Cadent
Your Gas Network

Detailed Analysis Study
Ashby Road

DAS/EX/000
Prepared for Cadent Gas Ltd
July 2019

Document Purpose

The aim of this document is to provide Cadent Gas Ltd the findings of the Detailed Analysis Study (DAS) undertaken for the domestic CSEP 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.

If you wish to secure capacity and connect to the network, please submit an FM138 Connections Request via the official connections route allowing for further analysis to verify the capability of the network again.

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Contents

Statement of Requirements

Cadent Gas Ltd has requested a Detailed Analysis Study (DAS) to identify where capacity is available within the Cadent Gas network in Hinckley, Leicestershire. The proposed connection is for a domestic CSEP.

1. Site Location

The proposed domestic CSEP location is off Ashby Road, Hinckley.

The site address provided by Cadent Gas Ltd is:

Land off Ashby Road
Ashby Road
Hinckley
LE10 3DX

Figure 1 shows the anticipated site location highlighted.

Figure 1 - Google Maps image showing Land off Ashby Road, domestic CSEP

1.1. Anticipated Flow and Pressure Requirement

Cadent Gas Ltd has a maximum preferred diversified gas load of 16725kwh (1543.87scmh) 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 two load options are captured in Figure 3.

Period	Peak Demand	Off Peak Demand	Peak Demand	Low 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.

The required pressure the connection point for this site is 26mbar.

As such, the most suitable connection point would be on a Low Pressure (LP) 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.

Option	Kwh (Diversified)	Scmh (Diversified)
Load Option 1 (Year 10)	16725	1543.87
Load Option 2 (Condition 16)	20752	1915.56

3 - Load options identified from DAS Application

1.2. Connections History

Cadent Gas Ltd submitted two land enquiry requests under references 16000xxxx and 16000xxxx, both FM172 requests triggered a requirement for reinforcement.

Connection Option(s)

2. Suitable Connection Points – without reinforcement

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).

There is an 8-inch Cast Iron (CI) low pressure gas main within the highway on Ashby Road running adjacent to the site.

Unfortunately, this LP pipeline would not be suitable for a new significant demand.

The pressure loss across the pipeline breaches our minimum pressure requirement at existing nearby customers both upstream and downstream of the proposed domestic CSEP.

Figure 4 shows the suitable connection points which would not require network reinforcement.

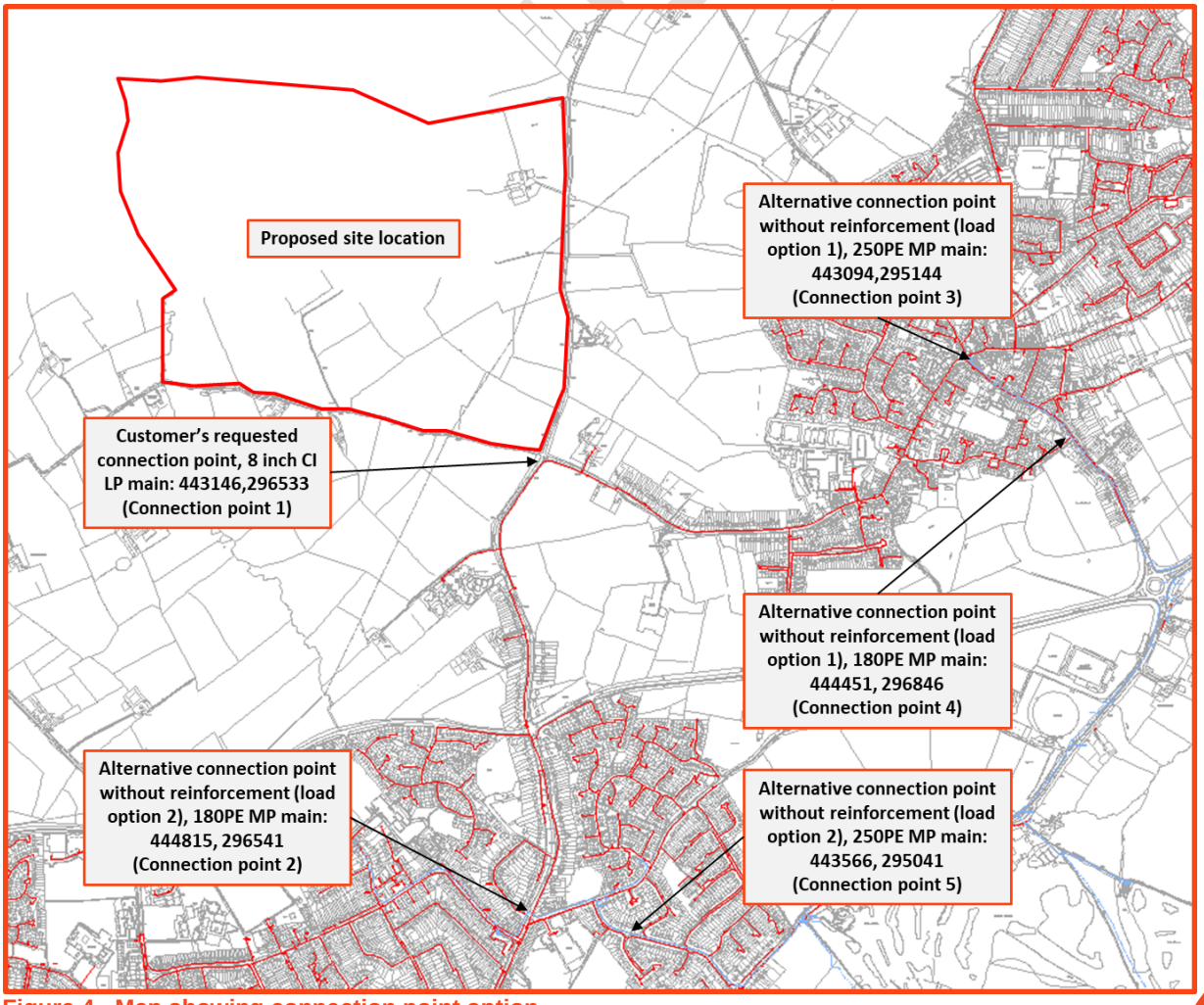

Figure 4 - Map showing connection point option

2.1. Load Option 1 – 16725Kwh Diversified (1543.87scmh)

The closest connection point to supply the requested load without reinforcement is on the 180mm polyethylene (PE) medium pressure (MP) main at co-ordinates 444451; 296846 (connection point 3); at the junction of Chapel Street and Shilton Road, Barwell.
This connection point is approximately 1.36km east of the site location (as the crow flies).
The operating pressure of this network is between 2000mbar and 350mbar.

There is also a connection point to the South of the proposed site which can supply the requested load without reinforcement. This connection point is on the 250mm PE MP main at coordinates 443094;295144 (connection point 2); at the junction of Barwell Lane and Ashby Road, Hinckley.
The connection point is approximately 1.44km South of the site location (as the crow flies).
The operating pressure of this network is between 2000mbar and 350mbar.

2.2. Load Option 2 – 20572Kwh Diversified (1915.56scmh)

The closest connection point to supply the requested load without reinforcement is on the 250mm PE medium pressure (MP) main at co-ordinates E443566; N295041 (connection point 5); at the junction of Stoneygate Drive and Ribblesdale Avenue, Hinckley.
This connection point is approximately 1.54km south of the site location (as the crow flies).
The operating pressure of this network is between 2000mbar and 350mbar.

There is also a connection point to the East of the proposed site which can supply the requested load without reinforcement. This connection point is on the 180mm PE MP main at coordinates 444815;296541 (connection point 4); located in The Common, Barwell.
The connection point is approximately 1.66km east of the site location (as the crow flies).
The operating pressure of this network is between 2000mbar and 350mbar.

2.3. Available Pressures

A minimum of 450mbar is the available pressure at each of the connection points identified in section 2.1 and 2.2 when assessing the demand options (from figure 3). Pressures recorded are based on peak analysis – which also reflects our 1:20 winter worst case pressure – so should be the minimum seen under normal operating conditions.

2.4. Available Capacity

This section gives you an indication of the available capacity at each of the connection points identified in figure 4 without the requirement for reinforcement. Figures taken from the full load schedule (figure 14 in Appendix A).

Connection point	Year of Phasing acceptable without reinforcement	Number of Properties	Load Diversified (in scmh)
1 – 8-inch CI LP	Year 3	600	490.01
2 – 180mm PE MP	Year 10	2000	1543.87
3 – 250mm PE MP	Year 10	2000	1543.87
4 – 180mm PE MP	Condition 16	2500	1915.56
5 – 250mm PE MP	Condition 16	2500	1915.56

Figure 5 – Table showing available capacity

2.5 Governor Capacity

As part of the analysis the capacity of influencing governors and Pressure Reduction Systems (PRS) were checked to ensure the customer's load did not cause a failure.

For all connection points identified within figure 4 no capacity issues were identified.

3. Utilising the requested connection point

As previously mentioned in section 1 the requested connection point on the 180mm PE main within Ashby Road does not have capacity to supply any new significant loads without reinforcement.
This section will demonstrate the reinforcement options to ensure security of supply to the connection point.

3.1 Load Option 1 - 16725kwh Diversified (1543.87scmh)

Utilising the requested connection point triggers the requirement for reinforcement. Two options have been identified to ensure security of supply to the proposed connection point. The first option is fully contiguous, and the second option offers a non-contiguous option.

3.1.1 Reinforcement Contiguous option:

The route to the connection point to supply loading scenario one (which is acceptable for up to 1543.87scmh) is within public access shown in figure 6.
Approximately 750m of 180mm PE would be required to maintain acceptable pressure drops and velocities from the 9-inch CI LP pipeline at 443087; 295878 to 443146; 296533 tying back in to the 8-inch CI LP at the connection point.

Figure 5 - Route of Contiguous option

3.1.2 Reinforcement Non-Contiguous option

The route for the non-contiguous reinforcement option that can supply the requested load (1543.87scmh) is within public access as shown in figure 7.
Approximately 590m of 180mm PE would be required to maintain acceptable pressure drops and velocities from the 200mm Ductile Iron (DI) LP pipeline at 443463; 295230 to 443165; 295289 tying back into the network at the 9-inch CI LP main.

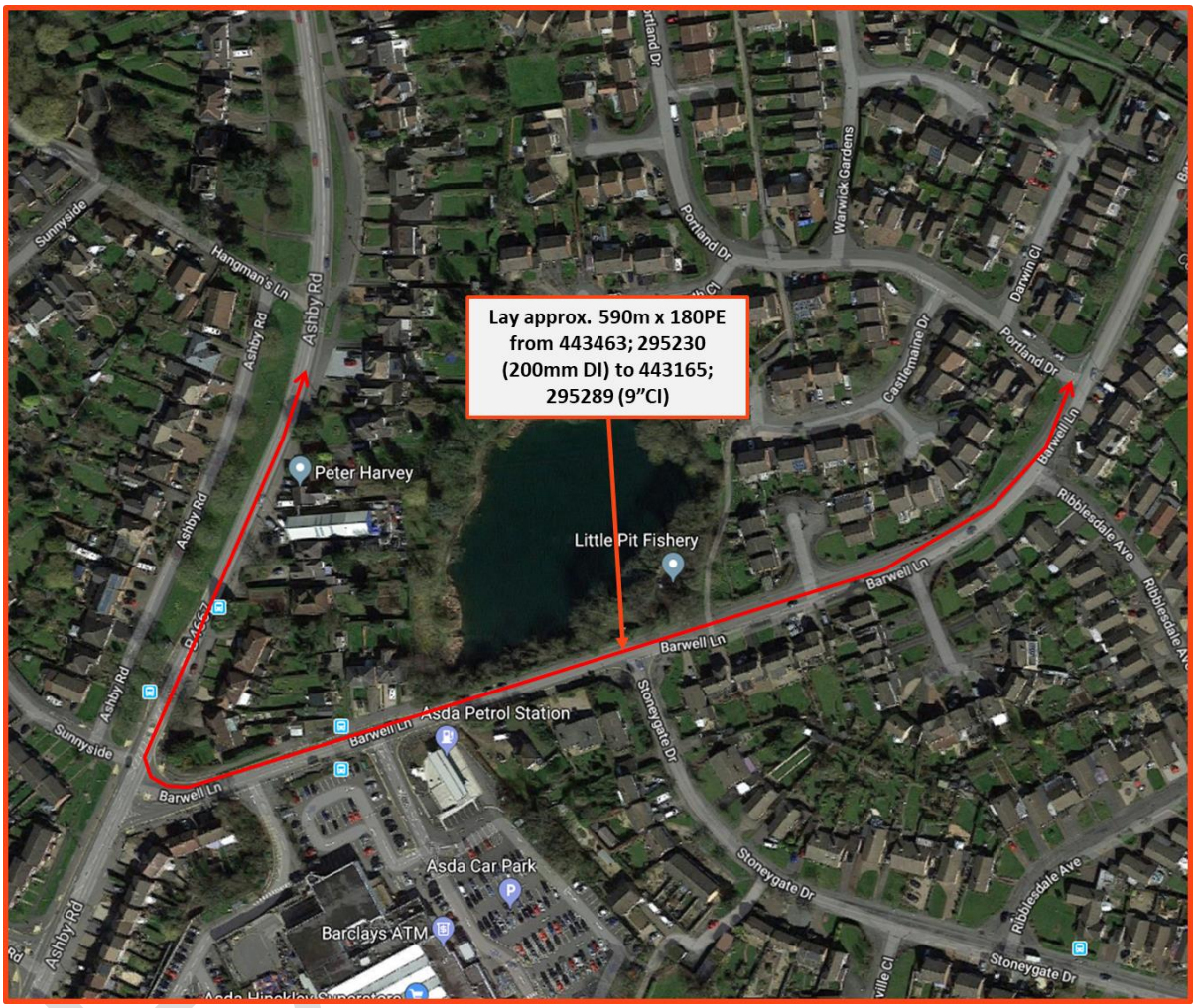

Figure 7 - Route of Non-Contiguous option

3.2 Load Option 2 – 20572Kwh Diversified (1915.56scmh)

Utilising the requested connection point triggers the requirement for reinforcement. Two options have been identified to ensure security of supply to the proposed connection point. The first option is fully contiguous, and the second option offers a non-contiguous option.

3.2.1 Reinforcement Contiguous option:

The route for the contiguous reinforcement option that can supply the requested load (1915.56scmh) is within public access as shown in figure 8.
Approximately 1,036m of 250mm PE would be required to maintain acceptable pressure drops and velocities from the 250PE LP pipeline at 443120; 295593; to 443146; 296533 tying back in to the 8-inch CI LP at the connection point.

This option will be classed as sufficiently complex due to cost.

Figure 8 – Route of contiguous option

3.2.2 Reinforcement Non-Contiguous option:

The route for the non-contiguous reinforcement option that can supply the requested load (1915.56scmh) is within public access as shown in figure 9.
Approximately 800m of 250mm PE would be required to maintain acceptable pressure drops and velocities from the 315mm PE LP pipeline at 443906; 295091; to 443146; 296533 tying back in to the 8-inch Ductile Iron (DI) LP pipeline.

This option will be classed as sufficiently complex due to cost.

Figure 9 – Route of non-contiguous option

4. 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.

Load Option	Charging point co-ordinates	Distance to requested connection point
1 – 1543.87scmh	443146; 296533	0m
2 – 1915.56scmh	443012; 296196	400m

Figure 10 - Charging point summary

5. Alternative options

5.1 Reduced pressure at connection point

An option that has been explored is to identify if taking a reduced pressure at connection point 1 identified in figure 4 would eliminate the requirement for reinforcement whilst still maintaining the security of supply of the network.

For the option 1 load (1543.87scmh) accepting a reduced pressure of 23mbar at the connection point would eliminate the requirement for reinforcement. However, the option 2 load (1915.56scmh) would still require some level of reinforcement to achieve 23mbar as detailed below.

The route for the contiguous reinforcement option that can supply the requested load (1915.56scmh) to maintain a source pressure of 23mbar is within public access as shown in figure 11.
Approximately 650m of 180mm PE would be required to maintain acceptable pressure drops and velocities from the 9-inch CI LP pipeline at 443146; 295968; to 443146; 296533 tying back in to the 8-inch CI LP at the connection point.

Figure 11 – Contiguous reinforcement to maintain 23mbar

6. Reinforcement costs

Figure 12 shows a budget indication of investment to maintain security of supply to the connection. These costs do not represent the downstream pipework from the connection point to the site.

The contiguous reinforcement aspects of the reinforcement options have been identified in sections 3.1.1, 3.2.1 and 5.1 are shown within the Total Estimated Cost Range within the summary in figure 13. This aspect of work is open to competition.

Figure 12 also highlights the non-contiguous reinforcement element of the option and this part must be delivered by Cadent (i.e. this is not open to UIPs to carry out the work).

Reinforcement Level	Non-contiguous Reinforcement	Customer Contribution	Contiguous Reinforcement	Customer Contribution	Connection Point Pressure	SCJ Design Study Cost
Load Option 1 – 1543.87scmh	£193,000	£0	£241,000	£0	26mbar	N/A
Load Option 2 – 1915.56scmh	£385,000	£90,000	£476,000	£185,500	26mbar	£4,500
Load Option 2 – 1915.56scmh	-	-	£210,000	£0	23mbar	N/A

Figure 12 Table showing indicative reinforcement costs

6.1. 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.

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.

Conclusions and Acceptance Options

Detailed network analysis has determined that (i) the nearest LP connection point would require some levels of reinforcement, and (ii) has identified the closest points of connection which could supply the new domestic CSEP.

Figure 13 summarises the options available for a connection to the LP gas network at the requested point of contact (costs based on Cadent only works – and are not an official quote).

Reinforcement Level	Non-contiguous Reinforcement	Customer Contribution	Contiguous Reinforcement	Customer Contribution	Connection Point Pressure	SCJ Design Study Cost
Load Option 1 – 1543.87scmh	£193,000	£0	£241,000	£0	26mbar	N/A
Load Option 2 – 1915.56scmh	£385,000	£90,000	£476,000	£185,500	26mbar	£4,500
Load Option 2 – 1915.56scmh	-	-	£210,000	£0	23mbar	N/A

Figure 13 - Summary of connection point / reinforcement options

To proceed with a connection to the Cadent Gas distribution network and secure the relevant capacity please submit either an FM138 Connection Request through a UIP or a non-standard quotation request.

Select one of the following options and submit this DAS report alongside your quotation request within 21 working days of receiving the report to receive a free quotation. You may submit a connections request for an option not identified within this report however you will then be charged the quotation fee.

Please tick one of the following and submit alongside your connections request:

- ☐ Option 1: Connection to the 8-inch CI LP main at 443146;296533 for the year 10 load.
- ☐ Option 2: Connection to the 8-inch CI LP main at 443146;296533 for the condition 16 load (this option will result in an SCJ quotation with a design study costing £4,500).
- ☐ Option 3: Alternative MP connection points 2 to 5 identified in figure 4 (please identify in your quotation submission which connection point you wish to connect to).
- ☐ Option 4: Accept reduced pressure of 23mbar at connection point as identified in section 5.1

Appendix A

Customer Loadings

Figure 14 shows the customers load schedule, taken from the customer's DAS application form.

CSEP Year	No. NDM Connections	Annual Quantity (kWh)	Supply Hourly Quantity (kW)	Max. Annual Quantity (kWh)	Max CSEP offtake rate (kWh/h)
Year 1	200	3,600,000	3,600	3,600,000	3,600
Year 2	400	7,200,000	7,200	7,200,000	7,200
Year 3	600	10,800,000	10,800	10,800,000	10,800
Year 4	800	14,400,000	14,400	14,400,000	14,400
Year 5	1000	18,000,000	18,000	18,000,000	18,000
Year 6	1200	21,600,000	21,600	21,600,000	21,600
Year 7	1400	25,200,000	25,200	25,200,000	25,200
Year 8	1600	28,800,000	28,800	28,800,000	28,800
Year 9	1800	32,400,000	32,400	32,400,000	32,400
Year 10	2000	36,000,000	36,000	36,000,000	36,000
Condition 16	2500	45,000,000	45,000	45,000,000	45,000

Figure 14: Customer's load schedule taken from the DAS application form