MSIP Re-opener Report

Hylton Castle – IAMP Connection

January 2024

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.

Abbreviations

Table of Abbreviations

Abbreviation	Term
AIS	Air Insulated Switchgear
CBA	Cost Benefit Analysis
DNO	Distribution Network Operator
GIS	Gas Insulated Switchgear
GSPs	Grid Supply Points
MSIP	Medium Sized Investment Project
NGET	National Grid Electricity Transmission
NMUK	Nissan Motors UK
NPg	Northern Powergrid
PCD	Price Control Deliverable
SCC	Sunderland City Council
SGTs	Super Grid Transformers
SSE	Scottish Southern Energy
TEC	Transmission Entry Capacity
TO	Transmission Owners
UM	Uncertainty Mechanism

Executive summary

1. This Medium Sized Investment Project (MSIP) submission to Ofgem by National Grid Electricity Transmission (NGET) details and requests funding for the proposed Hylton Castle customer connection during RIIO-T2. This is submitted under the MSIP re-opener provided for in Special Condition 3.14 of the NGET Transmission Licence.

2. The submission demonstrates the need for a total investment of XXXX at Hylton Castle (the 'Investment') in the northeast of England, of which XXXX are direct costs (2018/19 price base). This paper summarises the needs case for the investment, the optioneering process we conducted to identify the most efficient solution for delivering that need, and details the rationale for our proposed solution –the construction of a new 275kV double busbar substation, turning in at the required juncture on the existing ZZA[1] overhead transmission line, for the purposes of installing three new 275/66kV SGTs and 66kV cables required by the International Advanced Manufacturing Park (IAMP), requested originally by Sunderland City Council (SCC).

3. This is a licence requirement arising from a connection application made initially by SCC and which was subsequently novated to SSE in March 2023. A viable option is available, and NGET are confident in the customer need based on the strategic need being aligned to government goals and progress made by the customer which remains on programme. The paper is divided into seven main sections.

4. Section 1 – Introduction – positions the Investment within the context of NGET's investment portfolio. It confirms the methodology and regional context relevant to this submission. For the investment, this paper should be read in the context of enabling projects of national importance for the decarbonisation of the automotive sector. Indeed, IAMP is a Nationally Significant Infrastructure project (NSIP). More specifically, the connection will power a new Nissan Electric Vehicle (EV) production plant and new Envision giga plants that supply critical components for Nissan's EVs. These facilities are key contributors to government decarbonisation commitments and to providing cost-effective low-carbon transport.

5. Section 2 – Establishing need – establishes the investment drivers for the project, noting the strategic context and specific load drivers for this site. In this case, the Investment was triggered by a connection application made by SCC for a 255MVA Grid Supply Point (GSP) to supply a private network feeding the IAMP.

6. Section 3 – Optioneering – summarises the options considered for addressing the established need and the reasons for shortlisting/progressing the selected options to detailed analysis.

[1] ZZA is the unique identification for that particular OHL route, all OHL routes have their own individual identifications.

For the Investment, five options were identified, two of which were taken forward for detailed analysis and Cost Benefit Analysis (CBA) as the only technically feasible options. These were:

- Option 4 - extending the existing 275kV AIS West Boldon substation, and
- Option 5 - construct an entire new 275kV AIS double busbar substation along the ZZA overhead line route, subsequently named Hylton Castle

7. **Section 4 – Detailed options analysis** – outlines the detailed comparative analysis undertaken in relation to each shortlisted option. The relative merits of the two options are finely balanced. On the basis of our CBA, Option 4 likely offers lower costs in the short term, when only development and construction costs are considered.

8. However, NGET's findings demonstrate Option 5 delivers a more efficient long-term solution for consumers, on the basis that it:

   (a) Incorporates flexibility and capacity for the future investment likely required to manage significant levels of anticipated regional demand growth,

   and

   (b) mitigates the Environmental and social impacts inherent in Option 4, as well as the associated construction, design, and operational and delivery issues. As such, NGET's preferred solution is Option 5, namely the construction of a new substation.

9. **Section 5 – Deliverability, risks, and regulatory outcome** – identifies delivery risks and mitigations, as well as the proposed regulatory mechanism to be attached to the Investment.

10. **Section 6 – Conclusion** – confirms the proposed solution, including its key outputs, cost of XXXX, and allowance request of XXXX in 2018/19 price base.

11. **Section 7 – 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 – Hylton Castle 275kV	
Ofgem Scheme Reference/ Name of Scheme	Hylton Castle 275kV new supply point for Scottish and Southern Energy – International Advanced Manufacturing Park (IAMP).
Primary Investment Driver	Customer Connection
Licence Mechanism/ Activity	Special Condition 3.14 Medium Sized Investment Projects Re-opener and Price Control Deliverable/ Clause 3.14.6 [x]
PCD Primary Output	Construct a new 275kV double busbar substation for installing three new 275/66kV SGTs and 66kV cables to the International Advanced Manufacturing Park (IAMP) site by March 2026.
Total Project Cost (£m)	XXXX
Funding Allowance Requested (*Directs*) (£m)	XXXX
Output Delivery Year	2025-26
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 price base)						
Regulatory Year	**FY2023**	**FY2024**	**FY2025**	**FY2026**	**FY2027**	**Total**
Spend £m	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX

1. Introduction

12. This document is the formal Medium Sized Investment Project (MSIP) submission to Ofgem by National Grid Electricity Transmission (NGET) for the Hylton Castle customer connection in the North East of England during RIIO-T2. This is submitted under the MSIP re-opener provided for in Special Condition 3.14.6 paragraph (b): 'a Demand Connection project, including all infrastructure related to that project, the forecast costs of which are at least £11.84m more or less than the level that could be provided for under Special Condition 3.12 (Demand Connection volume driver)'. Calculations demonstrating this variance are detailed within Appendix A.

13. The works described in this submission are required to provide a Grid Supply Point (GSP) for SSE Scottish and Southern Energy (hereafter referred to as SSE), who require a 66kV feeder connection to supply a private electrical network for the International Advanced Manufacturing Park (IAMP) in Sunderland. IAMP is a joint venture between Sunderland City Council (SCC) and South Tyneside Council (STC). Other partners involved include Envision and Nissan. SSE have a signed connection agreement that specifies an initial connection date of December 2025 for the energisation of the first Super Grid Transformer (SGT) to power part of IAMP, followed by SGT 2 in January 2026, and SGT 3 in March 2026.

14. The three SGTs will enable the connection of several nationally significant projects creating 7000 new employment opportunities in the region such as:

- Nissan: Production of Electric Vehicles (EV)
- Envision: New giga battery production plants to supply critical components for Nissan's EVs.

15. This submission seeks to demonstrate that NGET's preferred solution and the associated funding request both (i) facilitates the capacity required for the IAMP' by the contracted connection date, and (ii) is the most efficient option for consumers.

1.1 Geographical context

16. On 2nd September 2020 SCC submitted a Connection Application for a new 132kV 140MVA supply point from West Boldon 275kV substation to the new IAMP facility located approximately [redacted] of the substation. The existing site at West Boldon consists of a NGET 275kV substation and a Northern Powergrid (local Distribution Network Operator - DNO) 66kV substation. SCC submitted a Modification Application (ModApp) to increase their demand capacity request from 140MVA to 255MVA, details of the chronology of their connection request are outlined in Appendix F.

17. [redacted]

[redacted]

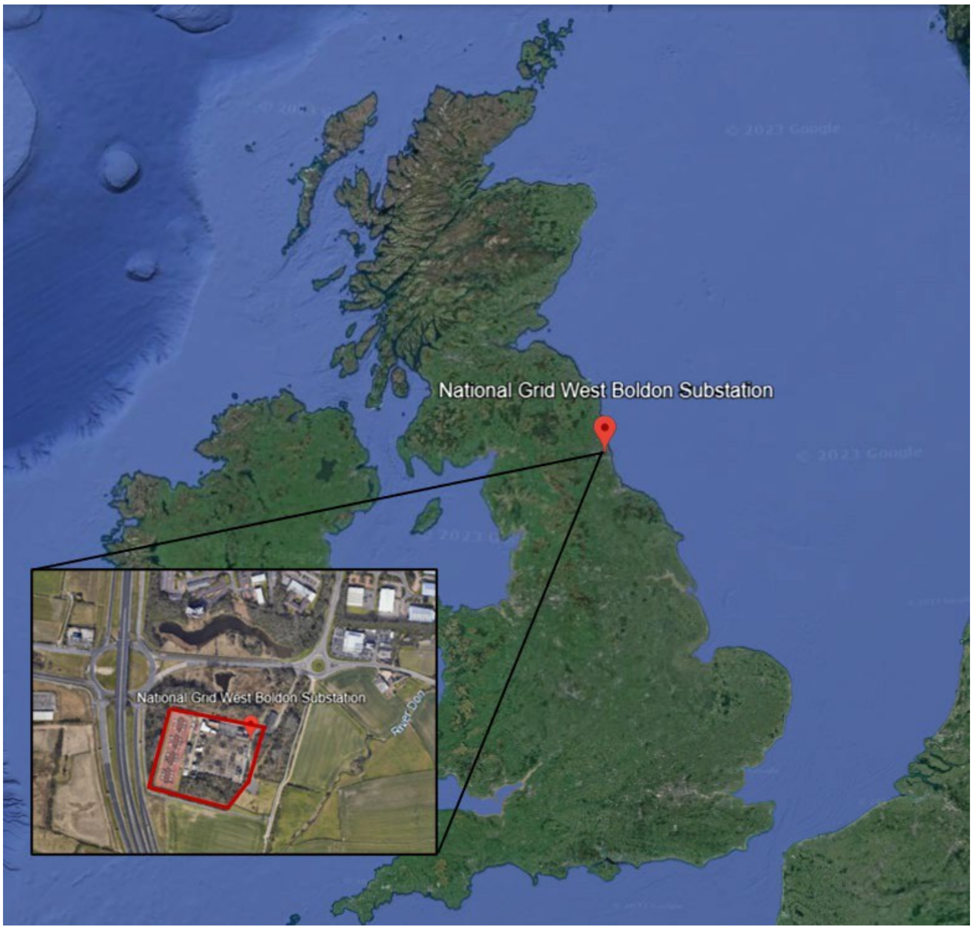

Figure 1 - Location of the West Boldon Substation

1.2 MSIP Eligibility

18. This submission is made in accordance with the 'RIIO-2 Re-opener Guidance and Applications Requirements' published by Ofgem in February 2021. This MSIP specifically aligns to the sub-criteria of the Special Licence Condition 3.14.6 paragraph (b) which Hylton Castle is eligible for: 'a Demand Connection project, including all infrastructure related to that project, the forecast costs of which are at least £11.84m more or less than the level that could be provided for under Special Condition 3.12 (Demand Connection volume driver)'.

19. In this case, the demand volume driver would provide NGET with [redacted] of allowance compared to the [redacted] direct costs requested within this submission. As such, the variance between the funding from the demand volume driver and the forecast direct cost of the Investment is greater than £11.84m. Detail of this calculated variance is available within Appendix A.

20. 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

21. This MSIP was discussed with Ofgem on XXXXXXXXX as part of the monthly NGET/Ofgem MSIP meeting, with the aim of ensuring that this submission enables the Authority to make a positive timely decision on funding.

1.3 Strategic Context

22. IAMP is a hub for automotive, advanced manufacturing and technology businesses, and has been identified as a Nationally Significant Infrastructure Project by the UK Government, in recognition of its key strategic significance in accelerating economic growth as the UK transitions to a net zero economy.[2]

23. IAMP holds a crucial position in the UK's national decarbonisation strategy, facilitating the phase-out of fossil fuel vehicles and enhancing the UK's domestic manufacturing capability. More detail on the development can be found at https://iampnortheast.co.uk/.

24. The project is expected to create significant economic benefits, including supporting over 7,000 employment opportunities over the next 10 to 15 years, contributing to the Government's Northern Powerhouse initiative.

25. As a catalyst for progress in the UK's transition to net zero, IAMP is expected to have a profound impact on the industry, driving growth, net zero transformation, and shaping the future of EVs.

[2] The Government directed that the IAMP project should require development consent under the National Significant Infrastructure Project (NSIP) regime on 15 September 2015.

2. Establishing need

26. Providing a connection is a NGET licence obligation which and aligns to our overall goal to provide customers with an efficient, effective, and timely connection.

2.1 Load related drivers

27. As noted above, the driver for this Investment is to facilitate a demand connection to supply electricity in the North East. The need for these works was triggered by a connection application made by SCC for a 255MVA GSP to supply a private network feeding the IAMP.

28. The strong strategic significance of the IAMP project is such that failure to provide this connection would not only breach our licence obligation, but would also have a cascading impact on national, regional and local net zero targets, undermine trust from international investors, and hamper vital net zero manufacturing output (e.g., EV vehicles). Moreover, failing to provide a connection would also prevent realisation of the potential benefits detailed in the 'Strategic Context' section highlighted previously.

2.2 Customer readiness and reliability

29. The customer plans to construct additional giga plants in the future. The first giga plant is currently under construction. Planning permission for the second plant was granted in August 2023 and construction is set to begin in 2024.

30. NGET is confident in the readiness of the customer due to:

- IAMP receiving very strong support from Sunderland Country Council and the UK Government.
- Nissan having progressed plans to construct the giga plant (with planning permission in place for the first 2 plants and construction started).
- The sufficient future demand for EVs given the government's target for all new vehicle sales to be zero emission by 2035.

31. Taken together, NGET is confident both the Investment driver and the readiness and on-going construction of the customers IAMP factories.

3. Optioneering

32. NGET's optioneering process is designed to rigorously and comprehensively identify the solution that will most effectively and efficiently meet the needs of the customer while also protecting the interests of current and future consumers. NGET strives to ensure that all relevant options are considered, and that the most appropriate and viable solutions are taken forward for detailed assessment based on all available information. This approach enables NGET to present informed decisions to Ofgem that consider stakeholder requirements and maximises value for consumers.

33. This is achieved by (i) proposing and reviewing several potential options, this is not an exhaustive list, more a high level comprehensive analysis of possible solutions, (ii) identifying those options which merit further detailed analysis, (iii) evaluating the shortlisted options in detail to determine their suitability against a range of consistent criteria, including cost, benefits, technical limitations, constructability and technical feasibility, and (iv) on that basis confirm a preferred solution.

34. The following section presents a longlist and shortlist of options which were considered in response to the identified customer need.

3.1 Initial optioneering (Long-list)

35. NGET undertook an optioneering study and considered a list of 5 options that adhere to the Ofgem Re-opener guidance, at a minimum including the following options:

    1. Do nothing,
    2. Option to delay capital expenditure,
    3. Whole System / Market based solution,
    4. Use / enhancement of existing assets, and,
    5. Construction of new assets.

36. The optioneering study considered multiple scenarios to ensure the varying demand and generation combinations were all accounted for.

37. NGET assessed the following long list of options – summarised in Table 2 – with the associated reasoning following in this section.

Table 2 - Long list of options

Option	Option Title	Option Description	Discounted / Taken Forward to Detailed Optioneering	Reason for discounting
1	**Do Nothing**	No connection provided to IAMP.	Discounted	The option does not allow the required capacity to be achieved.
2	**Option to delay**	A delay could create a short-term solution.	Discounted	NGET's high confidence in the customer timelines means that work cannot be delayed and therefore this option was not viable.
3	**Whole system / market-based solution**	Reinforcement of existing connections to meet needs.	Discounted	XXX was not able to provide the necessary capacity and thus meant the whole market solution was not viable. XXX could only provide 100MW connection.
4	**Extend the existing 275kV West Boldon substation**	Extend the existing West Boldon 275kV Substation for the purposes of installing three new 275/132kV SGTs and 132kV cables to the IAMP site.	Taken forward	Taken forward as a potential option as it fulfils the capacity request and meets the connection date.
5	**Construction of new assets**	Construction of a new 275kV double busbar substation along the ZZA route in the vicinity of the IAMP site, the installation of three new 275/66kV SGTs and three new 66kV cable circuits to the IAMP site.	Taken forward	Taken forward as a potential option as it fulfils the capacity request and meets the connection date.

38. The sub-sections below provide a summary of the options and the reasoning for either discounting or taking them forward for detailed options analysis.

3.1.1 (Option 1) Do nothing - *Discounted.*

Option description

39. Under this option, NGET would not provide a connection to IAMP (which would impact the viability of the IAMP).

Limitations

40. This option does not meet NGET's licence obligation to offer connection terms and would not meet the requirements of our agreements with the Electricity System Operator (ESO) under the Transmission Owner Code (STC).

41. The existing distribution infrastructure was able to accommodate a temporary connection for the first giga plant, however, there is no other means to provide a long-term solution to accommodate the 255MVA connection requested without a transmission connection.

42. This option would not have fulfilled the customer's capacity requirements and so was discounted.

3.1.2 (Option 2) Option to delay - ***Discounted.***

Option description

43. This option seeks to understand if a delay to the connection could provide a short-term solution.

Limitations

44. The customer requested a connection by December 2025. This connection date corresponds with the need to connect at least one SGT to power the first giga plant. Works are estimated to take at least 24 months necessitating NGET to commence construction in 2023. Therefore, the option to delay was not a viable solution to enable NGET to facilitate a connection by the customer's required date.

45. This option would not have delivered the necessary capacity in the timelines required and so was discounted.

3.1.3 (Option 3) Whole system / market-based solution - ***Discounted.***

Option description

46. This option explores the possibility of using a whole system or market-based solution to meet the customer's needs. This approach is often used to uprate existing connections, rather than when a new physical point of connection is required.

Limitations

47. A whole system option was considered, however, the DNO was only able to provide a 100MVA connection. Whilst this fulfilled requirements for an initial temporary connection it could neither fulfil SCC's initial 140 MVA demand connection request or their revised 255 MVA connection

requirement after submitting a ModApp. No other suitable market-based solution was identified.

48. This connection demand supply request was too large for the DNO capacity and equipment ratings and was therefore discounted.

3.1.4 (Option 4) Extend the existing 275kV West Boldon substation – **Taken forward for detailed analysis.**

49. Option description

50. This option consists of extending the existing AIS mesh corner West Boldon 275kV substation to install three new 275/132kV SGTs, equipment, protection and 132kV cables to the remote IAMP site. (approx. 1.5km to the South West)

Limitations

51. This is a potentially viable option and was taken forward for further analysis. Note that there are several risks and limitations associated with this option, outlined in Section 6.

3.1.5 (Option 5) Construction of new assets – **Taken forward for detailed analysis.**

Option description

52. This option is for the construction of a new AIS 275kV double busbar substation along the ZZA route, the installation of three new 275/66kV SGTs, and three new 66kV cable circuits to the IAMP site. The scope also includes for the creation of a 4th spare bay to enable a future connection.

53. This option meets the immediate requirements of the customer but also caters for potential extension in the future. As anticipated by the customer, should the IAMP expand further, either via Nissan or Envision, or any other manufacturers for that matter, Option 5 would enable a swift and efficient connection via this spare bay.

Limitations

54. This option would deliver the required network capacity while also facilitating further investment in the future. That said the option is of a higher short-term cost than option 4.

55. As will be explored in the following analysis, the option supports a pro-active approach to efficiently meeting anticipated future demand growth, whilst reducing risk, design constraints and constructability issues.

56. This option was taken forward for further analysis.

3.2 Short List – Option comparisons

57. The short-listed options to be taken forward for further assessment are:

- Option 4 - extending the existing AIS mesh corner 275kV West Boldon substation,
- Option 5 - construct a new AIS 275kV double busbar substation along the ZZA at a greenfield site.

4. Detailed options analysis

58. This section explains the detailed analysis undertaken for each shortlisted option and the rationale for the proposed solution.

4.1 Options analysis

59. The following two options have been taken forward from the long list in Section 4 above for detailed analysis:

a. Option 4 - Extend the existing AIS mesh corner West Boldon 275kV substation for the purposes of installing three new 275/132kV SGTs and 132kV cables to the IAMP site.

b. Option 5 - Construct a new AIS 275kV double busbar substation along the overhead line ZZA route in the vicinity of the IAMP site, the installation of three new 275/66kV SGTs and three new 66kV cable circuits to the IAMP site.

Table 3 – Overview of Shortlisted Options

Option	Estimate/ Total Cost	Lifetime NPV (£m)
Option 4 – Extend the existing West Boldon 275kV substation	[redacted]	[redacted]
Option 5 – Construct a new 275kV substation at Hylton Castle	[redacted]	[redacted]

4.1.1 (Option 4) Extend the existing AIS mesh corner 275kV West Boldon substation.

Option description

60. Under this option NGET would extend the existing AIS mesh corner West Boldon 275kV substation to facilitate the connection to the IAMP.

61. The works would require the design, construction and commissioning of:

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

- [redacted]

- [redacted]

62. It is estimated that this option would require a two-year build, however there is a large risk that circuit outage availability may prolong the build anywhere up to a total of four years. The risk of delayed outage availability is further discussed in the limitation section below (4.1.1.3).

63. Furthermore, this option would require significant intervention at the site of the West Boldon substation to provide sufficient space for the three SGTs and associated 132kV cabling.

4.1.1.1 Intervention Works

64. Provisional layout drawings demonstrate the need to demolish the existing overhead line (OHL) report centre and storage buildings in this option (see the figure below). Figure 2 illustrates the current West Boldon Substation, which is a mesh substation with four corners. [redacted]. The red areas indicate the proposed new take-off cables, which would run from the mesh corners to the new SGTs. The SGTs would be located in a new area and the depot would need to be demolished and rebuilt elsewhere.

Figure 2 - Line diagram of site

65. Additionally, Option 4 would require a new SGT compound, which would need to be located near the existing footprint of the West Boldon Substation. The only viable location for rebuilding the storage, report centre and the new SGT compound would be within the boundaries of West Boldon Lodge, a nearby environmental education centre established in partnership of National Grid and Groundwork North and South Tyneside[3]. The centre works with local communities and schools, with an annual footfall of around 5000 individuals.

4.1.1.2 Benefits

66. The key benefits associated with extending the existing West Boldon 275kV substation serve to highlight the lower short-term cost offered by the option:

- **Construction cost** - based on cost to deliver alone, estimates developed by NGET highlight that extending the existing West Boldon substation is likely to be lower cost than constructing a new substation, as envisaged in Option 5. Further detail can be seen in the cost benefit analysis section (4.3) below.
- **Land** - Option 4 offers the advantage of using existing NGET land, reducing the cost and time otherwise needed acquire additional land and undertake the associated land ownership negotiations. That said, several easements or wayleaves would be required for the extended cable routes.
- **Assets** - Option 4 also offers the advantage of using existing NGET assets, reducing the need to purchase, install and commission certain forms of new equipment.

67. While the short-term cost of any option should be given significant weight in the optioneering process, it is also important to see this in its longer-term, strategic context. This presents several material limitations to Option 4, as is summarised below.

4.1.1.3 Limitations

68. Below are the key risks and limitations NGET identified as associated with extending the West Boldon 275kV substation to facilitate the IAMP connection. These limitations are organised into futureproofing, outages, environmental and social considerations, and finally operational and equipment challenges.

4.1.1.3.1 Futureproofing

69. Whilst Option 4 would meet the short-term requirements of the customer, the solution provides no additional capacity, spare bays or space to enable connection of future demand to the West Boldon 275kV substation. Although not in the scope of their current agreement, SCC have continued to express their intention to expand the IAMP in the future. Furthermore, NGET is confident that regional demands in the area are only set to increase. Option 4 only

[3] More information on the centre can be found at https://westboldonlodge.co.uk/.

allows for the maximum capacity of the 132kV cables and 140MVA, providing no further available capacity at West Bolden substation should this option be selected.

70. The ESO's latest Electricity latest Ten-Year Statement (EYTS) identifies that future power transfer requirements in the North of England region, where West Boldon sits, could more than double compared to today[4]. Indeed, all four Future Energy Scenarios (FES) show a steady increase in the gross demand of the region. When determining the best value option to deliver SCC's requirements, NGET needs to balance short-term cost against longer-term strategic futureproofing for the region.

71. Indeed, indicative analysis undertaken by NGET to consider the approximate net present value of building Option 5 now (construction of a new 275kV substation) rather than later highlights that if NGET pursued Option 4 and was subsequently required to deliver further capacity increase to accommodate demand growth, this would almost certainly require the construction of a new substation (as per Option 5), no matter when this additional need is triggered from the immediate to 40 years. The detail underpinning this estimated calculation can be found within the Hylton Castle CBA model appended to this submission (Appendix B).

72. This points to a key limitation of Option 4, namely the lack of futureproofing ability the solution offers in the context of a region where national policy is targeting increased business activity, and by extension demand.

4.1.1.3.2 Outages

73. A further key limitation of extending the existing West Boldon substation includes the technically challenging and likely costly outages that would underpin the delivery of the solution. NGET would be amending an existing live site at three mesh corners, requiring significant additional outages and adding complexity and uncertainty to the Investment. Unlike Option 5, which requires only one outage of eight weeks to connect the new substation, Option 4 would require approximately three outages of three to four months each.

74. The West Boldon 275kV substation is in proximity to the Hartlepool nuclear power station site (Figure 3). Given the site's importance, NGET recognises that outages in the region are typically dictated by Hartlepool's own planned outages XXXXXXXXXXXXXXXXXXXXXXXXX XXXXXXXXX. These dates can vary at short notice due to system requirements and the operation of the nuclear power station, resulting in the planned dates for Hartlepool's outages being historically unreliable. Analysis undertaken by NGET identified that in the two years from January 2022 to date, the ESO had instructed a total of XXX changes across XX planned outages at Hartlepool.

75. As such, NGET recognises inherent risks in how the significantly larger outage requirements of Option 4, could impact on ease and simplicity of delivery. Costs such as re-scheduling contractors and paying delay charges could be an outcome of managing around a volatile

[4] ESO Electricity Ten Year Statement - https://www.nationalgrideso.com/research-and-publications/electricity-ten-year-statement-etys

outage landscape in the region. Indeed, NGET's current contract with XXXX, the main works contractor, states that NGET would incur a cost of XXXXXXX per week for having to delay contract works. Although, the scope of this contract does not cover the solution under Option 4, this does serve to indicate that additional, unreliable outages under Option 4 would generate significant increased costs.

Figure 3– OHL circuits

4.1.1.3.3 Environmental & Social

76. Another significant limitation of extending the existing West Boldon 275kV substation NGET identified was the impactful interventions the solution would have on the land and facilities surrounding the substation.

77. Option 4 would require the demolition and rebuild of both an existing storage facility and the northern region's Overhead Line Reporting Centre located at West Boldon. In addition, a new SGT compound would need to be constructed near the existing footprint of the West Boldon Substation. The only viable location for building this SGT compound, along with the other demolished buildings mentioned, would be within the boundaries of West Boldon Lodge – an environmental education centre (Figure 4).

Figure 4 – Topographic view of the substation and environmental centre

West Boldon Lodge

78. West Boldon Lodge is part of National Grid's Environmental Education Centre Network and was opened in 2010. The Lodge is a purpose-built, sustainable, environmental education centre, the only centre of its kind in South Tyneside. Set in 13 hectares of diverse habitats, the Lodge hosts woodland, ponds, marshland and meadows, managed to benefit both wildlife and the local community. The site believes to have hosted over 100,000 visitors since opening in 1997[5]. It hosts a variety of popular activities and events such as Forest Playschools, themed activity days, workshops and curriculum linked school trips.

79. West Boldon Lodge is also a key strategic site for contributing to National Grid's environmental targets and regulatory incentives. A key target within the NGET Environmental Scorecard Incentive (ESIt) (part of the RIIO-T2 framework) targets National Grid to 'increase the environmental value on our non-operational land by 10% by 2026'. This target also feeds into National Grid's Responsible Business Charter which aims to 'restore 10% of land we manage'.

80. As part of the strategy, NGET introduced a 10-year partnership agreement to enhance the natural capital at the West Boldon Lodge site. This included a combination of increasing health and social wellbeing of local communities by enabling the centre to undertake greater levels of onsite activities, outreach events, and enhancing the habitats present at the site. As part of this strategy, NGET alongside external ecology consultant XXXXX, calculated that the anticipated natural capital value of the West Boldon Lodge centre on completing the 10-year partnership would be XXXX from a baseline of XXXX in FY23.

[5] https://westboldonlodge.co.uk/about-us/

81. Against this background, Option 4 will come at a cost to the environment, specifically resulting in the permanent loss of XXXX hectares of habitat in an area identified as a Deciduous Woodland and Priority Habitat (according to Natural England Magic Maps). The figure below illustrates areas of habitat that could need to be repurposed as part of delivering this option. Based on this data and the relative cost per hectare of this land, NGET has calculated that Option 4 would have an estimated quantified impact on Biodiversity net gain (BNG) of XXXX. Although the required land take is lower for Option 4 than compared to Option 5, the tier of land is higher and more costly per hectare than the land around Hylton Castle.

Figure 5 – Aerial view of areas of habitat that could be affected by Option 4

82. In this way, Option 4 poses a significant risk to the social and environmental benefits currently enjoyed by the schools and local community at the West Boldon Lodge. Extension works at West Boldon substation present an uncertain level of impact on the centre and its ability to operate, which could result in a detrimental impact to the local communities who have come to rely on the facilities for many years as well as the improvement in natural capital the site is set to achieve in the coming years.

4.1.1.3.4 Operation & Equipment

83. Limitations are also posed by the age of the substation, where technology and plant in areas is over XX years old.

84. **Directional Drilling under the A19** - Delivering Option 4 would require NGET to conduct Horizontal Directional Drilling (HDD) under the new widened and extended A19 dual carriageway which sits in proximity to the West Boldon 275kV substation. Conducting HDD in this area would add additional risk, complexity and uncertainty. Key challenges of HDD include variations in ground conditions, the presence of unknown obstacles and other utilities, all of which could be present in this locality.

85. **Multiple DNO cable crossings** - Numerous existing DNO cables exist in the area and would need to be navigated around when laying the three circuits of 132kV cables required for the

[6] Value includes the permanent site expansion and land required during the construction phase (e.g., laydown and access roads).

investment. To accomplish this, new cables will need to be buried beneath the existing ones, a process that becomes increasingly expensive as the depth of excavation increases. Due to the high voltage rating of our cables, NGET would need to dig deeper to minimise the impact of our cables on the thermal ratings of adjacent, smaller cables. This may require further outages on XXX circuits to de-risk the HDD impacting their underground cables.

86. XXXXXX **Circuit Breakers -** The existing West Boldon 275kV substation also houses XXXXXX circuit breakers (CBs) which are known to have a history of unreliability, XXXXXXXX XXXXXXXXXXXXXX and regular repair and maintenance requirements. This issue has been explored previously with Ofgem and NGET are exploring the replacement of XXXXXX CBs during the RIIO-T3 period. The significant outage requirements associated with Option 4 will likely put additional demand on these CBs, XXXXXXXXXXXXXXXXXX.

4.1.2 (Option 5) Construction of new assets

4.1.2.1 Option description

87. This option involves the construction of a new AIS 275kV double busbar substation along the ZZA overhead line route adjacent to the customer's developments7 in the vicinity of the IAMP site, installation of three new 275/66kV 180MVA SGTs, and three new 66kV cable circuits to the IAMP site. Additionally, to efficiently futureproof the substation against future demand increases, Option 5 includes an installation of a fourth spare bay, with further capacity available within the substation land ownership boundary.

88. The primary design of the substation is to be an AIS double busbar layout, it will be constructed and connected to a full earth system mat, designed to accommodate the eight bay configuration and will be constructed within a typical compound. Table 4 details the equipment required for this option:

Table 4 – Equipment

Line Item	Units
XXXXXXXXXXXXXX	X
XXXXXXXX	X
XXXXXXXX	X
XXXXXXXXXXXXXXXXXXXXXX	X
XXXXXXXX	X

[7] ZZA is the unique identification for that particular OHL route, all OHL routes have their own individual identifications.

4.1.2.2 Future load requirements

89. The table below demonstrates the future load requirements for IAMP. This study was undertaken by a consultancy on behalf of SCC. The study concluded a capacity requirement of 255MVA.

Table 5 - Load requirements

XXXXX	XXXXX	XXXXX	XXXXX	TOTAL
XXXXX	XXXXX	XXXXX	XXXXX	255MVA

90. Electrical capacity for the initial phase of the IAMP development will be supplied by XXXXXXX XXXXXXXXX (DNO) through a temporary connection. This connection can only provide XXXXX, which does not meet the required XXXXX demand to power Gigafactory 1. The connection is temporary because the capacity is earmarked for future expansion of the IAMP development beyond the commission of the giga factories. Therefore, the DNO connection cannot be used as part of the enduring solution.

4.1.2.3 AIS

91. Option 5 proposes to use AIS switchgear rather than SF6 free GIS switchgears, for the following reasons:

92. SF6 free GIS switchgear technology was considered at the time the FEED was underway in XXXX, however, this technology was considered too nascent. The switchgear will be procured XXXXXXXXXX, however at the time of the FEED, this was prior to industry wide adoption of the technology that could have provided valuable feedback on installation and use. The customer requested connection date was considered tight and doesn't permit any delays, therefore, NGET made the decision to use an established technology that provides less risks to the programme of works.

93. GIS is usually installed on congested sites due to their compact designs, whilst AIS can be installed on sites with less space constraints. The installation site in question is in located in Sunderland City Council's jurisdiction and is not congested thus providing us with the opportunity to use the more cost-effective AIS switch gear technology.

94. Therefore, the proposed option provides the customer with a low-risk and cost-effective solution that would allow NGET to meet the customer connection date (December 2025).

4.1.2.4 Benefits

95. Option 5 would enable NGET to mitigate the potential limitations and risks identified in its analysis of Option 4, which includes:

- Futureproofing efficiently against anticipated demand requirements in the region.

- Mitigating risks associated with greater and longer outage requirements on a critical north-south circuit.
- Preventing intervention in local habitats and the West Boldon Lodge.
- Reducing the risks of reliability concerns of XXXXXX circuit breakers, crossing other DNO cables, and requirements to drill under the A19 dual carriageway.
- Not limiting any future options to the ratings of the cables from the West Boldon to IAMP.

4.1.2.4.1 Futureproofing

96. The new Hylton Castle GSP has been designed to include a 'spare' bay to future proof the site in context of the growing demand in the region, whether that be via the growing IAMP site or another future customer.

97. Analysis undertaken as part of the CBA exercise explored how varying levels of predicted demand growth on the network could alter the net present value of constructing a new substation at Hylton Castle now, as part of this connection investment, or in the future as a result of increased connection requirements. Based on our analysis, as summarised below in section 4.3, in all scenarios constructing the new substation now with optionality for additional connection in the future represented the better value solution for consumers, than restricting current work to the minimum immediately required and postponing additional work to the future.

98. This benefit is enhanced by the fact that NGET has also secured an additional corridor of land between the 275kV and 66kV substations from Sunderland City Council XXXXXXXXXXXXX to facilitate potential future expansion.

99. As such, future proofing in this way has a dual advantage of offering additional flexibility for further network reinforcement in the future and being the more cost-efficient solution for consumers over a longer-term time horizon – given the pace and scale of investment across the network needed in RIIO-T3, this future optionality is a significant benefit of Option 5.

4.1.2.4.2 Outages

100. As noted above, system access requirements are relatively short for delivering Option 5 with only one eight-week outage required. This outage on the West Boldon – Offerton 275kV OHL circuit (ZZA route) has been agreed XXXXXXX to facilitate the turn-in. Once the turn-in is complete all future outage requirements will be managed within the new substation without further impact on the wider system North / South flow requirements.

101. This is a substantially lower burden than for Option 4, lowering disruption for affected customers while reducing costs.

4.1.2.5 Limitations

102. The main limitation of Option 5 is that the solution will have a higher development and construction cost than extending the existing West Boldon Substation in Option 4.

103. This cost differential was highlighted in NGET's initial cost estimates. That said, through further, more detailed analysis of both options, we have concluded that whilst Option 5 has a higher immediate cost to deliver, the overall cost difference between both options is closer than initially estimated, as is summarised by the CBA in section 4.3 below. Given the significant long-term benefits of Option 5, the relatively small cost differential with Option 4 points more clearly to the benefits of building a new substation under this Option.

4.1.2.5.1 Cost

104. The proposed completion date for the works is March 2026 and spend will be across RIIO-T2. The funding requested for CAPEX (direct costs) is XXXXXXXXXX in 18/19 price base. The indirect costs will be considered as part of our OPEX escalator. Further breakdown is provided in the section titled (Detailed Cost for Preferred Solution) below.

4.2 Preferred solution

105. Taken together, while short-term cost to consumers is a significant factor, NGET's view is that the long-term interests of consumers and affected customers must carry substantial weight when designing this solution, particularly given the challenges of the RIIO-T3 period and the anticipated future demand growth in the area.

106. On that basis, NGET's preferred option is Option 5 which would see the construction of a new AIS 275kV double busbar substation along the ZZA route in the vicinity of the IAMP site, the installation of three new 275/66kV SGTs, and three new 66kV cable circuits to the IAMP site. The benefits and limitations outlined above, including the analysis undertaken through the CBA exercise, identify Option 5 as the best value solution in the interests of consumers in the long-term whilst meeting SCC's connection requirements to facilitate the IAMP site.

107. SCC set aside a development plot to facilitate the construction of the new GSP and outline planning was already granted for this site to be used as industrial units. NGET have subsequently resubmitted a revised planning application, which was approved in October 2023, to convert the plot for installation of a substation.

4.3 Lifetime Cost Benefit Analysis

108. This section outlines the process undertaken and the output of the Cost Benefit Analysis. We have conducted a full CBA of the two viable options (Option 4 and Option 5). The approach which we have followed is consistent with the guidance laid out by Ofgem and utilises the latest version of Ofgem's CBA TO Model.

109. To assess both Option 4 and Option 5 comprehensively, the CBA looks at both solutions from a total cost perspective (direct and indirect), in an 18/19 price base and converts these to a 23/24 price base for equivalent and consistent comparison.

4.3.1 Benefits/Disbenefits

110. As part of the CBA, we have considered two benefits/disbenefits: Biodiversity Net Gain (BNG) and natural capital value.

111. BNG refers to the cost attributed to re-placing and maintaining the habitat that has been lost to development and construction. The BNG cost for Option 4 is higher than for Option 5 due to the difference in habitat quality. Option 4 is located in a Tier 4 habitat and Option 5 in a Tier 1 habitat. As a result, the cost per hectare for Option 4 is higher than for Option 5, reflecting the greater environmental value of the land.

112. In addition, we have considered the natural capital value of the West Boldon Lodge environmental centre, which was assessed by National Grid in conjunction with an external consultancy in 2021. The study found that based on NGET achieving its targets for increasing natural capital on non-operational land by 10%, the West Boldon site is set to have a value of XXXXXX in societal benefits, comprised of both environmental and community/recreational benefits.

113. The table below sets out how the benefits/disbenefit has been attributed to each option.

Table 6 – Benefit/disbenefits for each option

Option	BNG	Natural Capital
Option 4	Cost/Disbenefit	Disbenefit
Option 5	Cost/Disbenefit	Benefit/Avoided Cost

4.3.2 Assumptions

114. Based on the information provided, we made several assumptions in our analysis:

- Inflated the BNG values by XXXX for Option 4 to account for the laydown and access road space required during the construction phase. This percentage increase was based on a calculated estimation of current site size against required laydown and access road space during the construction phase. Therefore, NGET would need to pursue recovery of these BNG losses offsite at greater cost subject to options being identified and available.
- Excluded the environmental benefits that were quantified as part of the natural capital assessment of the West Boldon Lodge environmental centre, as we cannot assume that all the benefits of the environmental centre XXXXXX will be lost. Instead, we assumed that the environmental benefits lost will be replaced by the environmental benefits created at the new habitat. However, we are assuming that although NGET would invest in the re-building of lost habitat that we would not be able to replicate the recreational and community aspect since it is unlikely that we would find land that is as close to the community and accessible. Therefore, we assumed that those benefits associated with community and recreational areas would be lost in pursuing Option 4.

- The equipment in Option 4 and 5 have an average asset life greater than the XXXXXX appraisal period and thus negating the need for asset renewal.
- Finally, we have excluded ongoing OPEX (not CAI) at this stage and assumed that the do-nothing scenario (baseline) is not providing a connection, resulting in no avoided baseline costs/benefits.

115. The table below outlines how the assumptions impact the feasible options.

Table 7 - CBA assumptions

Assumption	Option 4	Option 5
Inflated the BNG values by XXXX to account for the laydown and access road space required.	X	
Natural capital values have excluded environmental benefits and only accounted for recreation and community benefits	X	X
Assumed that assets on average have an asset life of beyond XXXXXX thus negating the need for asset renewal.	X	X
OPEX has been excluded at this stage.	X	X
Assumed that do nothing scenario (baseline) is not providing a connection and therefore baseline costs/benefits are 0.	X	X

4.3.3 Future proofing

116. To supplement the CBA, we have conducted a sensitivity analysis to evaluate the advantages of future proofing the grid now to accommodate future connections versus reinforcing today (Option 4) and delaying investment into a new substation (Option 5) to the future. Option 4, as discussed above, would provide the requested capacity for IAMP, however, remove the ability to accommodate future connections, whilst Option 5 would cater for the requested capacity and provide room for future connections. Therefore, we conducted a sensitivity analysis to identify the trade-off. The table below illustrates the estimated NPV for each scenario. The results clearly demonstrate that it is more beneficial to opt for Option 5 today than to build both Option 4 and 5 over now and the future. This continues to support the notion that Option 5 is the most appropriate solution for the requested customer connection.

Table 8 - Future proofing values (£m)

Line Item	Description	Whole Life NPV (£m)
Option 5	Construction of new assets at Hylton Castle.	XXXX
Scenario 6	Option 4 now, Option 5 in 10 years	XXXX
Scenario 7	Option 4 now, Option 5 in 15 years	XXXX
Scenario 8	Option 4 now, Option 5 in 18 years	XXXX
Scenario 9	Option 4 now, Option 5 in 20 years	XXXX
Scenario 10	Option 4 now, Option 5 in 30 years	XXXX

4.3.4 Results

117. The table below documents the NPV for the feasible two options we assessed.

Table 9 - Whole life NPVs

Line Item	Whole Life NPV (£m)
Option 4	XXXX
Option 5	XXXX

118. Furthermore, the figure below illustrates the NPV over the appraisal period.

Figure 6 – NPV time series

4.4 Detailed cost for preferred solution

4.4.1 Introduction

119. This section provides a breakdown of the overall costs for Hylton Castle including an expenditure profile for all Regulatory Years of delivery.

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

121. Appendix C, the Hylton Castle cost model submitted alongside this document provides a breakdown of the costs in more detail and should be reviewed alongside this chapter.

122. 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.

4.4.2 Total Allowance Request

123. Total project costs are XXXX. NGET requests XXXX of allowance is provided 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.

Table 10 – Allowance request – Cost Model tab reference 1.0

£	2022/23	2023/24	2024/25	2025/26	2026/27	Total
Total Project Costs	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
Allowance Request (Direct Only)	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX

4.4.3 Cost Estimate

124. The total cost to develop and deliver Hylton Castle project is XXXX. This table and figure include both direct, indirect and costs incurred to date.

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

Table 11 – Cost Summary – Cost Model tab reference 1.1

Element	Total (£)	CAI/Direct	Source
Contractor Costs			
Main Works Contractor	XXXXXX	Direct/CAI	Tendered
Third Party Design & Development	XXXXXX	Direct/CAI	Based on Purchase Orders and forecasted costs

Element	Total (£)	CAI/Direct	Source
National Grid Costs			
Direct Procurement	XXXXXX	Direct	Based on Purchase Orders
ET Ops	XXXXXX	Direct	Estimated NG resource costs
Project Management	XXXXXX	CAI	
Project Services	XXXXXX	CAI	
Support Functions	XXXXXX	CAI	
Lands	XXXXXX	Direct	Based on actuals and Purchase Orders
Consents	XXXXXX	Direct	
Legal	XXXXXX	Direct	
NGET Portfolio Costs	XXXXXX	CAI	NGET internal estimate
Other			
Contract Inflation	XXXXXX	Direct	XX contract clause calculation
Risk	XXXXXX	Direct	Risk Assessment
Total	XXXXXX		

Table 12 – Annual Phasing – Cost Model tab reference 1.1

Element	2022/23	2023/24	2024/25	2025/26	2026/27	Total (£)
Contractor Costs						
Main Works Contractor	-	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
Third Party Design & Development	-	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
National Grid Costs						
Direct Procurement	-	-	XXXXXX	XXXXXX	XXXXXX	XXXXXX
ET Ops	-	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
Project Management	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
Project Services	-	XXXXXX	XXXXXX	XXXXXX	-	XXXXXX
Support Functions	-	XXXXXX	XXXXXX	XXXXXX	-	XXXXXX
Lands	-	XXXXXX	-	-	-	XXXXXX
Consents	-	XXXXXX	-	-	-	XXXXXX

Element	2022/23	2023/24	2024/25	2025/26	2026/27	Total (£)
Legal	XXXXXX	XXXXXX	-	-	-	XXXXXX
NGET Portfolio Costs	-	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
Other						
Contract Inflation	-	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
Risk	-	XXXXXX	XXXXXX	XXXXXX	-	XXXXXX
Total	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX

4.4.4 Cost Firmness

126. 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. This shows that XXXX of the total costs (firmness 1 and 2) are either incurred or have been contracted, giving high confidence in our cost submission.

Table 13 – Cost Firmness – Cost Model Tab reference 1.9

Cost Firmness	Total (£)	Notes
1 - Fixed	XXXXXX	Prior years costs and 2023/24 actuals
2 - Agreed remeasurable	XXXXX	Future Contractor costs and Contract Inflation
3 - Agreed remeasurable future information		
4 - Estimated	XXXXX	Risk, NG costs, Third Party and Direct Procurement (less actuals)
5 - Early Estimate		
Total	XXXXX	

127. National Grid costs include forecasted resource requirement throughout the duration of the project XXXXXXXXXXXXXXXXXXXXXXXXX. National Grid risks to both programme and project have been identified through a series of risk and design reviews, reflecting the current level of uncertainty to which the project is exposed. Third Party and Direct Procurement costs include XXXXXXXXXXXXXX and services XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX. These have been calculated based on agreed tendered prices. Where relevant, current market conditions have been assessed to include an element of risk in non-firm Third Party and Direct Procurement costs, but these costs are subject to change.

4.4.5 Direct & CAI Split

128. The table below provides the split between direct and indirect costs related to this project.

129. 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 there be funded via the Opex Escalator mechanism.

130. 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.

131. 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 14 – CAI/Direct split – Cost Model Tab reference 1.9

Category	Total (£)	% of total
CAI	XXXXXX	XXXX
Direct	XXXXXX	XXXX
Total	XXXXXX	XXXX

4.4.6 Detailed Breakdown of Direct costs

132. The following sections discuss the component parts of the project's Direct costs. These figures differ to those within the summary table under "Total Allowance Request" as they do not include indirect costs.

4.4.6.1 Main Works Contract XXXX

133. XXXXXXXXXXXXXX have been appointed as the Main Works Contractor for the project. The Procurement strategy is described in more detail later in this document.

134. The table below shows a summary of direct Main Works Contract (MWC) costs required to deliver the Hylton Castle project.

135. The key activities are:

a. [redacted].

b. [redacted]

c. [redacted]

136. [redacted]

137. To date we have had one payment application from the MWC which covers initial project setup and resource costs to date.

138. [redacted] NGET ensured the MWC costs were efficient due to an extended and rigorous submission review period [redacted]. Additionally, benchmarking activities were undertaken against current market conditions and similar contracts.

Table 15 – Main Works Contractor Breakdown - Cost Model tab reference 1.2

Cost Code	Scope	2023/24 price base (£)	2018/19 price base (£)
[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]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]

Cost Code	Scope	2023/24 price base (£)	2018/19 price base (£)
XXXX	XXXXXXXXXXXXXXXXXX	XXXXXX	XXXXXX
XXXX	XXXXXXXXXXXXXXXXXXXX	XXXXXX	XXXXXX
XXXX	XXXXXXXXXXXXX	XXXXXX	XXXXXX
XXXX	XXXXXXXXXXXXXX	XXXXXX	XXXXXX
XXXX	XXXXXXXX	XXXXXX	XXXXXX
XXXX	XXXXXX	XXXXXX	XXXXXX
	XXX	XXXXXX	XXXXXX
	XXXXXXXXXX	XXXXXX	XXXXXX

4.4.6.2 Third Party Costs XXXX

139. The table below shows a summary of the main Third-Party direct costs required to deliver Hylton Castle project.

140. Third Party costs are based on quotes from suppliers and contracts in place. The suppliers involved sit on the current National Grid frameworks and have previously demonstrated to be able to provide the most economic and efficient solutions.

Table 16 – Third party costs – Cost Model tab reference 1.3

Element	2023/24	2024/25	2025/26	2026/27	Total (£)
XXXXXXXXXXXXX XXXXXXXX	XXXXXX	-	-	-	XXXXXX
XXXXXXXXXXX	XXXXXX	XXXXXX	-	-	XXXXXX
XXXXXXXXXXX	XXXXXX	XXXXXX	XXXXXX	-	XXXXXX
XXXXXXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
XXXXXXXXXXXXX XXXXXXXXXXX XX	XXXXXX	XXXXXX	-	-	XXXXXX
XXXXXXXXX XXXXXX	XXXXXX	-	-	-	XXXXXX
XXXXXXXXXXXXX XXXXXXXX	XXXXXX	-	-	-	XXXXXX
XXXXXXXXXX XX	XXXXXX	-	-	-	XXXXXX

Element	2023/24	2024/25	2025/26	2026/27	Total (£)
[redacted]	-	-	[redacted]	-	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

141. The key activities are:

a. [redacted]

b. [redacted]

c. [redacted]

d. [redacted]

e. [redacted]

4.4.6.3 Direct Procurement [redacted]

142. [redacted]

143. The table below shows the SGTs required for the Hylton Castle project. National Grid are yet to receive a payment application from the supplier thus no spend to date.

Table 17 – Direct procurement – Cost Model tab reference 1.7

Description	2024/25	2025/26	2026/27	Total (£)
Transformers	[redacted]	[redacted]	[redacted]	[redacted]
Total	[redacted]	[redacted]	[redacted]	[redacted]

4.4.6.4 ET Operations XXXX

144. This cost category relates to NGET's in-house resource supporting the project's delivery.

Table 18 – ET operations cost summary - Cost Model tab reference 1.4.

Description	Total (£)
XXXXXXXXXX	XXXXX
XXXXXXXXXXXXXXXX	XXXXX
Total	XXXXX

145. The days and rates used to calculate these costs are shown in the Hylton Castle cost model.

4.4.6.5 Lands, Consents and Legal XXXX

146. The tables below summarise the types of land, consents and legal activities required to complete Hylton Castle project.

Table 19 – Lands Costs – Cost Model Tab reference 1.5

Description	Total (£)
XXXXXXXXXXXXXXXXX	XXXXX
Total	XXXXX

147. The land was acquired from local authority Sunderland City Council with the agreed price based on two independent land agent valuations. The final acquisition of the land is due for completion in XXXXXXXXXXXX. The land is to be acquired for the construction of the new 275kV Substation at Hylton Castle.

Table 20 – Consents Costs – Cost Model Tab reference 1.5

Description	Total (£)
XXXXXXXXXXX	XXXXX
XXXXXXXX	XXXXX
Total	XXXXX

148. The key activities required are:

a. [redacted]

b. [redacted].

Table 21 – Legal Costs – Cost Model Tab reference 1.5

Description	Total (£)
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
Total	[redacted]

149. The key activities required are:

a. [redacted]

4.4.6.6 Contract Inflation [redacted]

150. [redacted]

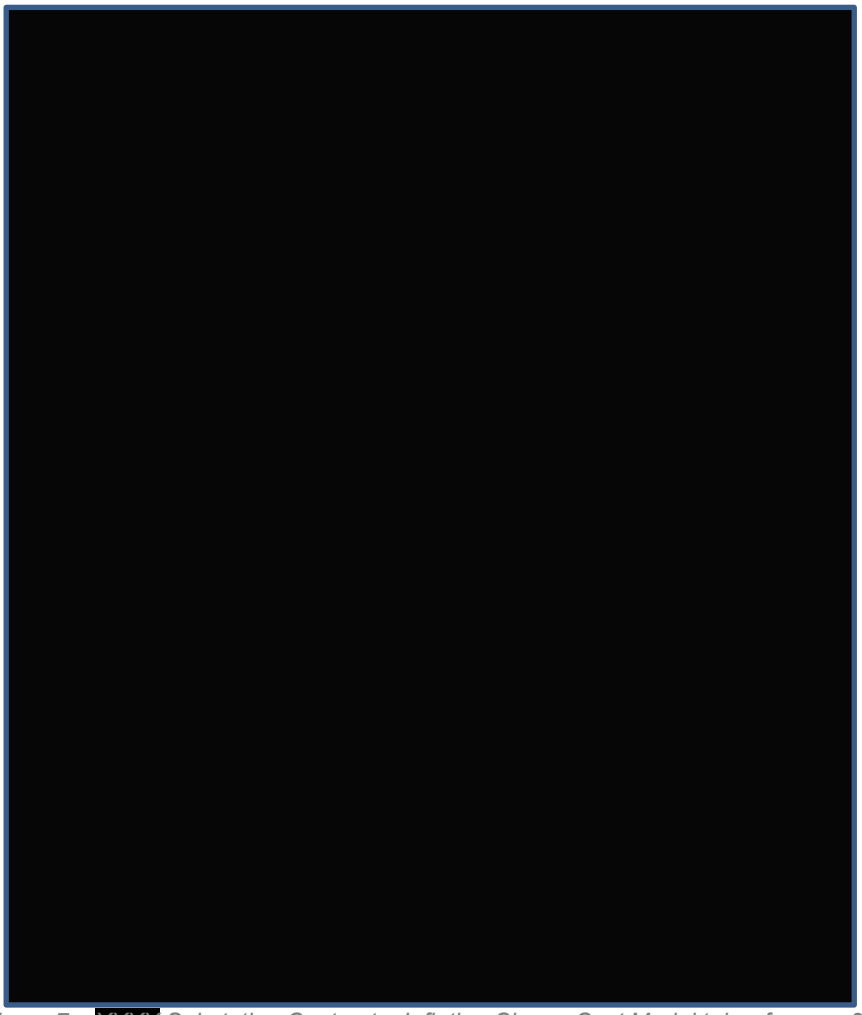

Figure 7 – XXXX Substation Contract – Inflation Clause Cost Model tab reference 2.2

151. NGET has sourced the data associated to these indices and forecast future increases using the assumptions detailed in the below table. Appendix D Hylton Contract Inflation Model shows the detail of each individual index.

Table 22 – Index forecast assumptions - Cost Model tab reference 2.2.

Index	Source	Code	Date Actuals used up to	Forecast Assumptions	Date of Forecast
XXXXXXXXXX XXXXXXXXXX XXXXXXXXXX XXXXXXXXXX XXXXXXXXXX XXXXXXX	XXXX	XXXX	XXXX	XXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXX XXXXXXXXXX	-
XXXXXXXXXXXXX XXXXXXXXXXXXX XXXXXXXXXXX	XXXX	XXXX	XXXX	XXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXX	-

Index	Source	Code	Date Actuals used up to	Forecast Assumptions	Date of Forecast
[redacted]					
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	-
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	-

152. The combined weighted index has been applied to the 2018/19 price of the [redacted] contract to arrive at a forecast Contract Inflation value of [redacted]. See Hylton Castle Cost Model, tab 2.2 Contract Inflation Calculation for further detail on this calculation.

5. Deliverability, risk and regulatory deliverables

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

5.1 Deliverability

154. NGET has proactively engaged with contractors to ensure that customer connection timescales can be met. The project plan outlines our programme milestones, which takes into account pre-works commencement mitigation measures to maintain deliverability within the customer's required timescales.

155. These measures include:

a. Submission of Planning Application and confirmation from the Local Authority of planning consent being granted subject to Section 106 agreement,

b. Detailed Front-End Engineering Design (FEED) design completed,

c. Completed the interface with the 66kV private wire substation commissioning, in accordance with customer requirements,

d. Early procurement of three SGT's which utilise existing 275/66kV design previously installed at Iver 275kV substation,

e. Acquisition of land previously set aside by IAMP for the purpose of building the new Hylton Castle 275kV GSP. Target date for completion of land purchase is February 2024,

f. Co-ordination between main direct stakeholders which include SSE, SCC & IAMP, and,

g. Co-ordination between wider IAMP stakeholders chaired by SCC.

156. We have met all historical milestones on time, and therefore do not have any legacy delays coming into this project. Our team is committed to ensuring that the project stays on track and that customer connections are completed as scheduled.

5.2 Procurement Strategy

157. The main objective of the procurement strategy for this project is the delivery of a high quality and reliable system in the most economic and efficient manner in accordance with Utilities Contract Regulations (UCR). The strategy considers the unique, innovative, and remote location factors of this project, whilst ensuring an efficient outcome for all contract costs. Finally, the strategy will take cognisance of any supply chain constraints, assess methods to obtain maximum value for customers and the most appropriate allocation of risk considering different contracts and construction delivery models.

Contracting

158. The procurement strategy relied on awarding a suitable company who could execute the installation of the transformers on time. A tender was issued on the EPC framework [redacted]

159. [redacted]. [redacted] are a suitably qualified organization with necessary resource availability. They have now been identified as the Principal Contractor on the scheme.

160. An [redacted] contract was chosen as the most appropriate form of contract for this scheme, given the project had a clear and well-defined scope of works. [redacted]

Key Equipment

161. To minimise the risk of delays in obtaining essential equipment which could impact the Customer's requirements, such as transformers, NGET took proactive measures to secure early orders [redacted]. [redacted]. This was achieved by calling off from the NGET Bulk Purchase 7 Framework Call Off Process. Through this process NGET secured equipment from [redacted] who was determined to provide the best value offering from the framework suppliers. By engaging early with suppliers and stakeholders, NGET was able to mitigate risks and ensure timely delivery of critical components, thereby avoiding any potential delays in connecting the infrastructure.

5.3 Work undertaken in RIIO-T2

162. During RIIO-T2, we undertook proactive steps to ensure a timely and cost-effective connection for our customer. To mitigate the risk of long lead times and secure our supply chain we purchased SGTs in [redacted]. This [redacted] decision allowed us to move forward with the necessary preparations for the connection, whilst also providing greater certainty and control over the delivery schedule. Concurrently, we conducted a Front-End Engineering Design (FEED) study, which enabled us to gain a more comprehensive understanding of the required works and refined our plans accordingly. These actions demonstrated our commitment to

delivering best value to our customer, whilst also ensuring that we were well-prepared to meet the challenges of the connection process.

5.4 Project Plan

163. A detailed project delivery timeline has been prepared by NGET. This plan facilitates the customer's contracted connection date of December 2025.

164. The key project milestones are summarised below:

Table 23 – Project milestones

Milestone	Date
Order long lead in equipment (SGT's)	XXXXXXXXXXXXXXXXXXXXXXXXXX
FEED Design Complete	XXXXXXXXXXXXXXXXXXXXXXX
Sanction (Internal)	XXXXXXXXXXXXXXXXXXX
Re-sanction	XXXXXXXXXXXXXXXXXX
Planning permission granted	XXXXXXXXXXXXXXXXXX
Contract Signed with main works contractor	XXXXXXXXXXXXXXXXXXX
Contract Awarded	XXXXXXXXXXXXXXXXXXX
Factory Acceptance Tests	XXXXXXXXXXXX
Land purchase complete	XXXXXXXXXXXX
First Site Access	XXXXXXX
Detailed Design Complete	XXXXXXXXXXXX
Commissioning of Main and Reserve Bus Bar	XXXXXXXXXXXXX
Available for Commercial Load SGT1	XXXXXXXXXX
Available for Commercial Load SGT2	XXXXXXXXXX
Available for Commercial Load SGT3	XXXXXXXXXX
Installation works Complete	XXXXXXXXX

5.5 Risks and Mitigations

165. A risk management process has been adopted to set out a framework for managing reasonably foreseeable risks in a proactive, efficient approach that will not impede delivery of this project. This process is an iterative process and is reviewed on a regular basis to capture any new risks, update any existing risks and remove any risks that have materialised.

166. The project is in the early stages of development and as such percentage allowance has been included to account for all risks. This is in line with the approach used for the RIIO-T2 Business

Plan. Initially, a total contingency of XXXX in 2018/19 price base (XXXX in 2023/24 price base) has been provided for the project, with the following key programme and project risks contributing towards this value and incorporated into the analysis within 24. The Table below presents the risks with a threshold of more than XXX probability in 2023/24 price base. The full list of risks can be found within project the risk register.

Table 24 – Extract from Risk Register (Values above 40%) (2023/24 price base)

Cause	Description	Impact	Mitigation	Probability	Cont. Value (£)
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	1. [redacted] 2. [redacted]	[redacted]	[redacted]

Cause	Description	Impact	Mitigation	Probability	Cont. Value (£)
	[redacted]		[redacted]		
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

5.6 Stakeholder Engagement

167. For this project, stakeholder engagement has occurred and involved several key parties, including IAMP (a subsidiary of Sunderland City Council - SCC), Nissan Motors UK, Envision, NGET and industry (for cost estimates). SCC served as the primary point of contact, given their ownership of the IAMP site and established relationships with local stakeholders. The engagement process aimed to understand the following:

- Demand needs and requirements of stakeholders,
- Options to address these requirements,
- Connection readiness of these stakeholders, and,
- Cost estimates and associated confidence levels.

168. During the engagement sessions, it was clarified that the transformers would be XXXXXXXXXXXXXX, resulting in minimal impact on the Local Authority, natural capital, and surrounding areas. Early engagement proved beneficial, as it allowed for the reduction of additional land requirements and facilitated a more efficient optioneering process and solution design build.

169. Engagement will continue with these stakeholders as the project progresses, in line with good project delivery principles.

5.7 Customer financial commitment (Securities)

170. Customers 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).

171. 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 looking for and demand. This is a financial commitment over and above any costs the customer has incurred itself associated with its own investment.

172. 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 the customer terminate before the works are complete, the costs incurred to date will be recovered from the customer itself.

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

5.8 Price Control Deliverables

174. It is proposed that an evaluative Price Control Deliverable is defined.

175. Construct a new 275kV double busbar substation for installing three new 275/66kV SGTs and 66kV cables to the International Advanced Manufacturing Park (IAMP) site by March 2026.

6. Conclusion

176. This document is the formal MSIP submission to Ofgem by NGET for the Hylton Castle customer connection during the RIIO-T2 Price Control period. The preferred option is Option 5. This is submitted under the MSIP re-opener provided for in Special Condition 3.14, paragraph (f) of the NGET Transmission Licence.

177. This paper has demonstrated the need for investment at Hylton Castle (the 'Investment') and summarises 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.

Table 25 – Conclusion Summary table

Main drivers	Provide a Grid Supply Point (GSP) for Scottish Southern Energy (SSE) who are seeking a 255MVA, 66kV feeder connection to supply the new International Advanced Manufacturing Park (IAMP) site, enabling the production of Nissan Electric Vehicles (EVs) of national importance to drive the country net zero goals in the transport sector, The IAMP site will create 7000 new roles in the North East
Selected Option	Construction of a new 275kV double busbar substation along the ZZA route for the purposes of installing three new 275/66kV SGTs and 66kV cables to the IAMP site.
Estimated Cost	XXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX
Outputs	SSE have a signed connection agreement that specifies an initial connection date of December 2025 for the first Super Grid Transformer (SGT), followed by SGT 2 in January 2026 and SGT 3 in March 2026.

7. Overview of Assurance and Point of Contact

178. Appendix E, 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.

179. This confirmation is provided by the Head of Future Price Controls, Electricity Transmission, 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.
- Quality assurance processes are in place to ensure NGET 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 NGET.

180. NGET's designated point of contact for this MSIP application is XXXXXXX, Regulatory Development Manager, email XXXXXXXXXXXXXXXXXX, telephone XXXXXXXXXXXXX

8. Appendices

Appendix A Calculation Volume Driver allowances vs MSIP Hylton Castle	Appendix A - Calculation Volume D
Appendix B Hylton Castle - Cost Benefit Analysis	APPENDIX%20B%20-%20NGET%20TO%20
Appendix C Hylton Castle - Cost Model	APPENDIX%20C%20-%20MSIP%20Hylton%
Appendix D Hylton Castle – Estimated Inflation Model	APPENDIX%20D%20-%20Hylton%20Contra
Appendix E Assurance Statement Letter	APPENDIX E - Assurance Statement
Appendix F Chronology of Connection Request	As below
Appendix G Reopener Guidance Checklist	APPENDIX G - Reopener Guidance -
Appendix H Direct Cost/ Asset Tables	MSIPs%20Jan%2024%20Direct%20Costs%

Appendix F

Chronology of Connection Request

The customer's connection request for the IAMP has evolved over time and to provide suitable context to the ensuing submission, a short chronology of its development is detailed here.

Prior to initially engaging NGET, SCC approached XXXXXXXXXXX (XXX) with a request to connect IAMP to the distribution network. XXX advised that they could only supply a maximum 100MW connection. As such, NPg were ruled out by the customer as this was not sufficient to meet demand.

Subsequently, SCC approached NGET in September 2020. The original connection application was made for 140MVA.

This connection was not included in NGET's RIIO-T2 baseline plan, as the connection agreement was signed in November 2020 after the business plan submission was made.

SCC submitted a Modification Application (MODAP) on 4th February 2022 for an increased capacity of 255MVA and the modified connection agreement was signed on 17th Sept 2022. The agreement was to provide a new 275kV substation connected via an OHL turn–in from the existing ZZA OHL running adjacent to the proposed new substation site. The 275kV substation will supply a private grid through three 180MVA SGT's via cable circuits connecting an adjacent private 66kV substation.

The original connection contract was novated to SSE from SCC in March 2023.

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