a breakdown of the individual load options are captured in Figure 3.

Period	Peak Demand	Off Peak Demand	Peak Demand	Off Peak Demand
	06:00 – 10:00	10:00 – 16:00	16:00 – 22:00	22:00 – 06:00
January – March	✓	✓	✓	✓
April – June	✓	✓	✓	✓
July – September	✓	✓	✓	✓
October - December	✓	✓	✓	✓

Figure 2 - Anticipated times of gas demand – identified from DAS Report Application.

As per the DAS application, the minimum required peak pressure at the connection point for this Power Generation site is:

- 450mBar, on the Medium Pressure (MP) network.
- 3640mBar, on the Intermediate Pressure (IP) network.

As such, the most suitable connection point would be either on the Medium Pressure or Intermediate Pressure (IP) network. This has also been taken into consideration when looking for suitable connection points, however, other pressure tiers (if deemed more economical) have not been ruled out during the optioneering phase.

A connection point onto the High Pressure (HP) network has been explored as part of the DAS, however, due to the demand surrounding this project, this pressure tier has been deemed as not economically viable and therefore, this HP connection point has been discounted.

Option	Kwh	Scmh
Load Option 1	100,000	9,230.77
Load Option 2	50,000	4,615.38
Load Option 3	20,000	1,846.15

Figure 3 – Load options identified from DAS Application

1.2. Connections History

An iGT Quotation was previously submitted under Cadent reference 1000XXXX, which identified the need for MP reinforcement.

Connection Option(s)

2. Suitable Connection Points

Optioneering takes into account pressure requirements (at the connection point and elsewhere), network constraints (such as maintaining acceptable velocities and upstream restraints) and available routes to connection (avoiding bridges, major highways and private land etc. where possible)

For FM138 UIP requests, if a booster, compressor or if engines are to be installed as part of the downstream equipment, transient analysis will need to be undertaken in the future to assess the impact of the equipment on our network and both the connection/meter points.

For FM153 iGT requests, if a booster, compressor, CHP or if engines are to be installed, please ensure that there are adequate safeguards in place to prevent accidental over-pressurisation of meter and upstream pipework as detailed in IGE/UP/6 and IGE/UP/2.

We have explored two potential connection points within this DAS.

2.1. Connection Point Options

Connection Point One: 503246; 233219 180mm PE MP Medium Pressure gas main located on A5120.

Due to the complexity of the reinforcement requirement for Load options 1 & 2, this connection point would only be suitable for load option 3 (20,000kwh).

Examples of potential complexities: - Excess amount of reinforcement, costing thousands above other options for the connection. – Reinforcement routes, over private property that will create more cost and time delays for the project. – Overhead cables / Water Crossing / Train Track crossings, that can trigger the need for a SCJ, adding more cost and time to the project.
Whilst these complexities are not a sole reason to deem a connection unsuitable, if there are other options available which are least cost fit for purpose solutions, then these options would be provided in the first instance and the more complex options discounted.

Unfortunately, this Connection Point One, would not be suitable for the full demand, of option 3 (20,000kwh). The pressure loss across the network breaches our minimum pressure requirement at the connection point. Therefore, reinforcement would be required and is listed within this document.

Connection Point Two: 503250; 233274 180mm HDPE Intermediate Pressure gas main located on A5120.

This Connection Point Two on the IP main would be suitable for the full demand of either demand option 1, 2 or 3.

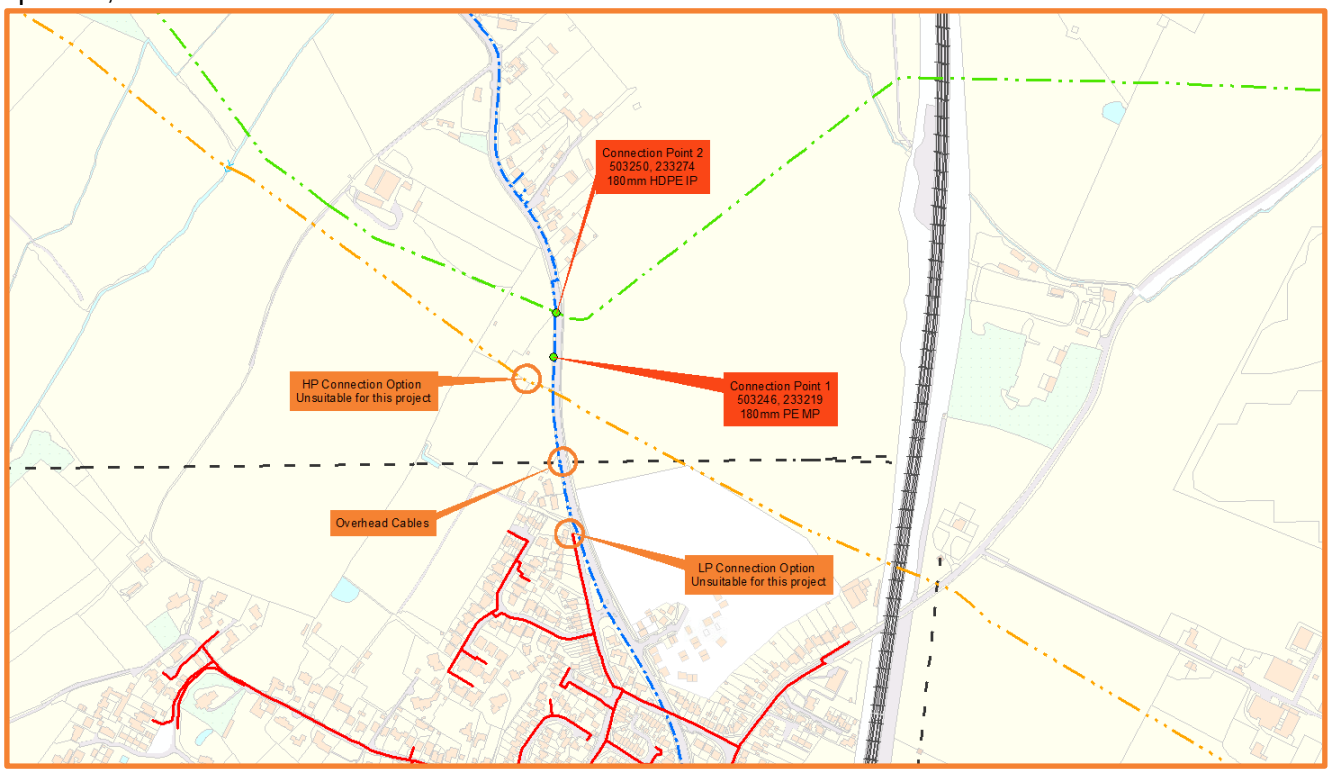

Figure 4 – Map showing connection point options.

2.2. NP14 Pressures

A minimum of 450mBar is the available pressure at the Medium-Pressure connection point when assessing the demand option (from figure 3). Pressures recorded are based on peak and off-peak analysis – which also reflects our 1:20 winter worst case pressure and should be the minimum seen under normal operating conditions.

A minimum of 3640mBar is the available pressure at the Intermediate-Pressure connection point when assessing the demand option (from figure 3). Pressures recorded are based on peak and off-peak analysis – which also reflects our 1:20 winter worst case pressure and should be the minimum seen under normal operating conditions.

The DAS can also explore the possibility of elevated pressures if requested within the DAS application.

Reinforcement Option(s)

3.1 Utilising the proposed Medium Pressure connection point

As previously mentioned in section 2, a connection onto the Medium-Pressure network with demand option 3 (20,000kwh) will trigger the need for reinforcement, for the Medium-Pressure connection point.

This section will explore the reinforcement options to ensure security to the connection point and elsewhere within the network.

3.2.0 Connection Point One – Medium Pressure (Demand Option 3 - 20,000kwh)

Utilising the 180mm PE MP potential connection point 503246; 233219. This triggers the requirement for reinforcement. Two options have been identified which requires Medium Pressure pipe-lay reinforcement.

3.2.1 Non-Contiguous Reinforcement

The route of the MP reinforcement necessary to supply the requested load is within public access as shown below.

Approximately 1459m x 180mm PE MP reinforcement would be required to maintain acceptable pressure drops and velocities from the 180mm PE MP main at 500977; 228829 tying back into the network at 501956; 229681 125mm PE MP main. The reinforcement route is shown in figure 5 and a Google maps view of this route is shown in figure 6.

Please note that a SCJ design study will be required for this option.

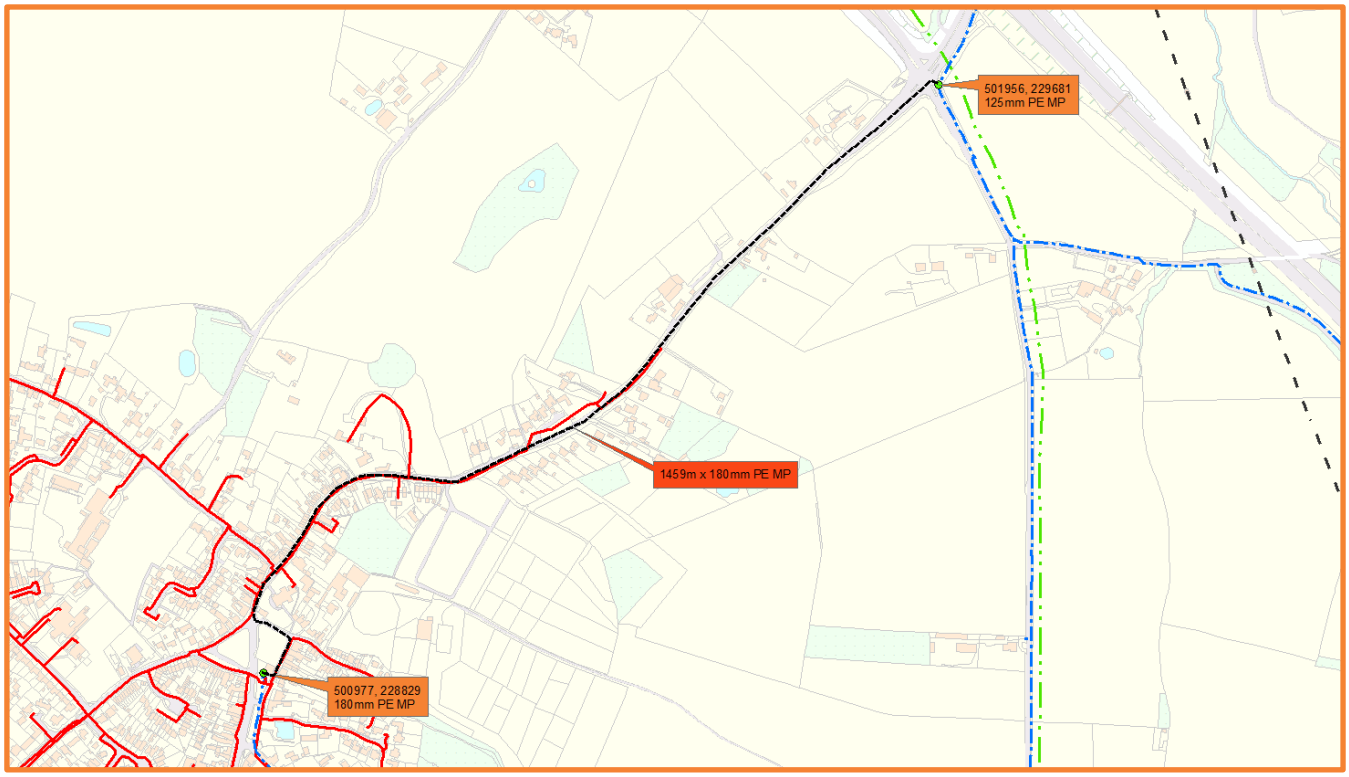

Figure 5 – Route of reinforcement

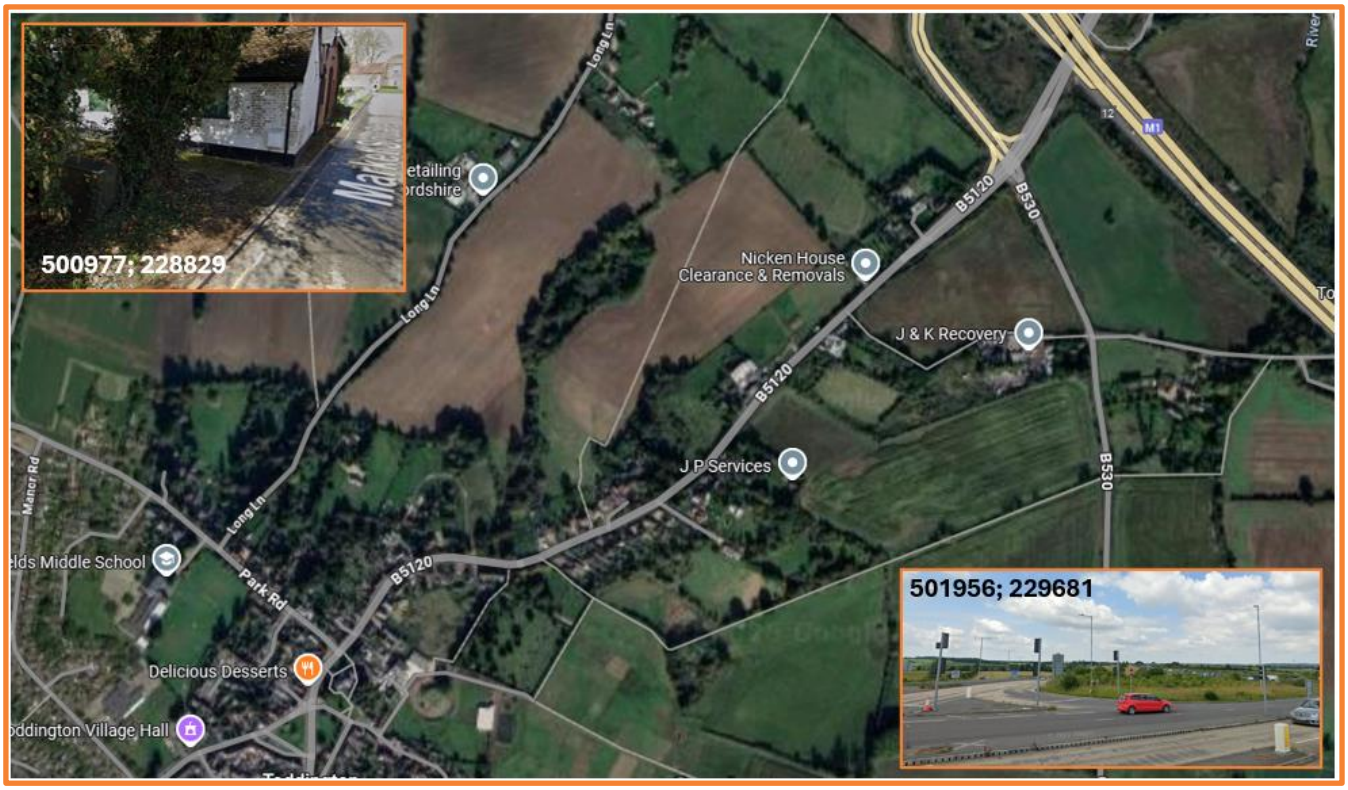

Figure 6 – Reinforcement Route – Google View.

3.2.2 Non-Contiguous Reinforcement

The route of the MP reinforcement necessary to supply the requested load is within public access as shown below.

Approximately 1,030.8m x 355mm PE MP reinforcement would be required to maintain acceptable pressure drops and velocities from the 180mm PE MP main at 502050; 227873 tying back into the network at 502089; 228885 125mm PE MP main. The reinforcement route is shown in figure 7 and a Google maps view of this route is shown in figure 8.

Please note that a SCJ design study will be required for this option.

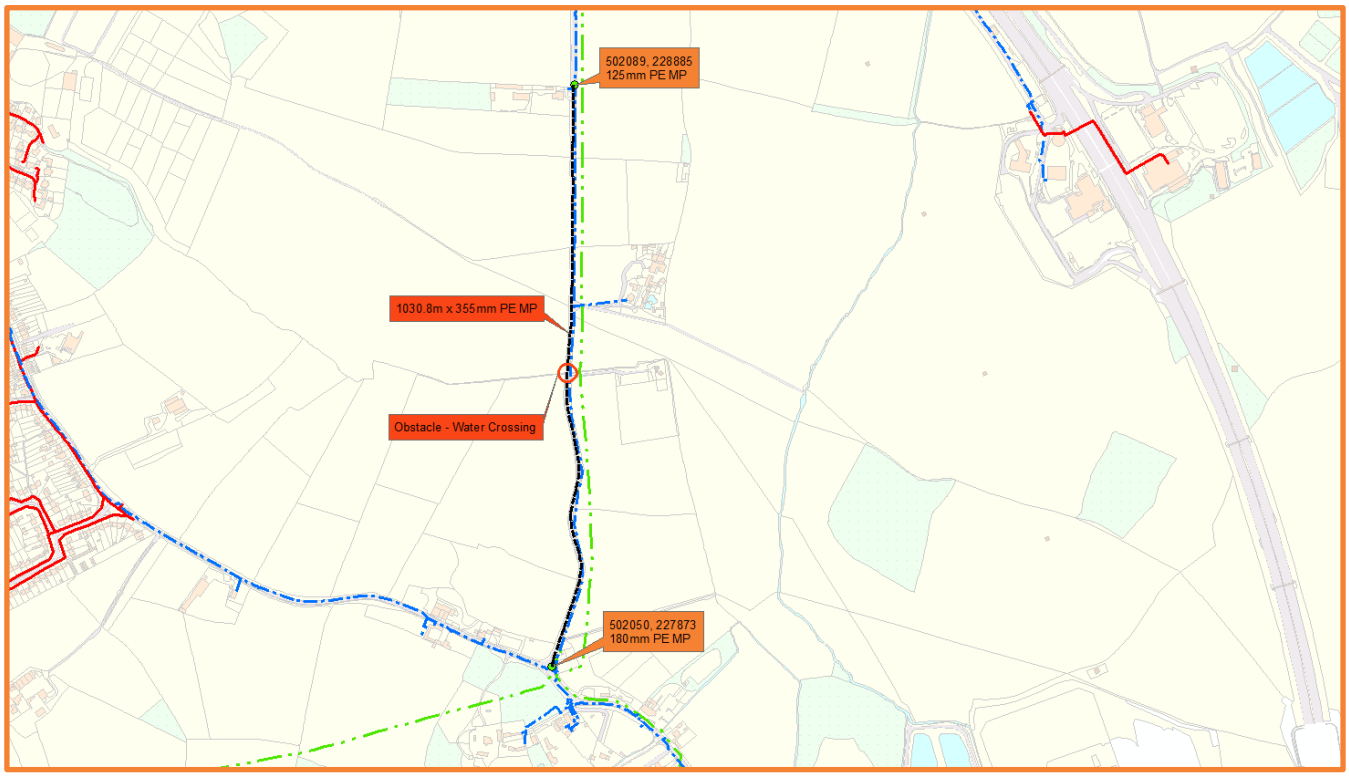

Figure 7 – Route of reinforcement.

Figure 8 – Reinforcement Route – Google View.

3.3.1 Connection Point Two – Intermediate Pressure (Demand Option 1, 2 or 3)

Utilising the 180mm HDPE IP potential connection point 503250; 233274. The IP main would be suitable for the full demand of either option 1, 2 or 3. With a minimum of main pressure of 3640mBar available at the connection point.

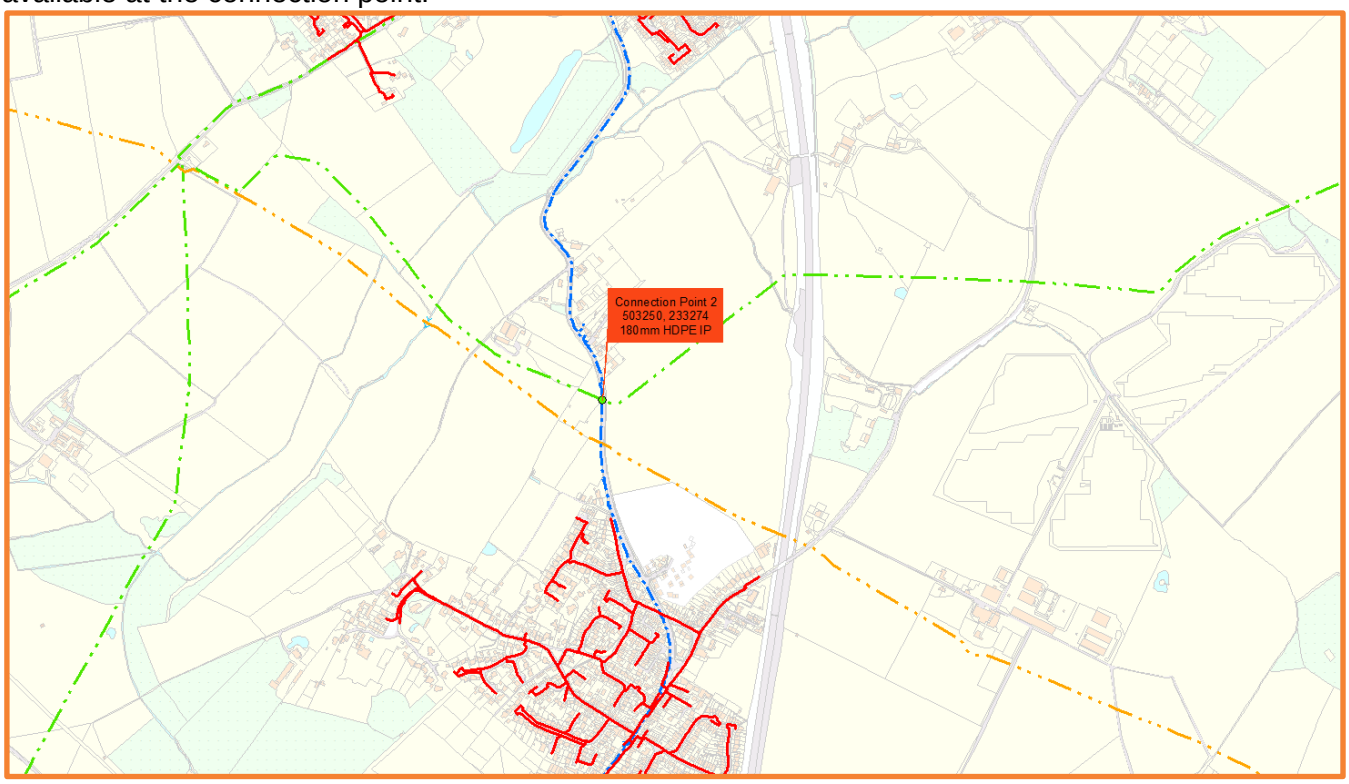

Figure 9 – IP Connection Point.

3.3.2 Heat Recovery

Following Heat Recovery analysis, it is expected that the temperature of gas will recover back to 0ºC before the proposed IP connection point shown in section 3.3.1. The distance from the outlet to the IP connection point is approximately 2,500.00 meters. This analysis has been completed using option 1 (the largest load) as worse case. Heat Recovery shown in figure 10.

Results

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Distance (km)	Temperature (°C)	Distance (km)	Temperature (°C)	Distance (km)	Temperature (°C)
0.00	-8.80	0.96	-3.87	2.62	1.06
0.04	-8.55	1.02	-3.62	2.74	1.31
0.08	-8.31	1.08	-3.37	2.87	1.56
0.12	-8.06	1.14	-3.13	3.01	1.80
0.16	-7.81	1.21	-2.88	3.16	2.05
0.20	-7.57	1.27	-2.63	3.32	2.30
0.25	-7.32	1.34	-2.39	3.49	2.54
0.29	-7.07	1.41	-2.14	3.67	2.79
0.34	-6.83	1.49	-1.89	3.87	3.04
0.38	-6.58	1.56	-1.65	4.08	3.28
0.43	-6.33	1.64	-1.40	4.32	3.53
0.48	-6.09	1.72	-1.16	4.59	3.78
0.53	-5.84	1.81	-0.91	4.89	4.02
0.58	-5.59	1.89	-0.66	5.24	4.27
0.63	-5.35	1.98	-0.42	5.65	4.52
0.68	-5.10	2.08	-0.17	6.14	4.76
0.73	-4.85	2.18	0.08	6.78	5.01
0.79	-4.61	2.28	0.32	7.65	5.26
0.84	-4.36	2.39	0.57	9.05	5.50
0.90	-4.11	2.50	0.82	13.19	5.75

Figure 10 – IP Heat Recovery from PRS to connection point.

Reinforcement Costing

4.0. Charging Point

The Connection Charging Point is the closest economically feasible point (taking into account any customer request for gas to be made available at a particular pressure) on our system, which is deemed to have enough capacity to supply the new load disregarding existing loads.

The Connection Charging Point creates the financial distinction between Connection Costs, that are fully chargeable to the person concerned and upstream reinforcement costs, which may be funded by us subject to any contractual requirements.

If a booster or compressor is to be installed as part of the downstream equipment, any charging point shall lie on a main which is at least the same diameter as the new connecting main.

Connection Options	Charging point co-ordinates	Distance to requested connection point
Connection Point One: 180mm PE MP	503246; 233219	0m
Connection Point Two: 180mm HDPE IP	503250; 233274	0m

Figure 11 – Charging point summary.

5.0. Reinforcement costs

Figure 12 shows a budget indication of investment to maintain security of supply to the connection, when using an UIP to complete the final connection.

Figure 13 shows a budget indication of investment to maintain security of supply to the connection, when using the iGT quotations route to complete the final connection.

The non-contiguous reinforcement aspects of the reinforcement option have been identified in sections 3.2.1 and 3.2.2, shown within the Total Estimated Cost Range within the summary in figure 12 and 13.

A design study will also be required for these options (3.2.1 & 3.2.2) prior to a quotation being provided, this is due to an obstacle identified along the route and the cost surrounding the project. Figures 12 and 13 details the anticipated design study cost for each option.

Reinforcement Level (UIP)	Connection Point Pressure	Estimated Reinforcement Cost	Design Study Cost	Estimated Customer Contribution (Total)
Reinforcement Option 3.2.1 – 20,000KWH 180mm PE MP 503246; 233219	450mBar	£800,859.31	£22,000.00	£0
Reinforcement Option 3.2.2 – 20,000KWH 180mm PE MP 503246; 233219	450mBar	£712,024.41	£22,000.00	£0

Figure 12 – Table showing indicative reinforcement costs UIP.

Reinforcement Level (iGT)	Connection Point Pressure	Estimated Reinforcement Cost	Design Study Cost	Estimated Customer Contribution (Total)
Reinforcement Option 3.2.1 – 20,000KWH 180mm PE MP 503246; 233219	450mBar	£800,859.31	£22,000.00	£0
Reinforcement Option 3.2.2 – 20,000KWH 180mm PE MP 503246; 233219	450mBar	£712,024.41	£22,000.00	£0

Figure 13 – Table showing indicative reinforcement costs, iGT.

5.2. Indicative Connection Routes & Indicative Costs

The routes identified are potential options when looking to lay pipeline.

Pipeline diameter, length and costs provided are indicative only, and based on works being delivered entirely by Cadent (or strategic partner).
No in-depth design work has been carried out as part of this DAS; therefore, the cost range covers the cheapest laying techniques (i.e., in verge) to the more complex and expensive (i.e., road/highway) – and diameters of such pipelines are subject to change following design stages.

A design study for options 3.2.1 and 3.2.2 are required. These studies need to be undertaken in the first instance; the cost of the study is set out in figures 12 and 13.

Upon completion of these studies a quotation will be provided.

Please also note that a more suitable route may be available.

The construction of connecting to <7 Bar pipe work is open to competition and customers therefore have the option to employ a Utility Infrastructure Provider (UIP) to carry out this work. The UIP must have met the following obligations to undertake the work:

- be a signatory to the Cadent Final Connection Agreement
- hold the appropriate GIRS accreditation
- follow Cadent Safe Control of Operations at all times whilst carrying out the works.

More information regarding Utility Infrastructure Providers (UIPs) can be found below:
https://cadentgas.com/our-services/household-customers/alternative-providers
https://www.lrqa.com/en-gb/utilities/girs/

You also have the option to employ Cadent to carry out this work, please visit https://cadentgas.com/our-services/connections-hub for more information on our Non Standard Quotations process which includes information on how to apply for a Non Standard Quotation and provides guidance for each step of the Non Standard connections process.

Conclusions and Summary

Detailed network analysis has determined that the connection point onto the IP network would be suitable for all demand option. A connection onto the MP network would only be suitable for the demand option 3 (20,000kwh) and reinforcement will be required.

Option 3.2.1 and 3.2.2 will require a design study in the first instance. – Due to the complexity of the reinforcement works and the design study required, the design study cost we have provided is based on a range between £22K - £25K. This cost would be revisited if you came in for a MP connections quotation request, and the SCJ documentation would detail the final design study cost amount.

Please be aware that due to the cost associated with the specific network reinforcement an Advanced Reservation of Capacity Agreement (ARCA) will be required for this connection. For more information relating to the ARCA please refer to the Cadent Charging Methodology which can be found here: https://cadentgas.com/our-services/information-hub

Figure 14 summarises the options available for a connection to the MP or IP network at the proposed point of connection (costs based on Cadent only works – and are not an official quote).

The Estimated Customer Contribution documented within Figure 14 is based on the works being completed via the UIP quotation route or via the Non-Standard connections route. For both of these routes, Cadent would adopt the connection on completion.

Reinforcement Level (UIP)	Connection Point Pressure	Estimated Reinforcement Cost	Design Study Cost	Estimated Customer Contribution (Total)
Reinforcement Option 3.2.1 – 20,000KWH 180mm PE MP 503246; 233219	450mBar	£800,859.31	£22k - £25k	£0
Reinforcement Option 3.2.2 – 20,000KWH 180mm PE MP 503246; 233219	450mBar	£712,024.41	£22k - £25k	£0
Reinforcement Option 3.3.1 – 100,000KWH 180mm HDPE IP 503250; 233274	3640mBar	£0	£0	£0
Reinforcement Option 3.3.1 – 50,000KWH 180mm HDPE IP 503250; 233274	3640mBar	£0	£0	£0
Reinforcement Option 3.3.1 – 20,000KWH 180mm HDPE IP 503250; 233274	3640mBar	£0	£0	£0

Figure 14 – UIP Summary of connection point.

Figure 15 summarises the options available for a connection to the MP or IP network at the proposed point of connection (costs based on Cadent only works – and are not an official quote).

The Estimated Customer Contribution documented within Figure 15 is based on the works being completed via the iGT quotation route or via the Non-Standard connections route. Upon completion of the works, Cadent would only be responsible for the connection and the rest of the site would be adopted by your chosen iGT.

Reinforcement Level (iGT)	Connection Point Pressure	Estimated Reinforcement Cost	Design Study Cost	Estimated Customer Contribution (Total)
Reinforcement Option 3.2.1 – 20,000KWH 180mm PE MP 503246; 233219	450mBar	£800,859.31	£22k - £25k	£0
Reinforcement Option 3.2.2 – 20,000KWH 180mm PE MP 503246; 233219	450mBar	£712,024.41	£22k - £25k	£0
Reinforcement Option 3.3.1 – 100,000KWH 180mm HDPE IP 503250; 233274	3640mBar	£0	£0	£0
Reinforcement Option 3.3.1 – 50,000KWH 180mm HDPE IP 503250; 233274	3640mBar	£0	£0	£0
Reinforcement Option 3.3.1 – 20,000KWH 180mm HDPE IP 503250; 233274	3640mBar	£0	£0	£0

Figure 15 – iGT Summary of connection point

Before a connection offer can be made, dependent on which option you choose, design studies will need to be completed in the first instance for 3.2.1 & 3.2.2.

Please submit an FM138/FM153 Connection Request or apply via the Non Standard connections route and include this DAS reference (DAS/EX/000) within the email.

This DAS is available for 21 days following the issue of this document, the expiry date is XX/XX/XXXX.

If you choose an option which has not been captured within the report this will incur the normal quotation charge.

Acceptance Options

Detailed analysis has been carried out to understand the capability of the network in relation to the customer's request to connect and reserve capacity. This study is a reflection of the network at the time delivered and is not a guarantee of gas flow or capacity due the changing dynamics of the gas distribution network.

UIP:

☐ Connection Point 1 – 503246; 233219. Demand option 20,000kwh only - 600mBar Peak and Off Peak - Connect to the 180mm PE MP main as identified in figure 4. This will require reinforcement as set out in section 3.2.1. There is no customer contribution anticipated for this option

☐ Connection Point 1 – 503246; 233219. Demand option 20,000kwh only - 600mBar Peak and Off Peak - Connect to the 180mm PE MP main as identified in figure 4. This will require reinforcement as set out in section 3.2.2. There is no customer contribution anticipated for this option. A design study will be also required in the first instance for this option.

☐ Connection Point 2 – 503250; 233274. Demand option 100,000kwh only - 3640mBar Peak and Off Peak - Connect to the 180mm HDPE IP main as identified in figure 4. No reinforcement required as shown in section 3.3.1. There is no customer contribution anticipated for this option

☐ Connection Point 2 - 503250; 233274. Demand option 50,000kwh only - 3640mBar Peak and Off Peak - Connect to the 180mm HDPE IP main as identified in figure 4. No reinforcement required as shown in section 3.3.1. There is no customer contribution anticipated for this option

☐ Connection Point 2 - 503250; 233274. Demand option 20,000kwh only - 3640mBar Peak and Off Peak - Connect to the 180mm HDPE IP main as identified in figure 4. No reinforcement required as shown in section 3.3.1. There is no customer contribution anticipated for this option

iGT:

☐ Connection Point 1 – 503246; 233219. Demand option 20,000kwh only - 600mBar Peak and Off Peak - Connect to the 180mm PE MP main as identified in figure 4. This will require reinforcement as set out in section 3.2.1. There is no customer contribution anticipated for this option

☐ Connection Point 1 – 503246; 233219. Demand option 20,000kwh only - 600mBar Peak and Off Peak - Connect to the 180mm PE MP main as identified in figure 4. This will require reinforcement as set out in section 3.2.2. There is no customer contribution anticipated for this option A design study will be also required in the first instance for this option.

☐ Connection Point 2 – 503250; 233274. Demand option 100,000kwh only - 3640mBar Peak and Off Peak - Connect to the 180mm HDPE IP main as identified in figure 4. No reinforcement required as shown in section 3.3.1. There is no customer contribution anticipated for this option

☐ Connection Point 2 - 503250; 233274. Demand option 50,000kwh only - 3640mBar Peak and Off Peak - Connect to the 180mm HDPE IP main as identified in figure 4. No reinforcement required as shown in section 3.3.1. There is no customer contribution anticipated for this option

☐ Connection Point 2 - 503250; 233274. Demand option 20,000kwh only - 3640mBar Peak and Off Peak - Connect to the 180mm HDPE IP main as identified in figure 4. No reinforcement required as shown in section 3.3.1. There is no customer contribution anticipated for this option

Before a connections offer can be made, a design study will be required in the first instance. Please arrange for a FM138/FM153 Connection Request to be submitted or apply via the Cadent Non Standard Quotations route and include this DAS reference (DAS/EX/000) within your application. Please also include which option you wish to go ahead with.

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