

**Planning and Advanced Reservation of Capacity Agreement (PARCA)**

**SCHEDULE ONE**

**NEED CASE REPORT**

**For**

**South Hook Gas Company Limited (the Reservation Party)**

**Prepared by National Grid Gas (NGG)**

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**Table of Contents**

EXECUTIVE SUMMARY .....3

1 Introduction .....4

2 South Hook Terminal .....6

3 Existing National Transmission System .....7

4 Assessment of the National Transmission System in the South West .....9

5 Conclusions ..... 11

Glossary ..... 12

Appendix A – Tolerance Check Summary ..... 16

Appendix B – Geographic View of the National Transmission System ..... 17

Appendix C – Summary of National Grid Legal Obligations ..... 18

Appendix D – National Transmission System Analysis Principles ..... 21

## **EXECUTIVE SUMMARY**

National Grid received a Planning and Advanced Reservation of Capacity Agreement (PARCA) application from South Hook Gas Company Limited on 24 April 2018. The application requested additional Firm NTS Entry Capacity<sup>1</sup> of up to 163 GWh/d above the prevailing level of Obligated Entry Capacity<sup>2</sup> at Milford Haven Aggregated System Entry Point (ASEP), from 1 January 2023. The application became a Competent PARCA Application on 4 May 2018<sup>3</sup>.

This Need Case Report documents the network analysis carried out in order to investigate the impact on the NTS of the requested additional Firm NTS Entry Capacity.

The network analysis has shown that the additional entry capacity cannot be met by the existing NTS.

The additional Firm NTS Entry Capacity is proposed to be reserved as Incremental Obligated Entry Capacity, the full quantity of which is proposed to be treated as Funded Incremental Obligated Entry Capacity<sup>4</sup>.

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<sup>1</sup> Uniform Network Code, Transportation Principal Document, Section, Section B2.1.7

<sup>2</sup> Special Condition 1A. Definitions

<sup>3</sup> Uniform Network Code, Transportation Principal Document, Section B1.15.4.

<sup>4</sup> Special Condition 5F of National Grid's Gas Transporter Licence in respect of the NTS

## 1 Introduction

- 1.1 This report (the “Need Case”) is part of the pre-application procedures adopted by National Grid Gas plc (“National Grid”) for major infrastructure projects that may require an application to the Planning Inspectorate<sup>5</sup> for Development Consent Orders (DCOs).
- 1.2 National Grid received a Planning and Advanced Reservation of Capacity Agreement (PARCA) application from South Hook Gas Company Limited. This Need Case documents the findings of National Grid’s assessment of the scope of changes needed to the existing gas National Transmission System (NTS) to meet the customer’s requirement for for additional Firm NTS Entry Capacity.
- 1.3 The purpose of this Need Case is to inform interested parties of any requirement to reinforce the National Grid’s existing NTS in order to provide additional NTS Entry Capacity at Milford Haven ASEP.
- 1.4 This Need Case does not propose technical options for how the necessary NTS reinforcement could be achieved. An assessment of any technical options that could meet the requirement set out in this Need Case will be presented in the Technical Options Report as required.
- 1.5 This Need Case document provides:
  - A summary of the NTS Entry Capacity requirement for Milford Haven ASEP (Section 2).
  - A description of the NTS infrastructure in the vicinity of Milford Haven ASEP (Section 3).
  - Summary details of the results of National Grid’s assessment of the capability of the NTS and of the NTS capacity that is available to meet the changes to customer requirements (Section 4).
  - Summary details of the options considered (Section 5).
  - The main conclusions from National Grid’s analysis work (Section 6).

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<sup>5</sup> Further information is available from the Planning Inspectorate website at <http://infrastructure.independent.gov.uk/>.

## National Grid

1.6 This Need Case document also includes appendices that contain more detailed information. The appendices provide:

- A geographic representation of National Grid's NTS (Appendix A).
- A summary of National Grid's legal obligations relevant to this Need Case document (Appendix B).
- An overview of the NTS policies standards and guidelines (Appendix C) analysis principles including details of compliance requirements, key assessment criteria, factors that limit the NTS capability, possible consequences of exceeding capability limits and references to generic options for enhancing the NTS capability are included in the Transmission Planning Code which can be found on the National Grid website using the following link:

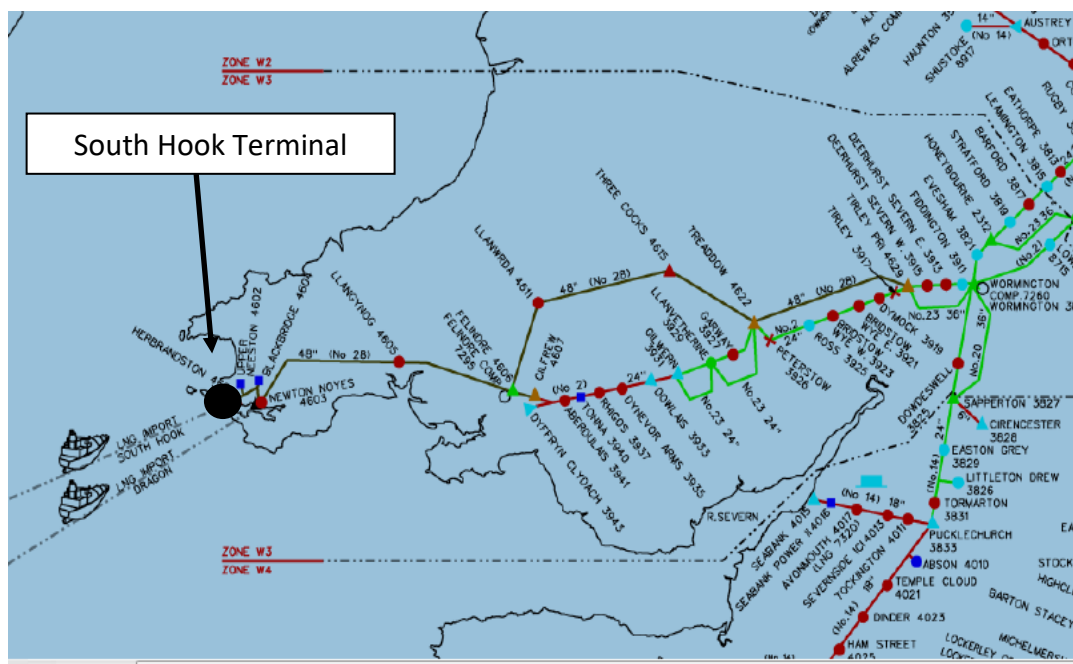
<https://www.nationalgridgas.com/charging>

- A summary of the capacity ranges assessed as part of the Need Case tolerance check (Appendix D).

## 2 South Hook Terminal

- 2.1 South Hook Gas Company Ltd will require additional Firm NTS Entry Capacity of up to 163 GWh/d from 1st January 2023 for the South Hook LNG Terminal at Milford Haven ASEP. This supply will be met by the existing connection on feeder 28.
- 2.2 South Hook Gas Company Limited has submitted a competent PARCA application which initiated PARCA Phase 1 Works. As part of these works National Grid began investigating the impact of the additional NTS Entry Capacity requirement on the NTS.
- 2.3 The location of South Hook LNG Terminal within the South West entry zone<sup>6</sup> of the NTS is shown in Figure 2.1.

Figure 2.1 - Map showing the location of South Hook Terminal



<sup>6</sup> As the zone is referred to in National Grid’s Gas Ten Year Statement (GTYS). The GTYS can be found at <https://www.nationalgridgas.com/insight-and-innovation/gas-ten-year-statement-gtys>

### 3 Existing National Transmission System

3.1 Details of the existing NTS pipelines in the vicinity of South Hook Terminal are given in Table 3.1 below.

Feeder Number	From	To	Diameter (mm)	Length (km)
28	South Hook Terminal	Upper Neeston	1200	1
28	Upper Neeston	Blackbridge	1200	7
28	Blackbridge	Milford Haven NN	1200	1
28	Milford Haven NN	Felindre	1200	96
28	Felindre	Treddow	1200	165
28	Treddow	Tirley	1200	34
2	Felindre	Tirley	600	127
23	Tirley	Wormington	900	26
2	Tirley	Wormington	600	26

**Table 3.1** - Details of the Feeders adjacent to South Hook Terminal

3.2 Details of the compressor stations used to support gas entry at Milford Haven are detailed in table 3.2.

Compressor Site	Unit	Unit type	Compressor purpose
Wormington	A	12.3 MW Avon 1533	Moves gas away from Milford Haven towards the West Midlands and supports extremity pressures in the South West.
	B	12.3 MW Avon 1533	
	C	15 MW electric	

Felindre	A	35MW electric	Moves gas away from the Milford Haven terminal towards Wormington compressor station.
	B	14.5MW Solar titan	
	C	14.5MW Solar titan	
Churchover	C	14.5MW Solar titan	Supports high levels of Milford Haven entry by moving gas away from the West Midlands and on to Peterborough and Alrewas compressor stations.
	D	15MW electric	
Alrewas	A	12.3 MW Avon 1533	Moves gas away from Churchover compressor station to support very high Milford Haven entry levels
	B	12.3 MW Avon 1533	
	C	15.2 MW Solar titan	

**Table 3.2** - Details of the compressors that support Milford Haven entry



#### 4 Assessment of the National Transmission System in the South West

##### *The existing National Transmission System in the South West<sup>7</sup>*

4.1 To assess the entry capacity available at South Hook Terminal, a physical network topology was used. This was derived from information gathered as part of the 2017 Future Energy Scenarios and Gas Ten Year Statement processes.

##### *Demand in the South West*

4.2 As part of the NTS Long Term Demand Forecasting process, National Grid collects information on an annual basis from customers that offtake gas from the NTS. Information is required to be provided to National Grid on a connection point specific basis. Customers are required to provide maximum demand information for the previous year and also demand forecasts for a ten year period. National Grid uses demand forecast information together with information from other sources (e.g. economic growth indicators) to support activities including operation of the NTS and planning NTS developments.

4.3 The '2022/23 Two Degrees, Low Continent' scenario was used at 3 demand levels. Two Degrees was selected due to it having the lowest demand flow level in the region, and Low Continent because it gives the highest supply flow level from the Milford Haven ASEP as a starting point for the capability analysis. Table 4.1 details the national and South Wales demand level used in the analysis.

National Demand (mscm/d)	South Wales Demand (mscm/d)
360	22.7
259	16.9
164	6.5

**Table 4.1** – Details of the demand levels used for analysis

##### *Capability of the National Transmission System in the South West entry zone*

4.4 Network capability analysis has been completed to identify the ability of the NTS to accommodate a given supply and demand pattern, respecting the maximum and minimum pressure requirements of the network, and the efficient and safe

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<sup>7</sup> Six network analysis sensitivity regions are defined for assessing challenging supply and demand pattern for a particular area of the NTS. They are South East, South West, North East, North West, North and Scotland. For this purpose, South Hook Gas Company, Ltd falls under South West.

operation of the system. The aim of the analysis is to find the point at which the network becomes “constrained” i.e. has reached its limits for the given scenario.

- 4.5 This analysis will then be used to inform commercial capacity processes, for example, the level of flow that may be achieved under certain supply/demand conditions is compared to the obligations to release capacity to determine a “constraint volume” of gas at that Entry or Exit Point. It should be noted that it is not possible to directly model the concept of capacity in the commercial sense within these.
- 4.6 As part of the Need Case analysis the entry capacity levels specified by South Hook Gas Company Limited in their application form were assessed to understand the impact on the “constraint volume” and the current risk levels for entry at Milford Haven. This initial capability assessment highlighted that the existing NTS is not capable of accommodating the entry capacity being requested by South Hook Gas Company Limited at an demand level.
- 4.7 With the existing NTS being “constrained” all lower demand levels substitution of another donor site has been discounted. The release of the capacity will be completed through “funded incremental entry capacity”.
- 4.8 Consideration was given to the “early release of capacity”. The additional income received for releasing the capacity as “non-obligated” was not sufficient to cover the commercial tools (“turn-up or down” contracts) required to manage the increase in risk. Therefore, under the current rules and incentives, none of the capacity can be released early.

## **5 Conclusions**

- 5.1 National Grid received a Planning and Advanced Reservation of Capacity Agreement (PARCA) application from South Hook Gas Company Ltd for an additional 163 GWh/d above the prevailing level of Obligated Entry Capacity at Milford Haven ASEP from 1 January 2023. The application became a Competent PARCA Application on 4 May 2018.
- 5.2 The Need Case analysis has shown that the additional entry capacity cannot be met by the existing NTS.
- 5.3 The additional Firm NTS Entry Capacity is proposed to be reserved as Incremental Obligated Entry Capacity, the full quantity of which is proposed to be treated as Funded Incremental entry capacity.
- 5.4 The analysis of investment options to increase the capability of the network is documented in the Technical Options Report.

## Glossary

**ASEP (Aggregate System Entry Point)** - A term used to refer to a gas supply terminal or group of gas supply terminals for which NTS Entry Capacity is sold.

**Bar** - The unit of pressure that is approximately equal to atmospheric pressure (0.987 standard atmospheres). Where bar is suffixed with the letter g, such as in  $\text{bar}_g$  or  $\text{mbar}_g$ , the pressure being referred to is gauge pressure, i.e. relative to atmospheric pressure. One millibar ( $\text{mbar}_g$ ) equals 0.001 bars.

**Calorific Value (CV)** - The ratio of energy to volume measured in Mega joules per cubic metre ( $\text{MJ}/\text{m}^3$ ), which for a gas is measured and expressed under standard conditions of temperature and pressure.

**Compressor Station** - An installation that uses gas turbine or electricity driven compressors to boost pressures in the pipeline system. Used to increase transmission capacity and move gas through the network.

**Cubic Metre ( $\text{m}^3$ )** - The unit of volume, expressed under standard conditions of temperature and pressure, approximately equal to 35.37 cubic feet. One million cubic metres (mcm) are equal to 106 cubic metres, one billion cubic metres (bcm) equals 109 cubic metres.

**Delivery Facility Operator (DFO)** - Operators of the reception terminals, which process and meter gas deliveries from offshore pipelines before transferring the gas to our system.

**Distribution Network (DN)** - An administrative unit responsible for the operation and maintenance of the Local Transmission System (LTS) and  $<7\text{bar}_g$  distribution networks within a defined geographical boundary. There are currently eight DNs, each consisting of one or more LDZs.

**Distribution Network Operator (DNO)** - The operator of a Distribution Network (DN).

**Distribution System** - A network of mains operating at three pressure tiers: intermediate (2 to  $7\text{bar}_g$ ), medium ( $75\text{mbar}_g$  to  $2\text{bar}_g$ ) and low (less than  $75\text{mbar}_g$ ).

**Entry Capability** – the entry capability of the system is the quantity of gas that can be inputted into the NTS. Entry Capability can be considered on a site specific, regional or wider locational basis and it may vary with respect to the distribution and volume of network supply and demand.

**Entry Capacity** – the right to flow gas onto the NTS under the UNC.

**GTYS – Gas Ten Year Statement**

**Gas Transporter (GT)** - Formerly Public Gas Transporter (PGT). GTs, such as National Grid, are licensed by the Gas and Electricity Markets Authority to transport gas to consumers.

**Interconnector** - A pipeline transporting gas to another country. The Irish Interconnector transports gas across the Irish Sea to both the Republic of Ireland and Northern Ireland. The Belgian Interconnector transports gas between Bacton and Zeebrugge. The Belgian Interconnector is capable of flowing gas in either direction. The Dutch Interconnector (BBL) transports gas between Balgzand in the Netherlands and Bacton. It is currently capable of flowing only from the Netherlands to the UK.

**Investment** – an investment to overcome a system constraint is the building of additional infrastructure or modification of existing infrastructure such as a reinforcement pipeline or modification of a compressor.

**Kilowatt hour (kWh)** - A unit of energy used by the gas industry. Approximately equal to 0.0341 therms. One Megawatt hour (MWh) equals  $10^3$  kWh, one Gigawatt hour (GWh) equals  $10^6$  kWh, and one Terawatt hour (TWh) equals  $10^9$  kWh.

**Liquefied Natural Gas (LNG)** - Gas stored and / or transported in liquid form.

**Load Duration Curve (1 in 50 Severe)** - The 1 in 50 severe load duration curve is that curve which, in a long series of years, with connected load held at the levels appropriate to the year in question, would be such that the volume of demand above any given demand threshold (represented by the area under the curve and above the threshold) would be exceeded in one out of fifty years.

**Load Duration Curve (Average)** - The average load duration curve is that curve which, in a long series of winters, with connected load held at the levels appropriate to the year in question, the average volume of demand above any given threshold, is represented by the area under the curve and above the threshold.

**Local Distribution Zone (LDZ)** - A geographic area supplied by one or more NTS offtakes. Consists of LTS and distribution system pipelines.

**Local Transmission System (LTS)** - A pipeline system operating at  $>7\text{bar}_g$  that transports gas from NTS/LDZ offtakes to distribution system low pressure pipelines. Some large users may take their gas direct from the LTS.

**National Balancing Point (NBP)** - A notional point which represents the System for balancing purposes.

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**National Transmission System (NTS)** - A high-pressure system consisting of terminals, compressor stations, pipeline systems and offtakes. Designed to operate at pressures up to 94 bar<sub>g</sub>. NTS pipelines transport gas from terminals to NTS offtakes.

**National Transmission System Offtake** - An installation defining the boundary between NTS and LTS or a very large consumer. The offtake installation includes equipment for metering, pressure regulation, etc.

**Office of Gas and Electricity Markets (Ofgem)** - The regulatory agency responsible for regulating Great Britain's gas and electricity markets.

**Peak Day Demand (1 in 20 Peak Demand)** - The 1 in 20 peak day demand is the level of demand that, in a long series of winters, with connected load held at the levels appropriate to the winter in question, would be exceeded in one out of 20 winters, with each winter counted only once.

**Planning and Advanced Reservation of Capacity Agreement (PARCA)** – A PARCA is a multi-phased bilateral contract between National Grid and a customer, which would allow Firm Quarterly System Entry Capacity and / or Firm Enduring Annual NTS Exit (Flat) capacity to be reserved for the customer, whilst they develop initial phases of their own project.

It is designed to provide National Grid with the financial security to undertake works such as planning activities prior to physical construction and ordering of materials, such as network analysis, project optioneering, engineering design and wider stakeholder consultation.

**QSEC** - Quarterly System Entry Capacity

**Shipper or Uniform Network Code (Shipper) User** - A company with a Shipper Licence that is able to buy gas from a producer, sell it to a supplier and employ a GT to transport gas to consumers.

**Substitution** – the transfer of unsold non-incremental entry capacity from an entry point at which it is not required to another entry point where incremental capacity is required.

**Supplier** - A company with a Supplier's Licence contracts with a shipper to buy gas, which is then sold to consumers. A supplier may also be licensed as a shipper.

**Therm** - An imperial unit of energy, largely replaced by the metric equivalent: the kilowatt hour (kWh). 1 therm equals 29.3071 kWh.

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**Transmission Planning Code** - The Transmission Planning Code describes National Grid's approach to planning and developing the NTS in accordance with its duties as a gas transporter and other statutory obligations relating to safety and environmental matters. The document can be found at

<https://www.nationalgridgas.com/charging>

**TSO** - Transmission System Operator

**Uniform Network Code (UNC)** - The Uniform Network Code replaced the Network Code and, as well as covering the arrangements within the Network Code, covers the arrangements between National Grid Transmission and the Distribution Network Operators.

**Appendix A – Tolerance Check Summary**

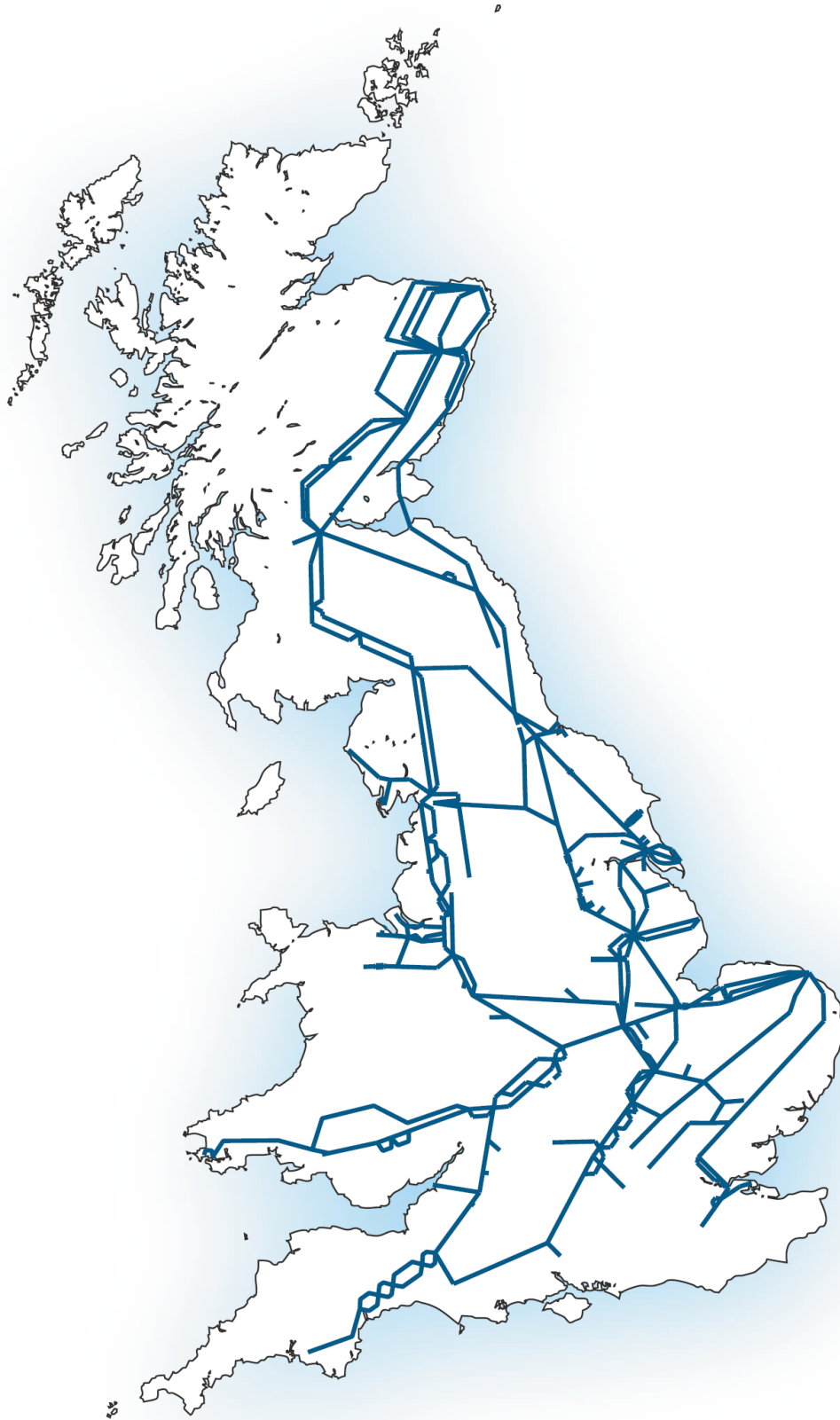
As part of the Need Case analysis the current capability of the network and all of the options considered were assessed to ensure that both all the tolerance levels of entry capacity, as specified in the South Hook Gas Company Ltd PARCA application, can be met. The table below outlines if the tolerance levels specified were acceptable. Where the tolerance level has been deemed unacceptable an alternative tolerance level has been provided.

*NTS Entry Capacity*

<b>Gas Year</b>	<b>Lower Range (% or kWh/d)</b>	<b>Tolerance Acceptable (Y/N)?</b>	<b>Alternative Tolerance Level (kWh/d)</b>	<b>Upper Range (% or kWh/d)</b>	<b>Tolerance Acceptable (Y/N)?</b>	<b>Alternative Tolerance Level (kWh/d)</b>
<b>2020</b>	0%	N	0	100%	N	0



**Appendix B – Geographic View of the National Transmission System**



## Appendix C – Summary<sup>8</sup> of National Grid Legal Obligations

- B.1 National Grid owns and operates the gas National Transmission System (NTS) in Great Britain.
- B.2 The Gas Act is the primary UK legislation that governs the transport and supply of natural gas within Great Britain. National Grid holds Gas Transporter Licences in respect of its gas transportation activities for the NTS.
- B.3 This licence is granted and administered by the Gas and Electricity Markets Authority (“the Authority”), established by the Utilities Act 2000.
- B.4 Section 9 of the Gas Act states a Gas Transporter has general duties in the planning and development of their system, which are:
- a. “To develop and maintain an efficient and economical pipe-line system for the conveyance of gas; and
  - b. Subject to paragraph (a) above, to comply, so far as it is economical to do so, with any reasonable request for him –
    - i. To connect to that system, and convey gas by means of that system to, any premises, or
    - ii. To connect to that system a pipe-line system operated by an authorised transporter.”
- B.5 Section 31 of the Planning Act 2008<sup>9</sup> requires a Development Consent Order for a development that is or forms part of a Nationally Significant Infrastructure Project (NSIP) and under Section 14(f) “the construction of a pipe-line by a gas transporter” is defined as such a project.
- B.6 National Grid is bound by the terms of its Gas Transporter Licence (“the Licence”) in respect of the NTS. This contains a number of Standard, Standard Special and Special Conditions that National Grid must comply with in developing and operating the network and in conducting its transportation business. The Licence obligations that are relevant to the planning and development of the NTS are described below.

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<sup>8</sup> Summary is not intended as an exhaustive list of National Grid’s legal obligations but provides information about the obligations that are particularly relevant to this report.

<sup>9</sup> Planning Act 2008: [http://www.legislation.gov.uk/ukpga/2008/29/pdfs/ukpga\\_20080029\\_en.pdf](http://www.legislation.gov.uk/ukpga/2008/29/pdfs/ukpga_20080029_en.pdf)

- B.7 Standard Special Condition A9: Pipe-Line System Security Standards** - This condition sets out the security standard for the NTS. It requires that National Grid NTS plan the system to meet the 1-in-20 peak aggregate daily demand, including but not limited to, within day gas flow variations on that day. The condition states that the 1-in-20 peak demand level should be calculated to include the load reduction through interruption or for contractual reasons and requires that historic data from at least the 50 previous years should be used when identifying the 1-in-20 peak day.
- B.8 Special Condition 7A2: Long Term Development Statement** - Under this obligation, National Grid NTS must publish an annual Long Term Development Statement for the NTS that sets out the likely use of the NTS, and the likely developments of the NTS, any other facilities or pipeline systems that may affect the connection charging and transportation charging arrangements over the next ten years. National Grid NTS publishes the Ten Year Statement (TYS) each year in accordance with this condition and the Uniform Network Code Transportation Principal Document (UNC TPD) Section O after consultation with the gas industry through the Transporting Britain's Energy process.
- B.9 Special Condition C8D: NTS gas entry incentives, costs and revenues** - The NTS entry condition sets out the entry capacity incentive arrangements that National Grid NTS operate under, the obligations on National Grid NTS to offer entry capacity for sale, the levels of entry capacity that must be offered for sale, and the process for increasing the levels of entry capacity that must be offered for sale. The condition describes two incentive mechanisms that incentivise National Grid NTS to manage its lead times for additional entry capacity release around a default lead time of 42 months. The details of the Entry Capacity release process are set out in Section B of the UNC and the Incremental Entry Capacity Release (IECR) Methodology Statement.
- B.10** National Grid NTS can only permanently increase the level of entry capacity at an Aggregated System Entry Point (ASEP) having first assessed how much entry capacity may be substituted to meet the increase as a result of applying its Entry Capacity Substitution Methodology. Entry Capacity substitution is the process of substituting Unsold Firm entry capacity from one or more ASEPs to another ASEP where demand for entry capacity exceeds the available capacity quantities for the relevant period.
- B.11 Special Condition C8E: NTS gas exit incentives, costs and revenues** - The NTS exit condition sets out similar requirements to that for entry capacity. Under the enduring exit arrangements there is an incentive for National Grid NTS to manage lead times for additional exit capacity release around a default lead time

## National Grid

of 38 months. The details of the Exit Capacity release process are set out in Section B of the UNC and the NTS Exit Capacity Release Methodology Statement.

- B.12 National Grid NTS can only permanently increase the level of exit capacity at an exit point having first assessed how much exit capacity may be substituted to meet the increase as a result of applying its Exit Capacity Substitution Methodology. Exit Capacity substitution is the process of substituting Unsold Firm exit capacity from one or more exit points to another exit point where demand for exit capacity exceeds the available capacity quantities for the relevant period.

## Appendix D – National Transmission System Analysis Principles

### Policy and Guidelines for NTS Planning

- C.1 A number of policy and guideline documents are maintained for the purposes of planning and development of the NTS. Some of these are industry guidelines applicable to all high pressure pipelines. Others are maintained and developed by National Grid to ensure compliance with legislation, industry standards and best practice. This section lists the particular industry standards and National Grid NTS policies used for network planning.

### Industry Standards and Guidelines

- C.2 The guidelines adopted by National Grid are maintained and developed by the Institute of Gas Engineers and Managers (IGEM), which is a recognised authority on technical standards relating to the natural gas industry. These are available from the IGEM website at: <http://www.igem.org.uk/>.
- C.3 IGE/TD/1: Edition 5 Steel Pipelines For High Pressure Gas Transmission

This document contains a comprehensive set of guidelines covering the design, construction, inspection, testing, operation and maintenance of high pressure steel pipelines and associated installations used for natural gas transmission, operating between 16 bar<sub>g</sub> and 100 bar<sub>g</sub>.

- C.4 IGE/TD/13 Edition 2 Pressure Regulating Installations for Transmission and Distribution Systems

This document contains a comprehensive set of guidelines covering the design, construction, inspection, testing, operation and maintenance of pressure reduction installations used for natural gas transmission and distribution systems up to 100 bar<sub>g</sub>.

- C.5 IGE/GL/2 Edition 3 Planning of Transmission and Storage Systems Operating at Pressures Exceeding 7 bar<sub>g</sub>

This document contains guidance on the planning of high pressure natural gas networks, including the required agreements and processes between Gas Transporters operating different systems to ensure the continuity of supply across the system boundaries.