MSIP Re-opener Report

Leiston Demand Connection for SZC

January 2024

Follow on from the January 2023 MSIP Needs Case Submission

nationalgrid

Contents

The table below signposts the structure of the document and sets out the purposes of each of the sections. This also lists the appendices. We invite Ofgem to consider the proposals set out in this submission and raise queries against anything that may require further clarification.

Chapter	Reopener clause	Description
Abbreviations		A table of key abbreviations
Executive Summary	3.1, 3.3	A high-level summary of the submission
Summary Table	3.1, 3.3	A table summarising key information.
1. Introduction	3.1, 3.3	High level overview of the project, Sets out the strategic and geographic contexts.
2. Establishing the need	3.10, 3.11, 3.12	Sets out the driver for the project
3. Optioneering	3.13	Provides a summary of the range of options considered and shortlisted options as per the January 2023 Needs Case submission.
4. Detailed option analysis	3.14, 3.19, 3.20	Summarises the scope of works and benefits the efficient costs of the project, setting out the assumptions and methodology used and the evidence to support cost confidence including risks and contingency
5. Deliverability, risk and regulatory deliverables	3.15, 3.16-3.18	Details the proposed pathway to completion, obligation to deliver the works and engagement with stakeholder
6. Conclusion		Summary of the submission
7. Overview of assurance and point of contact	2.2-2.3	Assurance statement
8.. Appendices		
Ref.		**Title**
Appendix A		Previously Submitted Needs Case Jan 23
Appendix B		Leiston Cost Model (Spend Profile of Investment)
Appendix C		Leiston Estimated Inflation Model
Appendix D		Assurance Statement Letter
Appendix E		Reopener Guidance Checklist
Appendix F		Direct Costs/ Asset Table

Abbreviations

Table of Abbreviations

Abbreviation	Term
NGET	National Grid Electricity Transmission
NGESO	National Grid Electricity System Operator
kV	Kilovolt (1,000 volts)
AIS	Air Insulated Switchgear
GIS	Gas Insulated Switchgear
SZC	Sizewell C – NNB Generation Company (SZC) Ltd. (the customer)
NETS	National Electricity Transmission System
FID	Financial Investment Decision
SQSS	Security and Quality of Supply Standard
CUSC	Connection and Use of System Code
SF_6	Sulfur Hexafluoride
MSIP	Medium-sized Investment Project
TEC	Transmission Entry Capacity
DNO	Distribution Network Operator
OFTO	Offshore Transmission Owner
SGT	Super Grid Transformer
GSP	Grid Supply Point
RIIO	Revenues = Incentives + Innovation + Outputs
OHL	Overhead line
OEM	Original Equipment Manufacturer

Executive Summary

1. This Medium Sized Investment Project (MSIP) submission to Ofgem by National Grid Electricity Transmission (NGET) provides a funding update for the proposed Sizewell C (SZC) customer connection during RIIO-T2, following the original re-opener MSIP Needs Case submission in January 2023 (Appendix A). This is submitted under the MSIP re-opener provided for in Special Condition 3.14, of the NGET Transmission Licence.

2. The paper demonstrates the need for XXXX of which XXXX are direct costs. These costs are for investment at Leiston 132kV substation (the 'Investment') in Suffolk for a new demand connection for SZC and summarises the optioneering analysis that led us to the proposed solution; undertake a two bay Gas Insulated Switchgear (GIS) extension of Leiston 132kV substation. The 0MW connection is to connect two 132kV feeder circuits for supplies to a new privately owned 132/11kV Substation (to be called Old Abbey) which will be constructed by the User (i.e., the customer). NGET are to install the two 132kV GIS bays and associated busbar extensions, all other works external to the Leiston Substation shall be undertaken by the customer.

3. This is a statutory requirement following a connection application being made by SZC. A viable option is available, and NGET are confident in the customer connection progressing and its associated timeline based on current status of the Sizewell C project, investment within it, and strategic need given alignment with government ambitions. The paper is divided into seven main sections, the first of which is this executive summary.

4. Section 1 – the **Introduction** - positions the Investment within the context of NGET's investment plan. It confirms the methodology and regional context papers relevant to this submission. For the Investment, this paper should be read in the context of decarbonising the UK electricity network. The Sizewell C project is expected to achieve full Financial Investment Decision (FID) in 2024 which when constructed will provide ~7% of the UKs current electricity demand and support meeting the UK Government targets for Net Zero and Energy Security Strategy.

5. Section 2– **Establishing need** – establishes the investment drivers for the project, noting the strategic context and specific load drivers for this site specifically. In this case, the Investment is driven by a connection agreement between National Grid Electricity System Operator (NGESO) and SZC (NNB Generation Company (SZC) Ltd). The new demand connection will be used to provide electrical supplies for construction activities associated with the new Sizewell C nuclear power station development.

6. Section 3 – **Optioneering** – summarises the options considered for addressing the established need and summarises the reasons for progressing the selected options to detailed analysis. For the Investment, four options were identified, one of which was taken forward for detailed analysis. The selected option is to populate spare bay space at Leiston 132kV. This approach minimises cost to the consumer and environmental impacts as well as achieving the customer connection date. The project needs case submission was approved by Ofgem

following the January 2023 MSIP Re-opener submission which identified other options for the connection such as do nothing, a Distribution Network Operator (DNO) connection or connection to existing Sizewell B power station which did not meet the driver or were considered too expensive.

7. Section 4 – **Detailed options analysis** – outlines the detailed analysis undertaken in relation to the shortlisted option, with reference to key sensitivities applied and a detailed cost analysis. For the Investment, following this detailed analysis, the preferred solution identified to meet this driver is a two bay 132kV non-Sulfur Hexafluoride (SF_6) GIS extension to the existing substation, including extension of the substation busbars, enabling SZC to install the new 132kV cables to connect to their new Old Abbey 132kV substation. This approach minimises cost to the consumer and environmental impacts, as well as achieving the customer connection date. [redacted]

8. As agreed with Ofgem via email received 21/11/2023, a full cost submission for the project will be provided within [redacted] of this MSIP submission following receipt [redacted] final [redacted] costs to ensure a high confidence level in our cost forecasts. At this time the total cost estimate for the proposed works is [redacted] in 18/19 price base and through this submission NGET are requesting only the direct element of [redacted] (current forecast, 18/19 price base).

9. Section 5 – **Deliverability, risk and regulatory outcome** – identifies the delivery plan, any key stakeholder input, and associated risks and mitigations, and the proposed regulatory mechanism to be attached to the Investment. Due to delays to the customers project, the investment has been carefully progressed to avoid spend in advance of need and customer certainty with [redacted] of total project forecast cost incurred during development. However, based on the customers current construction programme for the new power station, delivery phase works will require to commence from April 2024 to facilitate timely connection of the customer in line with their current programme and required connection date. The proposed completion date for the site works is June 2026 with majority of spend occurring within RIIO T2 period with some forecast spend occurring in T3 [redacted]

10. Section 5 – **Conclusion** – confirms the proposed solution, including its key outputs, total estimated project cost of [redacted] and direct allowance request of [redacted].

11. Section 6 – **Overview of Assurance and Point of Contact** – confirms NGET's alignment of this submission with assurance requirements and the designated point of contact for this MSIP application.

Summary Table

MSIP Re-opener Application – Leiston Demand Connection for SZC	
Ofgem Scheme Reference/ Name of Scheme	Leiston Demand Connection for SZC
Primary Investment Driver	NGESO Connection Agreement
License Mechanism/ Activity	Medium Size Investment Projects (MSIP) Special condition 3.14.6 paragraph (f)
PCD Primary Output	Provide a new demand connection for SZC at Leiston 132kV to connect two new User 132kV feeder circuits by 30/06/2024.
Total Project Cost (£m)	XXXX
Funding Allowance Requested (£m)	XXXX
Output Delivery Year	2026/27
Reporting Table	Annual RRP – PCD Table
PCD Modification Process	Special Condition 3.14, Appendix 1

Issue Date	Issue No	Amendment Details
31st January 2024	1	First issue of document.

Summary Spend Phasing Table (2018/19 Prices)					
Regulatory Year	**Prior Year**	**2023/24**	**2024/25**	**2025/26**	**2026/27**
Spend £m	XXXX	XXXX	XXXX	XXXX	XXXX

1. Introduction

12. This document is the formal MSIP submission to Ofgem by NGET for the 'Leiston Demand Connection for SZC' during RIIO T2. This is submitted under the MSIP re-opener provided for in special condition 3.14.6 paragraph (f) of the NGET Transmission Licence: 'a system operability, constraint management or 0MW connection project or substation work, which is required to accommodate embedded generation, which in each case has been requested in writing by the Electricity System Operator'.

13. The need for these works was triggered by an NGESO connection agreement with the customer SZC (NNB Generation Company (SZC) Ltd). The new demand connection will be used to provide electrical supplies for construction activities associated with the new Sizewell C nuclear power station development.

14. Following the needs case submission for the project as part of the January 2023 MSIP re-opener, NGET have previously evidenced that the proposed investment represents the preferred, best value option for consumers and is the only credible option to connect the customer efficiently and achieving the required connection dates. Ofgem approved this needs case in October 2023.

15. The works within this report are not included within NGET RIIO-T2 Baseline allowances thus NGET are seeking funding through an MSIP re-opener.

1.1 Geographical Context and Existing Network Arrangements

16. [redacted]

17. Figure 1 below displays the Leiston local transmission network.

Figure 1 – Leiston substation local transmission network

18. Figure 2 shows an aerial view of Leiston substation.

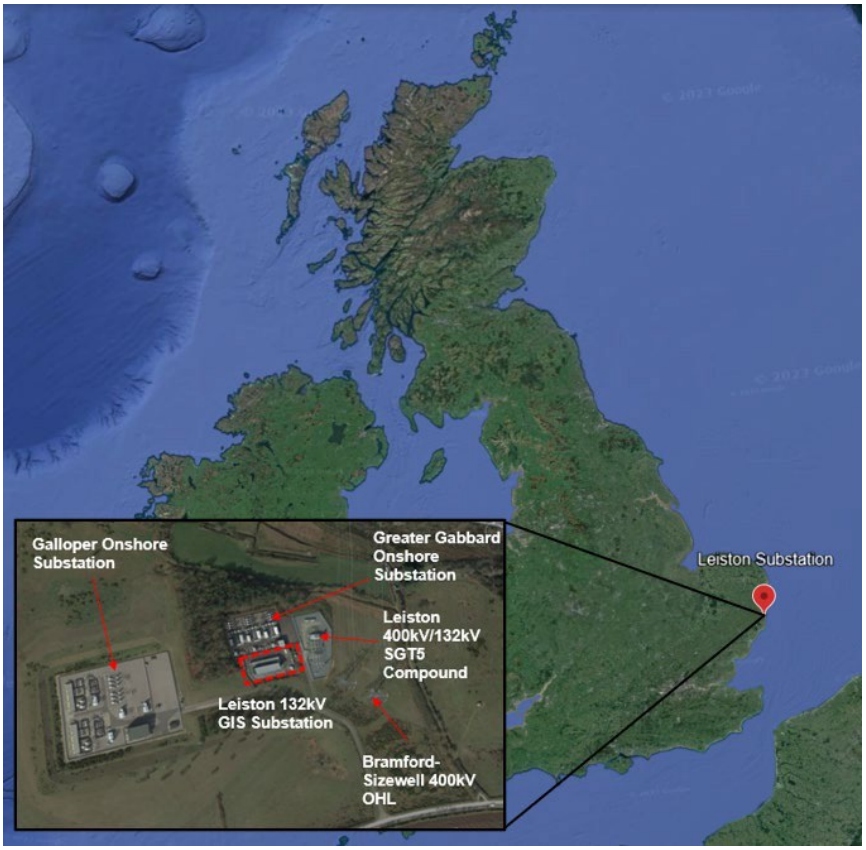

Figure 2 – Aerial view of Leiston substation

19. Figure 3 outlines the single line diagram of Leiston 132kV substation.

Figure 3 – Single line diagram of Leiston 132kV Substation with two new Old Abbey Circuits circled in green.

1.2 MSIP Eligibility

20. This submission is made in accordance with the 'RIIO-2 Re-opener Guidance and Applications Requirements' published by Ofgem in February 2021. NGET are seeking allowance for this connection under Special Condition 3.14.6 paragraph (f): 'a system operability, constraint management or 0MW connection project or substation work, which is required to accommodate embedded generation, which in each case has been requested in writing by the System Operator'.

21. The works within this report are not included within NGET RIIO-T2 Baseline allowances thus NGET are seeking funding through an MSIP re-opener.

22. This connection is not deemed to be covered by either the RIIO-T2 generation or demand uncertainty mechanisms (UMs) due to the ownership boundary at the GIS / cable boxes at Leiston 132kV. The associated step-down transformers located at the User's substation will not be installed or owned by NGET, therefore there are no assets in which output can be measured against to trigger the UM. As such, this investment was classified as a 0MW as reflected in the previous 2023 MSIP re-opener needs case submission.

23. The contents of the submission have also been informed by engagement between NGET and Ofgem with the aim of ensuring that this submission enables the Authority to make a positive timely decision on funding. Table 1 demonstrates how this proposal meets the remaining MSIP eligibility criteria.

Table 1 – MSIP eligibility checklist

Criteria	Criteria has been met.
Investment is not eligible for funding via the generation or demand Volume Driver Uncertainty Mechanism.	Yes
Investment sum < £100m not included in baseline funding	Yes
Transmission investment	Yes

24. It is NGET's responsibility to connect customers to the system. The works described in this submission are required to provide a new demand connection at Leiston 132kV for two 45MVA 132kV feeder circuits to a new 132/11kV substation (Old Abbey) which will be constructed by the User to provide electrical supplies for construction activities associated with the new Sizewell C nuclear power station development. If these works were not carried out NGET would not be able to meet Transmission Owner (TO) contractual obligations under the existing connection agreement, resulting in potential delays to the customer's construction and commissioning activities for the new nuclear power station (3340MW Transmission Entry Capacity (TEC) due to connect in mid-2030's). The new supply is also proposed to remain during operational phase of the power station to feed the emergency equipment store and ancillary buildings.

25. The proposed works include extension of the existing substation main/reserve busbars and two 132kV GIS bays by NGET for the connection of the new User/customer owned 132kV feeder circuits which will be cabled to the User's new 132/11kV Old Abbey substation. Extension of the existing Leiston 132kV substation common systems including Substation Control System and Busbar Protection will also be required to accommodate the extension of the site by two new bays.

26. The previously signed connection agreement reflected a connection date of August 2024. The customer indicated a delay to their project programme in early 2023 which was formalised via a modification application (Mod App) being submitted by SZC to NGESO in August 2023 to modify the required connection date to Q2 2026, to align with the proposed construction programme for the new nuclear station. A revised connection offer has been issued to the customer by NGESO and in line with standard Connection and Use of System Code (CUSC) timelines is due to be signed in February 2024 to reflect new contracted date for the connection of June 2026.

1.3 The Strategic Context

27. Given a signed connection agreement between NGESO and the customer, NGET is required to provide a connection in line with the connection dates requested by the customer SZC while ensuring connection options which are considered are economic and efficient to provide value for consumers.

28. The Leiston Demand Connection forms a key part of the necessary enabling works for the Sizewell C project. The new demand supply will enable electrical supplies to be distributed to areas of new development, allowing construction activities for the new nuclear power station to progress. Once operational in the mid 2030's the new Sizewell C station will generate 3.3GW of low carbon energy, providing the equivalent of 7% of current UK electricity demand to supply ~6 million homes.

29. The existing transmission network in East Anglia has seen a growing increase in renewable generation connecting in the region, which is becoming recognised for its green energy credentials with potentially around one third of today's UK energy demand being provided via new connections in the area by the end of the decade via large scale projects for nuclear, offshore wind and interconnectors. Although there are potential future developments recognised in the area which may increase network demand such as housing and industrial growth in addition to local port strategies/electrification, there are currently no firm drivers for large scale demand capacity increases in the short term, particularly in the rural coastal location of Sizewell and Leiston.

30. However, if future drivers for demand capacity in East Anglia do materialise, there are several opportunities for this to be enabled via new transmission reinforcements currently planned within the zone to achieve the boundary capacity increases necessary due to extent of new generation planned to connect in the region.

31. In 2019 the UK government adopted a legally binding obligation to reach net zero greenhouse gas emissions by 2050. Intermediary government ambitious targets have also been defined in:

- The Ten Point Plan for a Green Industrial Revolution – November 2020
- Energy White Paper – Powering our Net Zero Future – December 2020
- The Sixth Carbon Budget – The UK's path to Net Zero – December 2020
- Net Zero Strategy: Build Back Greener – October 2021
- British Energy Security Strategy – April 2022

32. In addition to offshore wind generation and interconnectors to mainland Europe, the connection of new nuclear generation has been identified as strategically important to support meeting 2050 net zero targets. Nuclear will be required for inertia and grid balancing as the UK phase out oil and gas, supporting generation when wind or solar are unavailable. Government policy has been set to secure Financial Investment Decision for one large scale nuclear project (Sizewell C) by the end of this Parliament in addition to committing over £300m of investment into the development of Small Modular Reactors (SMR) and Future Nuclear Enabling Fund.

33. NGET has an SF_6 Policy Statement setting out the ambition to minimise the environmental impact related to the use and emission of SF_6. Due to the existing Leiston 132kV GIS comprising SF_6 filled assets, the extension of the site required to deliver this customer

connection has been specified to be achieved through the installation of non-SF_6 GIS equipment, ensuring the proposed works are aligned with NGETs business commitments and Net Zero strategy.

2. Establishing the need

34. NGET's overall strategy is centred around serving our customers and providing them with an efficient, effective and timely connection.

2.1 Load Related Driver

35. The primary investment driver for this MSIP is to facilitate a connection required to feed a new privately owned 132/11kV substation to be located within the Sizewell C development site. NGET is obligated by our licence to provide a connection for this customer. Therefore, NGET are required to complete works at Leiston 132kV substation to ensure the new connection can be made. NGET cannot provide the connection without completing all necessary works to modify and extend existing infrastructure at the site, thus given the Bilateral Connection Agreement, which is in place, this forms the basis of the need case for investment proposed in this submission.

36. The supply to the new substation will be used to facilitate construction of the new Sizewell C nuclear power station, it will distribute electrical supplies to areas across the planned development site to enable construction activities associated with the new power station to be undertaken.

37. Although primarily required to provide necessary supplies for construction activities, benefits of the new connection are planned to be realised beyond the construction phase of the Sizewell C project with the connection proposed to be utilised to continue to provide supplies during operational phase of the new station, feeding the emergency equipment store and other ancillary buildings within the complex.

2.2 Customer Readiness and Reliability

38. Due to complex nature of financing and construction activities for the new Sizewell C power station since the January 2023 MSIP submission the customer has delayed the required dates for the new demand connection from August 2024 to June 2026. This was formalised through a modification-application submitted by SZC in August 2023 to agree planned dates for the demand connection with the current programme of works for the new power station development, upon which the current procurement and delivery programme for NGET works have been aligned.

39. Since the need case submission for this project which was approved by Ofgem as part of the January 2023 MSIP re-opener, there has been no change to the project driver in need to provide a new demand connection at Leiston 132kV to feed the customers new 132/11kV substation and power station construction activities.

40. The investment proposed in this submission is driven by a single customer connection. Therefore, this submission does not present any analysis of wider scenario forecasting or

outcomes as the contractual position and latest project status are the primary measures of need case certainty for this investment.

41. The needs case and stakeholder engagement section of this submission detail the current status of the customer's project, evidencing that there is a high degree of certainty the customers' project will progress and is independent of any other wider system developments.

3. Optioneering

42. The optioneering process of NGET is a rigorous and comprehensive methodology that considers all relevant factors to identify the best possible solutions for the needs of our customers. The process evaluates various options against a range of criteria, including cost, benefits, limitations, and technical feasibility. Our optioneering approach used to identify and evaluate schemes is built on the knowledge gained from various areas of the business while operating as a Transmission Owner (TO).

43. This process creates a long list of potential options, which are then analysed and evaluated to determine their viability and suitability. The optioneering process is designed to ensure that all relevant options are considered, and that the most appropriate/viable solutions are taken forward for detailed assessment based on all available information. This approach enables NGET to present informed decisions to Ofgem, that align with its strategic objectives of stakeholders and maximise value for our customers. The following section presents a long list and shortlist of options which were considered in response to the need.

3.1 Chronology of connection request

44. SZC conducted its own option appraisal which led to an application to National Grid for a connection to the National Electricity Transmission System (NETS).

45. Prior to application for a connection at Leiston 132kV, the customer investigated gaining a connection from the DNO ([redacted]). This was rejected [redacted] compared to [redacted] the National Grid Substation at Leiston, which is located in close proximity to the new Sizewell C development site.

46. [redacted]

47. During development and planning activities for the Sizewell C project, a location was ultimately selected for the new customer 132/11kV substation to be located east of Old Abbey farm.

3.2 Minimum Technical Requirements

48. As this is a non-embedded connection, SZCs new circuits do not provide a connection for a defined volume of embedded generation, nor does it impact any existing group demand level applicable at Leiston 132kV substation as the site currently does not act as Grid Supply Point (GSP) with only windfarm OFTO circuits connected at the site.

49. Due to the new demand connection feeding a non-embedded customer, two separate circuits

between NGET and User site are required to achieve the necessary redundancy and supply restoration requirements in compliance with the Security and Quality of Supply Standard (SQSS), with the 45MVA connection being defined as Class C supply (12-60MW demand).

50. The need for two separate circuit connections therefore requires two 132kV circuits to be connected at the Leiston 132kV substation, thus two new bays must be provided to facilitate the connection of these circuits to the substation busbars. The new switchgear that will connect the circuits to the substation busbars (e.g., the circuit breakers, disconnectors and associated bay plant) will be classified as Transmission Connection Assets under the responsibility of NGET due to these being sole use and customer elected ownership/operation boundary as per CUSC paragraph 2.12 (f) (i).

51. NGET has studied the effect of adding the additional 132kV circuits to the Leiston site. This work is undertaken to determine if the additional connection will trigger any additional works on any NGET or third party owned assets at Leiston substation or local network. The studies conducted concluded that the existing assets could accommodate the new circuits without the need for any upgrade or reinforcement work to increase capacity or fault level ratings.

3.3 Long List

52. NGET undertook an optioneering study and considered a long list of 4 options following the Ofgem Re-opener, including:

1. Do nothing
2. Whole system / market-based solution
3. Use / enhancement of existing assets
4. Construction of new assets

53. NGET assessed the following options when identifying how to facilitate the connections.

Table 2 – Option summary

No.	Option	Cost (£m)	Timescale	Selection
1	**Do Nothing**	£0	N/A	Discounted
2	**Whole System / Market-Based**	N/A	N/A	Discounted
3	**Re-use Existing Assets – Busbar extension and new bays within existing building and associated protection equipment**	XXXXX	August 2024 (Now June 2026)	Taken forward
4	**New Assets/Extension – e.g., 2 x new SGT connections from 400kV OHL**	XXXXX	N/A	Discounted

3.3.1 (Option 1) Do nothing – **Discounted**

54. **Option description** – under this option, NGET would not be able to facilitate connection to the new substation for SZC.

55. **Limitations** – this option is not applicable to this need case as NGET is obligated to provide a connection for this customer. There is no way to facilitate the customers application without providing some form of direct access/connection to the transmission system.

3.3.2 (Option 2) Whole system / market-based solution – **Discounted**

56. **Option description** – this option explores the opportunity of using a whole system or market-based solution to meet customer's needs. This option is mostly used for reinforcements of existing options, rather than in the provision of new connections.

57. **Limitations –** the requested connection for SZC requires a connection to the transmission network. A DNO connection, as noted above, was not considered feasible as a result of the high connection capacity requirement. Therefore, as a connection to the transmission system must be provided for this customer there is no whole system or market-based alternative to providing a physical connection at the proposed connection site. The connection does not trigger any other works in the local transmission network e.g., replacement of circuit breakers due to increased fault levels or increased circuit ratings to manage higher loadings. Therefore, no whole system or market-based solutions need to be investigated as an alternative to any infrastructure works required beyond the connection site.

58. Investigation of the options identified that whole system and market-based options were not applicable in this case due to the need for the customer to have direct access to the transmission system.

3.3.3 (Option 3) Re-use / enhancement of existing assets – **Taken forward for detailed analysis.**

59. **Option description –** this option consists of utilising existing infrastructure at the Leiston substation to reduce the cost, timescales and local impact to accommodate the two new 132kV circuit connections. As the existing GIS building includes provision and space for future bays to be installed, NGET can extend the existing switchgear to populate this area with new GIS equipment so that the customer can connect. The most cost effective and efficient way to achieve a connection to locate new equipment within the space available on the west side of the GIS hall.

60. With this approach, the construction of a new site, extension, or construction of substantial new assets such as additional SGTs connected to the existing 400kV overhead lines (OHLs) to provide the connection is not required.

61. The option of using the existing future bay provision enables the re-use of existing infrastructure and hence reduces the scope of works that must be carried out to satisfy the driver. This results in lower costs for NGET, SZC and is therefore considered the most cost-effective option for the end consumer.

62. NGET therefore considers the use of the existing assets/infrastructure as the most cost-effective solution to the new connection request. NGET will provide busbar extension, two

new GIS bays and associated light current equipment (e.g., busbar protection, SCS) such that SZC can connect their 132kV cables to these newly constructed feeder bays.

3.3.4 (Option 4) New Assets/Extension – **Discounted**

63. **Option description** – this option explores the opportunity to implement a new site/asset solution such as providing new SGTs connected to the existing 400kV OHLs to achieve the new demand connection.

64. **Limitations** – NGET discounted this option following investigation on the basis of substantial additional works/assets this option would trigger, at significantly higher cost than a connection being made directly to the existing 132kV GIS substation which already has provision for new bays to be installed. Connection to the existing OHL and provision of two new SGTs to feed the required demand would require a new bus/substation to be constructed at the Leiston location to feed the new User site, including associated land acquisition, planning, new compound construction and reconfiguration of the existing primary network configuration.

65. The Leiston site is located within the Suffolk Coast and Heaths AONB which has led to this location being discounted for site selection of new developments in the area associated with new Offshore Wind and Interconnectors. Given no additional network demand capacity need has been identified within this rural coastal location as part of Joint System Design Liaison meetings with the DNO, the additional costs/works required for a new site/compound option would not be justifiable as the solution would not provide any identified wider regional/future benefits.

66. An Air Insulated Switchgear (AIS) extension of the existing site was similarly discounted due to no space being available within the existing substation compound to site open-terminal assets. New land would require to be acquired and a compound extension would be triggered, in addition to technical complexities in achieving a physical connection from the existing 132kV substation busbars located within the elevated GIS building to a new AIS connection point.

4. Preffered Option

4.1.1 Preferred option: (option 3) reuse/enhance existing asset – population of spare bay space at Leiston 132kV.

4.1.1.1 Option description

67. The preferred option to provide the new customer connection is for NGET to populate the space already allocated for future bays within the existing GIS hall at Leiston 132kV substation with two new GIS feeder bays.

68. This solution reduces the requirement for substantial civil works to be completed by NGET and allows re-use of existing civil infrastructure that is in place given provisions which were made as part of the original substation construction to extend the 132kV substation in future, which includes additional space within the building for three future bays and cable apertures (both HV and LV) that are already cast-in to the GIS hall floor slab.

69. Existing cable ladder support structures are also in place within the GIS building undercroft (below the GIS floor slab cable apertures) which can be re-used to support new customer cables. Re-utilisation of these existing assets provides efficiency and cost savings for the customer and end-consumer. The available area for extension within the existing GIS building is shown below in Figure 4.

Figure 4 – Leiston 132kV GIS Hall Spare Bays

4.1.1.2 Solution design

70. NGET will carry out extension of the existing substation busbars (double busbar) to connect to the two new GIS feeder bays. The differentiation between Infrastructure (shared) and Connection (sole use) Assets is identified as the gas zone boundary associated with the busbar selector disconnectors on the new GIS feeder bays.

71. The two new GIS feeder bays will be constructed by NGET up to the HV cable termination boxes as part of the GIS bay. These assets are classified as Transmission Connection Assets due to them being sole use.

72. SZC's appointed contractors will design, supply and install the new 132kV HV cables and terminate these into the cable boxes provided by NGET as part of the GIS supply.

73. Extension of common/substation level infrastructure and bay-level protection at the Leiston 132kV site will be undertaken by NGET as Transmission Infrastructure Asset works, with the feeder protection and SCADA equipment associated with the two new Old Abbey circuits provided by the customer given they will own and operate the new feeder circuits.

74. SZC will construct the new 132/11kV substation and install the new 132kV cables to Leiston. SZC previously requested the selected ownership boundary given 132kV (i.e., non-transmission) voltage level, extent of development works they will be undertaking with the new Sizewell C complex and EDF land ownership of the new cable route.

75. The existing substation at Leiston is of GIS type containing SF_6 which is a potent greenhouse gas with significant global warming potential. To align with NGET policy relating to minimising the use of SF_6 and emission reduction targets the new GIS assets to be installed at Leiston have been specified to be of non-SF_6 type to minimise environmental impact. To achieve this, a GIS adaptor/interface transition is proposed to interface between new non-SF_6 and existing SF_6-filled equipment. Replacing all existing GIS equipment at the Leiston site is not proposed at this time as it is not needed to meet the customer connection requirements. The additional cost is not deemed proportionate given the existing equipment is early within its asset life (commissioned circa 2010), all SF_6 assets being housed indoors within the GIS building and no SF_6 leakage issues at the site currently identified.

76. [redacted]

Figure 5 – Isometric view of 132kV GIS 2-bay extension with adaptor

77. The works by NGET to facilitate the connection includes:

- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted],

- [redacted],
- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted],
- [redacted]
- [redacted]
- [redacted].

Figure 6 – Proposed layout of Leiston 132kV.

New NGET Infrastructure Assets shown in red, New NGET Connection assets shown in blue, new User (Customer) assets shown in magenta, future bay in orange.

4.2 Volumes

78. The proposed volumes of work to extend the 132kV substation is outlined in the table below.

Table 3 – Proposed volumes

Asset	Volume
XXXXXXX	X
XXXXXXXXXXXXXX	X

4.3 Lifetime cost benefit analysis

79. Our assessment of options using estimated costs has shown that the preferred option offers the best value option for consumers, the earliest connection date for the customer, minimal new/modification to existing assets and the lowest level of technical and project risk.

80. As such, in line with Ofgem's guidance to develop MSIP submissions that are proportional to scale and cost of the investments proposed, it is not considered necessary or efficient to undertake a CBA process as part of this submission as the reasoning behind the selection of the preferred option are clear based on the information presented in this and previous January 2023 needs case submission.

4.4 Detailed costs for preferred option

4.4.1 Introduction

81. This section provides a breakdown of the overall costs for Leiston including an expenditure profile for all Regulatory Years of delivery.

82. The following cost estimate breakdown represents our latest view of costs for the proposed investment in 2018/19 price base. All costs are presented in 2018/19 price base, unless otherwise stated.

83. Appendix B Leiston Cost Model submitted alongside this document provides a breakdown of the costs in more detail and should be reviewed alongside this chapter.

84. This chapter is broken down into the following sections:

    4.4.2 Total Allowance Request

    4.4.3 Cost Estimate

    4.4.4. Cost Firmness

    4.4.5 Direct & CAI

    4.4.6 Detailed Breakdown of Direct Costs

85. Since the project needs case submission as part of the January 2023 MSIP, NGET's scheme team have continued to develop the proposed works to fully understand scope, prepare

delivery plans and undertake supplier engagement to validate key equipment solutions that are available, as well as current lead times.

86. Formal engagement with the supplier to provide a bid for the works commenced in October 2023. The invitation to bid was released after receipt of a Mod App from SZC that clarified connection dates following a programme review undertaken by the customer.

87. Following achievement of consents and initial Government Investment in the Sizewell C project, the review agreed revised timelines to both secure financial investment for the project and planned construction programme. The customer has indicated that the timelines proposed have been informed by learning taken from the Hinkley Point C project, of which Sizewell C will be a second of a kind design.

88. [redacted]

89. Upon completion of the procurement process [redacted], NGET will provide an updated cost submission for this MSIP Re-opener [redacted]

90. [redacted]

4.4.2 Total Allowance Request

91. Total project costs are [redacted] NGET request [redacted] allowances is directed through the MSIP reopener mechanism to recover the direct portion of costs and deliver works described above. The MSIP reopener mechanism is subject to the Opex escalator and therefore indirect costs will be funded under this route.

92. Both Transmission Infrastructure and Transmission Connection assets will require to be constructed as part of the project, with [redacted] of the project total costs relating to the Connection Asset works. Due to them being sole use, Transmission Connection Assets will ultimately be paid for by the customer over the lifetime of the asset through applied Connection

Asset Charges, however relevant costs are included as part of this funding submission given, they constitute a Directly Renumerated Service under revenue allowances.

Table 4 – Allowance request – Cost Model tab reference 1.0

	2018/19 Prices (£)							
	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	Total
Total Project Costs	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
Allowance Request (Direct Only)	-	-	-	XXXX	XXXX	XXXX	XXXX	XXXX

4.4.3 Cost Estimate

93. The total cost to develop and deliver the Leiston project is XXXX including indirect costs and costs incurred to date.

94. The tables below show a summary of costs including annual phasing.

Table 5 – Cost Summary – Cost Model tab reference 1.1

Element	Total (£)	CAI/Direct
Contractor Costs		
Main Works Contractor	XXXX	Direct/CAI
Third Party Costs	XXXX	Direct/CAI
National Grid Costs		
ET Ops	XXXX	Direct
Project Management	XXXX	CAI
Project Services	XXXX	CAI
Support Functions	XXXX	CAI
Lands	XXXX	Direct
Legal	XXXX	Direct
NGET Portfolio Costs	XXXX	CAI
Other		
Estimated Inflation	XXXX	Direct
Risk	XXXX	Direct
Total	XXXX	

Table 6 – Annual Phasing – Cost Model tab reference 1.0

Element	2020/ 21	2021/ 22	2022/ 23	2023/ 24	2024/ 25	2025/ 26	2026/ 27	Total (£)
Contractor Costs								
Main Works Contractor	-	-	-	-	[redacted]	[redacted]	[redacted]	[redacted]
Third Party Costs	-			[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
National Grid Costs								
ET Ops	-	-	-	-	[redacted]	[redacted]	[redacted]	[redacted]
Project Management	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Project Services	-	-	-	-	[redacted]	[redacted]	[redacted]	[redacted]
Support Functions	-	-	-	-	[redacted]	[redacted]	[redacted]	[redacted]
Lands	-	-	-	-	[redacted]	-	-	[redacted]
Legal	-	-	-	-	[redacted]	-	-	[redacted]
NGET Portfolio Costs	-	-	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Other								
Estimated Inflation					[redacted]	[redacted]	[redacted]	[redacted]
Risk					[redacted]	[redacted]	[redacted]	[redacted]
Total	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

4.4.4 Cost Firmness

95. The table below shows the assessment of cost firmness using the classification outlined in the Ofgem LOTI reopener guidance document published on 29th March 2021.

96. As the procurement phase is still in progress, the current cost estimate presented within this submission has been derived from internal estimates of the projects' scope. This is reflected in the table below. Further cost firmness will be available once final [redacted] costs are returned [redacted], this will be included within the revised project cost assessment to be submitted in April 2024.

Table 7 – Cost Firmness – Cost Model Tab reference 1.9

Cost Firmness	Total (£)	Notes
1 - Fixed	XXXX	22/23 and 2023/24 timesheets and invoices
2 - Agreed remeasurable		
3 - Agreed remeasurable future information		
4 - Estimated	XXXX	Risks, NG costs, procurement and third-party costs without a contract or quote (less actuals).
5 - Early Estimate		
Total	XXXX	

4.4.5 Direct & CAI Split

97. Table 8 below provides the split between direct and indirect costs related to this project.

98. The costs of the Closely Associated Indirect (CAI) activities are incremental to the funding we received as part of our T2 baseline allowances. The T2 Baseline allowances for CAI were determined through Ofgem's regression (econometric) model, one of the key inputs being the baseline load and non-load capital allowances and as such no funding has been provided for this MSIP project. The costs are therefore in addition to the CAI allowances provided in T2 Final Determinations and should be funded via the Opex Escalator mechanism.

99. The following table represents the split of Direct and CAI spend within this MSIP submission. The split is based on NGET's understanding of the definition of the scope of Closely Associated Indirects at the time of preparation (January 2024), and in particular the classification of those activities undertaken by contractors in the course of delivering assets.

100. NGET notes that work is ongoing between the TOs and Ofgem regarding application of the Opex Escalator mechanism and the definition of Indirect activities, and therefore this interpretation of CAI may be is subject to change. It is worth nothing that, should the Opex Escalator be applied by Ofgem to the January 2024 MSIPs in the same manner as it was applied by Ofgem to NGET's January 2022 MSIPs (in its decision of 6 October 2023) , it is unlikely that incurred CAI spend will be fully funded on all projects; we therefore believe that such under-funding should fall within the scope of the Opex Escalator True-up Mechanism currently being discussed with Ofgem.

Table 8 – CAI/Direct split – Cost Model Tab reference 1.9

Cost Firmness	Total (£)	% of Total
CAI	XXXX	XXXX
Direct	XXXX	XXXX
Total	XXXX	XXXX

4.4.6 Detailed Breakdown of Direct Costs

4.4.6.1 Main Works Contract [redacted]

101. The following is a ‘class 4’ estimate for the Main Works Contractor (direct costs only), for the work package forming the Leiston works.

102. The Main Works Contractor (MWC) costs are based upon the key equipment to be supplied and activities to be undertaken to extend Leiston 132kV for this customer connection. This includes the design, procurement, supply, installation, testing and commissioning of the following:

- [redacted]
- [redacted]
- [redacted]
- [redacted]

103. [redacted]

104. [redacted]

Table 9 – Main Works Contractor Estimate - Cost Model tab reference 1.2

Scope	2024/25	2025/26	2026/27	Total (£)
[redacted]	[redacted]	[redacted]	-	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	-	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	-	[redacted]	[redacted]	[redacted]
[redacted]	-	-	-	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

4.4.6.2 Third Party Costs [redacted]

105. The main construction works for the project requires the services of specialist 3rd party providers.

106. During the project execution phase, XXXXX will undertake specialist activities associated with Technical Assurance and Commissioning Officer roles. The estimated costs are based upon an evaluation of the resources required to meet the project delivery timescales.

107. The table below shows the direct third-party costs required to deliver project.

Table 10 – Third party costs – Cost Model tab reference 1.3

Activity	Provider	2023/24	2024/25	2025/26	2026/27	Total (£)
Technical Assurance & Commissioning Officer	XXXXX	XXXX	XXXX	XXXX	XXXX	XXXX
	Total	XXXX	XXXX	XXXX	XXXX	XXXX

4.4.6.3 ET Operations XXXX

108. This cost category relates to National Grid's in-house operational and commissioning resources supporting the project's construction and commissioning phases. It is from this team that necessary 'safety from the system' and acceptance of testing/commissioning related to allowing the new assets to connect to the transmission network will be provided.

109. Table 11 below provides the cost breakdown in relation to this support.

Table 11 – ET operations cost summary - Cost Model tab reference 1.4.

Description	18/19 Price Base (£)
XXXX	XXXX
XXXXXXXXXXX	XXXX
XXXXXXXXXXXXXXX	XXXX
XXXXXXXXXX	XXXX
XXXXXXXXXXXXXXX	XXXX
Total	XXXX

110. The basis of estimate related to these specialist resources can be found within the cost model provided.

4.4.6.4 Lands and Legal XXXX

111. No new permanent land will be acquired as the new assets are being installed within the existing GIS building.

112. While no new NGET assets are being constructed outside of the existing operational site, the works related to the project will still require consent interface interactions with the construction

activities undertaken by the customer associated with the new User substation and incoming 132kV cables consented under the Sizewell C DCO.

113. Although no new permanent land is required, temporary land is necessary for site establishment. The location of this temporary land is planned to be in the field south-east of the existing site compound. As part of the existing lease agreement for the site, NGET hold existing rights for use of temporary land hence we have included costs associated with gaining existing grantor use within the proposed construction window.

114. In addition, the project requires the existing lease for the Leiston 132kV site to be modified to reflect new use of the site for provision of electricity demand (in addition to its current use for the export of wind generation farm the existing connected Offshore Windfarms).

115. Associated costs for production of lease deed of variation, freehold land owner consent, and associated legal costs payable to the existing lease [redacted] are given in Table 12 & Table 13 below:

Table 12 – Lands Costs – Cost Model Tab reference 1.5

Description	18/19 Price Base (£)
[redacted]	[redacted]
Total	[redacted]

Table 13 – Legal Costs – Cost Model Tab reference 1.5

Description	18/19 Price Base (£)
[redacted]	[redacted]
[redacted]	[redacted]
Total	[redacted]

4.4.6.5 Estimated Inflation [redacted]

[redacted]

5. Deliverability, risk, and regulatory deliverables

5.1 Deliverability

117. This section will document the approach to delivery, list any potential deliverability constraints and associated mitigation strategies that will need to be implemented to minimise the risk.

5.2 Procurement strategy

118. [redacted]

119. [redacted]

120. [redacted].

121. [redacted].

122. [redacted].

enclosure) compared with higher voltage switchgear such as 400kV which is phase segregated, thus less complex to interface.

123. [redacted]

124. [redacted]

[redacted]

5.3 Project Plan

125. A detailed project delivery plan has been prepared by NGET to facilitate the planned connection date of 30/06/2024.

126. The proposed delivery programme has been informed based on engagement with the customer to confirm current programme for the Sizewell C project, NGESO regarding preferred system access windows and supply chain to verify current equipment lead times to ensure market engagement is sufficiently early to meet the required connection date.

127. The key project milestones are summarised below:

Table 14 – Key Project Milestones

Milestone	Date
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
Internal NGET Committee Sanction	[redacted]
Contract Awarded/Signed	[redacted]
Equipment Order	[redacted]
Primary Design Complete	[redacted]
Secondary Design Complete	[redacted]
First Site Access	[redacted]
GIS Offline Install HV Test (Key Date)	[redacted]
Busbar Extension Outages	[redacted]
Available for Commercial Load (Sectional Completion Date)	[redacted]

128. A Mod App was submitted by the SZC in August 2023 to delay their connection from August 2024 to June 2026. Based on the newly requested connection date, procurement activities have continued to be progressed in Q4 2023 due to the existence of a current signed connection agreement and increased certainty of project progression following Government funding to achieve project FID in 2024.

129. The modification connection offer reflecting new programme dates was released to the customer in November 2023 and is due to be signed in February 2024. Award of NGET contracts to deliver the connection will therefore not be placed until the new contract is signed and in place.

130. The latest status of the customer project is summarised below: -

Table 15 – Customer Status

Milestone	Status	Date
Obtain planning consents	Complete	[redacted]
Government Investment to achieve FID	Complete	[redacted]
Submit Mod-App to confirm project delivery programme	Complete	[redacted]
Accept Mod-Offer	Planned/On Target	[redacted]
Exchange of Reference Design Information	Planned/On Target	[redacted]
Final Investment Decision for Sizewell C Project	Planned/On Target	[redacted]
Exchange of Detailed Design Information	Planned/On Target	[redacted]
User First Site Access date to	Planned/On Target	[redacted]

Milestone	Status	Date
NGET Connection Site		
Stage 2 Commissioning Outages/ACL	Planned/On Target	[redacted]
Demobilisation	Planned/On Target	[redacted]

5.4 Risk and Mitigations

131. Key programme and project risks have been identified and incorporated into the current project risk register, with Quantitative Risk Analysis undertaken to produce the contingency as detailed within the Leiston Cost Model (ref tab 4.1).

132. [redacted]

133. [redacted]

134. The following table indicates the top five risks forming the basis of NGETs risk contingency value for delivery of the project.

Table 16 - Extract from Risk Register (Values above [redacted]) (2023/24 price base)

Cause	Description	Impact	P50 Value (2018/19 Prices)	Mitigation
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Cause	Description	Impact	P50 Value (2018/19 Prices)	Mitigation
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

5.5 Stakeholder engagement

135. The key stakeholders identified by NGET for this project are SZC (the customer) and NGESO who own the bilateral connection agreement with the customer.

136. Engagement with wider stakeholders has also been undertaken through listening events held across England and Wales to inform the 'Future Network Blueprints' strategy, which included engagement sessions across Cambridge and Peterborough for the East Anglia region, in addition to regular ongoing engagement with DNOs as part of Joint System Design Liaison meetings.

137. Development consent to construct Sizewell C nuclear power station was granted in July 2022 which included relevant consents for the Leiston Demand Connection associated with the customers new Old Abbey 132/11kV substation and new cable circuits to connect to Leiston 132kV.

138. A Government Investment Decision was made in November 2022 for the UK Government to acquire a 50% stake in the Sizewell C project following £679m of investment for continuing development of the project to reach a financial investment decision. Additional Government funding was subsequently announced in July and August 2023 taking Government Investment in the project to ~£1.2bn.

139. NGET have worked closely with SZC to develop the project and agree a programme that meets their needs to achieve the desired connection date. To ensure our investment is efficient, we will closely track the progress of the customer in advancing their aspects of the connection to ensure that NGET does not invest ahead of need.

140. [redacted]

141. Given a key risk to the project is related to division of scope and responsibilities between NGET and User at key interfaces, during development of the project NGET have produced an interface responsibility diagram and shared this along with relevant ITT scope definition documentation with the customer. This collaborative approach to interface management has been taken to ensure all parties are clear on expected responsibilities at points of interface and minimise the risk of scope gaps occurring between respective Main Works Contractors.

142. With key milestones achieved for consents and securing significant levels of UK Government investment in the project, there are now increased levels of certainty both in terms of project progression and the planned construction programme, with financial close of the Sizewell C project expected to be completed in 2024. The progress of the customer in achieving these milestones indicates that they will be ready to connect by the connection date as specified within their modification connection offer due to be signed in February 2024 and hence our

investment should continue as planned to meet this date given strategic importance of the project.

5.6 Security for Consumers

143. Customers looking for a connection to the transmission system are signatories to the Connection and Use of System Code (the CUSC), which describes the associated rights and obligations. Customers contract directly with the ESO, who has an agreement with NGET covered by the SO-TO Code (STC).

144. One of the customer's obligations in the CUSC relates to the liabilities that are incurred if a customer terminates their connection agreement before the works are complete. These arrangements differ for generation and demand.

145. For demand, such as in this submission, customers' liabilities are based on the actual costs incurred and this is mirrored in the ESO's agreement with NGET. This means that should a demand customer terminate before the works are complete, the costs incurred to date will be recovered from the customer itself.

146. This arrangement means that the customer is prepared to make a financial commitment to the works being undertaken on their behalf and supports the need case for the investment.

5.7 Price Control Deliverables

147. As there is no measurable output in terms of contracted TEC or demand transformers to be delivered by NGET for this project, it is proposed that an evaluative Price Control Deliverable is defined.

148. Provide a new demand connection for SZC at Leiston 132kV to connect two new User 132kV feeder circuits by 30/06/2024.

6. Conclusion

149. This document is the formal MSIP submission to Ofgem by NGET for the Leiston customer connection during the RIIO-T2 Price Control period. This is submitted under the MSIP re-opener provided for in Special Condition 3.14, paragraph (f) of the NGET Transmission Licence.

150. This paper has demonstrated the need for investment at Leiston 132kV substation (the 'Investment') in Suffolk for a new demand connection for Sizewell C; and summarised the optioneering analysis that led us to our proposed solution. The following table summarises the main drivers for this Investment, the selected option, estimated costs and forecasted outputs.

Main drivers	To facilitate a demand connection for Sizewell C, required to feed a new privately owned 132/11kV substation to be located within the new nuclear power station development site
Selected Option	Populate the space already allocated for future bays within the existing GIS hall at Leiston 132kV substation with two new GIS feeder bays
Estimated Cost	XXXXXXXXXX XXXXXXXXX
Outputs	Commercial Load by 2026

7. Overview of assurance and point of contact.

151. Appendix D, contains the assurance statement letter, providing written confirmation in line with the assurance requirements set out in Ofgem's Re-opener Guidance and Application Requirements Document, dated 17th February 2023.

152. This confirmation is provided by the Head of Future Price Controls, Electricity Transmission where they are accountable for re-opener submission for National Grid Electricity Transmission (NGET) including any changes to these allowances. They provide the following statements below regarding how this MSIP application has been prepared and submitted in relation to each of the three assurance points requested by Ofgem:

- It is accurate and robust, and that the proposed outcomes of the MSIP submission are financeable and represent best value for consumers.
- There are quality assurance processes in place to ensure the licensee has provided high-quality information to enable Ofgem to make decisions which are in the interests of consumers.
- The application has been subject to internal governance arrangements and received sign off at an appropriate level within the licensee.

153. NGET's designated point of contact for this MSIP application is Kiah Cox, Regulatory Development Manager, email Kiah.Cox@nationalgrid.com, telephone +44 (0) 7814 284333.

8. Appendix

Appendix A Previously Submitted Needs Case Jan 23	MSIP_LEISTON_Need_ Case_submission_Fina
Appendix B Leiston Cost Model (Spend Profile of Investment)	Leiston%20Cost%20 Model.xlsx
Appendix C Leiston Estimated Inflation Model	APPENDIX%20C%20- %20Leiston%20Estima
Appendix D Assurance Statement Letter	APPENDIX D - Assurance Statement
Appendix E Reopener Guidance Checklist	APPENDIX E - Reopener Guidance -
Appendix F Direct Costs/ Asset Table	MSIPs%20Jan%2024 %20Direct%20Costs%

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