national gas transmission

Western Gas Network Project

FIOC Project Direction Uncertainty Mechanism Submission

May 2023

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Executive Summary

Project Snapshot

Having received a customer request for additional entry capacity at the Milford Haven Entry Point, National Gas Transmission has followed its approved capacity methodologies and framework obligations to develop the Western Gas Network Project proposal. The request for 163 GWh/d, which represents a ~17% increase on the existing obligated baseline, cannot be met by the existing network in any Future Energy Scenario and is therefore treated as Funded Incremental Obligated Entry Capacity.

Our Need Case submission detailed the project need and optioneering process that led to our preferred strategic option, which was approved by Ofgem on 14 Dec 2021. The option required the least new infrastructure, therefore minimising the impact of the project on communities and the environment. It had the lowest capital cost with the greatest consumer benefit and represents the most economic and efficient solution for UK consumers. It is a modular solution, meeting the immediate requirements of the customer request, whilst being flexible for future development as the energy landscape evolves.

The option has continued to be refined to provide the optimum solution to meet the needs of the PARCA, being revalidated against the latest data available, with the incremental capacity release set for the contractual date of 01 Jan 2026. We have secured all material planning consents, developed delivery plans and held competitive tender events.

This document represents the Project Direction submission of the RIIO-T2 Funded Incremental Obligated Capacity process. It details cost, technical, procurement, delivery strategy and risk management information meeting the requirements of the guidance documentation, for Ofgem assessment. It requests a FIOC Project Direction from Ofgem to include outputs, delivery dates and associated allowances totalling £67.08m within our licence. A positive Ofgem direction, by no later than 18 August 2023, is on the critical path to enable award of construction contracts and adherence to delivery of the increased capacity and the associated consumer benefits by 2026.

This project aligns with our RIIO-T2 stakeholder priorities, *'I want to connect to the transmission system'* and *'I want to take gas on and off the transmission system where and when I want'*. The provision of this increased capacity can bring significant wider benefits for gas consumers in Great Britain in terms of both security of supply and access to lowest cost sources of gas from international markets.

1. National Gas Transmission (referred to in this regulatory submission as 'National Gas') is submitting this Project Direction under the RIIO-T2 Funded Incremental Obligated Capacity (FIOC) Re-Opener Price Control Deliverable Uncertainty Mechanism, in accordance with Licence Special Condition 3.13 Part C and as per the FIOC Guidance and Submissions Requirements Document[1].

Summary of position up to Need Case approval (Dec 2021)

2. As the owner and operator of the Gas National Transmission System (NTS), National Gas has a statutory obligation under the Gas Act 1986 to develop and maintain an efficient and economical pipeline system for the conveyance of gas.

3. Requests to reserve firm NTS capacity are through the Planning and Advanced Reservation of Capacity Agreement (PARCA) process. The PARCA is a bilateral contract that allows long-term NTS entry and/or exit capacity to be reserved for a customer while they develop their own project, before they buy that reserved capacity. The release of Funded Incremental Obligated Entry Capacity is only possible through a PARCA.

4. South Hook Gas Company Limited (SHGCL) submitted a PARCA application for 163 GWh/d in excess of the prevailing level of Firm Entry Capacity at the Milford Haven Aggregate System Entry Point (ASEP), with a capacity Registration Date of 1 January 2023. Milford Haven ASEP is an LNG entry terminal in South Wales, comprising two sub-terminals.

5. During the Phase 1 PARCA works, the application was considered in the context of the Future Energy Scenarios (FES), National Gas's legal duties, obligations and the capacity of the existing NTS. The application was considered to be compliant with requirements and an offer was therefore made to SHGCL for the entry capacity they had applied for, to be treated as Funded Incremental Obligated Entry Capacity, with an indicative registration date of 1st January 2026.

6. As well as the PARCA framework, we are following our internal Gas Network Development Process (GNDP or ND500). The project has passed through the relevant stages to date. National Gas keeps all projects under review and revisits earlier stages if key assumptions, such as supply and demand forecasts, change.

7. The Western Gas Network (WGN) project does not, in whole or in part, meet the criteria for late competition as detailed in the RIIO-2 Sector Specific Methodology Decision Core Document. As such, it should not be delivered through a late competition model, identified in Chapter 9 of RIIO-2 Final Determinations Core Document. This position was agreed by Ofgem and stated within the Need Case Consultation[2].

8. The WGN project is designed to accommodate the immediate requirements triggered by a customer request for incremental capacity, without over-investing in infrastructure that may not be required. As such it does not resolve the potential wider network constraints that may appear in some scenarios in the longer term. It is however, a scalable, modular option that would support any future investment that is needed, which would be highlighted through our Annual Network Capability Analysis Report (ANCAR) and requested as part of a future regulatory period and business plan.

[1] https://www.ofgem.gov.uk/sites/default/files/docs/2021/03/fiocr_guidance_document_apr_21_clean_0.pdf
[2] https://www.ofgem.gov.uk/sites/default/files/2021-10/WGN%20Needs%20Case%20Consultation_Final.pdf

Summary position for this Project Direction Application

9. The purpose of this stage of the process is to request a FIOC Project Direction from Ofgem, in order to include outputs, delivery dates and associated allowances within our licence, enabling us to deliver this project. It provides details on cost, technical, procurement, delivery strategy and risk management information for Ofgem assessment.

10. The proposed project includes modifications to the existing network and requires the least new infrastructure, therefore minimising the impact of the project on communities and the environment. This option has the lowest capital cost with the greatest consumer benefit and therefore represents the most economic and efficient solution for UK consumers. The option has continued to be refined in order to provide the optimum solution to meet the needs of the PARCA. The project is progressing to the conclusion of PARCA Phase 2, and this submission reflects the analysis performed since the Need Case submission, with a refresh based on the FES that informs our current Gas Ten Year Statement (GTYS) and includes three pathways to net zero by 2050.

11. We have continued to revalidate the solution using the latest data, leading to refinements in scope including the removal of compressor re-wheels at Felindre and Wormington; removal of uprating from Felindre to Cilfrew and of Cilfrew Pressure Reduction Station; removal of Tirley bypass modifications; routeing of the new pipelines and the inclusion of a pressure protection system at Three Cocks.

12. As well as these technical refinements, we have looked for efficiencies across the range of work required to deliver the project, such as the coordination of In Line Inspection (ILI) runs already scheduled within the RIIO-T2 period, along with the alignment and learning taken from related projects.

13. All material planning consents have been secured and National Gas has undertaken engagement on the project with a wide variety of stakeholders including relevant statutory bodies, SHGCL, political representatives, potentially affected landowners and the general public through a variety of approaches since 2021. Project engagement will continue as the project moves from the design and planning phase into pre-construction preparation. This includes using a variety of channels and mediums to share project information, including community information and 'meet the contractor' events, focused stakeholder meetings, update letters, leaflet drops and media relations, as well as a range of digital platforms such as the project website, a dedicated project app and social media. Further engagement will take place more informally through community investment and benefits programmes.

14. We have considered the most efficient delivery model for all activities and respect our commitment to utilise competition where possible, in order to leverage better prices and quality to ensure value for money for consumers. This helps the project navigate the extraordinary market conditions driven by geo-political events, in the form of abnormally high inflation and a strained construction sector supply chain. We are poised to award a competitively priced contract upon the direction from Ofgem and allocation of capacity to the customer.

15. We have also used our procurement process to better understand the risks faced during the build phase, using the data gained to inform our calculations and determine the optimal allocation for these, based on the party best placed to manage along with the potential to provide the most beneficial consumer outcome.

16. A detailed delivery plan is included within the submission, representing our delivery strategy to create the two distinct work packages of pipelines and uprating. By achieving the pipeline build within the 2024 build season, this provides essential capability facilitating outage dependant works in 2025 and delivering pressure uprating. Early commissioning of the pipelines also affords the potential to offer non-obligated capacity ahead of FIOC release.

17. The Western Gas Network (WGN) project contains the following key elements:

    - 9km of new pipeline between Wormington and Honeybourne and 2km of new pipeline between Churchover Compressor Tee and Churchover Multijunction;
    - Related works at several existing Above Ground Installations (AGIs) to facilitate the connection of new pipelines;
    - Pressure uprating of part of the existing Feeder 28 pipeline between Felindre and Three Cocks only (note this specifically excludes the section between Felindre and Cilfrew, see section 8.1 for further details); and
    - Related works at several existing Above Ground Installations (AGIs) and compressor stations to facilitate the pressure uprating and increased flow rates. This category includes Tirley modifications.

18. The cost profile for the WGN project is represented in Table 1, in 2018/19 prices. There was no regulatory mechanism within the RIIO-T1 period to recover the costs incurred on this project within that price control. National Gas are requesting approval from the Authority, to recover these costs alongside the direction of RIIO-T2 outputs, delivery dates and allowances. These costs would be included within the first year of the RIIO-T2 period. The Direct Costs, also shown in Table 1, represents the allowances requested, as this project is subject to the Opex Escalator (SpC 3.18):

£m	RIIO-T1	RIIO-T2					RIIO-T3	Total
	Prior years	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	
2018/19 Prices	2.734	2.384	6.823	19.361	49.089	0.841	0.059	81.291
Direct Costs (18/19)	0.590	1.386	5.695	15.007	43.704	0.700	0.005	67.087

Table 1: Western Gas Network Project profile costs

Project Direction

19. National Gas is requesting a FIOC Project Direction from Ofgem, to modify the licence to include the following outputs, delivery dates and associated allowances within our licence, within Appendix 2 of SpC 3.13, as represented below:

SpC 3.13 Appendix 2

Funded incremental obligated capacity reopener allowances (FIOCOt) by Regulatory year

Allowance (£m)					Total Allowance (all years)
2021/22	2022/23	2023/24	2024/25	2025/26	
1.98	5.70	15.01	43.70	0.70	67.08

Funded incremental obligated capacity Price Control Deliverables

Project	Output	Delivery Date	Total Allowance (all years) (£m)
WGN	Pipeline construction between Honeybourne and Wormington, Churchover Compressor Tee and Churchover Multi-junction and all associated AGI works	01 Jan 2026	54.50
WGN	Pressure uprating from Felindre to Three Cocks and all associated compressor and AGI works	01 Jan 2026	12.58

Table 2: SpC 3.13 Appendix 2 (shown at 2 decimal places as per licence)

20. We have identified four project-specific Cost and Output Adjusting Events, that are defined within this submission, for Ofgem to include in their direction. These represent high impact, low probability events that are best managed through this mechanism, in order to protect consumer value.

21. Ofgem are invited to assess our application and issue a FIOC Project Direction, with the requested FIOC outputs, delivery dates and associated allowances, as specified in Special Condition 3.13 and as per the FIOC Guidance and Submission Requirements Document.

22. In order to maintain programme to deliver the capacity as per the PARCA framework, we request the appropriate priority is given to this assessment. A positive FIOC Project Direction from Ofgem by no later than 18 Aug 2023 is on the critical path to enable award of construction contracts and adherence to delivery of the increased capacity and the associated consumer benefits by 2026. There are significant implications in terms of both commercial processes and the technical delivery of the project in going beyond this date, as well as consumer interests due to the impact to cost and delay of the wider benefits to security of supply and competition this project will enable.

23. We have valued the continual and constructive engagement with Ofgem leading up to this Project Direction submission, given the challenging timescales and volatile marketplace. We look to maintain this throughout the Project Direction assessment process, to ensure we successfully deliver the capacity for the customer and value for consumers.

Contents

Chapter 1: Summary Table

24. The costs in this summary table and throughout the document are in outturn prices unless otherwise stated.

Name of Project	Western Gas Network (Milford Haven ASEP PARCA)		
Scheme Reference	PAC3843		
Primary Investment Driver	Customer PARCA Application		
Project Initiation Year	2018		
Project Close Out Year	2027		
Total Installed Cost Estimate (£) (18/19)	£81.291m		
Cost Estimate Accuracy	+/-15%		
Project Spend to date (£) (18/19)	£11.941m (end of March 2023)		
Current Project Stage Gate	4.3 – Conceptual Design Development		
Reporting Table Ref	4.2 - LR Uncertainty Mechanism, Entry, Incremental		
Outputs included in RIIO-T1 Business Plan	No		
Outputs included in RIIO-T2 Business Plan	No. PARCA and UM flagged in BP.		
Spend apportionment (18/19)	RIIO-T1 £2.734m	RIIO-T2 £78.498m	RIIO-T3 £0.059m

Table 3: Engineering Justification Paper Summary Table

Chapter 2: Project Status and Request Overview

25. This document, produced by National Gas Transmission (referred to in this report as 'National Gas') has been prepared as the submission required to seek a Project Direction for the Funded Incremental Obligated Capacity (FIOC) Re-opener for the Western Gas Network (WGN) Project, driven by the Milford Haven Aggregate System Entry Point (ASEP) Planning and Advanced Reservation of Capacity Agreement (PARCA).

26. National Gas are submitting this under the FIOC Re-opener Price Control Deliverable (PCD) Uncertainty Mechanism, which allows application for the funding required to release Incremental Obligated Entry Capacity or Incremental Obligated Exit Capacity that cannot be released by Entry Capacity Substitution or Exit Capacity Substitution.

27. This Project Direction submission is in accordance with Special Condition 3.13 and 9.13 of the NTS Transmission Licence, the RIIO-T2 FIOC Guidance and Submissions Requirements Document and the RIIO-T2 Final Determinations for National Gas. Its purpose, at this stage of the FIOC Re-opener, is to request a FIOC Project Direction from Ofgem in order to include outputs, delivery dates and associated allowances within our licence, enabling us to deliver the WGN project. It provides technical details as well as information on costs, procurement, delivery strategy and risk management for Ofgem assessment.

28. The WGN project has spanned multiple regulatory periods. All applicable processes and notifications related to the PARCA and capacity processes have been published in accordance with the prevailing obligations and methodologies at the time. This Project Direction follows our previously submitted Need Case under the RIIO-T2 Licence.

2.1 Project Overview

29. National Gas has duties under the Gas Act 1986 to develop and maintain an efficient and economical pipeline system (the National Transmission System) for the conveyance of gas and to comply, so far as it is economical to do so, with any reasonable request to connect to that system.

30. Typical lead times for the delivery of new pipeline infrastructure to create additional capacity in the NTS, and the lead time for the construction of connected facilities, are dependent on many variables including planning processes. It is important therefore that Shipper Users and Reservation Parties are able to commit early to the provision of additional capacity to avoid misalignment of projects. Delay in commencement of work to deliver additional capacity in the NTS could lead to that capacity not being available to the timeframes originally required by the connecting party.

31. In order to facilitate the timely delivery of capacity, a Shipper User or Reservation Party can apply for a PARCA that allows the reservation of capacity, ahead of it being allocated and registered to that party and hence before they are financially committed to the capacity itself. Capacity requests are considered against the provisions of National Gas's statutory licence obligations and in accordance with our published methodologies.

32. The South Hook Gas Company Ltd submitted a PARCA with the intention of increasing the baseline entry obligation by 163 GWh/d (15 mscm/d). This would increase the baseline obligation at the Milford Haven ASEP to 1,113 GWh/d (102.7 mscm/d).

33. If such an increase in flows was accommodated on the existing NTS, then unacceptably high levels of entry constraint costs would be anticipated from 2023 onwards. National Gas has therefore considered options that would enable it to offset network constraint costs through physical network changes, review of commercial contracting strategy and regulatory rules.

34. The development of the WGN project, as well as following the PARCA framework, also uses the National Gas Network Development Process (GNDP or ND500).

35. The project is currently in Conceptual Design Development phase. Conceptual Design Studies have formed the basis for competitive tenders for Project Execution (detailed design and build). Long lead materials have also been sourced for free issue to main works contractors during Project Execution. The project will pass into the Project Execution phase subject to the issue of a Project Direction from Ofgem and the allocation of capacity.

2.2 PARCA

36. The PARCA Application was received on 24 April 2018 and requested Firm NTS Entry Capacity of 163,000,000 kWh/d above the prevailing Obligated Entry Capacity at Milford Haven ASEP for a Registration Date of 01 January 2023. The Application was deemed a Competent PARCA Application[3] on 4 May 2018. The initiation of PARCA Phase 1 Works was delayed until 14 June 2018 due to the PARCA Application's interaction with the Quarterly System Entry Capacity (QSEC) process for that year.

37. Under the UNC, we are required to open a PARCA Entry Window within 10 Business Days of the initiation of Phase 1 PARCA Works. The PARCA Entry Window is an opportunity for other PARCA Applications to be submitted. We are also required to issue an invite to NTS Users to participate in an ad-hoc QSEC auction. The auction is an opportunity for NTS Users to submit bids for unsold entry capacity at all ASEPs. Most pertinently, no further PARCA applications were received.

38. The purpose of Phase 1 PARCA Works is to assess how we could deliver the requested entry capacity through network analysis. This analysis will assess if the requested capacity could be delivered through (or by a combination of) existing network capability, substitution of entry capacity, a contractual solution or physical investment in the NTS.

39. The PARCA, and Phase 1 PARCA Works Report, were delivered to the PARCA Applicant on 14 December 2018, provided the PARCA Applicant with the relevant information in order to proceed to PARCA Phase 2.

40. In the PARCA Phase 1 Works Report, we stated the indicative programme was based on agreeing funding for detailed design and long lead items prior to achieving consent. We stated we would approach this as follows:

[3] Uniform Network Code, Transportation Principal Document, Section B1.15.4

- The funding would be subject to agreement with The Authority and in accordance with the Generic Revenue Driver Methodology. We would seek to bring agreement from The Authority to bring forward the funding ahead of capacity allocation.
- In the event that such agreement with The Authority was not achieved we would approach South Hook Gas Company Ltd to underwrite the procurement of long lead items, by way of a Long Lead Item Agreement.
- In the event that this is not agreed the timeline will be extended accordingly.

41. Under the PARCA framework, we may require Demonstration Information to provide us with the surety we may need to progress with the reservation and subsequent release of Funded Incremental Obligated Capacity or capacity to be provided for by substitution. We made no formal request for Demonstration Information during any stage of Phase 1 PARCA Works, as it was our understanding the South Hook terminal has the physical deliverability and any further works at South Hook terminal would be for reliability purposes.
42. We published a PARCA Notice[4] on 18th January 2019, confirming the following details:
    - The quantity of capacity requested at the NTS Entry Point in excess of the prevailing level of Firm Entry Capacity to be treated as Incremental Obligated Entry Capacity is 163,000,000 kWh/d.
    - The quantity of Firm Entry Capacity to be treated as;
    - Funded Incremental Obligated Entry Capacity is 163,000,000 kWh/d.
    - Non-incremental Obligated Entry Capacity provided by Capacity Substitution is 0 kWh/d.
    - The indicative Registration Date is 1st January 2026.
43. PARCA Phase 2 was triggered by the signing of the PARCA and this was notified to the industry on 15th March 2019[5]. South Hook Gas Company Limited became the Reservation Party under the UNC.
44. PARCA Phase 2 includes the production of a Strategic Options Report (SOR), building on the work completed in PARCA Phase 1. Through the process of creating the SOR, we considered the widest range of options which could meet our operational requirements and accommodate the customer application for increased capacity, irrespective of an initial view of their viability. Following an early filtering process, a shortlist of options was then costed from an asset investment perspective. Our recommended solution is supported by a Cost Benefit Analysis (CBA) which has considered investment costs, constraints and contracts costs, and operational costs.
45. Ofgem agreed with our strategic option selection and subsequent refinement in their Needs Case Final Decision on 14 December 2021, following a consultation on 14 October 2021.
46. The decision was subject to securing material planning consents. Initial design development work resulted in proposals for the WGN project that were below thresholds that automatically triggered a Development Consent Order (DCO) process being required subject

[4] https://www.nationalgas.com/document/125146/download
[5] https://www.nationalgas.com/document/126451/download

to confirming that Environmental Impact Assessment was also not required. As a result of confirming via screening with BEIS and various LPAs that the works were not EIA development, the WGN permanent works have been progressed as a mix of Permitted Development (PD) and one successful Town and Country Planning Act (TCPA) planning application. This was in line with the originally developed consents strategy.

47. In order to expedite delivery of the capacity, we entered into a Long Lead Item Agreement underpinned with security provided by South Hook Gas Company Limited.

48. The PARCA will 'fall away' when the Reserved Capacity is allocated to the NTS User, as will the Long Lead Item Agreement. The Total PARCA Security Amount will be returned to the Reservation Party, as will the security under the Long Lead Item Agreement.

49. The Churchover Tee Extension TCPA application was made and validated on the 7 April 2022 and planning permission granted 8 August 2022.

50. Originally, a stretch target of 1 January 2025 was established for the accelerated release of Incremental Obligated Entry Capacity (classified as Non-Obligated Entry Capacity). The date has since been revised, with the release of capacity to South Hook Gas Company Ltd now expected by 1 January 2026.

2.3 Funding Mechanism

51. The initial Phase 1 works are funded through the PARCA application fee, which was reconciled to actual costs at the end of this phase.

52. The FIOC Re-opener, as defined in Special Condition 3.13, allows for the application for funding required to release Incremental Obligated Entry Capacity that cannot be released by Entry Capacity Substitution.

53. This FIOC Project Direction stage of the re-opener, is possible due to receiving an approved need case submission and National Gas obtaining the required material planning consents, and is where National Gas submit project costs for assessment. This will cover all expenditure related to Phases 2 and 3 of the PARCA process.

54. The cost for delivery of this network reinforcement project is £81.291m. National Gas is requesting allowances for Direct costs only as specified in the RIGs[6], as this reopener is subject to the Opex Escalator mechanism, as detailed in Special Condition 3.18.

55. Details of these costs are broken out into more detail in chapter 6 and appendix 10B.

56. Costs incurred prior to the start of the RIIO-T2 regulatory period had no mechanism for recovery within RIIO-T1, and due to the timing of this re-opener submission, the Close Out process is no longer available. As a result, RIIO-T1 and RIIO-T2 allowances for the WGN project are being requested as part of this submission. There is also spend associated with project closure within the first year of the next regulatory period (RIIO-T3), which upon direction from Ofgem, would be included within our business plan submission.

[6] https://www.ofgem.gov.uk/sites/default/files/2023-04/RIIO-GT2%20-%20Regulatory%20Instructions%20and%20Guidance%20v2.2%20Clean.pdf

57. We are applying to the Authority for a FIOC Project Direction specifying the following outputs, delivery dates and associated allowances in Appendix 2 of SpC 3.13 to allow us to release Incremental Obligated Entry Capacity that cannot be provided by Entry Capacity Substitution. This will take the form of two outputs for the WGN project within the PCD, as detailed below:

SpC 3.13 Appendix 2

Funded incremental obligated capacity Price Control Deliverables

Project	Output	Delivery Date	Total Requested Allowance (all years) (£m)
Western Gas Network Project	Pipeline construction between Honeybourne and Wormington, Churchover Compressor Tee and Churchover Multi-junction and all associated AGI works	01 Jan 2026	54.50
Western Gas Network Project	Pressure uprating from Felindre to Three Cocks and all associated compressor and AGI works	01 Jan 2026	12.58

Table 4: SpC 3.13 Appendix 2 PCD

58. Funded incremental obligated capacity re-opener allowances (FIOCOt) by Regulatory year to be included in Appendix 2 of SpC 3.13

SpC 3.13 Appendix 2

Funded incremental obligated capacity re-opener allowances (FIOCOt) by Regulatory year

Requested Allowance FIOCOt (£m)					Total (£m)
21/22	22/23	23/24	24/25	25/26	
1.98	5.70	15.01	43.70	0.70	67.08

Table 5: SpC 3.13 Appendix 2 FIOCOt allowances

59. Should the FIOC Project Direction be rejected by Ofgem, or the PARCA be cancelled or terminated prior to the allocation of capacity, pass-through of a PARCA Termination Value will be carried out in accordance with Special Condition 6.1.

60. The WGN project does not, in whole or in part, meet the criteria for late competition as detailed in the RIIO-2 Sector Specific Methodology Decision Core Document. As such, it should not be delivered through a late competition model, identified in Chapter 9 of RIIO-2 Final Determinations Core Document. This position was agreed with by Ofgem and stated within the Need Case Consultation.

2.4 Request Summary

61. Ofgem are invited to assess our application and issue a FIOC Project Direction, with the requested FIOC outputs, delivery dates and associated allowances, as specified in Special Condition 3.13 and as per the FIOC Guidance and Submission Requirements Document.
62. We have identified four project-specific Cost and Output Adjusting Events, that are defined within this submission, for Ofgem to include in their direction. These represent high impact, low probability events that are best managed through this mechanism, in order to protect consumer value. Our funding request does not include any allowance for COAE. Should COAE events occur, National Gas will apply to the Authority for a direction adjusting the outputs, delivery dates and associated allowances pursuant to SpC 3.13.11. Further details are provided within sections 8.5 and 8.6.
63. Our request for two PCD outputs is aligned to the project delivery plan and structure of our submission. It is also designed to allow the appropriate management of uncertainties in the detailed scope of pressure uprating, which are documented through our quantified risk register. Our funding request for the Pressure Uprating PCD output includes a risk allowance for these scope variables. Our Basic PCD Report shall detail the outcome of these scope variables, the actual costs incurred and our view on the value of any adjustment to allowances. Further details are provided within section 8.1.
64. In order to maintain programme to deliver the capacity as per the PARCA framework, we request the appropriate priority is given to this assessment. A positive FIOC Project Direction from Ofgem by no later than 18 Aug 2023 is on the critical path to enable award of construction contracts and adherence to delivery of the increased capacity and the associated consumer benefits by 2026. There are significant implications in terms of both commercial processes and the technical delivery of the project in going beyond this date, as well as consumer interests due to the impact to cost and delay of the wider benefits to security of supply and competition this project will enable.
65. We have valued the continual and constructive engagement with Ofgem leading up to this Project Direction submission, given the challenging timescales and volatile marketplace. We look to maintain this throughout the Project Direction assessment process, to ensure we successfully deliver the capacity for the customer and value for consumers.

Chapter 3: Problem/Opportunity Statement

66. The following section summarises sections 47 – 56 in the Western Gas Network Project – FIOC Need Case Submission, for further detail please refer to Appendix 10D.

67. South Hook is one of two sub-terminals at the LNG terminal in Milford Haven, South Wales. The location is indicated on Figure 1. The South Hook Gas Company Ltd has submitted a PARCA with the intention of increasing the baseline entry obligation by 163 GWh/d (approximately 15 mscm/d) from January 2023.

68. Table 1 shows the current and future maximum (obligated and deliverable) sustainable entry flows for each sub-terminal:

Name	Current maximum (GWh/d)	New maximum (GWh/d)	Current maximum (mscm/d)	New maximum (mscm/d)
South Hook	650	813	60.0	75.0
Dragon	300	300	27.7	27.7
Total	950	1,113	87.7	102.7

Table 6: Milford Haven maximum sustainable flows.

69. Feeder 28 connects the Milford Haven ASEP to the rest of the NTS. Figure 1 shows the location of Milford Haven and the key compressors used to move gas away from the terminal:

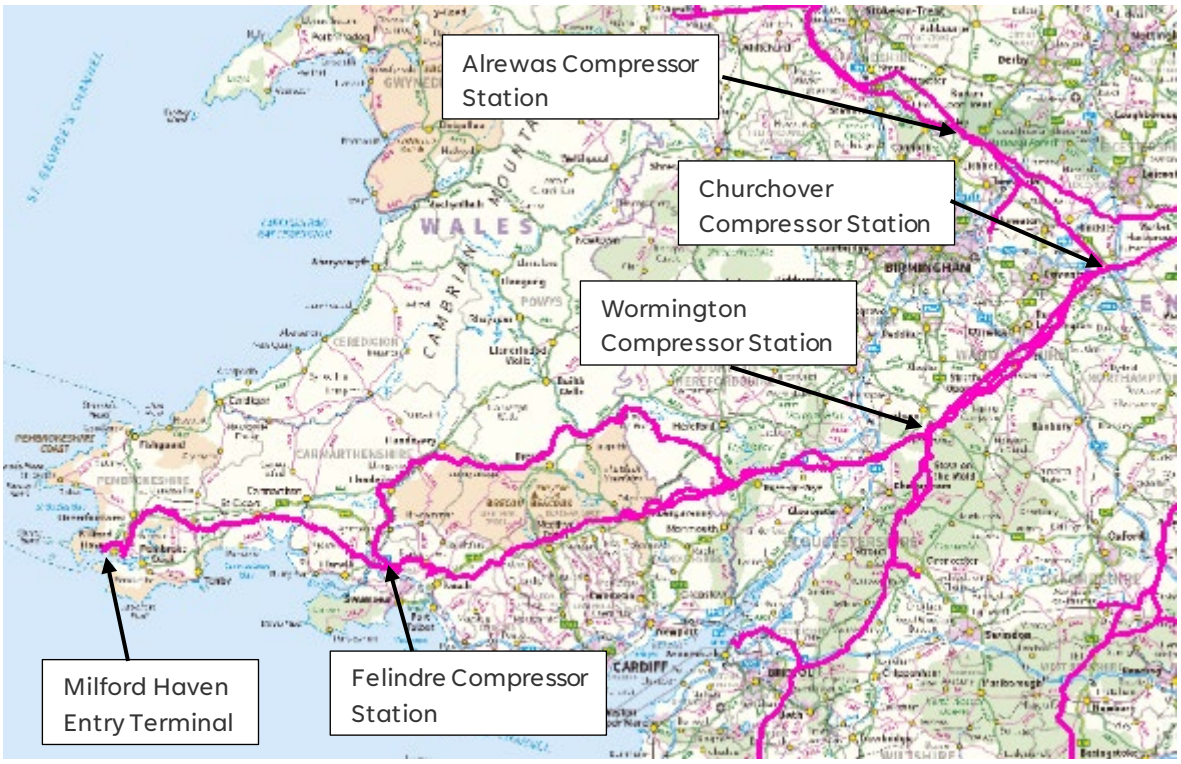

Figure 1: Milford Haven and key compressor sites on the NTS.

70. The ability of the NTS to receive gas from Milford Haven is linked to the availability and capabilities of compressor stations at Felindre, Wormington, Churchover and Alrewas. These sites facilitate maximum entry capability at the Milford Haven ASEP.

71. Before the requested increase in baseline capacity at Milford Haven could be accepted, an assessment of the capability of the existing network was required. Approved network modelling software was used to identify the "bottlenecks" or relative flow and pressure restrictions along the corridor between Milford Haven and Wormington, and along the onward flow paths towards Churchover and the southwest. It became clear that physical network reinforcements would be required to support the requested increase in capacity.

72. Physical options such network reinforcements, including new compressor stations, new feeders, control valves and changes to operating pressures were combined in the most logical sequences, to increase capability where it was most needed as the modelled flow was incrementally increased. As a parallel approach, opportunities were explored to bypass restricted areas altogether to provide larger increments in capability.

3.1 Uncertainties affecting the Problem / Opportunity Statement

73. There were several uncertainties that influenced the problem/opportunity statement. The four main themes are stated below:

    - Changes in UK supply and demand patterns beyond the FES models.
    - Changes in European markets and thus flows through interconnectors.
    - Changes in global LNG markets.
    - Technical challenges to deliver the proposed scheme of a scale beyond that currently anticipated.

74. Since the Needs Case submission, gas markets have been affected by the conflict in Ukraine. In response, the European Union plans to make Europe independent from Russian fossil fuels by 2030. Until last year, 45% of Europe's annual gas demand had come from Russia. This could result in a sustained increase of LNG gas supply at Milford Haven to meet the increase in interconnector export demand at Bacton, as seen in 2022. This arises due to the limited LNG importation facilities on the continent. It is expected that this will continue in the short term, although there remains uncertainty about how this will develop over the long term. To model the impact if these changes persist in the long term, we have run a sensitivity to the CBA that only considers the high LNG FES case. This maximises the use of LNG to meet flexible supply, with lower levels of imports from the continent.

75. The WGN project has responded to these external factors and uncertainties through a range of measures:

    - Deployment of both National Gas and external provider expertise to confirm the viability of technical solutions based at appropriate stages on a combination of professional judgement, desk-based assessment, modelling, and direct investigations.

- Backcheck reviews – such as when new FES releases occur, and relevant data becomes available.
- Refinement of the CBA timeframes to understand when uncertainties may begin to impact the assessment outcomes.
- Consideration of a staged approach, with a modular option that means the capacity can be released but avoids over-investment before long term uncertainties are better understood.
- Frequent liaison with dependant projects.

3.2 Related projects

76. As previously described, the WGN solution is reliant on availability and capability of compression at Felindre, Wormington, Churchover and Alrewas compressors. Several separate projects are being progressed by National Gas at some of these sites. The following projects listed in the Needs Case Document remain relevant:
    - Commissioning of the Variable Speed Drive at Felindre Compressor Station – This project, currently ongoing, will provide accurate performance data for the electric motor driven compressor at Felindre. This data will inform our system modelling but should not affect the scope of WGN.
    - Medium Combustion Plant Directive (MCPD) works at Wormington compressor – The WGN project Needs Case was submitted on the basis that Wormington MCPD would be funded for 2 new Gas Turbine driven compressor units. This was rejected by Ofgem in their Final Determination which states:

    "In accordance with Special Condition 3.11.9, we propose to reject the option identified by National Gas Transmission as the Final Preferred Option (Option 10) and approve one of the other shortlisted options (Option 7) as the Final Preferred Option."

    "The Final Preferred Option requires the installation of a new gas turbine compressor unit, approximate size 15MW (unit size to be determined during tender event), commissioned before 1 January 2030. The new unit should be installed on a new plinth within the existing boundary of Wormington Compressor Station. In addition, one of the existing Avon units should be retained, under the 500-hour Emergency Use Derogation allowed for in the Directive, with significant asset health investment to improve unit availability. The other Avon should be decommissioned. There is no preference as to which of the existing Avons should be retained / decommissioned. The need for decommissioning should be reassessed following operational acceptance of both the new and derogated units. To ensure operation mapping alignment across all site compressors, this option will also consider the case for a VSD re-wheel during the next phase of the project."

    This decision does not affect the scope of WGN.

77. The following list of related projects was also included in the Needs Case. Whilst none were considered to affect the WGN project requirements at the time, this was held under review

to ensure any construction programme implications are understood and factored in. The bold items are expanded upon below now that further information is known.

- **Tirley Tactical Access Valves**
- Boundary Control System replacement/removal
- The portfolio of RIIO-T2 works to be delivered in the region between Milford Haven and Churchover including:
    - Minor site remedial works such as painting and refurbishment
    - Compressor refurbishments (unit overhauls, air intakes, cabs, exhausts, ventilation, fire suppression, structural, HV motors and exciters, transformers, frequency converters)
    - Corrosion and Cathodic Protection defects resolution
    - Replacement of failed Insulation Joints (IJs)
    - **Replacement of failed valves**, overhauls of non-return valves and/or vent and sealant lines repairs
    - [redacted]
    - PSSR Filters, PSSR PIG Traps, ILI and OLI/4 inspections including subsequent repairs as required
    - Integrated Security Solutions (ISS) Technical Refreshes

[redacted]

79. Felindre V24 replacement works – Felindre V24 is the PIG trap valve at Felindre for the Felindre to Three Cocks pipeline. It is faulty and in scope from the National AGI Refurbishment Campaign (NARC) '23 works, which have recently been delayed to 2024 due to the failure of the isolation methodology to facilitate the valve replacement. The valve replacement is required before the In Line Inspection (ILI) can be completed on the Felindre to Three Cocks Pipeline. The ILI data is a key piece of information feeding into the Uprating Assessments. 12-18 months are required following ILI to facilitate localised repairs identified. Based on an assumed replacement date of Spring 2024, this work is also driving uprating pressure raising in Autumn 2025.
80. Tirley Tactical Access – This work may be delivered by the same Main Works Contractor and contract to optimise delivery efficiency. It remains separately funded within the T2 business plan.

81. The WGN scope is deliberately modular and facilitates expansion later. Depending on how supply and demand patterns progress towards net zero by 2050, there may be a requirement to consider any or all of the following in RIIO-T3 or later:
    - additional uprating (from Milford Haven terminals to Felindre compressor)
    - additional new pipeline from Tirley to Wormington
    - Tirley bypass reconfiguration
    - other system reinforcements for which a need is identified later.
82. These projects would not necessarily have a PARCA driver but could have economic and efficient capital investment needs cases, if future entry constraint cost risk is significant.

3.3 Project Boundaries

83. The WGN project is designed to accommodate the immediate requirements triggered by a customer request for incremental capacity through the PARCA process.
84. It does not resolve the potential wider network constraints that may appear in some scenarios in the longer term. However, it is a scalable modular option that would support any future investment that is needed, which would be highlighted through the ANCAR process and requested as part of a future regulatory period and business plan.

Chapter 4: Project Definition

4.1 Supply and Demand Scenario Selection and Future Requirements

85. Our FIOC Need Case Submission contained analysis based on data from FES 2019 and 2020, depending on what was the latest available data at the time for specific assessments. As the project has progressed, we continue to test the investment against the latest relevant data. The analysis presented within this FIOC Project Direction uses a hybrid of FES 21 and FES 22 data, in line with the latest Gas Ten Year Statement (GTYS), to provide the scenarios to test the investments against credible supply and demand scenarios.

86. It is becoming increasingly important to review the changes seen in each scenario over the next ten years to understand what needs to happen to make each of them credible. With the current lack of incentives in place for consumers to change their behaviour, invest in thermal insultation and convert to net zero heating solutions, we do not expect the reductions in demand seen in Consumer Transformation (CT) and Leading the Way (LW) to occur as quickly as predicted. The record gas prices seen recently are driving consumers to turn down their thermostats, but there is no guarantee this will continue if prices reduce.

87. Although the 2022 FES is very similar to the 2021 edition over the next 10 years, there are big differences after this period – as shown in Figure 2 below.

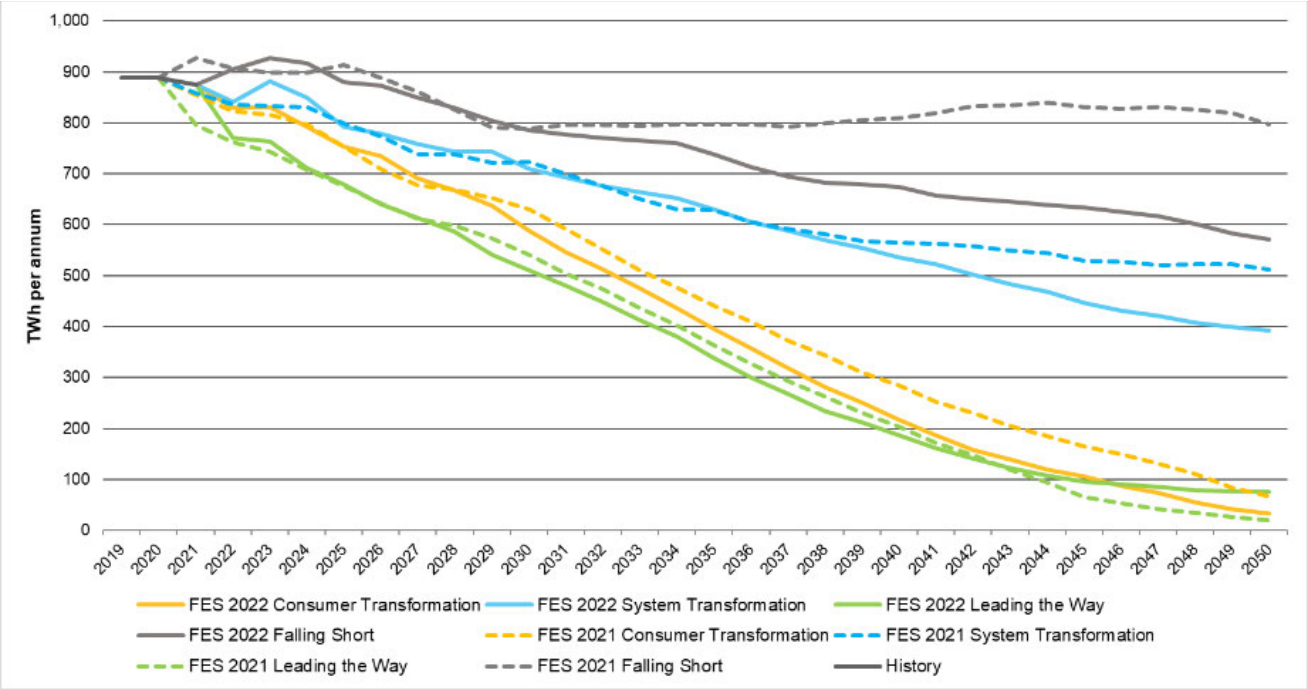

Figure 2: FES21 vs FES 22 Annual demand comparison

88. Whilst the FES provides us with detailed insight and analysis, there are several uncertainties around the data and how relevant it still is for our forward view in Gas Transmission when considering a wider context. For example, the changes seen in the Falling Short scenario compared to the Steady Progression scenario are driven by

consumers converting to heat pumps from gas boilers. There is currently no incentive or policy driving that reduction, and unless that changes we don't expect to see the level of reduction currently forecast.

89. Due to these uncertainties, for the next 12 months, we will be continuing to base our investment decisions on the 2021 FES Steady Progression (SP) and System Transformation (ST) scenarios. These will be used alongside the 2022 FES scenarios of CT and LW.

90. In the short to medium term National Gas are required to provide for the capacity increase reserved by the PARCA for SHGCL. LNG supplies to the UK have increased in recent years, but the importance in our ability to bring LNG into GB has never been more critical with the decrease in gas supplies from Europe due to global events. Milford Haven has at times in the last year supplied 30 percent of GB's gas demand, highlighting its importance as a supply point into the network.

91. There is a high degree of certainty in the short to medium term that LNG imports via Milford Haven will continue to increase, both in terms of frequency of LNG deliveries and in the instantaneous LNG flows delivered onto the NTS. Based on this, there is a requirement for investment to increase the LNG import capability at Milford Haven.

92. The FES scenarios do not reflect the current reality of highly flexible energy supplies by LNG and do not cater for credible scenarios regarding LNG supply in the future. Over the last year we have seen actual LNG imports well above any FES scenario at ~25 bcm/year (with the highest FES scenario being at 11 bcm/year).

93. In addition to the recent experience of LNG supply, industry forecasts now show significant annual volumes of future LNG supply expected to come to GB. Forecasts show 20 to 25 bcm/year of LNG imports out to 2040, which is circa double the levels assumed in any of the FES scenarios.

94. Between 2040 and 2050, there is uncertainty arising from the actual pathway followed by the UK in pursuit of the 2050 net zero target. Therefore, there is a need to invest to meet the short-term requirement whilst allowing for long-term uncertainty.

95. There is an advantage to be gained in terms of consumer value from making the proposed WGN investment in the short-term to facilitate increased entry capability and the avoidance of excessive constraint costs. But there is also the need to ensure this investment will allow (or not preclude or lead to adverse efficiency of any) future investment, where the case arises that high LNG importation scenarios continue towards 2050. We will be assessing as part of the RIIO-T3 submission how we best ensure we are able to continue to deliver for our customers.

4.2 Project Scope Summary

96. The project being progressed has been identified following a comprehensive evaluation process of options capable of meeting the PARCA requirements and a detailed optimisation process to focus from the preferred strategic option. The option identified as F6.6x is the optimum solution to meet the needs of the PARCA in an economic and efficient manner at least cost to UK consumers, and consists of the following with further detail set out in Tables below:

    I. 9km of new pipeline between Wormington and Honeybourne and 2km of new pipeline between Churchover Compressor Tee and Churchover Multijunction

    II. Related works at several existing Above Ground Installations (AGIs) to facilitate the connection of new pipelines.

    III. Pressure uprating of part of the existing Feeder 28 pipeline between Felindre and Three Cocks only (note this specifically excludes the section between Felindre and Cilfrew, see section 8.1 for further details).

    IV. Related works at several existing Above Ground Installations (AGIs) and compressor stations to facilitate the pressure uprating and increased flow rates. This category includes Tirley modifications.

New Pipeline – Wormington Compressor to Honeybourne AGI	
Start Point	Wormington Multijunction
End Point	Honeybourne Multijunction
Design Pressure	75 Barg
Design Capacity	45 Million Standard Cubic Metres/Day
Expected materials of construction	API 5L X65 / ISO 3183 L450 Steel
Related Works	Pipeline tie-ins at Wormington Multijunction and Honeybourne Multijunction

Table 7: Project Scope Summary Table (Wormington to Honeybourne Pipeline)

New Pipeline – Churchover Compressor Tee to Churchover Multijunction	
Start Point	Churchover Compressor Tee
End Point	Churchover Multijunction
Design Pressure	70 Barg
Design Capacity	42 Million Standard Cubic Metres/Day
Expected materials of construction	API 5L X65 / ISO 3183 L450 Steel
Related works	Pipeline tie-ins at Churchover Compressor Tee and Churchover Multijunction

Table 8: Project Scope Summary Table – Churchover Pipeline

Pressure Uprating (Feeder 28) and other Associated Works	
Start Point	Felindre Compressor Station and Multijunction
End Point	Three Cocks Above Ground Installation (but this element does include works as far East as Tirley)
Design Pressure	102 Barg
Associated Works	Modifications to Felindre Compressor Station, Felindre Multijunction, Alltwern Compressor Recycle Facility, Llanwrda Block Valve, Three Cocks Above Ground Installation and Tirley Pressure Reduction Station

Table 9: Project Scope Summary Table – Uprating and Associated Works

97. Details of the minor changes in design since the FIOC Need Case submission from June 2021, with explanations and associated evidence as appropriate, is included in Section 8.1.

Chapter 5: Options Considered

98. The full detail behind our strategic optioneering process for this project, and the further refinement of our preferred option, is available in our FIOC Needs Case submission (Appendix 10D). Our preferred option has been continuously refined, such that several scope queries were approved on this project since the Needs Case submission. These are shared in Appendix 10I.

99. Option revalidation has been completed through re-running the CBA against our refined option list. This is a standard activity in our Conceptual Design Development stage (4.3) of the Network Development 500 (ND500) process. Once the CBA was re-run, the results informed a decision on the preferred option. Due to the current stage of development, this analysis enables National Gas to make a 'go'/'no go' decision on the preferred option before making this Project Direction submission, it is not feasible to switch to a significantly different option. In the following section we are revisiting and revalidating the refined options, as requested as part of the FIOC guidance. The capability analysis below feeds into the analysis presented in Chapter 7.

100. We have maintained the designation of options from the previous submission, with variations on the preferred option of F6.6. These were based on cost team estimates in order to inform decision making, avoiding the inefficiency of pricing multiple variants that are detailed in Chapter 7.

Option	Option Descriptor	Option components
a	Counterfactual	Counterfactual Existing Network
c	F6.6 1200 Base	F6.6 1200 Base 1200 Wormington to Honeybourne, all uprating and biggest Tirley bypass, Churchover partial bypass.
D	F6.6 1200 Light	F6.6 1200 Light 1200 Wormington to Honeybourne, uprating only downstream of Felindre, existing bypass at Tirley, Churchover partial bypass.
E	F6.6 900 Light	F6.6 900 Light 900 Wormington to Honeybourne, uprating only downstream of Felindre, existing bypass at Tirley, Churchover partial bypass.
F	F6.6 900 Min	F6.6 900 Min 900 Wormington to Honeybourne, NO UPRATING, existing bypass at Tirley, Churchover partial bypass

Table 10: Need Case submission preferred option variants

5.1 Capability Analysis and Discussion

101. Since the Needs Case submission there has been some refinement to the tools used to simulate the performance of the shortlisted strategic options. Whilst we have continued to successfully validate our Network Model in line with license requirements throughout this period, we have made some enhancements to the model which have further supported the detailed comparison of F6.6 refinement options. We have revaluated the options with the updated model and have found some changes the capability they are shown to provide, and these updates have fed into the CBA, which is covered in chapter 7. The impacts of the modelled capability in terms of forecast constraints are also discussed in chapter 7.

102. Because the pipe resistance in the updated model (Milford Haven to Alrewas) is lower than previously simulated, the capability of all options utilising this route is therefore shown to be increased broadly in a similar proportion. This amended view of capability further reduces the relative value of any previously discounted, larger scale investment options, in favour of the minimum spend associated with the F6.6.

103. The updated model continues to show that the pipeline reinforcement strategy associated with option F6.6 provides the bulk of the increase in capability necessary to support the increased entry capacity at Milford Haven. The value of the further analysis carried out since the Needs Case submission has been in reassessing the benefit given by each of the additional elements within the F6.6 variants as well as any variations in the diameter of the pipeline reinforcements themselves.

104. Tirley Pressure Reduction Installation (PRI) is a site which performs the essential function of protecting pipework downstream of Feeder 28 from overpressure. This is needed due to a change in the physical properties of the pipework at this point on the NTS. Carrying out this function in a high flow scenario tends to create a "bottleneck" at Tirley, which in turn limits capability to accept gas at Milford Haven, upstream. Analysis had previously shown that certain investment at the Tirley would allow us to retain the pressure protection whilst safely bypassing the regulator in high flow conditions, thereby reducing the bottleneck. In the updated analysis this was specifically tested by the modelling of option refinement F6.6X (F6.6e without modification at Tirley). The updated modelling now shows that in lower demand conditions the bypass stream would not be accessible due to higher pressures at the inlet to site than previously modelled. This change is due to the lower values of internal pipe resistance (roughness) in the updated model, associated with a reduced pressure drop along Feeder 28.

105. It is also worth noting that possible options for further increasing capability in the future include the tie in of a new at Tirey (running to Wormington), which could itself provide the bypass stream functionality and therefore render the bypass modification redundant.

106. We have also reassessed the value of uprating the maximum operating pressure of Feeder 28 to 102 Barg between Felindre Compressor Station and Three Cocks AGI. Enabling Felindre compressor to discharge at up to 102 Barg allows the compressor to work more effectively in high flow scenarios and to offset the effect of the large downstream pressure drop seen along the route towards Tirley and Wormington. The modelling continues to demonstrate that this project element provides a significant capability increase across the annual demand range when added to the pipeline investments.

107. We also revisited the possibility of increasing the MOP of Feeder 28 to 99 Barg between the Milford Haven South Hook terminal (Herbranston site) and Felindre Compressor Station. The effect of more gas entering the NTS from the terminal is to increase the overall pipeline resistance and therefore the pressure drop at all points downstream, which tends to elevate the terminal pressure. Increasing the terminal MOP therefore permits a higher entry flow. The modelling continues to show that there is an appreciable increase in capability where the change is implemented in addition to the uprating downstream of Felindre Compressor Station.

108. Finally, the modelling also continues to show a relatively small increase in capability where a 1200mm diameter feeder is installed between Wormington to Honeybourne in place of the 900mm feeder that is currently planned.

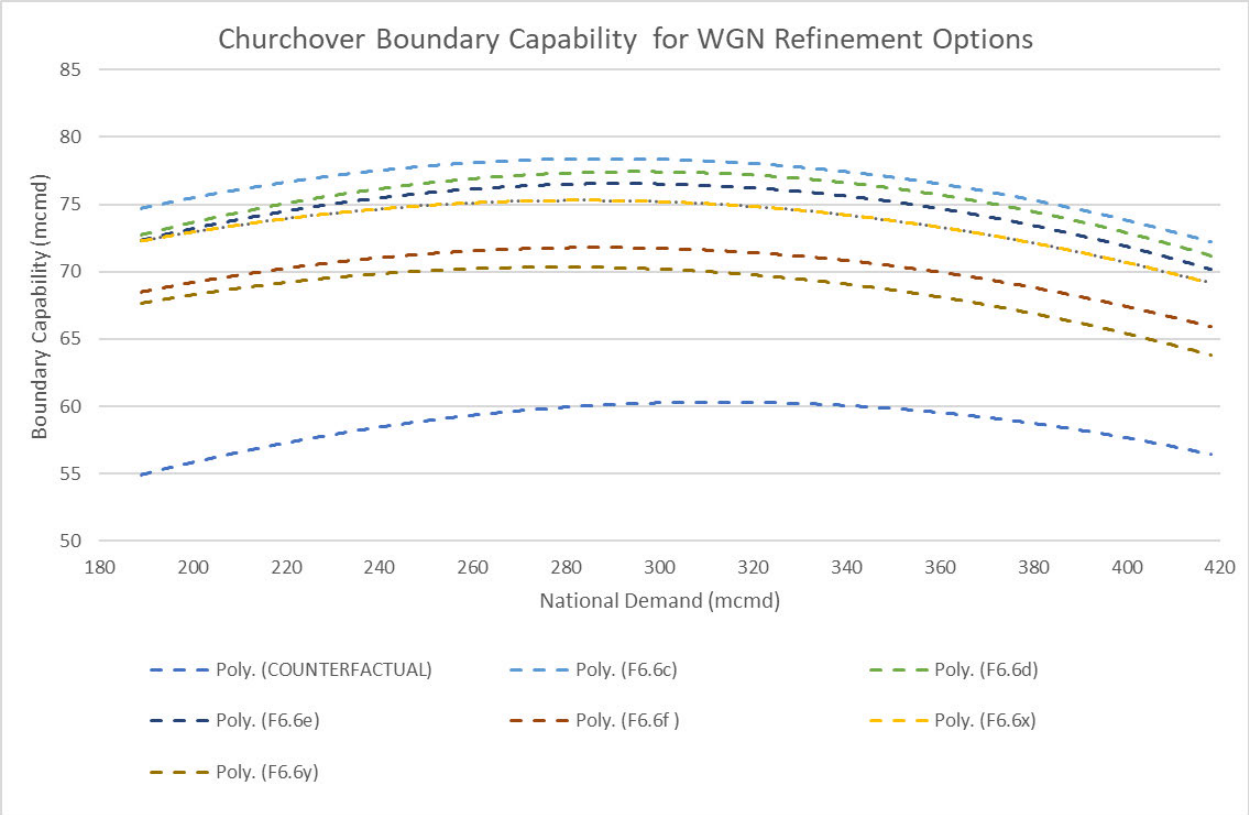

Figure 3: Strategic Option Refinements Boundary Capability

Chapter 6: Cost Definition

6.1 Cost Estimate Methodology

109. The project is in 4.3 Conceptual Design Development. Options have been defined and the conceptual design study is complete. The associated Cost Estimate is made up of incurred spend and forecast estimates. The costs have also been split up into two parts; Pipeline and Uprating. The incurred spend accounts for front-end engineering design (FEED), surveys, staff time and free issue material purchases (as shown in Section 6.5 Incurred spend) and further granularity within appendix 10B. The remaining estimated costs within future years relate to National Gas staff, unlet scope and any additional surveys. Further technical information on the scope of previous and future contracts is included at Section 8.2.

110. The Uprating works encapsulates spend to date and market tested rates provided by Specialist Services and Contractors to provide efficient costings for delivering the scope of works. This includes Surveys, Detailed Design, Build, Testing and Commissioning and Contractor Project Management. The remaining estimated costs relate to National Gas staff time to support the delivery based upon the roles required to deliver the project Which has been carried out in consultation with the Operational Planners and Supervisors.

111. The Pipeline works contains the same approach as stated above [redacted] As above, the remaining estimated costs are National Gas staff time to support on the delivery which has been completed using the same approach as the Uprating works.

112. The project has developed since our 2019 RIIO-T2 Business Plan submission and Need Case submission. As such, the scope of works has become more certain and the accuracy of the estimate has improved. This has led the phase of the project now being defined as "Final Business Case (FBC)" as stated within the Infrastructure Projects Association (IPA) published cost estimate guidance[7]. The level of cost certainty at this point is +15%/-15%, in-line with the expectations at this stage of the ND500 process.

113. The cost information within the cost estimates have been derived from a variety of sources, such as:

- **Actuals (spend to date)**

Due to the phase of the Project actual costs (incurred spend) are included within Section 6.5: Incurred Spend and further granularity is provided within appendix 10B.

- **Supplier quotations**
    - Within the Pipeline and Uprating works National Gas are procuring long lead items and quotations have been received for equipment costs.
- **Tendered costs**

[7] IPA_Cost_Estimating_Guidance.pdf (publishing.service.gov.uk)

        - Tendered costs for the main works contract for pipeline and uprating have been gained through a tendered process

- **Estimated costs**
    - This relates to the Estimating internal cost database that is built through a consolidation of framework rates, outturn costs of completed projects and tendered costs.
    - On a yearly basis Finance release an "Investment Handbook 2024" that details National Gas staff costs, which are used to inform the estimate and the appropriate rates for levels/grades within the business as detailed within appendix 10b Costbook.
- **Fixed costs**
    - These are the established business costs, otherwise known as Overheads, that cover several areas including but not limited to Insurance, offices, and non-time sheeted staff.
- **Risk**
    - The risks within the Project have been identified and quantified using the methodology shown in Section 8.5 Key Business Risks and Opportunities.

Estimate Scope

114. The estimate scope is covered in Section 4.3 – Project Scope Summary and identified as Option F6.6x as shown below.
    - The construction of 9km of new pipeline between Wormington and Honeybourne and 2km of new pipeline between Churchover Compressor Tee and Churchover Multijunction.
    - Related works at several existing Above Ground Installations (AGIs) to facilitate the connection of new pipelines.
    - Pressure uprating of part of the existing Feeder 28 pipeline between Felindre and Three Cocks only (note this specifically excludes the section between Felindre and Cilfrew, see section 8.1 for further details).
    - Related works at several existing Above Ground Installations (AGIs) and compressor stations to facilitate the pressure uprating and increased flow rates.

115. The total Installed Cost (TIC) of **£81,290,827** (2018/19 prices) is made up of the components listed above and the approximate spend profiles for this option is shown in Section 6.2. All the estimates have been developed based on an assumed standard Engineering, Procurement and Construction (EPC) delivery strategy. This strategy consists of FEED and EPC main contracts.

6.2 Cost Information

116. This section lists a simple cost breakdown for the project, in the EJP specified table format.

Item	Note	18/19 Costs (£m)
Engineering Design	Detail costs for studies/FEED/Detailed design as appropriate	[redacted]
Project Management	Element of project costs attributed to the project management, not direct or indirect company costs.	
Materials	Bulk Materials, breakdown preferred	
Main Works Contractor	Project Construction contractor costs	
Specialist Services	Costs for any additional services used to support the project I.e., surveys, data procurement etc.	
Vendor Package Cost	Costs of packages purchased for project	
Direct Company Costs	Refer to Regulatory Instructions and Guidance for definition of direct Company costs	
Indirect company costs*	Refer to Regulatory Instructions and Guidance for definition of Indirect Company costs	
Risk / Contingency	Contingency included in base cost estimate	
Total Installed Cost	Forecast total cost including contingency and all the above	81.291
Cost Estimate Accuracy	This is an important element to give confidence that the engineering is mature, and costs can be relied upon	+/-15%

**Indirect costs are covered by Engineering Design and Project Management*

Table 11: EJP Cost Information Breakdown Summary

6.3 Project Spend Profile

£m	RIIO-T1	RIIO-T2					RIIO-T3	Total
	Prior years	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	
2018/19 Prices	2.734	2.384	6.823	19.361	49.089	0.841	0.059	81.291
2018/19 Direct Costs	0.590	1.386	5.695	15.007	43.704	0.700	0.005	67.087

Table 12: EJP Cost Information Breakdown Summary

6.4 Efficient Cost

117. The WGN project team has to-date, and continues to, progress the project through several specific actions to ensure the project progresses efficiently. Examples of this are summarised below:

Lessons learnt that have been incorporated

118. Experience from previous projects has highlighted the consequences of changes in the outturn costs of strategic options, as further detail is added. This may lead to a need to change the option being addressed with programme and additional cost implications. The WGN project has therefore sought to define strategic and shortlisted options at a suitable level of detail to reduce risks of future sensitivity testing. All major elements of strategic options were identified (e.g. pipeline length, need for compression etc) to ensure that comparisons were made based on options close to likely final design. This approach reduces the potential for later back-checks and sensitivity testing to lead to an alternative option being more optimum.

Ongoing efficiencies that have been realised

119. Use of a District Licensing approach for Great Crested Newts where this is available. This approach is different from the traditional newt surveying and mitigation approach and provides the potential for programme and cost savings. It is only available for the proposed new 9km Wormington to Honeybourne pipeline section, but is being adopted (in agreement with Natural England) and is estimated to reduce costs by more than £60,000 (the final saving may be higher but depends on final pipeline alignment).

120. Our Consent Strategy in combination with a proactive approach to mitigation within pipeline routing, is allowing the project to progress as permitted development with limited need for Town and Country Planning Act (TCPA) planning applications. The alternative to this would have been to seek a DCO, likely to have added an estimated 18 – 24 months to programme and additional costs estimated in the order of £2m.

121. In Line Inspection (ILI) required to support Uprating Assessments has been aligned with Business As Usual ILI as far as possible. This means that this FIOC re-opener only seeks funding for the additional runs required, rather than all the gauge, calliper and intelligent Pipeline Inspection Gauges (PIGs) that are used.

Historical benchmarks: internal and external

122. Capital Cost comparisons have been made on across options using National Gas estimates. These are based on an agreed methodology and informed by previous outcome experience.

Procurement efficiencies

123. The use of existing supplier frameworks, plus services and equipment secured through competitive tendering is being adopted where possible, to ensure best value is achieved. In combination with pro-active negotiation over scope of works, this is reducing the costs of the design and consenting stage of the project. Examples include:

- Environmental support – Three framework suppliers were invited to tender with the one offering best value (combining cost, experience, method, and quality) selected. This provided a saving estimated at around £50,000.
- Uprating assessments. Pro-active negotiation with the supplier with relevant expertise on scope of work reduced the costs by an estimated £100,000 compared with their initial fee scope estimate.

124. Refer to Section 8.8 Procurement Strategy for further insight into the routes of driving efficiencies and remaining compliant.

Other

125. Details of Scope refinement are provided in Section 8.1 and demonstrate National Gas's commitment to continually refine the scope to meet the demands of the PARCA with the least new infrastructure. This is consistent with the guiding principle of Strategic Option selection and refinement presented in the Needs Case submission.

126. Details of National Gas's experience of managing similar projects explains how lessons learned have been incorporated to ensure efficient cost. Further details are provided at Section 8.3.

6.5 Incurred Spend

127. The following table represents a breakdown of the incurred spend on the WGN project to date, with further granularity available in appendix 10B.

Incurred Spend (£m) as at 31st March 2023	FY20 (18/19)	FY21 (18/19)	FY22 (18/19)	FY23 (18/19)	Total
Materials	0.000	0.000	0.000	4.147	**4.147**
Main Works Contractor	0.000	0.000	0.000	0.000	**0.000**
Specialist Services	0.073	0.515	1.371	1.543	**3.502**
Vendor package costs	0.000	0.000	0.000	0.000	**0.000**
Direct Company Costs	0.001	0.001	0.015	0.006	**0.022**
Engineering Design	0.019	0.054	0.174	0.042	**0.289**
Project Management	0.489	1.583	0.824	1.086	**3.982**
Indirect company costs	0.000	0.000	0.000	0.000	**0.000**
Risk / Contingency	0.000	0.000	0.000	0.000	**0.000**
Total	**0.581**	**2.153**	**2.384**	**6.823**	**11.941**

Table 13: WGN Incurred Spend

Chapter 7: Business Case Outline and Discussion

7.1 Cost Benefit Analysis Refresh

128. We have continued to analyse the project since the WGN FIOC Need Case submission, in order to inform decision making, such as those detailed within section 8.1. At the point of Project Direction submission, WGN has progressed considerably based on the preferred strategic option and refinement presented in the Needs Case document, so the following results are presented to meet the requirements specified in the guidance documentation. They confirm the results of the original CBA submitted are still valid and the option proposed in its needs case submission remains the optimal solution.

129. This section was authored before technical evaluators were permitted to see the commercial tender submissions for both pipelines and uprating and as such are based on internal estimates, consistent with the previous CBA. This is considered sufficient for decision making. The CBA presented here will focus on further refinement of F6.6 including consideration of Tirley bypass re-configuration and uprating separately as follows:

Option	Descriptor	Option for CBA Sheet	Total	2021	2022	2023	2024	2025
a	Counterfactual	Counterfactual Existing Network	[redacted]					
c	F6.6 1200 Base	F6.6 1200 Base 1200 Wormington to Honeybourne, all uprating and biggest Tirley bypass, Churchover partial bypass. Latest eHub estimate £100m in range of £85m to £124m.						
d	F6.6 1200 Light	F6.6 1200 Light 1200 Wormington to Honeybourne, uprating only downstream of Felindre, existing bypass at Tirley, Churchover partial bypass. Internal estimate £79m (within -20,+30%)						
e	F6.6 900 Light	F6.6 900 Light 900 Wormington to Honeybourne, uprating only downstream of Felindre, existing bypass at Tirley, Churchover partial bypass. Internal estimate £68m (within -20,+30%)						
f	F6.6 900 Min	F6.6 900 Min 900 Wormington to Honeybourne, NO UPRATING, existing bypass at Tirley, Churchover partial bypass (within -20,+30%)						
x	F6.6 900 Light. No Tirley bypass	F6.6 900 Light 900 Wormington to Honeybourne, uprating only downstream of Felindre, NO bypass at Tirley, Churchover partial bypass (within -20,+30%)						
y	F6.6 900 Min. No Tirley bypass	F6.6 900 Min (900 Wormington to Honeybourne, NO UPRATING, NO bypass at Tirley, Churchover partial bypass (within -20,+30%)						

Table 14 – Capital Costs for Strategic Option Refinement

7.2 Cost Benefit Analysis Drivers and Key Assumptions

130. The core focus of the CBA was the 10-year view to 2035. This aligns with the assessment carried out in our FIOC Need Case Submission and is aimed at determining the optimal configuration for Option F6.6 given updated costs and scenarios.

131. The relative costs of the options can be seen in the figure below. As would be expected the investment costs decrease as different elements of the projects are removed.

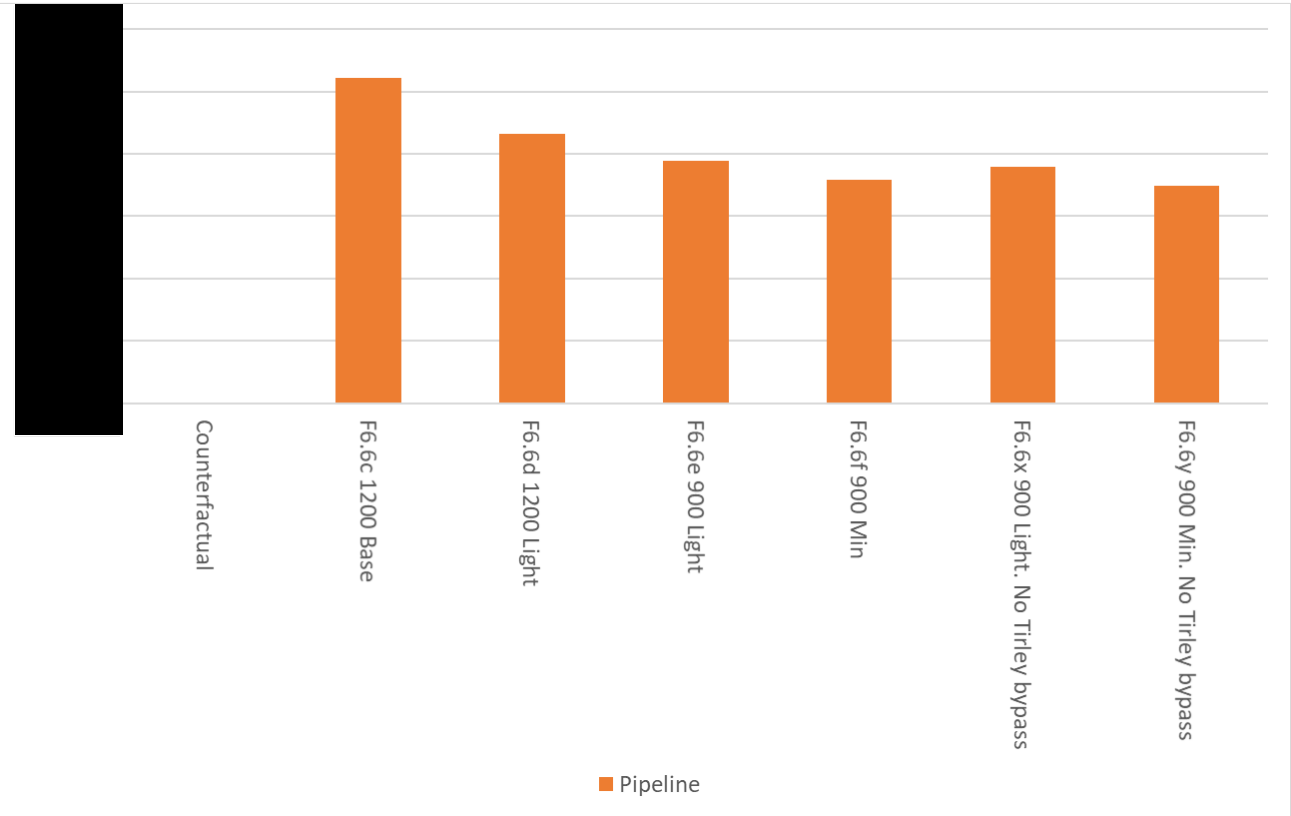

Figure 4: F6.6 sub option costs

132. The constraints up to 2035 can be seen in Figure 5 below. For all scenarios, the counterfactual constraints are significantly higher than the other options. To avoid these distorting the picture and to allow comparison of the options these have been excluded from the charts below.

133. The magnitude of constraints varies significantly by scenario. In both Consumer Transformation and Leading the Way constraints increase significantly due to rapidly declining demands in both scenarios. This results in accelerating the requirement to expand the capability of the network further to reduce this constraint risk. As described in section 4.1, we do not believe these demand levels are realistic expectations over the next 10 years. As a result, we do not see an immediate driver to change course to expand the capability at this stage, with the current phased approach remaining the correct path to take at this stage. However, we should continue to monitor future flow expectations and review the need to trigger further investment as part of our RIIO-3 submission.

134. The lowest constraint risk for all scenarios is F6.6c – 1200 Base, which marginally outperforms F6.6d – 1200 Light, F6.6e – 900 Light and F6.6x – 900 Light No Tirley bypass. All of these options result in slightly reduced risk from the current network in both the Steady Progression and System Transformation scenarios.

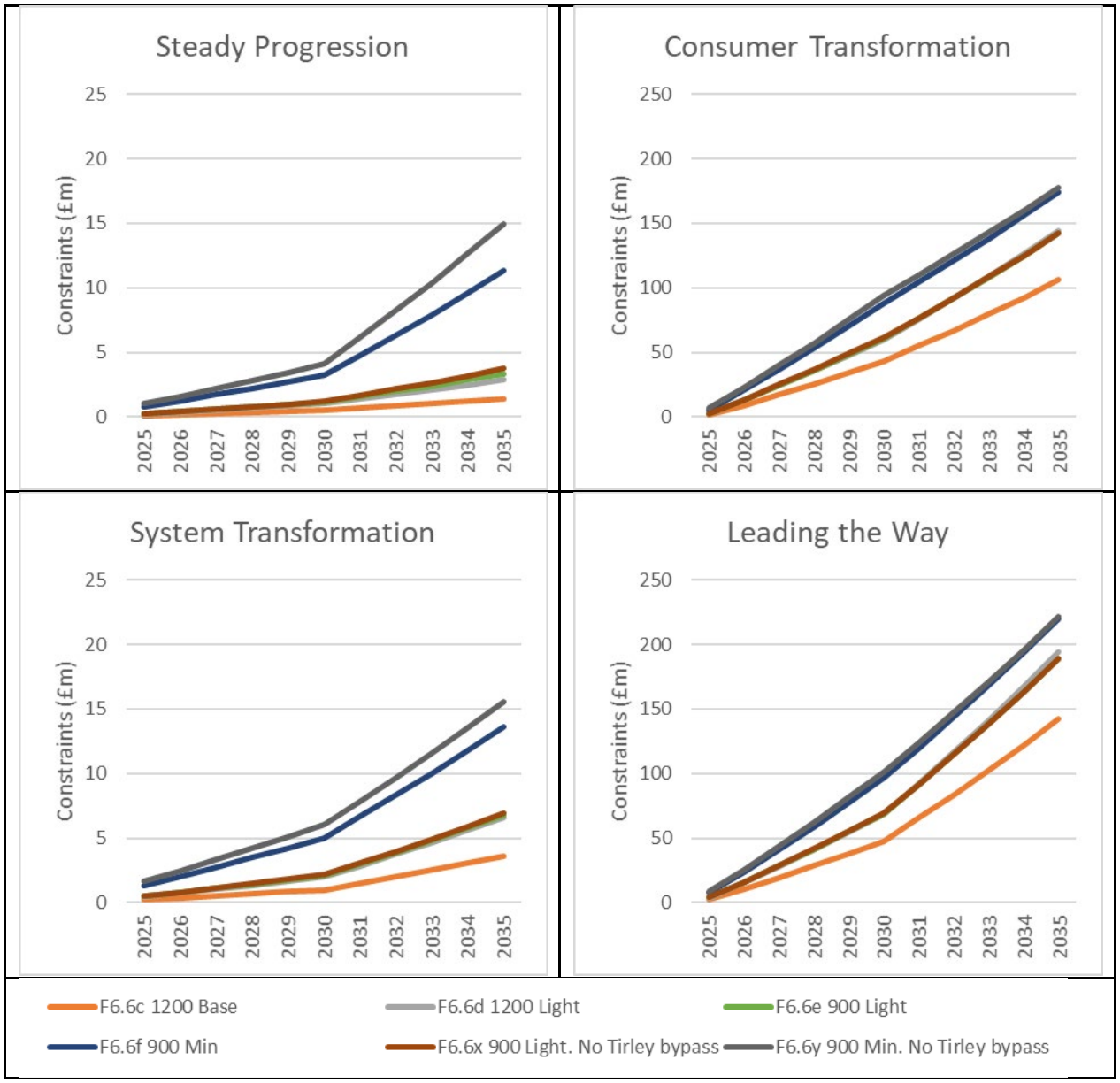

Figure 5: Constraints (all scenarios)

135. As with the Strategic Options selection process, all the options have been tested against all four scenarios from FES 2022. In addition, the probabilistic modelling considers High LNG and High Continent supply cases in the same way as described earlier.

136. The key assumptions are detailed in the table below.

	Assumption	Base Assumption	Rationale
CBA parameters	WACC	2.81%	Defined in RIIO-2
	Social Time Preference Rate	3.5% (Years 0 – 30) / 3.0 % (30+)	Defined in Green Book
	Regulated Asset Life	45 years	Defined in RIIO-2
	Assessment Period	10 years from installation.	Consistent with Strategic Option selection
	Depreciation	SOTYD	Defined in RIIO-2
	Capitalisation	75%	Defined in RIIO-2
Investment Costs	Investment Costs	Detailed in Appendix V: Optioneering Cost Breakdowns	Detailed in Appendix V: Optioneering Cost Breakdowns
Operating Costs	Supply/Demand Scenario	FES2022 – All Scenarios	Wide range of uncertainty, all scenarios given equal weight
	Constraint management method	50% buy backs / 50% locational actions	Reflective of tools available to manage constraints.
	Constraint Costs	BEIS Reference scenario	As defined by Commercial Constraint Price Methodology

Table 15: Key Assumptions for sub option evaluation

7.3 Results and Sensitivities

137. The absolute and relative NPVs for the sub options can be seen in Table 16 and 17 below. When we consider constraints up to 2035, we can see that option F6.6x is the lead option in both Steady Progression and System Transformation, while performing well in both Consumer Transformation and Leading the Way.

138. The capability of F6.6x is only slightly reduced from F6.6e and the cost savings outweigh the additional constraint risk. In addition to this, the increased flows at Milford Haven are likely to support further expansion of the capability of the route in RIIO-T3. If this expansion goes ahead the capability gains of the Tirley by-pass would be made redundant. The technical specifications of the scope change between F6.6e and F6.6x are discussed in further detail in section 8.1.

139. As discussed in section 4.1, the constraints in both Consumer Transformation and Leading the Way are not considered realistic in this timeframe, as such the relative position of these options should not factor into the investment decision.

140. Options F6.6c and F6.6d both involve the use of 1200mm pipeline. Given the status of the project, these would involve additional costs that have not been factored in. As such, they are included here for information only and are not currently options which could be selected for development.

Option	Steady Progression	Consumer Transformation	Leading the Way	System Transformation
Counterfactual	-£642 m	-£2241 m	-£2444 m	-£696 m
F6.6c 1200 Base	-£158 m	-£605 m	-£721 m	-£170 m
F6.6d 1200 Light	-£147 m	-£727 m	-£884 m	-£164 m
F6.6e 900 Light	-£141 m	-£719 m	-£869 m	-£158 m
F6.6f 900 Min	-£160 m	-£883 m	-£1033 m	-£178 m
F6.6x 900 Light. No Tirley bypass	-£140 m	-£721 m	-£869 m	-£157 m
F6.6y 900 Min. No Tirley bypass	-£169 m	-£912 m	-£1056 m	-£185 m

Table 16: Absolute NPV, no constraints post 2035

Option	Steady Progression	Consumer Transformation	Leading the Way	System Transformation
Counterfactual	£0 m	£0 m	£0 m	£0 m
F6.6c 1200 Base	£485 m	£1636 m	£1723 m	£526 m
F6.6d 1200 Light	£495 m	£1515 m	£1559 m	£532 m
F6.6e 900 Light	£501 m	£1522 m	£1574 m	£538 m
F6.6f 900 Min	£483 m	£1358 m	£1410 m	£518 m
F6.6x 900 Light. No Tirley bypass	£502 m	£1521 m	£1575 m	£540 m
F6.6y 900 Min. No Tirley bypass	£473 m	£1329 m	£1388 m	£511 m

Table 17: Relative NPV, no constraints post 2035

141. Several sensitivities were applied to understand how changes to key variables could impact our investment. All these cases continue to test the investments in the medium term, with no constraint costs considered after 2035.

142. A key uncertainty is the cost of constraints. To test the impact of these, we have modelled two scenarios to capture credible extremes for these costs.

143. To find the lowest level for constraints we have resolved all constraints using locational actions. 50% of these are modelled as sells, with all proceeds returned to consumers resulting in zero impact. The other 50% require a buy action, this is costed based on a 20% premium on the prevailing gas price.

144. The relative position of the options is not significantly changed in this sensitivity. All the options continue to pay off against the counterfactual.

Option	Steady Progression	Consumer Transformation	Leading the Way	System Transformation
Counterfactual	-£129 m	-£721 m	-£778 m	-£125 m
F6.6c 1200 Base	*-£102 m*	*-£235 m*	*-£257 m*	*-£104 m*
F6.6d 1200 Light	*-£88 m*	*-£264 m*	*-£297 m*	*-£90 m*
F6.6e 900 Light	-£81 m	-£257 m	-£287 m	-£83 m
F6.6f 900 Min	-£80 m	-£309 m	-£337 m	-£82 m
F6.6x 900 Light. No Tirley bypass	-£79 m	-£256 m	-£286 m	-£81 m
F6.6y 900 Min. No Tirley bypass	-£80 m	-£317 m	-£343 m	-£82 m

Table 18: Absolute NPV, 100% locational actions

Option	Steady Progression	Consumer Transformation	Leading the Way	System Transformation
Counterfactual	£0 m	£0 m	£0 m	£0 m
F6.6c 1200 Base	*£27 m*	*£486 m*	*£521 m*	*£21 m*
F6.6d 1200 Light	*£41 m*	*£457 m*	*£481 m*	*£34 m*
F6.6e 900 Light	£48 m	£464 m	£491 m	£42 m
F6.6f 900 Min	£49 m	£412 m	£441 m	£43 m
F6.6x 900 Light. No Tirley bypass	£50 m	£465 m	£492 m	£43 m
F6.6y 900 Min. No Tirley bypass	£49 m	£404 m	£435 m	£43 m

Table 19: Relative NPV, 100% locational actions

145. To test an upper limit for costs we have modelled a gas price of 300 pence per therm. During 2022 prices were at or above this level for a significant period. In addition, this aligns to the potential impact on wholesale prices due to sustained market disruption

as detailed in our St Fergus Compressor Emissions FOSR[8] and our Wormington Compressor Emissions FOSR Consultation response[9]. It is also the cost of Buy Backs seen during 2006 following disruption at St Fergus.

146. Under these conditions, F6.6e would have benefits over F6.6x, with the additional capability worth the slight increase in investment costs.

Option	Steady Progression	Consumer Transformation	Leading the Way	System Transformation
Counterfactual	-£3254 m	-£11337 m	-£12359 m	-£3544 m
F6.6c 1200 Base	-£485 m	-£2782 m	-£3372 m	-£550 m
F6.6d 1200 Light	-£494 m	-£3443 m	-£4241 m	-£584 m
F6.6e 900 Light	-£492 m	-£3437 m	-£4198 m	-£581 m
F6.6f 900 Min	-£606 m	-£4277 m	-£5042 m	-£705 m
F6.6x 900 Light. No Tirley bypass	-£495 m	-£3450 m	-£4203 m	-£582 m
F6.6y 900 Min. No Tirley bypass	-£658 m	-£4433 m	-£5164 m	-£745 m

Table 20: Absolute NPV, High Price

Option	Steady Progression	Consumer Transformation	Leading the Way	System Transformation
Counterfactual	£0 m	£0 m	£0 m	£0 m
F6.6c 1200 Base	£2770 m	£8555 m	£8987 m	£2993 m
F6.6d 1200 Light	£2761 m	£7894 m	£8118 m	£2959 m
F6.6e 900 Light	£2762 m	£7900 m	£8161 m	£2963 m
F6.6f 900 Min	£2648 m	£7060 m	£7318 m	£2839 m
F6.6x 900 Light. No Tirley bypass	£2759 m	£7887 m	£8156 m	£2962 m
F6.6y 900 Min. No Tirley bypass	£2597 m	£6904 m	£7195 m	£2799 m

Table 21: Relative NPV, High Price

147. To test the sensitivity to the overall investment we also tested how increasing the overall investment costs impacted the options. This was done for the System Transformation scenario by increasing and decreasing the investment for all options until the preferred option changed.

148. Costs would have to decrease to 25% of their modelled levels until the selected option changed to F6.6e. Costs would need to increase by 650% of their modelled levels until the selected option changed, in this case to F6.6y. Given the similarity in these costs it is expected a dramatic reduction in costs would be required to drive any difference between the options.

[8] https://www.nationalgas.com/document/142126/download
[9] https://www.ofgem.gov.uk/sites/default/files/2023-03/NGGT_Wormington%20Compressor%20Emissions_Response_09012023_Redacted.pdf

7.4 Long Term Consumer Value

149. Throughout the project to date, all investigation, analysis and review has been undertaken to identify the investment that provides the most economical and efficient solution to safely provide the reserved capacity using the defined methodologies in place.

150. This includes a robust and transparent options appraisal process, the application of our CBA methodology as demonstrated within this chapter, plus the economic test as detailed within the Entry Capacity Release Methodology Statement (ECR) with the relevant NPV test threshold determined by Licence Special Condition 9.18 Part B. The NPV test and allocation of capacity to SHGCL are planned for August 2023, with the financial commitment to the capacity equating to a significant proportion of the project cost. These are all described in more detail within the WGN FIOC Need Case submission with no changes in approach since then.

151. As stated within the Ofgem WGN Need Case Decision

> *To secure this additional capacity South Hook LNG Gas Company Ltd is required provide a financial commitment prior to construction. In this case, the financial commitment represents a material contribution to the estimated cost of the Western Gas Network project. Increasing South Hook LNG Gas Company Ltd's import capacity will bolster security of supply for gas consumers in Great Britain as gas production declines.*

Capability and Future Expansion

152. As previously highlighted within the Need Case submission, some scenarios see constraints increase dramatically from 2035, meaning we would require further capability within the network. The approach adopted retains the opportunity for future investment when future supply and demand balances become clearer, without overinvestment in a potentially poorer performing solution at this stage. We will signal any such future requirements in our ANCAR publication. As detailed in section 4.1, the importance in our ability to bring LNG into GB has never been more critical with the decrease in gas supplies from Europe due to global events. Milford Haven has at times in the last year supplied 30 percent of GB's gas demand, highlighting its importance as a supply point into the network.

153. From the range of options considered from the start of this project, we have a number of variations from the strategic optioneering process that would represent a modular approach to increase capability in future. Within our FIOC Need Case submission we presented the two most likely expansions, uprating from Milford Haven to Felindre and a further 26km of pipeline from Tirley to Wormington. We would have to reassess any such options, costs and delivery timescales using the latest data available.

Chapter 8: Project Scope and Project Plan

8.1 Project Scope / Technical Information

Details of the construction works, scope and route

154. The WGN project being progressed has been identified following a comprehensive evaluation process of options capable of meeting the PARCA requirements. A detailed optimisation process has also been undertaken to refine the preferred strategic option. We established that option F6.6x is the optimum solution to meet the needs of the PARCA in an economic and efficient manner, at the least cost to UK consumers, and consists of the following scope:

I. 9km of new pipeline between Wormington and Honeybourne and 2km of new pipeline between Churchover Compressor Tee and Churchover Multijunction

II. Related works at several existing Above Ground Installations (AGIs) to facilitate the connection of new pipelines

III. Pressure uprating of part of the existing Feeder 28 pipeline between Felindre and Three Cocks only (note this specifically excludes the section between Felindre and Cilfrew, see section 8.1 for further details)

IV. Related works at several existing Above Ground Installations (AGIs) and compressor stations to facilitate the pressure uprating and increased flow rates. This category includes Tirley modifications.

Pipelines

155. A Conceptual Design Study [redacted] defined the technical scope of the pipelines and associated connections for the purposes of consenting and procurement of a MWC for Detailed Design and Build (DDB). Further technical details for the pipelines are included in the tables below:

New Pipeline – Wormington to Honeybourne	
Start Point	Wormington Multijunction
End Point	Honeybourne Multijunction
Design Pressure	75 Barg
Design Capacity	45 Million Standard Cubic Metres per Day
Expected materials of construction	API 5L X65 / ISO 3183 L450 Steel
Related Works	Pipeline tie-ins at Wormington Multijunction and Honeybourne Multijunction

Table 22: Project Scope Summary Table (Wormington to Honeybourne Pipeline)

New Pipeline – Churchover Compressor Tee to Churchover Multijunction	
Start Point	Churchover Compressor Tee
End Point	Churchover Multijunction
Design Pressure	70 Barg
Design Capacity	42 Million Standard Cubic Metres per Day
Expected materials of construction	API 5L X65 / ISO 3183 L450 Steel
Related works	Pipeline tie-ins at Churchover Compressor Tee and Churchover Multijunction

Table 23: Project Scope Summary Table – Churchover Pipeline

156. The pipelines will be constructed within the land shown blue with red hatching on the CPO Maps[10], available on the project website and included as Appendix 10E. The pipelines will be installed generally in accordance with the animation[11] on the project website.

157. Crossings of roads, rivers and other obstacles have additional working area associated to facilitate open-cut and trenchless crossing techniques such as auger-bores.

[10] https://www.nationalgas.com/document/141206/download
[11] https://players.brightcove.net/867903724001/default_default/index.html?videoId=6228048532001

The A44 crossing is the most challenging crossing on the route and has been designed as a micro-tunnel.

158. The pipelines will be connected into existing infrastructure at either end. Conceptual Design Studies (CDS) are available for each connection. General Arrangement drawings from these CDS are included as Appendix 10F.

159. The Wormington connection is straightforward, utilising an existing above ground connection point and incorporating a Pipeline Inspection Gauge (PIG) trap to facilitate In Line Inspection (ILI) of Feeder 23 as one continuous section (new and existing) from Wormington to Churchover MJ. No outages are required for the works.

160. The Honeybourne connection is also straightforward and involves removal of the existing PIG trap to tie in the new pipeline. No outages are required for the works. This connection was significantly simplified by earlier decision making to reduce the Wormington to Honeybourne pipeline diameter from 1200mm to 900mm, such that the pipeline now runs continuously through the site.

161. The Churchover Tee connection is complex. This is primarily because gas is required to partially bypass the Churchover compressor in high flow scenarios to avoid running compressors in choke. Once the new pipeline is commissioned, some gas will free-flow past Churchover compressor station and other gas will be directed toward the compressor station to be compressed. The work will be carried out during a Churchover Compressor outage and subsequent Feeder 23 Newbold Pacey to Churchover Tee outage, utilising a [redacted] Remote Techno Plug to reduce vented gas associated with recompression, vent and purge. Town and County Planning Act planning permission has been granted for this pipeline connection and freehold land will be acquired to facilitate the site extension required to accommodate the new pipework.

162. The Churchover MJ connection involves a new PIG trap, and significant underground pipework to achieve a connection to the existing Feeder 14. No outage is required for the works.

Uprating

163. Pressure uprating increases the physical capability of the network to flow gas by increasing the pressure at which it can be discharged from Felindre Compressor Station.

164. The WGN project seeks to uprate the section of Feeder 28 between Felindre and Three Cocks to 102 Barg from the existing Maximum Operating Pressure of 94 Barg.

165. Uprating Viability Studies and Assessments have so far demonstrated that the pipeline can be uprated and the Health and Safety Executive have been engaged on progress to date. The Pipeline Integrity and Risk Evaluation report is included as Appendix 10G.

166. Uprating affects Felindre Compressor Station, Felindre MJ, Alltwern Recycle Facility, Llanwrda Block Valve and Three Cocks AGI.

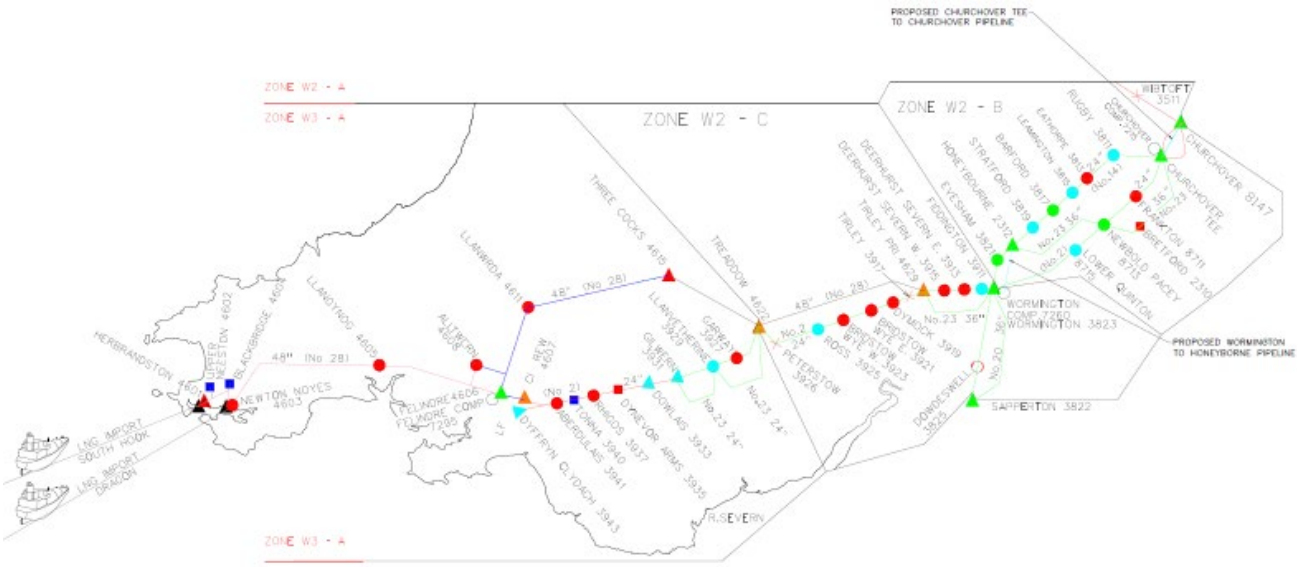

Figure 6: Network diagram of AGI

167. Each of these installations have been subject to Uprating Assessments by our Uprating Contractor [redacted]. Uprating Assessments are systematic checks of equipment exposed to the uprated pressure to check it is safe and sufficient to operate at the uprated pressure. The Uprating Assessment Summary reports for each AGI and Felindre Compressor Uprating Summary report are provided at Appendix 10H.

168. Where equipment has failed uprating assessments, we have worked [redacted] to develop conceptual designs necessary for the modifications (see Description of the Delivery Model in section 8.2).

169. At Felindre MJ, these modifications include:

- Closing and locking three valves to inhibit reverse compression and prevent compressed gas flowing towards Milford Haven or Cilfrew.
- Opening and locking one valve to inhibit reverse compression and prevent compressed gas flowing towards Milford Haven.
- Re-ranging various instruments.
- Replacing valve actuation components for higher pressure alternatives.
- Pneumatically testing pipework where test records cannot be located.
- Recoating areas of corrosion.

170. At Felindre Compressor Station the modifications include:

- Installation of orifice plates and silencers into the compressor vent system to achieve compliance with specification and reduce noise at the uprated process conditions.
- Adjust vent control valve look-up tables to match the mass flow rate required for uprated process conditions.

- Remove three pressure transmitters that are redundant and not rated for the uprated pressure.
- Take measured wall thicknesses at various locations to inform stress analysis exceptions, remodel the stress analysis and remediate if necessary.
- Possible modifications to the in-line ultrasonic meter.
- Possible modifications to the compressor surge control pipework.
- Other minor instrumentation and control modifications as identified by uprating assessment.

171. At Alltwern, the modifications include:

- Design and implementation of a control system to close Alltwern valve where the pressure is above the rated pressure of the upstream asset.
- Re-ranging various instruments.

172. At Llanwrda, the modifications include:

- Replacement of actuators for equipment suitable for the uprated process conditions.
- Pneumatically testing pipework where test records cannot be located.

173. At Three Cocks, the modifications include:

- Implementation of an automatic pressure protection system to protect the downstream asset from over-pressurisation.
- Install an additional pressure transmitter for the pressure protection system.
- Installation of two new gas-hydraulic actuators for the pressure protection valves.
- Installing a means of positive isolation in the PIG trap bridle pipework.
- Re-ranging various instruments.

Tirley

174. Modifications at Tirley will include:

- Disabling the remote functionality of valve 01 (to remove a failure scenario for uprating).
- Re-ranging of various instruments.
- Implementation of a maximum flow limit of 81 mcm/d.

Scope Ambiguity

175. There remains significant ambiguity associated with uprating and Tirley scope definition, particularly at Felindre Compressor Station. This is attributable to delays with the Uprating Assessments and Original Equipment Manufacturer (OEM) Assessments upon which they rely.

176. National Gas assert that scope ambiguity does not undermine the business case for uprating or affect the fundamental viability of this approach.

177. It is acknowledged that some of these high value, low probability risks are driving a significant contingency request associated with uprating. For this reason, we have defined Uprating (and Tirley) as one of two PCD outputs requested as part of this Project Direction such that, if necessary, it may be adjusted to suit a developed scope of works following detailed design. This is detailed later in this section.

Details of changes since Needs Case submission approval

178. National Gas is continually reviewing the economy and efficiency of the project, including exploring opportunities to optimise the scope of works. These decisions were supported by bespoke CBA where relevant (further details in Section 7). This section details the design changes since the approved FIOC Need Case submission (Appendix 10D) for the WGN project earlier in the FIOC process, with explanations and associated evidence as appropriate. All Project Scope Document Query Forms are included in full at Appendix 10I.

Project Scope Document Query 1 – Removal of Wormington Re-wheels

179. Project Scope Document Query 1 was approved to remove Wormington re-wheels from WGN scope. In summary, it is no longer considered economic and efficient to re-wheel the existing Gas Turbine compressor units at Wormington, as the Ofgem Final Decision for Wormington MCPD confirms that one unit is expected to be decommissioned and one unit subject to a 500Hrs Emergency Use Derogation. There is an enduring requirement for Unit C (the electric Variable Speed Drive) to be re-wheeled, but this will be delivered by the MCPD project consistent with Ofgem's Final Decision on Wormington MCPD which states *"to ensure operation mapping alignment across all site compressors, this option will also consider the case for a VSD re-wheel during the next phase of the project."* All three Wormington re-wheels have been removed from WGN scope.

Project Scope Document Query 2 – Removal of Felindre Re-wheels

180. Project Scope Document Query 2 was approved to remove Felindre re-wheels from WGN scope. In summary, it is no longer considered economic and efficient to re-wheel compressor units at Felindre, as doing so offers a small capability benefit that is uncertain. [redacted] Felindre re-wheels have been removed from WGN scope.

Project Scope Document Query 3 – Removal of Feeder 28 Felindre to Cilfrew and Cilfrew Pressure Reduction Station (PRS) Uprating

181. Project Scope Document Query 3 was approved to remove Feeder 28 Felindre to Cilfrew and Cilfrew PRS Uprating from WGN scope. This pipeline and installation were originally included to maintain existing system flexibility (the ability of the system operator to re-configure the network based on prevailing flows and pressures). Uprating Assessments identified a need for more extensive modifications to Cilfrew PRS than originally anticipated, and as such permission was sought from the National Gas System

Operator (SO) to accept a reduced system flexibility to avoid the need for significant capital investment, which was agreed. Felindre to Cilfrew and Cilfrew PRS uprating have been removed from WGN scope.

Project Scope Document Query 4 – Removal of Tirley Bypass reconfiguration modifications

182. Project Scope Document Query 4 was approved to remove Tirley bypass modifications from WGN scope. Tirley bypass modifications were designed to reduce the differential pressure across Tirley PRS at high flow by diverting some flow through an existing bypass which is currently configured to permit only East – West flow. The re-configured bypass would only be available in the West – East direction when the gas at the inlet of Tirley was at a lower pressure than the downstream Maximum Operating Pressure (75 Barg). Due to system modelling updated in 2022, following a period of high Milford Haven flows, the roughness factor of Feeder 28 was reduced to better approximate real-world observed conditions. The lower roughness factor results in higher inlet pressures to Tirley. Higher inlet pressures reduce the network scenarios where the bypass is available, reducing the benefit of the modifications.

183. Conceptual Design Studies and in particular Formal Process Safety Assessments identified the requirement for an in-line ultrasonic flow meter to be incorporated into the modification. Engagement with the System Operator confirmed that the modification works would require a stopple isolation as a site outage could not be facilitated for the works duration. Both developments significantly increased the capital cost.

184. The latest Cost Benefit Analysis (see Section 7) confirms that F6.6x (without Tirley bypass modifications) outperforms F6.6e (with Tirley bypass modifications).

185. Tirley bypass modifications have been removed from WGN scope.

Other changes

186. Other notable changes not formalised through Project Scope Document queries include:

- The decision to deviate from the 2007 pipeline routing of the Wormington to Honeybourne pipeline. This was done to maintain full consistency with the modern guiding principles and routeing principles derived for the project. The main change resulted in a 300m shorter route, reducing overall project cost and impact.
- The decision to implement a pressure protection system at Three Cocks to protect the downstream asset from pressure excursion above the Maximum Incidental Pressure (MIP = Safe Operating Limit (SOL)). This will be supplemented by a manual boundary control procedure implemented within Gas Network Control Centre (GNCC) to ensure pressure is controlled below Maximum Operating Pressure (MOP).
- Capacity release is now planned for the PARCA contractual date of 01 January 2026, due predominantly to the related projects drivers (see Section 3). Capacity Allocation is still planned for Q3 2023.

Technical designs and construction techniques

187. This section details and justifies any technical designs (e.g. compressor station layout) and construction techniques to be used in the project (with additional detail if design and/or construction activity is technically challenging, novel, or a cause for divergences in cost relative to industry benchmarks). Designs and construction techniques proposed above are not especially technically challenging, novel or cause for divergences in cost relative to industry benchmarks.

188. Pressure uprating has been executed elsewhere on the NTS. However, Feeder 28 uprating is considered novel since the maximum operating pressure will now exceed classification ratings for the Class 600 flanges and other equipment installed on the associated installations.

189. As described above, there remain significant technical risks associated with uprating that need to be considered further in detailed design. None of the risks undermine the viability of uprating and rather relate to the definition of the full scope of works.

190. The following table describes residual uprating scope risks at the point of FIOC PD submission. Note - the risks highlighted below are held by National Gas (rather than having been transferred to any contractors).

191. The inclusion of the variable scope elements within the risk register, means our total risk percentage for the pressure uprating work is higher than we would typically expect to carry. This method however is deemed the best way to include an appropriate level of allowances, using our methodology of calculating P50 values, to complete work as these scope elements are determined. We have made a request for a specific Pressure Uprating PCD Output to allow the appropriate management of these elements, where we will detail what has materialised and what the actual costs associated with each was, within our obligated Basic PCD Report. This report will also provide our view on the value of any adjustment to allowances for Ofgem assessment, under the PCD process.

192. Due to the delivery timescales of the PARCA and regulatory processes, we deem this to be the best mechanism to provide value to consumers.

Risk ID	Title
T-65963	NG specifications review findings
T-65965	Purchase additional Central Emergency stock
T-65970	Surge control and recycle loop modifications at Felindre CS
T-65971	New meter at Felindre CS
T-65969	New fuel gas skids and air intake modifications at Felindre CS
T-65026	Felindre Compressor Noise
T-65968	Power Mechanical valves and actuators (CS) replacement
T-65972	Pipework support reinforcement
T-65973	Pipework stress analysis exception resolution
T-66613	Felindre Vent Stack Replacement

Table 24: Pressure uprating variable scope elements in Risk Register

193. **T-65963 NG Specification Review Findings** refers to the fact that much of National Gas's Safety Management System (SMS) is written to facilitate the safe construction and operation of gas transmission infrastructure with maximum operating pressures (MOPs) no higher than 94 Barg (the existing MOP of Feeder 28) or 100 Barg (a seemingly arbitrary limit, consistent with industry standards). A tender proposal has been received [redacted] to review the full suite of documents that make up the SMS and make recommendations and conclusions on what changes are required to raise these limits. In many cases, the limits will be arbitrary and documents can be updated with little effort, but until the full extent of the impact is understood it is impossible to define the effort associated. For now, a percentage of the effort associated with adapting the SMS to Hydrogen transmission has been used, on the basis that impact of uprating is likely to be smaller than the impact of Hydrogen.

194. **T-65965 Purchase additional CEME stock** refers to the fact that Central Emergency stock held at Pipelines Maintenance Centre (Ambergate) was procured for Class 600 pipelines. Further engineering studies are required to determine whether the Class 600 equipment is suitable and sufficient for operation at the uprated pressure, or whether Class 900 or intermediate class rated equipment should be purchased to maintain National Gas's ability to respond to emergencies on Feeder 28 without this resulting in a requirement to temporarily or permanently downrate the pipeline afterwards.

195. **T-65970 Surge control and recycle loop modifications** at Felindre CS refers to an ongoing dynamic process modelling study carried out in line with the requirements of TR/16 (National Gas specification for uprating of compressor stations). There is some evidence from early experience of operating Unit A at Felindre that the surge control recycle line is too short and that modifications may be required to facilitate uprating. The dynamic process modelling study will ultimately conclude whether modifications are required and if so, what the extent of these modifications are, but this information is not available at the point of FIOC PD submission.

196. **T-65971 New meter at Felindre CS** refers to the conclusion from the uprating assessment of the station ultrasonic meter at Felindre, which identified that meter velocities were above the maximum OEM recommended velocities. The likely result of this is marginally compromised metering accuracy. However, there remains a small risk of compromised meter signal integrity, which may warrant investment in a new meter that can perform better at high gas velocities.

197. **T-65969 New fuel gas skids at Felindre CS** refers to the risk that the GT compressors may draw more fuel or air under uprated conditions, requiring change to the air intakes or fuel gas skids. The air intakes have since been confirmed as suitable, so this has been removed from the quantification in the risk register. There remains a risk that modifications to the fuel gas skids may be required, or in the worst case, they need to be replaced altogether.

198. **T-65026 Felindre Compressor Noise** refers to the fact that, whilst empirical models have been used to draw conclusions on likely levels of noise and vibration at Felindre, these studies have serious limitations and real operational duty is required before noise and vibration mitigation actions can be finalised. Since this will be after uprating pressure raising, contingency is required if noise or vibration problems require mitigation.

199. **T-65968 Power Mechanical valves and actuators (CS) replacement** refers to the conclusion from [redacted] OEM assessment of eight valve/actuator 'batches' on Felindre Compressor Station. Four are acceptable for uprating with reduction of air pressure along with the addition of a small relief valve but four are not. The four problem-batches are calculated to over-torque the valve stems. Replacement small bore actuators are likely required, but further clarification is required with the OEM to define the exact scope of works.

200. **T-65972 Pipework support reinforcement** refers to conclusions in all Uprating AGI Pipework Stress Analysis (PSA) reports that support load checks could not be wholly completed and require reverse engineering of the as-built civils designs to confirm allowable loads. This has been completed for Three Cocks only, so far, and the supports are not suitable for the significant lateral loading resulting from our PSA. Therefore, there is a credible risk that support modifications or additional supports may be required to facilitate uprating.

201. **T-65973 Pipework stress analysis exception resolution** refers to conclusions from several Uprating AGIs PSAs that stress exceptions are present and require further work to resolve. 3D Finite Element Analysis is currently ongoing to attempt to resolve these, but there is a credible risk that some will require geometry information of the component to be obtained and/or that exceptions will endure, requiring pipework modifications to resolve.

202. **T-66613 Felindre Vent Stack Replacement -** the base scope for Felindre vent modifications assumed that the installation of orifice plates and silencers would eliminate the risk of overpressure of the lower rated downstream pipework. Further conceptual design work has demonstrated that this is not the case. [redacted]

8.2 Project Plan

203. The milestones are based on our current view of investment in the proposed new infrastructure, taking into consideration wider works planned across the network. Please note that these are subject to change as the project progresses through the ND500 process. The table below is an indicative project plan showing progression through the stage gate process, purchasing of long lead items, commissioning dates and key operational milestones. A full detailed plan is included in Appendix 10J of this submission.

Cycle	Network Development Stage Gates		Indicative Dates
Pre-FEED Stage 4.0 and 4.1	T0	Generation of Need Case	May 2018 - January 2019
	T1	Accept Need Case	May 2019
	F1	Initial Sanction	May 2019 Re-sanction Feb 2020
	T2	Define Strategic Approach & Outputs Required to Deliver GT Handover to Delivery Unit	April 2020 Revalidated October 2020 and June 2021
FEED Stage 4.2	F2	FEED Sanction and Feasibility Sanction	April 2020 Re-sanction November 2020 and June 2021
	T3	Agreement to Proceed to Conceptual Design	May 2022
	F3	Conceptual Design Sanction and Sanction of long lead items	June 2022
Tender Award Stage 4.3	T4	Scope Freeze	June 2023
Project Execution Stage 4.4	F4	Detailed Design AND Build Sanction (T4-F4-T5)	July 2023
	T5	DDS Challenge, Review & Sign off Maintenance Requirements Identified	February 2024
Acceptance Stage 4.5	T6	Post Commissioning Handover to GT; Operational & Maintenance Complete or Planned	November 2025 – Pipelines November 2026 - Uprating
	F5	Project Closure	May 2027

Table 25: Project Plan

A description of the delivery model

204. WGN will be delivered as two distinct work packages; Pipelines and Uprating. Whilst Tirley is not actually subject to pressure uprating, it is considered part of the uprating package.

205. The pipelines package of works covers points I & II in the first paragraph of Section 8.1.

206. The uprating package of works covers points III and IV inclusive of Tirley.

Pipelines

207. The pipelines package of works has been tendered for a Detailed Design and Build New Engineering Contract 4 (NEC4) Option C (Target Cost) contract. The MWC will develop our Conceptual Design Studies to detailed design, including all associated approval and appraisals before executing the construction works in 2024.

208. The tender programme for the selected tenderer is included as Appendix 10A.

209. In addition to this, two distinct packages of work are currently being tendered:

- Archaeological trial trenching, which will include topsoil stripping of the Wormington compound using a strip, map and sample technique due to the likely presence of archaeological artifacts. This is tendered on the Environmental Services Framework. Delivery is scheduled for summer 2023 to help mitigate the archaeological risk during construction in 2024.
- Site Investigation, including pipe depth and geometry information to inform detailed design by the MWC. This will include Churchover compound topsoil stripping, which is not expected to discover archaeological artifacts. This is tendered on the Minor Civils Framework. Delivery is also scheduled for summer 2023.

210. Works to date include:

- [redacted] Front-End Engineering Design (FEED) studies and supervised the Ground Investigation [redacted].
- [redacted] Ground Investigation of the pipeline routes and site investigation at Churchover Tee. The work was direct awarded on the Minor Civil Works Framework as under the value threshold for mini-tender.
- Gas found leaking from a sleeve during site investigation works at Churchover Tee was sent [redacted] for analysis.
- [redacted] site supervision and inspection for the Churchover Tee Site Investigation.
- [redacted] undertook a detailed Unexploded Ordnance (UXO) Desktop Survey and follow up Non-Intrusive and Intrusive site investigation works.
- Statutory bodies such as Natural England and Canal and Rivers Trust (CRT) have required payment for some of their services and [redacted] have

carried out a bathymetric survey of the Churchover Canal Feeder on advice of the CRT.

- Ground Penetrating Radar to inform valve stem extension lengths, [redacted].

211. As discussed in Section 8.1, [redacted] will provide an RTP to facilitate the pipeline outage required for the Churchover Compressor Tee tie-in.

Uprating

212. The uprating package of works currently consists of:

- Uprating Phase 1 studies which are mostly complete. These works were tendered on the Technical Consultancy Services Framework and awarded [redacted] in May 2020.
- Uprating Phase 2 studies which are part complete. These works were tendered on the Technical Consultancy Services Framework and awarded [redacted] in March 2023.
- Uprating Safety Management System review for implications of pressures above 94Barg. These works have been quoted [redacted] on the basis that they have recently conducted a similar piece of work for a hydrogen project and therefore have a good understanding of the documents to be reviewed and can complete the work most economically and efficiently.
- Compressor anti-surge dynamic process modelling which is part complete. These works were single sourced [redacted] as they had previously modelled Felindre Compressor Station during the Unit A commissioning works and could therefore complete the works more efficiently than the suppliers on our TCS Framework.
- Uprating AGI modifications conceptual design was undertaken [redacted]. The work was direct awarded on the Design Services Framework because they carried out the original designs for many of the affected sites and incorporated this efficiency into their studies.
- Uprating AGI modifications MWC works which have not been awarded yet. These works were tendered on the Gas Asset Health framework and originally intended to be an NEC Option A (Fixed Price) contract. However, [redacted] was received, and market appetite was further reduced due to the removal of Tirley bypass and PIG trap replacements. This work will now proceed using a detailed design then build strategy, using [redacted] for detailed design as a follow-on from their conceptual designs. The detailed design will be NEC Option A (Fixed Cost).
- Modifications at Felindre have been separately identified for delivery [redacted] and delivery of the WGN modifications [redacted] affords an opportunity for holistic project delivery and removal of various project interfaces. The strategy is for FEED to be conducted on an NEC Option E (Cost Reimbursable) basis with later detailed design and build on Option C. This mechanism better shares the risk between NG

and the Contractor and provides better opportunity for one 'Uprating Contractor' to holistically consider the work.

- Low value technical oversight services provided by [redacted], which is ongoing.
- In Line Inspection provided [redacted], which was completed for Felindre to Cilfrew before that section was de-scoped and is still required for Felindre to Three Cocks. Uprating requires two forms of Magnetic Flux Leakage detection (Axial and Circumferential), which requires WGN to fund the Axial Flux Detection (AFD) tool. [redacted] are our current preferred ILI provider.
- Cathodic Protection services [redacted] via the Specialist CP Services Framework, which is ongoing. Due to the delayed ILI and absence of corrosion data, [redacted] have installed corrosion resistance probes. The pipeline does not appear to be corroding, but data will continue to be monitored.
- Other Cathodic Protection surveys are also required within 12 months of uprating. [redacted] are likely the most efficient route to deliver this requirement also, due to their experience of working on the associated installations.
- Various other surveys are also required within 12 months of uprating, such as VS/02 inspections. A supplier for these surveys has not yet been identified.
- [redacted] carried out aerial surveys to inform Uprating Infrastructure assessments. The work was direct awarded due leverage efficiencies from their recent involvement in TD/1 Infrastructure Surveys for the same pipeline section. Their [redacted] tool was used by [redacted] throughout this part of the uprating assessments.

Combined

213. Other contracts are in place for:

- Long lead materials (with long lead item securitisation in place from South Hook Gas Company Ltd) -
    - Valves and actuators – Consistent with the National Gas overall procurement strategy, orders for the projects valves and actuator requirements have been placed using our sourcing agent, Score. The bulk of our valve requirements will be satisfied using [redacted] and the actuators shall be supplied by [redacted].
    - Line Pipe – Consistent with the National Gas overall procurement strategy for pipe, orders for the project pipe requirements have been placed using our sourcing agent, [redacted]. Line pipe has been ordered from [redacted] and the balance of pipes from [redacted].
    - Fittings - Consistent with the National Gas overall procurement strategy for fittings, orders for the projects fittings requirements have been placed using our sourcing agent, [redacted]. Most of the fittings will be manufactured by [redacted]. This route to market was benchmarked against the offer of another supplier and found to be the most cost-effective route to market.

214. Legal support – [redacted] provide legal support for land acquisition and the Compulsory Purchase Order, including legal counsel. [redacted] were awarded the work for WGN on 20 Dec 2019 following a competitive mini tender which was run by the legal team. The Legal Services Framework was reviewed in 2019/20 and [redacted] re-appointed to the panel under a legal services framework dated 24 Jan 2020.

215. Procurement legal support - [redacted] was awarded the procurement legal support services following a competitive tender process also via the Legal Services Framework.

216. Environmental services - [redacted] are providing ecological surveys, ecological impact assessments, advice on biodiversity net gain, arboriculture surveys and impact assessments, protective species licencing, archaeological investigations (geophysical and trial trenching). The latest services were procured directly due the efficiencies gained by re-appointing [redacted], as they had previously undertaken similar work on the project as part of the environmental screening process and were therefore familiar with the sites and works proposed. This previous work was tendered on the Environmental Services Framework and included preparing the Environmental Determination Report (including associated environmental surveys and assessments) and Non-Statutory Environmental Reports, draft Construction Environmental Management Plans and draft Traffic Management Plans. [redacted] are also drafting the archaeological trial trenching project designs.

217. Land agency – [redacted] have provided land agents to negotiate survey access and land rights required to deliver the scheme.

218. Land referencing – [redacted] carried out land referencing for [redacted] activities and the CPO.

219. Community Relations Agency - [redacted] support the project team to develop and implement an appropriate communications strategy. This encompasses identifying and mapping stakeholders, proactively engaging and managing responses, developing local community initiatives and building positive community relations between National Gas and the communities along the route of the project. [redacted] have developed various animations and communication aids for the project website and consultation activities. [redacted] have posted social media advertisements on our behalf. [redacted] have also prepared maps for the project website.

220. Other contracts will be required for:

- Senior Pipeline and other inspectors/inspections.
- Uprating free issue materials including spades, orifice plates, silencers and other fittings.
- Authorship of a new Emergency plan for the uprated Felindre Compressor Station.
- Uprating leakage and aerial surveys.
- Fulfilment of our biodiversity net gain obligations.
- Maintenance of hedges reinstated as part of the pipeline works.
- Drawing Appraisal of as-built and operational drawings.

Detailed delivery plan/schedule with key dates and critical paths clearly identified

221. A detailed delivery plan is included at Appendix 10J.

222. The pipelines MWC tender programme is at Appendix 10A.

223. The uprating AGI MWC tender programme is at Appendix 10A.

224. The pipeline installation and commissioning will conclude in 2024. This provides essential pipeline capability which facilitates the Felindre Compressor outage [redacted]. WGN relies on these works to deliver pressure uprating before FIOC Capacity release on 01 January 2026 (see Section 3.1). Early commissioning of the pipelines also affords National Gas the opportunity to provide some capacity at the Milford Haven ASEP, upfront of FIOC release, as non-obligated capacity.

Evidence of readiness to proceed: details of delivery team structure, roles and responsibilities.

225. Western Gas Network Project is currently resourced with:

- Senior Project Manager.
- Full time Lead Project Manager.
- Full Time Project Managers for both Pipelines MWC and Uprating AGI Modifications MWC.
- Full time Delivery Manager.
- Full time Document Controller.
- Full time Senior Quantity Surveyor (QS) and 50% Junior QS.

226. The enduring delivery model contains the following roles, for which we will internally resource or recruit accordingly:

- Full Time Project Supervisor for Churchover pipeline.
- Full Time Project Supervisor for Wormington to Honeybourne pipeline and connections.
- Full Time Project Supervisor for uprating.
- Construction engineer/Assistant Project Manager.
- Commissioning engineers.
- Quality Advisors.
- Health, Safety and Environmental Advisors.
- Environmental Advisors.
- Full Time Agricultural Liaison Officer.
- Materials Expeditors.
- Ops Process Owners.

8.3 Details of Experience Managing Similar Projects

Details of previous experience in managing similar projects and how learning has been applied

227. National Gas Transmission and its predecessors have constructed over 7,600 km of high-pressure pipelines from 1964 to date, of which over 3,600 km are 900 mm nominal Diameter. Projects have been successfully managed using the New Engineering Contract (NEC) since 1997. From the first construction, project lessons learned have been carried forward and incorporated into projects and into the construction specifications.

228. National Gas has developed, over time, a tried and tested approach to acquiring the necessary land and rights in land that avoids reliance on statutory powers. This approach promotes long-term engagement with the landowners that are affected by new pipeline schemes. The approach also aims to make a fair offer for payment for these rights to be granted voluntarily which is linked to local land values on a consistent and impartial basis to those affected.

229. We will also consult with the relevant farming and rural bodies. National Gas commits to conforming to the Compensation Code to ensure that affected businesses are left in no worse a position than prior to entry. In particular we remain committed to addressing any land defects following construction. We also ensure that appointed land agents have the correct level of professional competence to negotiate agreements with the right level of sensitivity and address areas of concern.

230. National Gas has significant experience in gaining consent for new infrastructure through its internal consents team. It can also draw on the expertise of an established framework of experienced planning and environmental consultants.

231. There is no recent experience of uprating within National Gas. Learning from previous uprating was embedded in technical specifications and management procedures TR/7, TR/8 and TR/16, which are being strictly followed for the Feeder 28 Uprating (part of WGN).

232. National Gas has had experience of protestor action from HS2 diversion projects and has carried forward some of the security requirements into the main works contracts for the new pipelines. Final security arrangements will be determined by comprehensive security risk assessments.

233. Long lead materials were ordered for free issue to the main works contractor to ensure that delivery timescales could be achieved. We have sourcing agents for all major materials and equipment required to deliver the scheme, and experience of ordering equipment to our own bespoke quality assurance requirements.

234. [redacted]

8.4 Engagement with Stakeholders

235. National Gas has engaged with a wide variety of stakeholders in progressing its plans for the WGN. Regular engagement has been held with representatives from the shipper (SHGCL) and terminal operator (SHLNG) associated with the PARCA and Network Entry Agreement respectively to appraise them of progress and seek to support their own project development process. Engagement has also been held with Dragon LNG to discuss the potential effects on their operational activities, though these are now avoided with the adjacent part of the NTS not being subject to pressure uprating.

236. The requirement to consider whether the WGN programme of works constituted development, for which Environmental Impact Assessment (EIA) was required, led to engagement with planning and technical stakeholders and a screening request to be submitted to the Department of Energy Security and Net Zero (DESNZ) formerly Department for Business, Energy & Industrial Strategy (BEIS), including:

- Statutory consultees – Environment Agency (EA), Natural England (NE), Historic England (HE), and Natural Resources Wales (NRW).
- Local planning authorities & technical consultees – Relevant planning officers (at unitary, district and/or county level as appropriate) and technical officers on disciplines such as: traffic & transport; ecology; landscape; rights of way; heritage; noise & vibration)
- Feedback was considered and, in some cases has led to future scope of survey work additions or modified the working assumptions. For example, after engagement with the EA, a presumption of trenchless crossing of all watercourses was adopted until field survey information was available to allow the implications of whether a lower cost alternative open-cut technique could be agreed with the EA.
- All the parties consulted in respect of EIA screening agreed that the pipeline works did not constitute EIA development with the BEIS screening opinion issued to that effect in December 2020.
- Further engagement was undertaken with Swansea Council and Neath & Port Talbot Council (NPTC) to consider the need for EIA for works at Felindre compressor site and Cilfrew Pressure Reduction Station. Swansea Council confirmed that the works at Felindre do not constitute EIA development (March 2021). Likewise, NPTC have also confirmed that works at Cilfrew do not constitute EIA development (April 2021).

237. There is of course a need to engage directly with landowners potentially affected by the project. National Gas are committed to securing the land and rights needed for the project by voluntary agreement if possible. However, to provide certainty that the land and rights required for the project can be secured within a reasonable timeframe to enable the project to be delivered, National Gas made a Compulsory Purchase Order (CPO) in parallel with private treaty negotiations.

238. It was decided from the outset to undertake an engagement programme with not just political stakeholders but with members of the public.

239. Our engagement programme sought to inform the following key stakeholders about the project and was co-ordinated with initial approaches to landowners:

- Political office holders and Local representatives (MPs, parish councillors, officers etc)
- General Public.

- Due to the COVID-19 pandemic restrictions, we had to rethink our approach to stakeholder engagement. After careful consideration, we decided to take a digitally led approach to our stakeholder engagement programme but ensured that it was supported with a more traditional approach for those who can't access online resources. The team created several channels to communicate the project information as described below.

240. A project website[12] has been set up as the main vehicle for project information. Online meetings have been held with elected representatives to introduce the project and garner feedback. Members of the public have been able to comment on and meet the team through a series of online webinars and feedback forms.

241. Between January 2021 and May 2021, the communications team has held 16 online meetings with key political stakeholders including five MPs, three parish councils, two council leaders and 10 ward councillors.

242. Two public webinar sessions using Zoom were held specifically to discuss the proposed pipeline routes. These sessions were promoted via a number of methods both digitally and traditionally. Flyers were sent out to 118 properties close to the Churchover pipeline and 649 properties based around the Wormington to Honeybourne pipeline. A social media campaign was also arranged targeting Facebook users that lived within a 1-mile radius of the pipeline. The engagement programme has been split into two phases, first to introduce the project and the proposed new pipelines and the second to introduce the AGI and compressor works.

243. Engagement around proposed AGI and compressor works are still ongoing. The main feedback from political stakeholders has been to request that consideration is made to avoid traffic build up which could lead to diversions through local villages. National Gas would note that the preparation of Traffic Management Plans (TMP) to address this potential issue was proposed as part of the screening requests to BEIS, with these currently being developed and informed by surveys of typical traffic levels, speed and composition.

244. Feedback from all parties on the specific proposals has been captured and considered in finalising the siting and route alignment and methods of construction to be taken forward as part of relevant planning submissions.

245. Feedback from political stakeholders received during online meetings and over email centred around a need to ensure good communications channels are made available during the construction phase for local stakeholders. They also raised an expectation for National Gas to contribute to the local communities they are working in through educational support, volunteering and financial help for local charities.

246. As part of our ongoing commitment to support and enhance the communities along the project route, members of the project team volunteered at St Egwin's C.E. Middle School, Evesham in summer 2022. They painted and prepared a range of classrooms and

[12] https://www.nationalgas.com/wgn

communal spaces ready for the children's return from their summer break. We will continue to identify opportunities to make a meaningful difference as the project progresses.

247. We are collaborating with National Energy Action (NEA), who are the leading national fuel poverty charity, to deliver training to local communities. Trained individuals will be able to identify, offer advice and signpost those impacted by fuel poverty. In addition, community fun days will be delivered by NEA to further offer energy advice to local residents and offer an opportunity for the project team to engage with people directly.

248. Feedback from members of the public, which was received during our webinar sessions around the new pipelines and via email was more focused around traffic. For example, concerns were raised by those living between Wormington and Honeybourne that if sections of the A44 were suspended it would cause delays and push vehicles into local roads. Another comment was for appropriate signage and directions be given to HGV drivers to ensure they don't drive through local villages. Such measures will be addressed within the TMP as indicated above.

249. As the project approaches the start of construction, design changes will be shared on the project website and communicated as necessary to stakeholders. A robust communications plan will also be created to support the Traffic Management Plan ahead of any construction work starting to ensure all stakeholders are kept informed.

250. A freephone line, email and freepost address have been set up to support the project operational now right through to commissioning. Public facing staff have been given contact cards / QR codes to hand out to stakeholders.

251. It is intended that the majority of the works comprising the project will be carried out as permitted development under the Town and Country Planning (General Permitted Development) (England) Order 2015 (as amended) and the Town and Country Planning (General Permitted Development) Order 1995 (as amended). Full planning permission (Reference R22/0130) under the Town and Country Planning Act (1990) was granted (subject to conditions) on 08 Aug 2022 by Rugby Borough Council for the permanent extension of Churchover Tee. It is therefore considered that the necessary permitted development rights and planning consents are in place to enable to project to proceed. Two applications under the Town and Country Planning Act (1990) are required to secure consent for temporary accesses required at two locations on the Wormington to Honeybourne Section of pipeline. Initial discussions with the relevant Highway Authorities have confirmed acceptability in principle of these locations.

252. Further engagement has been scheduled to take place later this year as the project continues to progress so that all stakeholders are kept informed, as shown in appendix 10M.

8.5 Key Business Risks and Opportunities

Risk Methodology

253. The purpose of this chapter is to explain the methodology used to assess the risk position on the WGN project. It will run through the risk process starting from the initial risk review prior to tendering and submission of costs for assessment by Ofgem. It provides

examples to illustrate the risk process and displays outputs at this review stage. Finally, it will quantify the risk allowance applied for and outline the top 5 residual risks carried by us moving into the delivery phase of the works. Full risk registers for both pressure uprating and pipeline works are included within appendix 10B, that provide detail into the calculations and assumptions applied to these risks.

Risk ID	Title	Description
T-66113	Untimely provision of free issue materials to pipelines contractor	Untimely provision of free issue materials to pipelines contractor
T-66613	Felindre Vent Stack Replacement	It would be required to replace the vent stack and associated pipework if the deviation is not granted. NGT are arranging formal process safety assessment review/ LOPA looking if the existing control valves can be formally classed as safety devices to satisfy the requirement without major mods.
T-65963	NG specifications review findings	There may be a requirement to change NG specifications to accommodate the higher pressure on the network
T-66082	Physical Conditions - Archaeology	There may be archaeological findings during topsoil strip works or trench excavation works
T-67757	Defective Materials	There is a risk that materials could be unusable

Table 26: Top five project risks

254. The risk contingency allowance applied for within this submission has been set at a P50 level. This means that there is a 50% chance of spending above or below the allowance during the delivery of this project.

255. The National Gas P50 Contingency value applied for within this submission is £7.3m (18/19 prices) for the project delivery. It is important to note, that this figure includes a significant proportion associated to the uprating scope variables, as discussed in more detail in section 8.1 and noted in appendix 10B.

256. Our project risk management process is described below. The risk process allows for the assessment and management of risks on major projects and has also been used on our major infrastructure development projects.

257. Project Risk – risks owned by us that would be within the direct control/influence of the Project Manager and that may arise from the National Gas element of the project or may result in compensation event from the contractor.

258. Contractor Risk– risks that are expected to be owned by the contractor based on the proposed form of contract

Risk management process

259. The risk management process adopted by National Gas is based upon ISO 31000:2009; Risk Management – Principles and Guidelines. The process runs throughout the lifetime of the project identifying potential risks and managing their mitigation to reduce the likelihood of them negatively impacting on cost, time, or quality.

260. The risk management process sets out a framework to manage reasonably foreseeable risks in a manner which is proactive, effective, and appropriate. The objective is maximising the likelihood of the project achieving its expected outputs, while maintaining risk exposure at an acceptable level.

261. The risk management process enables stakeholders to focus attention on those risks potentially able to exert the greatest positive or negative influence on achievement of project outputs.

262. The risk management process is summarised in Figure 1.1.

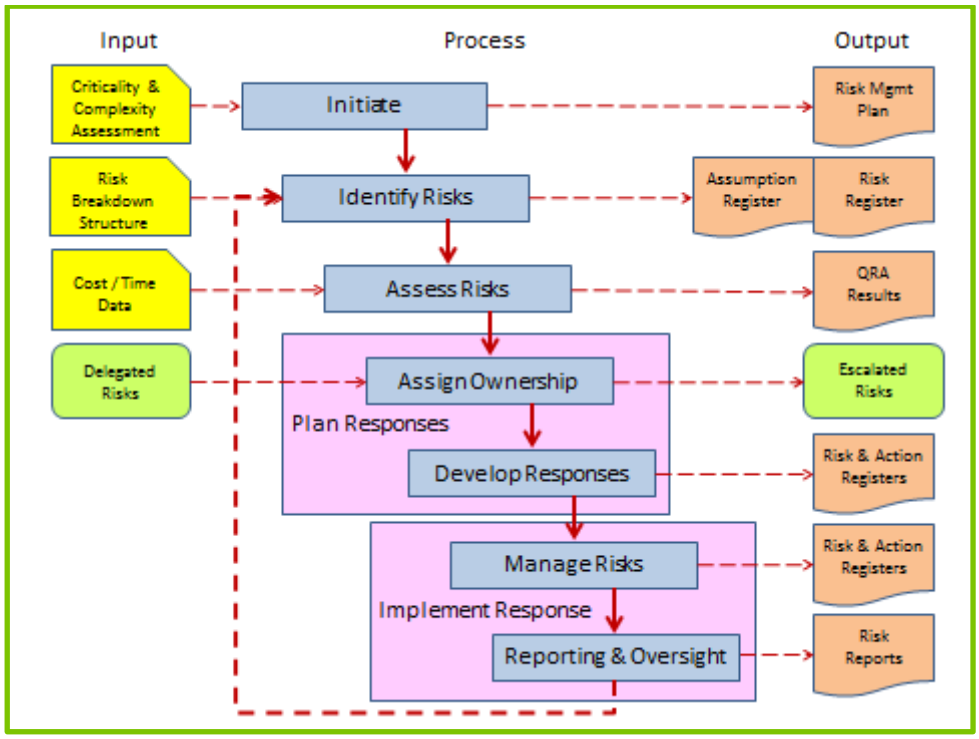

Figure 7: Summary Risk Management Process (ISO 31000:2009)

Risk Identification and Quantification

263. During the development phase of the WGN project, we ran several risk identification workshops to capture risks at the Project and Contractor levels.

264. The risks identified during these workshops were then input into Predict! – a proprietary Electronic Risk Management (ERM) system provided by Risk Decisions Ltd.

265. At this stage the risk was clearly described, along with the cause of the risk and potential impact. Risks were then quantified, defining the initial percentage probability (of the risk occurring) and three-point estimates on cost (Minimum, Most Likely and Maximum) should the risk occur.

266. Quantitative risk data in the form of percentage probability and three-point estimates for cost impact as mentioned above was captured and recorded in the risk register in Predict! for input into the *Quantitative Risk Analysis* (QRA) process. Quantitative cost risk analysis (QCRA) was run on the WGN project risk data to inform the final cost estimates.

267. The following data for each risk was required to support the QCRA process:

- Probability of occurrence (Percentage)
- Three-point cost estimate - Minimum, Most Likely, Maximum (£)
- Probability Distribution Function (Triangular)

268. A snapshot of a risk quantification from the WGN risk register can be found in Figure 8, which shows the risk score and the three-point cost impact estimates along with the quantification assumptions made.

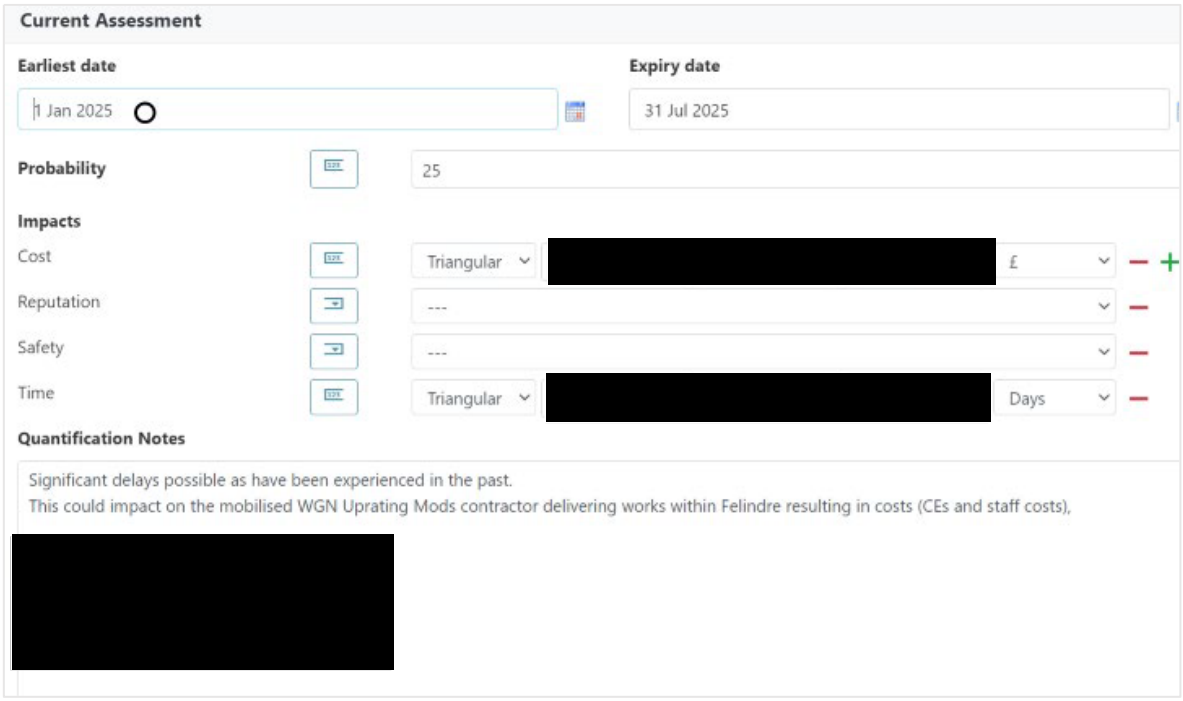

Figure 8: risk quantification snapshot

269. The above process was applied to all risks identified at the risk review before a simulation was undertaken using Predict! Risk Analyser software.

270. This process collates all the 3-point estimates and then undertakes a Monte Carlo simulation to derive a probabilistic output (S Curve) using 10,000 iterations. For this submission, we are using the P50 output. This means that there is an 50% chance of spending above or below the allowance during the delivery of this project.

271. The outputs of this process are included within the WGN Cost Workbook, provided in appendix 10B.

Contractor risks

272. As with all projects, the contractor has included their own forecast of risks in their contract price. Our approach to these is detailed within section 8.6, Contractual Risk Methodology.

Cost and Output Adjustment Events

273. Under certain circumstances, National Gas may apply to Ofgem to amend the FIOC Outputs, delivery dates or allowances, where project expenditure has increased, or decreased significantly during construction. The provisions for a Cost and Output Adjusting Event (COAE) are set out in Part D of Special Condition 3.13.

274. Through engagement with Ofgem on our risk allocation approach within the pipeline tender event, we highlighted several low probability, high impact events that could skew the calculations in the risk register. We feel that the best value for the consumer would be for us to not include these risks, but instead define them as trigger events for potential COAE applications. These are:

- Major archaeological finding.
- Extreme weather.
- Major protestor action.
- Major prevention events.

275. These events are defined within section 8.6 as Trigger Events. Their definition or inclusion within the licence direction does not exclude an application for any unforeseen generic COAE triggers that may occur, that should be considered under the defined process.

276. Should one or more of the defined trigger events occur, National Gas will apply under SpC 3.13 Part D, regardless of its materiality to the project allowances. Ofgem have the authority to direct a percentage relative to the applicable allowance, based on the actual impact of the event.

277. The rationale behind this, relates to the default licence threshold, where the event has caused expenditure to increase or decrease by at least 20% relative to the allowance. Despite the high impact nature of the trigger events defined, it is deemed unlikely that they would reach such a percentage when considered in isolation.

278. These project specific COAE are not viewed to have an economic and efficient contingency, as a result they have been excluded from our risk register calculations, and do not form part of our allowance request. This is on the basis of our pre-submission engagement with Ofgem and our approach to risk allocation. Should this principle not be agreed, our risk register would need to be adjusted accordingly, although we do not believe this would be in the interests of consumers for the above reasons.

8.6 Contractual Risk Methodology

279. This section relates to the pipeline tender, a similar process was undertaken for the AGI Modifications and Uprating of Feeder 28 tender but has not been included due to the change in strategy approach, which is detailed within section 8.8.

National Gas standard contractual risk approach

280. For construction, National Gas generally aligns its contracts to the standard NEC4 risk allocation position, but reviews this on a project-by-project basis depending on the type of work, programme, and specific requirements of each project. The risks generally reviewed on each project are inflation, change in law, weather risk and physical conditions often referred to as ground conditions, but this review can be expanded.

281. Once the risk allocation is decided/allocated, within contract risks are managed by the Risk Register and Risk Reduction Meetings with both parties holding their own costed risk pots, but managing the identification and impact of risks together through the Risk Reduction process. Should a Client (National Gas/project) risk occur which has an impact on the main works contractor, the cost and time impact of this risk is managed through the Compensation Event process as detailed in the Contract.

NEC standard risk allocation

282. National Gas uses NEC4 Conditions of Contract for all its major construction projects. The NEC4 conditions have a standard set of risks which sit with the Client, and which the NEC4 allows the Client to add to, which are summarised below. All other risks sit with the Contractor.

283. The standard Client risk can be summarised as follows:

- Change to the Scope.
- Client doesn't allow access to the Site.
- Client doesn't provide something in accordance with the programme e.g. Free Issue Materials.
- Client stops the works.
- Client or Others do not work as per the programme.
- Client doesn't reply to a communication on time.
- Client gives an instruction of how to deal with object of value or historical interest.
- Client changes a decision.
- Client withholds an acceptance (not in accordance with this contract).
- Client instructs to search for defect and no defect is found.
- Test or inspection undertaken by Client causes unnecessary delay.
- Contractor encounters physical conditions which an experienced contractor would've judged at contract date have such a small chance of occurring it would've been unreasonable to have included for them.
- Weather above 1:10.
- Client's liabilities as stated in Contract.
- Client takes over the works before completion.

- Client doesn't provide items for tests and inspections as identified in the Scope.
- Client changes an assumption regarding a Compensation Event.
- Breach of Contract by the Client.
- Prevention Event – although not defined in standard NEC4.
- Client advises a quotation for a proposed Compensation Event is not accepted.
- Additional Compensation Events as stated in the Contract.

284. In addition to the above the NEC4 allows the Client to add (per contract) additional risks including the following two X clauses:

- X1 – Inflation
- X2 - Change in the Law

285. In the process of reviewing the risk allocation and selecting risks for market testing, the project team looked at the likelihood of the risk, the information available to the tenderers and the potential programme impact alongside ability of the tenderers to competitively price these risks, thus representing best value for consumers. The risks which the project team did not consider for market testing, as they are truly within the full control of National Gas, were risks such as 'Client withholds an acceptance'. The process is detailed in the diagram below:

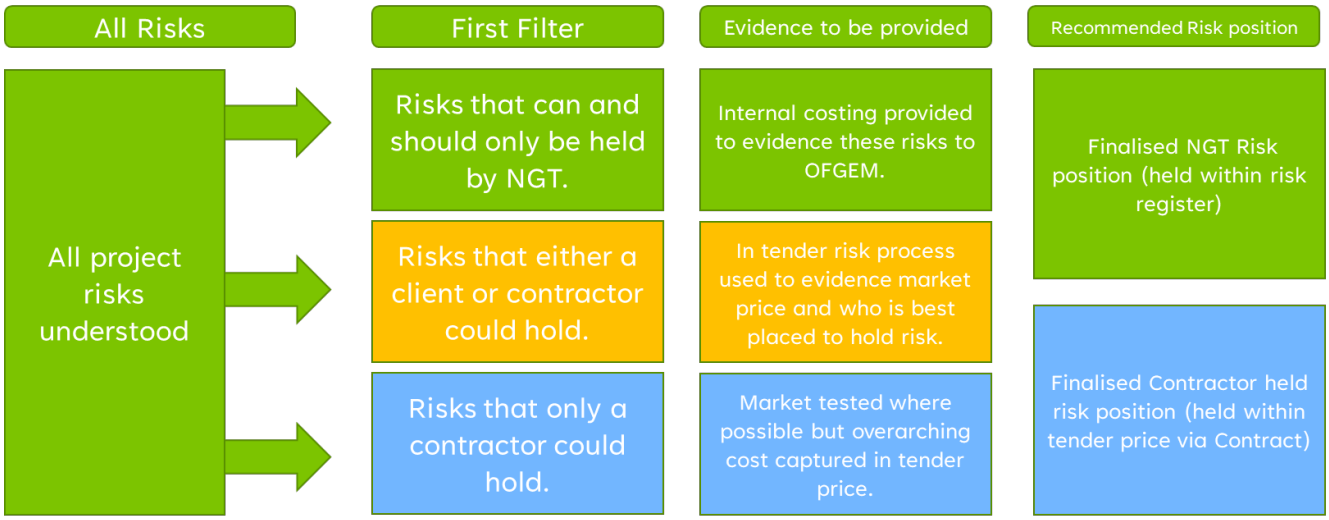

Figure 9: Risk Allocation and market testing process

Pipeline Tender Stage 1 – Tender Risk Allocation

286. Undertaking the review of risks for the WGN Pipeline Tender, the project team concluded that the following Client risks would be market tested:

- Inflation – From Tender return to Contract Award and from Contract Award to Contract Completion, the latter would be classified as X1 under the contract terms.

- Change in Law – A change in the law of England & Wales post Contract Award. X2 under the contract terms.
- Physical Conditions – As this is a wide-ranging risk and considering the varying impacts on the programme of differing aspects and impacts of a Physical Condition risk, the project team reviewed this and decided for market testing it was appropriate to break this risk down into: Ground Conditions, Archaeology, Contaminated Ground, Environmental, and Services (utilities). This is one area where the experience of the tenderers in a competitive environment can assess elements of the physical conditions risk (depending on the particular project) and subsequently manage risk and mitigate impact in their programme and therefore deliver value to consumers.
- Weather – Above 1:10 – This is the standard NEC4 risk and is one area which is typically held by the Client but there was merit in market testing this. For reference purposes we also asked the tenderers to indicate the cost included for the standard contractor risk of up to the 1:10 weather risk.
- Prevention Event – In reviewing this risk, the standard NEC4 risk was defined rather than being left open ended, the position where for market testing was for the cost impact element only.

287. In addition, the following risks (some specific to the project) were market tested for tender appetite, after review within the project team:

- Ambiguity, inconsistency, impossible requirements in the Project Scope Documents – Due to the long tender period, the tenderers will have undertaken a significant amount of due diligence on the Project Scope, which has been supported by the level of questions asked. Market testing of this risk should result in an overall benefit to the project by ensuring appropriate due diligence is carried out at tender stage, but also to reduce the risk in contract of compensation events for relatively minor changes to the scope. This risk was capped to what (in respect of review) could be expected of tenderers during the tender period, this being a standard legal test.
- Acceleration – An optional clause was added to the contract which can be used as a leverage for maintaining programme (instructed acceleration with no cost impact to Client) but including this clause will come at a price as tenderers will make an allowance for its use/impact. It was considered worthwhile to market test the inclusion of this clause for the Pipeline tender considering the challenging programme.
- Minor CEs - This has been included (with a cost limit of £2,500 per event) for the contractor to price for. Valuing and assessing small compensation events under an Option C Target Cost contract is cost prohibitive for both parties, with discussions during the tender process reinforcing this view. Therefore, to reduce administration burden and high costs for low impact Compensation Events, this has been included to deliver value to consumers by including for this within the base Target Cost.

- Protester Action – As protestor actions can be considered a Client Risk and a Contractor Risk, the position was clarified as part of Stage One, with placing all Protestor Action as a Contractor risk to solicit tenderer appetite to determine best value.

Stage 1 - Feedback from the tenderers

288. The general response at Stage 1 to market testing of risks was positive. [redacted]

[redacted]

Table 27: Initial Tender Feedback Summary

Stage 1 – Amendments for Stage 2 Tender

Review Process

289. Each of the Tenderer's responses, both from a red line or corporate governance perspective, along with pricing for the risk were considered. Tenderers advised which risk they were unable to take due to corporate governance restrictions (red line) but provided cost assessments for evaluation purposes. This was undertaken alongside our own assessment of the cost and time impact of the risk and discussed as part of the decision-making process. This included analysing which risks following feedback should be retained by National Gas to manage, where this represented the best value for consumers.

Review findings & Recommendations for Stage 2 (Final Tender Stage)

290. The risk allocation recommendation by the project team was discussed with Ofgem through our pre-submission engagement and went through our internal governance processes, which resulted in the following changes being made to the risk profile within the Stage 2 Tender.

			Initial Tender		Final Tender	
No	**Ref**	**Risk Description**	**Contractor**	**NGT**	**Contractor**	**NGT**
1	X1	Inflation - Tender Validity	·		·	
2		Inflation - X1 Contract	·			·
3	X2	X2 Change of Law	·		·	
5	60.1 (12)	Physical Conditions - General including Ground Conditions	·		·	
6		Physical Conditions - Archaeology	·			·
7		Physical Conditions - Contaminated Ground	·			·
8		Physical Conditions - Environmental	·			·
9		Physical Conditions - Services	·		·	
11	60.1 (13)	Weather - Up to 1:10 weather	·		·	
12		Weather - Above 1:10 weather	·			·
13	60.1 (19)	Prevention Event	·			·
14	60.3	Ambiguity, Inconsistency, illegal or impossible requirement	·		·	
15	37	Acceleration where there is culpable delay	·			·
16	61.4	Minor CEs (Under 2.5k)	·		·	
17	81	Protestor Action	·			·

Table 28: Final Tender risk allocation

Recommendation Narrative

291. The tables below show the range of values received through the initial tender process with each of the associated market tested risks, along with any additional feedback, exclusions or caveats, plus the rationale for our approach in the Final Tender process.

Inflation

No.	Risk	Market tested range (in tender priced risk register)	Market Exclusions and commentary	Rationale
[redacted]				

Change in Law (X2)

No.	Risk	Market tested range (in tender priced risk register)	Market Exclusions and commentary	Rationale
[redacted]				

Physical Conditions

No.	Risk	Market tested range (in tender priced risk register)	Market Exclusions and commentary	Rationale
[redacted]				

Weather

No.	Risk	[redacted]	Market Exclusions and commentary	Rationale
[redacted]				

Prevention Events

No.	Risk	Market tested range (in tender priced risk register)	Market Exclusions and commentary	Rationale
[redacted]				

Ambiguity and Inconsistencies

No.	Risk	Market tested range (in tender priced risk register)	Market Exclusions and commentary	Rationale
[redacted]				

Acceleration

No.	Risk	Market tested range (in tender priced risk register)	Market Exclusions and commentary	Rationale
[redacted]				

Low Value Compensation Events

No.	Risk	Market tested range (in tender priced risk register)	Market Exclusions and commentary	Rationale
[redacted]				

Protestor Action

No.	Risk	Market tested range (in tender priced risk register)	Market Exclusions and commentary	Rationale
[redacted]				

Trigger Events

292. To ensure value to consumers and that risk is appropriately managed for a one-off project, this submission is based upon the following trigger events. These trigger events can be classified events that have a low probability of occurring on this project (and in general on projects) but the impact should they occur (particularly on a project which has seasonal construction and outage windows) will be considerable. The standard contractual approach in works contracting should be adopted for National Gas in relation to these trigger events – namely the event "has such a small chance of occurring that it would have been unreasonable to have allowed for them" within the risk allowance. If allowed a significant allowance would need to be made, which is not in the best interest of consumers.

293. These trigger events are unlikely to reach the standard COAE threshold. Therefore, we are raising these project specific risks, to be included as part of the Ofgem project direction in accordance with SpC 3.13.17 (b). These are in addition to any generic unforeseen events that the COAE process covers. These events will have a significant cost and time impact on the project should they occur, particularly as stated above should they move construction into the next season.

294. In making provision for these trigger events National Gas would need to include a significant level of risk allowance compared to the base cost, which in these limited events doesn't represent value for consumers.

295. Due to the default 20% COAE threshold stated within the licence, we cannot foresee that any of these trigger events should materialise to that value. As a result, we are requesting for Ofgem to agree that these defined events should occur, we would apply under SpC Part D regardless of the percentage value of the allowance awarded, with Ofgem having the power to direct a percentage based on the actual impact of the event.

296. In the case this principle is not agreed, we must increase our risk pot for the very high impact low probability outcomes.

297. This submission is based on the following defined trigger events/COAE re-openers under this principle.

Trigger Event - Archaeology

298. National Gas have provided an archaeological assessment as part of the Site Information for the tenderers to review, and this indicates that some archaeology may be present at certain locations on the pipeline, with some locations a higher risk than others. To allow for further investigation a two-week window for investigation has been included for after topsoil stripping.

299. From the Stage 1 Tender process the Tenderers have indicated a willingness to take the risk of minor archaeology that can be accommodated as part of the two-week time period required within the scope but are not willing to take the risk of major or significant archaeological finds as tenderers consider the risk is unquantifiable.

300. From our experience the resultant risk that would sit with the Client could occur as follows.

301. [redacted]

302. [redacted]

303. Our approach and submission is based on keeping minor archaeology with the Contractor, medium level archaeology that could be dealt with within the construction window with National Gas, and have as a trigger event major archaeological finds and medium level finds which delay the project into the next construction window i.e. April to October 2025.

304. The reason for this is that a delay into the next construction window has a low probability but a high impact, in the region of [redacted] and for National Gas to include for this within our risk register would not be in the best interest of the consumer. This sum includes for the contractor to maintain their site establishment facilities etc., over the winter, demobilise the site and then remobilise in April the following year to complete the project, plus impact to the works/project for out of sequence working and unproductive working

305. [redacted]

306. Where archaeology can be accommodated within the construction season, the following is likely to happen. Archaeology is commonly found during pipeline construction and can vary from something small like a burn pit to large a complex structures / dwelling covering the width of the working area. Smaller finds can be accommodated within the programme, larger finds may need a variety of mitigation. This can vary from bog matting a running track to allow traffic through whilst the area is excavated then re-aligning the bog matts to allow the area under the original location to be excavated to minor reroutes to avoid the archaeology altogether. Both would involve the main pipeline operations from pipe stringing onwards to bypass the area and return when the excavation is completed.

Trigger Event - Prevention Events

307. Prevention Events for this contract have been defined as:

308. A Prevention Event is one of the following events which an experienced contractor could not reasonably have foreseen or allowed for at the Contract Date and which prevents the Contractor from completing the works by the date shown on the Accepted Programme, namely: pandemic (other than in respect of Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2)), acts of God, fire, explosion, flood, acts of terrorism, war, rebellion, riot, acts of Government, sabotage, official strike or similar official dispute (other than a strike or official dispute by Contractor Personnel) or shortage of fuel on a national level, but excluding acts of protestors or other unauthorised persons within the Working Areas.

309. Due to the recent Covid Pandemic and the current level of strikes, tenderers are particularly nervous at estimating this risk as expected, due to the probability of likelihood and the potential significant impact i.e. a year delay.

310. As for archaeology, an impact of a Prevention Event which can be accommodated within the construction/outage season is included for within the risk register, however a Prevention Event which causes the pipeline works to extend into the next construction/outage season is to be considered a Trigger Event.

311. In 2001, the Foot & Mouth pandemic occurred which had an impact on the gas pipelines being constructed. It commenced in February 2001 and lasted for approx. 7 months. This impacted pipeline and other construction works in two major ways:

- If works had started and the farms concerned did not have Foot & Mouth, the works could continue but with certain requirements being adhered to. We were building the Birch Heath to Mickle Trafford pipeline at the time and fortunately all spread fences had been erected prior the outbreak, which with DEFRA's advice meant the pipeline construction could continue. However, all plant, equipment, vehicles and personnel had to be fully cleaned down and disinfected with approved disinfectant at all changes of land ownership and road crossings. This reduced productivity for all operations and caused a large increase in personnel and equipment both for the cleaning operation and to maintain production. The project incurred additional cost but was completed within the construction season. An example such as this has been included for within the risk allowances
- If the works had started but the farm or farms concerned had Foot & Mouth, then all works had to stop. This resulted in projects having plant abandoned in fields for the

duration of the pandemic or until such point as the farm was declared free of foot & mouth. This resulted in construction projects being delayed by one year.

312. It is this latter example that would be considered a trigger event.

Tigger Event - Extreme Weather

313. The Contractor takes the risk of weather up to a 1:10 weather event and the Client takes the risk of weather above the 1:10 weather event (Extreme Weather).

314. The risk allowance includes for the above the 1:10 weather event or events occurring but being able to be accommodated within the construction/outage season.

315. Weather events can cause disruption due to deterioration of the running track, which can be mitigated by standing down crews until the ground conditions improve or additional ground preparation works prior to reinstatement. If the weather event happened late in the programme (e.g. late August /September), this could prevent both final construction works (such as a crossing or tie ins) and reinstatement being competed in 2024, causing reinstatement works being delayed into 2025. This is because reinstating land in inclement weather can cause significant and sometimes permanent damage to the soil structure, having a detrimental effect on the lands agricultural productivity. More detrimental effects are from run off of silt laden water into water courses. This has been mitigated on previous projects in a variety of ways from silt fencing at water courses, leaving a one metre grasses buffer at the edge of a water course to filter the water prior to it entering, grips across the working area to slow the speed of water flow and divert water onto adjoining fields and pumping out onto grass fields to allow the grass to filter the silt out. In one instance the water was diverted into the pipeline trench and pipe as the water flow was overcoming all other mitigation. This caused the trench to have to be pumped out after the weather event, the pipe removed from the trench, cleaned and checked for damage prior the replacement in the trench.

316. The latter is an example of accommodating the extreme weather within the construction/outage season where not completing the mechanical works or having to come back the following season to reinstate the land are examples of trigger events. We have used the average of the contractors market tested 'Most Likely' scenario as our worst case, to account for the project specific COAE protecting us against the worst risk materialisation.

Trigger Event – Protester action

317. Protester action for this contract has been defined as:

318. The presence and actions of persons within the Site other than the *Client*, the *Project Manager* and the *Supervisor* (and any persons authorised by the *Client*, the *Project Manager* and the *Supervisor*) where the *Contractor* has complied with the Scope, the Security Annex and the Applicable Law and taken such other reasonable action to prevent such presence and actions.

319. This definition places a level of responsibility on the contractor to ensure they secure the site and comply with their obligations under law and the scope.

320. As with Prevention Event, there is a general nervousness from the tenderers in relation to protestors and protestor actions, primarily for two reasons. [redacted]

321. Examples of the impact of protestors would depend on where the protest happened. [redacted]

322. All of the above examples would involve increasing security presence and delay and disruption to the pipeline works. National Gas have had experience of protestor action on the Milford Haven pipeline, where protestors tried to damage the steel pipe and gained access to the pipeline route and caused delay and disruption. The 100km oil pipeline currently being constructed from Southampton to London has not seen any protestor action to date. Whilst protesters are rare, they have increased in recent years and could easily prevent the completion of the pipeline in the 2024 season, causing works to rollover into 2025. Protestor action moving construction into the following construction/outage season is a trigger event.

323. We reduced our own estimates of this risk based on the market tested information.

Tigger Event - Other content

Substantiation for the year delay

324. One year delay to the pipeline project has been assessed as between [redacted] (minimum) and [redacted] (maximum), with the most likely being [redacted]. [redacted] this at between [redacted] (contractor costs only).

WGN Pipeline – Assessment of One Year Delay

Minimum - Contractors pause works and delay works for 6 months with 8 weeks physical disruption

[redacted]

Total [redacted]

Most Likely - Contractors pause works and delay works for 9 months with 16 weeks physical disruption

[redacted]

[redacted]

Total [redacted]

Maximum - Contractors pause works and delay works for 12 months with 20 weeks physical disruption

[redacted]

Total [redacted]

8.7 Key dates and Deadlines

325. National Gas kindly request an Authority decision by 18 August 2023 to maintain our project plan communicated above. This will enable National Gas to progress efficiently and meet our PARCA obligations, or conversely avoid starting a costly process if it is not deemed necessary by Ofgem. There are significant implications in terms of both commercial processes and the technical delivery of the project in going beyond this date, as well as consumer interests due to the impact to cost and delay of the wider benefits to security of supply and competition this project will enable.

326. The PARCA is a bilateral contract that allows long-term capacity to be reserved for a customer while they develop their own project. Throughout the process to date, we have been engaging with South Hook Gas Company Ltd and have been made aware of key dates relating to their development upstream of the NTS.

327. SHGCL have indicated that they are prepared to allocate capacity more than 24 months ahead of capacity release to facilitate the desired programme. They are prepared for the process, including the NPV test.

328. National Gas and SHGCL also entered into a long lead item agreement, where SHGCL securitise materials that need to be purchased ahead of capacity allocation and FIOC Project Direction in order to maintain the programme.

8.8 Procurement Strategy

Introduction

329. The purpose of this chapter is to introduce the procurement processes that were followed for the different packages of work which constitute the WGN project. This procurement process took into account lessons learned from previous major projects.

Utilities Contracts Regulations 2016 (UCR 2016)

330. To ensure that the interests of consumers are protected, we follow the procurement principles by running fair and transparent procurement processes compliant with the requirements of the Utilities Contracts Regulations 2016 (UCR 2016).

331. The UCR are set out in UK law and derived from EU treaties and directives, which govern the majority of our UK Procurement activity. The UCR contain a mixture of definitive instructions, such as timescales for certain activities, and more general principles and statements. These general principles and statements may be open to interpretation, and their meaning and implications are often further defined by case law.

Strategic Sourcing Process (SSP)

332. It is in consumers interest that we have a robust procurement process that meets procurement legislation and allows for effective competition. National Gas Transmission applies our Strategic Sourcing Process (SSP) for all high value and above threshold requirements to ensure UCR 2016 compliance and establish best value framework agreements and contracts. SSP describes the staged process from the initial assessment of a requirement through to contract award.

333. We will consider the most efficient delivery model for all activities and respect our commitment to utilise competition where possible in order to lever better prices, quality and ensure value for money for consumers.

334. We always award contracts based on the Most Economically Advantageous Tender (MEAT).

Routes to market

335. The SSP is used with the following routes to market:

- **Framework Call-off events**: Where an existing Framework or Contract exists, this can reduce procurement transaction times and is usually the foremost option.
- **Strategic sourcing events**: Where an existing Framework for the Goods or Services is not in place the procurement procedures that are available include the Negotiated, Restricted or Competitive dialogue procedures.
- **Non-regulated events**: This route can be applied to UCR Exemptions and non-UCR threshold procurements.

WGN Packages

336. The key WGN packages of procurement and their respective routes to market are shown in the table below. These routes reflected the most effective balance of efficiency and competition in the given timescales.

Route to Market	Description
Framework Call Off	• Long Lead Items
	<u>AGI Modifications & Uprating of FEEDER 28:</u> • Detailed Design (Altwern, Llanwrda, Three Cocks, Tirley) • Build (Altwern, Llanwrda, Three Cocks, Tirley)
	• FEED (Felindre) • Detailed Design & Build (Felindre)
Strategic Sourcing Event (Negotiated Procedure)	Detailed Design & Build new Pipelines and associated works

Table 29: WGN package route to market

337. Long lead Items were procured with cognisance to their respective lead times and to ensure availability for Contractors to achieve the programme construction timescales.

338. The new Pipeline and AGI Modifications & Uprating of Feeder 28 activities were aligned so both could inform the Project Direction submission, with due consideration of the Ofgem review process timescales and included a National Gas and Ofgem pre-engagement period.

Long Lead Items

339. As outlined previously, the strategy for the procurement of pipe, valves actuators and fittings was to Free Issue these long lead materials; the benefits of which relate to risk management and include:

- Free Issue of Materials to reduce inflationary impacts and Contractor on-costs.
- Secure manufacturing capacity.
- Ensure quality and specification integrity.
- Mitigate (as far as possible) long lead times to reduce the challenging programme timescale risks.

340. To secure these benefits and enable the project programme, National Gas Transmission committed to the procurement of Long Lead Items in 2022 – ahead of Ofgem

Direction determination in Q3/Q4 2023. Security from SHGCL was secured for these, in order to protect consumers in the event of a PARCA termination.

AGI Modifications & Uprating of Feeder 28

341. The original procurement strategy was for one single Detailed Design & Build works (DD&B) contract to be awarded via a Framework Call Off event.

342. This tender was launched and due to challenging timescales, the FEED scope was phased for completion during the live tender event. However, as the FEED scope progressed, scope complexity along with significant levels of uncertainty and unfavourable tenderer feedback prompted a review of the current procurement strategy of DD&B.

343. The implications of continuing with the Detailed Design & Build (DD&B) strategy could have exposed National Gas to an unacceptable level of commercial, scope and delay risk. Tenderers feedback to scope uncertainty, and therefore commercial uncertainty, supported National Gas's concerns to heightened levels of risk exposure.

344. The logical conclusion was to modify the strategy as follows:

i. Cancel current Detailed Design & Build works tender event and replace with:

- **Altwern, Llanwrda, Three Cocks, Tirley:** Detailed Design services (DPS Framework Call Off)
- **Felindre:** FEED services (EC&I Framework Call Off)

ii. Agree strategy to procure required Build only contract(s) following completion of Detailed Design and FEED activities above. It is anticipated these will be framework call offs.

<u>Cost Submission for AGI Modifications & Uprating of Feeder 28</u>

345. As a result of the above and the timing of this review and revision to strategy, the costs submitted as part of this Project Direction are based on the original strategy of Detailed Design and Build as these are market tested prices. This covers the scope of work at Alltwern, Llanwrda, Three Cocks, Tirley and Felindre MJ. [redacted]

346. [redacted]

New Pipeline Tender

Process

347. The tender followed the process below to ensure UCR compliance and mitigate post Contract Award delays due to contractual negotiations.

i. Prequalification Questionnaire (PQQ):

- Issue PQQ to qualifying Achilles registered economic operators. (Achilles is the initial qualified vendor route National Gas – along with many other utilities uses as the initial route to market).

ii. Invitation to Tender (ITT):

- Stage 1: Issue tender documents including draft contract to bidders. Invite exceptions and deviations (legal & technical). Make accepted changes to the draft contract and documentation.
- Stage 2: Issue final contract at Final Tender stage at which no further exceptions and deviations are accepted.

PQQ

348. Documentation was issued in accordance with the negotiated procedure on the Achilles system on 22 Aug 2022 to 219 economic operators. The documentation featured:

- Four highest ranking compliant PQQ applicants invited to ITT
- Single award to one Contractor

Evaluation Criteria

349. The PQQ Evaluation Criteria was:

Section Name	Section Weighting (% or PASS/FAIL)	Question Ref	Contribution to final score	Minimum % PASS/FAIL mark
Applicant Details	For Information Only	2.1 to 2.15(d)	For Information Only	For Information Only
Achilles Verify and Quality Assurance	PASS/FAIL	3.1	PASS/FAIL	PASS
		3.2	PASS/FAIL	
		3.3	PASS/FAIL	
Compliance	PASS/FAIL	4.1	PASS/FAIL	PASS
		4.2	PASS/FAIL	
		4.3	PASS/FAIL	
		4.4	PASS/FAIL	
	For Information Only	4.5	For Information Only	For Information Only
Additional Questions: Scope of Services	For Information Only	5.1	For Information Only	For Information Only
Additional Questions: Policies and Procedures	PASS/FAIL	6.1	PASS/FAIL	PASS
		6.2	PASS/FAIL	PASS
		6.3	PASS/FAIL	PASS
Additional Questions: Sustainability	PASS/FAIL	7.1	PASS/FAIL	PASS
		7.2	PASS/FAIL	
		7.3	PASS/FAIL	
		7.4	PASS/FAIL	
		7.5	PASS/FAIL	
		7.6	PASS/FAIL	
		7.7	PASS/FAIL	
		7.8	PASS/FAIL	
		7.9	PASS/FAIL	
		7.1	PASS/FAIL	
		7.11	PASS/FAIL	
		7.12	PASS/FAIL	
Detailed Additional Questions: Quality Assurance	2.00%	8.1	2.00%	1.00%
	8.00%	8.2	2.00%	
		8.3	2.00%	
		8.4	2.00%	
		8.5	2.00%	
Detailed Additional Questions: H&S	12.00%	8.6	3.00%	6.00%
		8.7	3.00%	
		8.8	3.00%	
		8.9	3.00%	
	3.00%	8.10	3.00%	1.50%
Detailed Additional Questions: Technical and Professional Ability	35.00%	9.1	35.00%	17.50%
	20.00%	9.2	20.00%	
	10.00%	9.3	10.00%	
Detailed Additional Questions: Environmental Performance	10.00%	9.4	2.00%	
		9.5	2.00%	
		9.6	2.00%	
		9.7	4.00%	
Detailed Additional Questions: Financial Stability, Legal and Due Diligence	PASS/FAIL	10.1	PASS/FAIL	PASS
		10.2	PASS/FAIL	
		10.3	PASS/FAIL	
		10.4	PASS/FAIL	
		10.5	PASS/FAIL	
		10.6(a)	PASS/FAIL	
		10.6(b)		
		10.6©		
		10.7(a)	PASS/FAIL	
		10.7(b)		
		10.8(a)	PASS/FAIL	
		10.8(b)		

Table 30: PQQ Evaluation Criteria

PQQ Assessment

350. The original closing date for submissions was 26 Sep 2022.

351. Of the 219 invitations, a total number of six tender submissions were received from the following tenderers and their submissions assessed as follows:

Table 31: PQQ Assessment

352. The four highest ranking compliant tenderers were assessed as having passed the minimum threshold and were progressed to ITT.

ITT

353. Tender documents were issued in accordance with the negotiated procedure on the Ariba system (National Gas procurement platform) on 29 Nov 2022 to the four bidders.

354. The closing date for submissions was 2 Feb 2023 (extended to 24 Feb 2023)

355. The issued Contract risk profile was aligned in order to market test risks (with competitive tension) and inform NGT of the optimum risk position at Final Tender stage.

Award Criteria

356. The headline Contract Award Criteria was as follows:

Criteria	Overall Weightings
Commercial	40%
Technical	60%
Total	**100%**

Table 32: Award Criteria

357. The rationale behind the selected 40% Commercial: 60% Technical weighting was presented to Ofgem (in Oct 2022) in advance of ITT issue, with consensus that the Contract Award Criteria is:

- Proportionate to the project requirements;

  and

- would achieve the most economically advantageous tender (MEAT).

358. The Contract Award Criteria includes the required provisions so that this procurement embeds National Gas's business plan commitments to environment, sustainability and social value.

Main Section Name	Subsection Name	No	Question Name	Question Pass Mark (if any)	Contribution to Final Score	Main Section Score
Commercial	Standard Forms	1	Form of Tender		FIO	40%
		2	Notice of Intention to Subcontract		FIO	
		3	Exceptions & Deviations		FIO	
	Price	4	Activity Schedule		28.00%	
		5	Tender Risk Register		FIO	
		6	Fee Percentage		8.00%	
		7	Schedule of Cost Components - People		2.00%	
		8	Schedule of Cost Components – Equipment		2.00%	
	Terms and Conditions	9	Contract Data Part 2		FIO	
		10	Acceptance of Final form of Project Agreement	PASS/FAIL	PASS/FAIL	
Technical	Programme	11	Programme	5% PASS/FAIL	10.00%	60%
	Technical Delivery	12	Construction Methodology		8.00%	
		13(a)	Technical Assurance		4.00%	
		13(b)			4.00%	
		14	Resources		4.50%	
		15	Ground and groundwater conditions		5.00%	
		16	Landowner Liaison & Reinstatement of Private Land		5.00%	
	Environment & Sustainability	17	Customer and Stakeholder Management Plan		2.00%	
		18	Biodiversity		1.00%	
		19	Water abstraction and discharge		1.00%	
		20	Protected species and Heritage		1.00%	
		21	Permitted Development		1.00%	
		22	Sustainability & Carbon Reduction		2.00%	
	Health & Safety	23	Compliance with the Construction (Design Management) Regulations 2015		2.50%	
		24	Health, Safety and Wellbeing Behaviours		2.50%	
		25	Method Statements for Safe Systems of Work for pipeline construction activities		2.50%	
	Social Value	26	Real Living Wage	0.25% PASS/FAIL	1.00%	
		27	Community		1.00%	
		28	Skills Development		1.00%	
		29	Human rights and Modern Slavery		1.00%	
	Total					**100.00%**

Table 33: Contract Award Criteria

Stage 1 Initial Tender Assessment

359. All Initial Tender submissions were assessed by a cross functional stakeholder team in accordance with the Award criteria and ITT scoring methodology. This allowed us to assess all submissions on an equal basis.

360. [redacted]

361. The table below provides a summary of the scoring at ITT Initial Tender stage. Scores for Q12-29 are finalised at this stage and stated as "Finalised Scores".

[redacted]

Table 34: Initial Tender Assessment

362. [redacted]

363. [redacted]

364. [redacted]

Final Tender invitations

365. Tenderers had varying stances on the level of risk they were able or willing to stand. National Gas engaged with Ofgem to review the final risk profile for Final Tender stage. (See Section 8.6 – regarding the market testing of risks)

366. The contract risk profile was agreed with Ofgem and the revised documentation and invitations to submit a Final Tender were issued via Ariba on 14 Apr 2023 [redacted].

367. The closing date for submissions was 9 May 2023.

Stage 2 Final Tender Assessment

[redacted]

Table 34: Final Tenders

372. All Final Tender submissions were assessed by a cross functional stakeholder team in accordance with the Award criteria and ITT scoring methodology. [redacted]

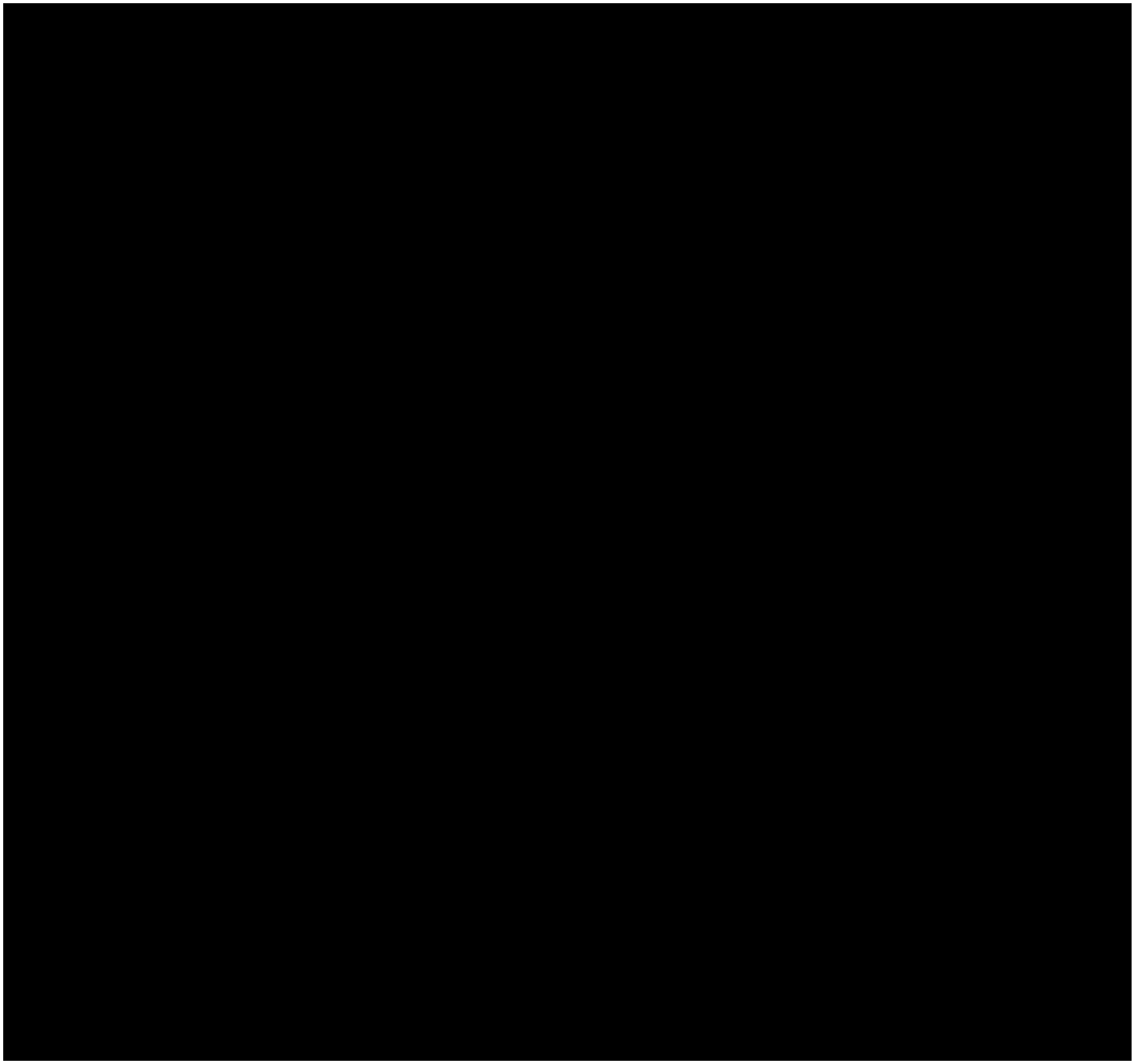

Table 34: Final Tender Assessment

Technical Assessment

373. Question 11 Programme assessment formed 10% of the total scores in Final Tender stage:

[redacted]

Commercial Assessment

374. The commercial assessment formed 40% of the total scores available.

- All submissions were assessed using tendered rates and percentages into a common model. This has allowed us to assess all submissions on an equal footing.

[redacted]

Table 35: Final Tender Scoring

Final Ranking

Table 36: Final Tender Ranking

Award Recommendation

Chapter 9: Conclusion and Next Steps

377. In conclusion, National Gas is submitting this Project Direction under the RIIO-T2 FIOC Re-Opener Price Control Deliverable Uncertainty Mechanism, requesting a FIOC Project Direction from Ofgem, in order to include the outputs, delivery dates and associated allowances within our licence, within Appendix 2 of SpC 3.13.

378. This is in response to the SHGCL PARCA application for 163 GWh/d in excess of the prevailing level of Firm Entry Capacity at the Milford Haven ASEP.

379. The request includes allowances of £67.08m (in 18/19 prices) to deliver the project, which represent direct costs that will be subject to the Opex Escalator Mechanism (SpC 3.18) and cover work across both RIIO-T1 and RIIO-T2 periods. RIIO-T3 costs will be included in the relevant business plan submission.

380. We have identified four project-specific Cost and Output Adjusting Events, that are defined within this submission, for Ofgem to include in their direction. These represent high impact, low probability events that are best managed through this mechanism, in order to protect consumer value.

381. In order to maintain programme to deliver the capacity as per the PARCA framework, we request the appropriate priority is given to this assessment. A positive FIOC Project Direction from Ofgem by no later than 18 Aug 2023 is on the critical path to enable award of construction contracts and adherence to delivery of the increased capacity and the associated consumer benefits by 2026. There are significant implications in terms of both commercial processes and the technical delivery of the project in going beyond this date, as well as consumer interests due to the impact to cost and delay of the wider benefits to security of supply and competition this project will enable.

382. This WGN Project contains the following main elements:

- 9km of new pipeline between Wormington and Honeybourne and 2km of new pipeline between Churchover Compressor Tee and Churchover Multijunction;
- Related works at several existing Above Ground Installations (AGIs) to facilitate the connection of new pipelines
- Pressure uprating of part of the existing Feeder 28 pipeline between Felindre and Three Cocks only (note this specifically excludes the section between Felindre and Cilfrew)
- Related works at several existing Above Ground Installations (AGIs) and compressor stations to facilitate the pressure uprating and increased flow rates. This category includes Tirley modifications.

383. The WGN project is designed to accommodate the immediate requirements triggered by a customer request for incremental capacity without over-investing in infrastructure which may not be required. As such it does not resolve the potential wider network constraints that may appear in some of scenarios in the longer term. It is however, a scalable, modular option that would support any future investment that is needed.

Chapter 10: Appendices

10A Tender Information

10B Cost Workbook

10C Cost Benefit Analysis Refresh

10D WGN Need Case Submission

10E Compulsory Purchase Order Maps

10F General Arrangement Drawings

10G The Pipeline Integrity and Risk Evaluation Report

10H Uprating Assessment Summary Reports

10I Project Scope Document Query Forms

10J Detailed Delivery Plan

10K Assurance Letter

10L Mapping of Ofgem Requirements

10M Communications Planner

10N Glossary