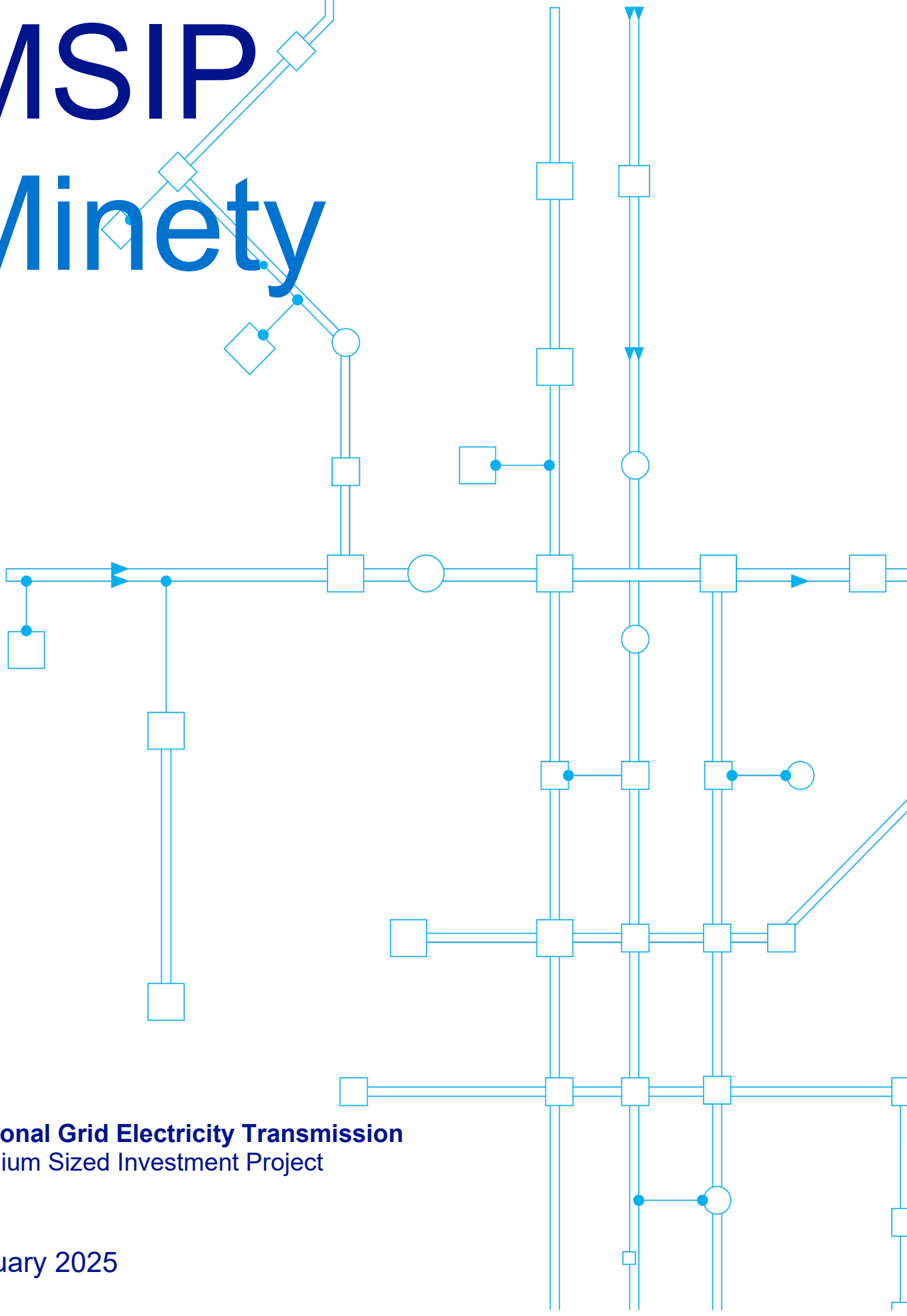
MSIP Minety



National Grid Electricity Transmission
Medium Sized Investment Project

January 2025

Contents

Investment Summary

Project Name	Southern Electric Power Distribution (SEPD) Minety	**Delivery year**	[redacted]
SpC 3.14 Category	(f) a system operability, constraint management or 0MW connection project		
Drivers for the Investment	**Signed Customer Connection Request:** To mitigate the potential of a double circuit fault condition at Minety 400kV substation [redacted] This enhancement will improve network resilience and enable Southern Electric Power Distribution (SEPD) to connect additional embedded generation capacity to the (SEPD) network via their Active Network Management (ANM) scheme.		
Key considerations & challenges	Key considerations and challenges in delivering this investment include: • **Planning & Consent:** Planning permission obtained but subject to the discharge of several conditions. Licences for Great Crested Newts / Dormice are required from Natural England. • **Environment:** Biodiversity Net Gain / habitat mitigation land required to offset habitat loss. • **Outage Availability:** Outages need to be agreed upon with the Network Planning team. • **Procurement:** Market lead time for equipment, such as circuit breakers, present a risk to the programme's delivery and will be procured in advanced. • **Uncertainty:** Main contractor's costs are currently based on indicative budget pricing, whilst we await tendered costs • **Interaction with other works:** Circuit breaker works are close to Minety Grid Park works.		
Proposed Solution	Due to space limitations at the south of site, which cannot accommodate SF6 AIS CB solution, a decision was made to install the hybrid solution which [redacted] Final scope includes [redacted] The solution encompasses the design, supply, and installation, along with all associated works such as protection and control (P&C), compound extension, land purchase, land clearance, and earthworks. These elements are essential to facilitate implementation of solution.		
Outputs of the Investment	The solution at Minety 400kV substation will mitigate the impact of a double circuit fault on the OHL circuit. Enhancing network resilience and facilitating more efficient customer connections for SEPD, whilst enabling integration of further renewable and low carbon technologies on the network		
PCD Primary Output	Installation of a circuit breaker on both Cowley-Minety OHL circuit & Melksham-Minety 1 OHL circuit at Minety 400kV substation by [redacted]		
Reporting Table	Annual RRP - PCD	**PCD Modification Process**	Special Condition 3.14 Appendix 1
Estimated Cost (price base 2018/19)	Our total cost for the investment and funding allowance being sought is: The current total cost of the project is: [redacted] The total direct cost of the project - the funding this MSIP seeks is: [redacted]		
Spend profile (Direct Project Costs)	**T2 (FY2022 - FY2026):** [redacted]	**T3 (FY 2027 - FY2031):** [redacted]	**T4+ (FY 2032+):** N/A
Historic funding interactions	Not applicable as the project was not part of the RIIO-T1 or RIIO-T2 determination by Ofgem.		

1. Executive summary

1.1. Context

This paper summarises NGET's proposed investment to extend Minety 400kV substation and seeks to demonstrate the consumer interest in the associated investment.

This Medium Sized Investment Project (MSIP) seeks approval of the need for the investment, as well as approval of the proposed solution. An indicative funding allowance request has been provided alongside this MSIP, however requested funding allowances for efficient spend on the project will be sought via an updated submission post March 2025, as agreed with Ofgem. The funding is required by NGET to deliver works in response to the Southern Electric Power Distribution (SEPD) Active Network Management (ANM) scheme and, to enable the delivery of the project in line with the contracted connection date in [redacted].

1.2. What is the background to this Investment?

NGET was initially contacted by SEPD to support with the implementation of an ANM scheme at Minety substation. This ANM scheme enhances electricity management by providing automated real-time monitoring, decision-making, and efficient control of electricity flow, while also allowing SEPD to incorporate additional embedded generation at that location on the network.

SEPD have now implemented the ANM scheme, however the four-switch mesh arrangement at the Minety 400kV substation presents a risk of a double circuit fault. In such a condition, the ANM system may not function as intended, impeding SEPD's ability to efficiently manage supply which could lead to delays in integrating additional generation into the network. This particular investment aims to eliminate the double circuit fault condition by installing 400kV circuit breakers on two of the existing overhead line circuits at Minety substation, thereby providing the full intended functionality of the ANM scheme.

1.3. What have we considered in developing options for this investment?

NGET assessed a range of solutions to meet the investment drivers in a way that best serves the interests of consumers. The project assessed six options across five overarching categories:

- Category A: Do Nothing (1 Option, could not provide a connection to customer)
- Category B: Market Based Solution, connection made through procurement of ancillary services (1 Option, could not provide a connection to customer)
- Category C: Whole System Solution – connection facilitated through DNO services - (1 Option, could not provide a connection to customer)
- Category D: Making use of existing substations (2 options shortlisted)
- Category E: Construction of a new substation (1 Option, considered excessive) in terms of cost to consumers for relative minor works

Two options within Category D were shortlisted for further consideration. They involved site extension works on the Cowley-Minety and Minety-Melksham 1 OHL (overhead line) circuit bays to facilitate the installation of two new circuit breakers while utilising the existing substation. The two shortlisted options, D-1 and D-2, differed on the type of CB solutions adopted.

- Option D-1: Circuit breaker (CB) installation in a hybrid approach with Air Insulated (AIS) SF6 CB solution on Cowley-Minety OHL and a compact single module SF6 insulated CB solution on Melksham-Minety 1 OHL.
- Option D-2: SF6 AIS CB installation through the use of standard disconnector and circuit breaker solution on Cowley-Minety OHL, as well as on Melksham-Minety 1 OHL

An important consideration was the introduction of SF6 as part of Option D-1. This was required due to non-SF6 400kV single module alternatives not being commercially available. For D-2, the spatial

constraints on the southern end of the site necessitated a compact design solution which presented challenges due to the larger footprint required.

1.4. What is the preferred option and what outputs does it deliver?

Option D-1, which implements an AIS SF6 CB solution on Cowley-Minety OHL and a compact single module SF6 insulated CB solution on Melksham-Minety 1 OHL, is our preferred solution due to its cost-effectiveness and its ability to maintain access for SEPD maintenance and Grid Park transformer delivery. The solution of the 2 400kV CBs delivers the necessary mitigates the risk of a double circuit fault, therefore ensuring the full functionality of SEPD's ANM scheme to prevent constraints in generation to the network.

Funding allowances are sought as part of this MSIP submission. The direct costs for this investment [redacted] Further details related to the makeup of these requested allowances are detailed within the cost model available alongside this submission.

1.5. How has future proofing been considered in the proposed investment?

This submission outlines the scope for installing two new circuit breakers and related works for the SEPD ANM scheme. It also includes additional clearance and earthworks to the north of the site to accommodate expected future development needs at the Minety substation. This relates to the possible installation of an additional Super Grid Transformer (SGT) to facilitate new SEPD connections. By undertaking these works at this stage, we anticipate minimising disruption to operations in future and enhancing efficiency . While the Grid Park extension at Minety is not included in the CB scope and thus not part of the MSIP investment request, it will be carried out concurrently with the CB works. This was a key consideration when selecting the preferred option.

1.6. What are the uncertainties and how have they been accounted for?

The risks and uncertainties to the successful delivery of this project include:

- **Planning & Consent:** Planning approval is obtained; however, a key risk remains on the discharge of planning conditions necessary for onsite clearance and development. In addition, site clearance must adhere to the wildlife calendar, for dormice and nesting birds. Natural England will not issue a dormouse licence, required to commence clearance, until planning permission is granted, so, it is not possible to decouple these risks.
- **Outage Availability:** Outages need to be coordinated with the Network Planning team. Proposed outages have been submitted to the outage power systems team for feedback.
- **Procurement of equipment:** The procurement lead times for the required switchgear has recently increased to 105 weeks, posing a risk to meeting the programme deadlines. To mitigate against the impact of a delay, we will request the main contractor to procure long lead items at the earliest opportunity.
- **Environment & Sustainability**: Biodiversity Net Gain (BNG) and habitat mitigation land are required to offset habitat loss. Head of terms have been agreed for the additional land required to enable this investment.
- [redacted] Consequently, the initial costs included in this MSIP submission are currently based on a combination of internal estimates and a high-level budgetary contractor quote only, derived from the defined scope detailed in the direct allocation documentation.

Following the investment driver to address network constraints (SEPD) Active Network Management scheme), we conducted a robust assessment of various detailed options for Minety 400kV substation. This assessment sought to balance the need to deliver the connection within the contracted deadlines, whilst facilitating the connection of future customers, minimising harm to the environment, and creating a network capability of handling a future low carbon energy system.

The conclusion of NGET's optioneering analysis is [redacted] The proposed design aims to provide the necessary infrastructure and ensure a reliable and efficient connection, and the greatest benefits in terms of consumer value.

2. Introduction

2.1 Project background

This paper presents the investment case and associated indicative[1] efficient costs for our preferred solution for delivering the required scope of works at the Minety 400kV substation. This submission seeks approval for the funding required by National Grid Electricity Transmission (NGET) to reinforce the transmission network, thereby supporting Southern Electric Power Distribution (SEPD) in facilitating additional embedded generation customer connections through their Automatic Network Management (ANM) scheme. The paper outlines and seeks approval for the need for this investment, to enable the delivery of the project in line with the contracted connection dates [redacted]

Minety substation, as shown in Figure 1, is located in Wiltshire. It is an existing outdoor substation featuring a 400kV four-switch mesh air-insulated switchgear (AIS) arrangement, connected to a SEPD owned 132kV substation. The four-switch mesh configuration presents a risk of a double circuit fault. In this scenario, the ANM system may not function as intended, hindering SEPD's ability to manage the supply efficiently and potentially restrict the integration of additional generation into the network.

Figure 1: Minety Substation Location

[1] Full and confirmed efficient costs are subject to tendering of contracts which we expect to be completed by [redacted] These finalised cost will be presented in a resubmission subsequently as agreed with Ofgem.

Chronology to the request

In April 2019, SEPD applied to NGET for an Active Network Management (ANM) scheme. Following this, SEPD submitted a project progression application because the acceptance of embedded generation exceeded the remaining Material Headroom (MH) at Minety. A reassessment of how new generation impacts the transmission system was required, as the number of embedded generation connections exceeded the capacity of the current Super Grid Transformers.

In November 2019, a formal agreement was established between NGET and SEPD. NGET agreed to support the installation of an SGT (ANM) scheme at the Minety 132kV substation to manage the export of newly connected embedded generators.

The Minety site, configured as a four-switch mesh corner arrangement, increases the likelihood of a double circuit trip. SEPD completed the installation of their ANM scheme; however, the full capacity for embedded generation cannot be realised without further enhancements on the network by NGET. Delays in progressing the investment and bundling of work with other schemes have extended the [redacted]

2.2 Regional and strategic context

Minety is within the Southwest regional transmission network. This principally consists of one 400kV ring fed by circuits from South Wales, West London, and the South Midlands. The majority of the transmission network is designed for west-east power flows with high levels of localised generation and demand.

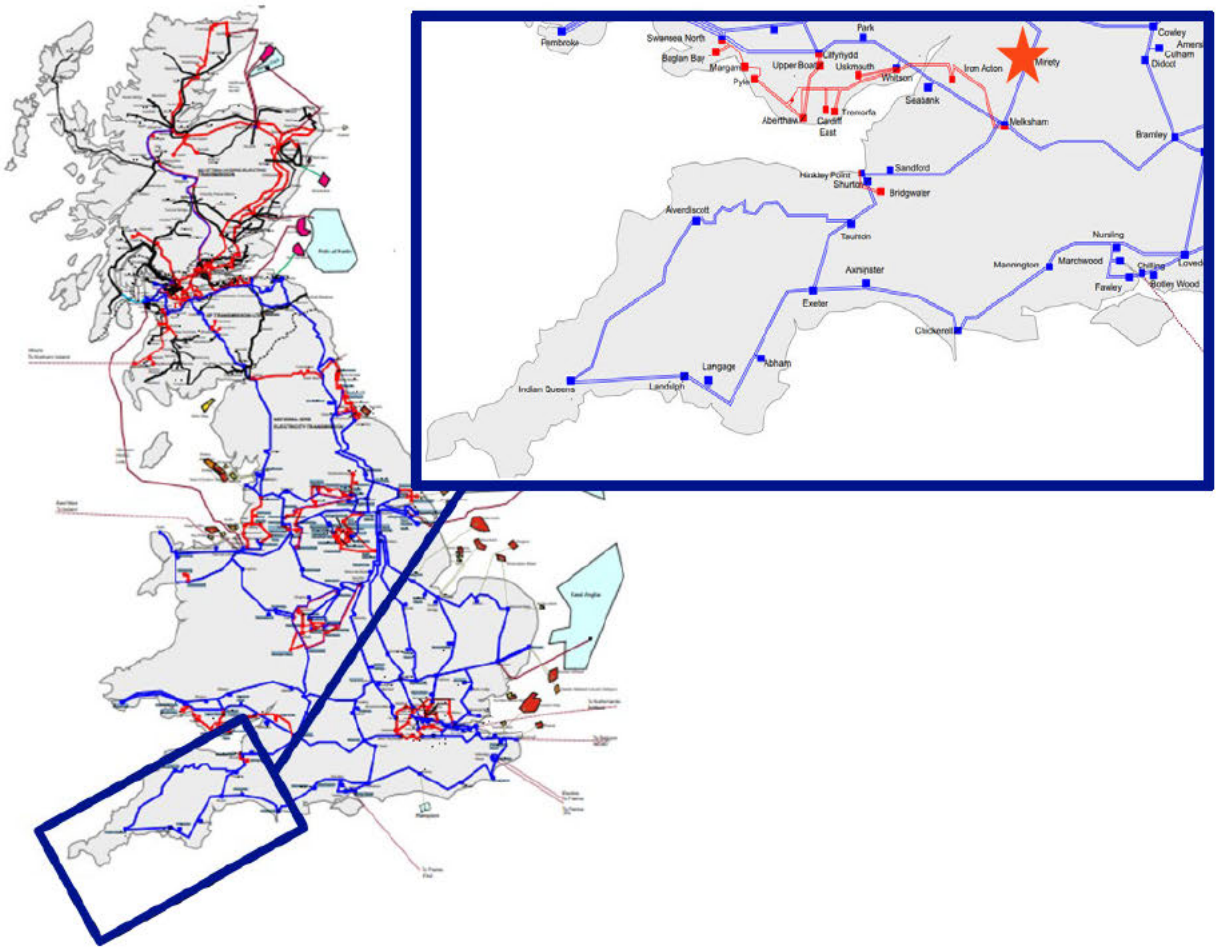


Figure 2: Overview of the South West network region and the location of Minety 400kV substation

The southwest has extensive areas of natural beauty and national parks taking up large areas of land and restricting entry points of connection for offshore generation. Minety is located south of the Cotswolds Area of Outstanding Natural Beauty, and east of The National Arboretum. Any NGET upgrades will need to be sympathetic to, and in accordance with, these environmental factors.

2.3 MSIP Eligibility

The Minety SEPD project meets the MSIP criteria under Special Condition (SpC) 3.14.6 (f) a system operability, constraint management or 0MW connection project.

As agreed with Ofgem in January 2025, NGET will not obtain full cost clarity for this investment until March 2025, due to receiving delayed tender returns. As such, the cost model provided alongside this submissions are an indicative summary of efficient costs only. We will follow up with an updated funding request to this submission subsequently.

2.4 T3 Interactions

While this MSIP is being submitted under the RIIO-T2 price control period, we have ensured alignment with initiatives outlined in our RIIO-T3 Regional Report *South-West: Future Network Blueprint*[2]. Through this blueprint, we are enhancing existing networks to ensure adequate capacity for electricity transmission in the region. This includes the upgrade of the FMR2 Feckenham to Minety circuit during RIIO-T3.

The proposed enhancements at Minety substation in this MSIP align with the ambitions set out in our RIIO-T3 business plan, facilitating the transition to a clean and sustainable energy network for the future and aligning with Ofgem's T3 consumer outcomes (see Table 1). Addressing transmission network constraints and improving network resilience is critical as the region accelerates the integration of low-carbon technologies into the grid, which forms a key element of expected new generation in the South-West region during the T3 period.

Table 1: Alignment with Ofgem T3 consumer outcomes

Infrastructure fit for a low-cost transition to net zero	Active Network Management (ANM) schemes help to accelerate the connection of distributed generation, supporting the integration of low-carbon energy sources without waiting for full transmission reinforcements.
Secure and Resilient Supplies	The installation of two new circuit breakers at Minety 400kV substation mitigates the risk of a double circuit fault, enhancing the reliability of the network around Minety. The circuit breakers enable functionality of the AMN scheme to prevent transformer overload and voltage fluctuations, reducing the likelihood of outages and therefore ensuring a more resilient electricity supply for consumers.
System efficiency and long-term value for money	The implementation of an ANM scheme provides an efficient and cost-effective alternative to traditional transmission reinforcements by allowing distributed generation to connect sooner through coordinated network management.

[2] South West Future Network Blueprint

3. Establishing Need

3.1 Overview

This section sets out the key driver of the investment need. This is summarised in Table 2 below.

Table 2: Summary of Investment Driver

Summary of Primary Driver		Date
SSEN Active Network Management (ANM) Scheme	Signed Customer Request: To mitigate the potential of a double circuit fault condition at Minety 400kV substation via installation of two overhead line (OHL) circuit breakers. This enhancement will improve network resilience and enable Southern Electric Power Distribution (SEPD) to connect additional embedded generation capacity to the (SEPD) network via their Active Network Management (ANM) scheme.	[redacted]

3.1.1 SEPD Active Network Management Scheme

SEPD has indicated that their networks in the Southwest are significantly constrained. [redacted]

Renewable and low carbon generation necessitates greater network flexibility and resilience to ensure security of supply to consumers. The DNO is granted the capability to connect customers ahead of the completion of transmission reinforcement works on the basis that the combined capacity contributions from connected customers does not exceed either the import or export GSP Technical Limits. To maintain the power flows across the GSPs the DNO will deploy an Active Network Management (ANM) scheme to control generation customers' power imports and exports.

NGET's power system modelling has indicated an increased risk of a double circuit fault at Minety 400kV if additional generation is connected. This type of fault could potentially result in interruptions to consumer supply. Installing two circuit breakers on the overhead line circuits at Minety would mitigate this risk and improve security of supply for consumers. SEPD have completed the installation of their ANM scheme, however the full embedded generation capacity cannot be realised without this investment.

3.2 Load related drivers

Table 3: Details of Load Drivers

Customer Name	Project Name	Project Type	MVA Demand	Available for Commercial Load (ACL) Date	Customer Status
Southern Electric Power Distribution	Minety OHL CB	Network Reinforcement	0MVA	[redacted]	Customer has a signed agreement and has already implemented the ANM scheme.

3.2.1. Other Customer Connections

Other planned works at Minety 400kV substation include the development of a Grid Park extension to the west of the substation. While the Grid Park extension is not included in the MSIP submission, both projects have been combined under a single planning application and will be managed by one main lead contractor. This approach provides efficiencies in design and delivery.

NGET have nine (47.5 MVA / 4272.5 MVA overall) signed Grid Park connections at Minety 400kV substation. Although this project is not included in this investment request, space, layout, and substation capacity considerations were made during the optioneering process to ensure both projects can be delivered simultaneously at the Minety 400kV substation site. The Grid Park extension will introduce further generation connections at Minety which cannot become fully operational without NGET's mitigation for OHL faults.

3.3 Existing and planned future network

3.3.1. Overview of the network today

The region is transitioning from a net importer to a net exporter of power flows. This shift is driven by significant current and anticipated developments in low-carbon, nuclear, onshore, and offshore wind generation over the next 10-15 years. A coordinated strategy between network providers is essential to enable this generation growth and meet regional demand needs.

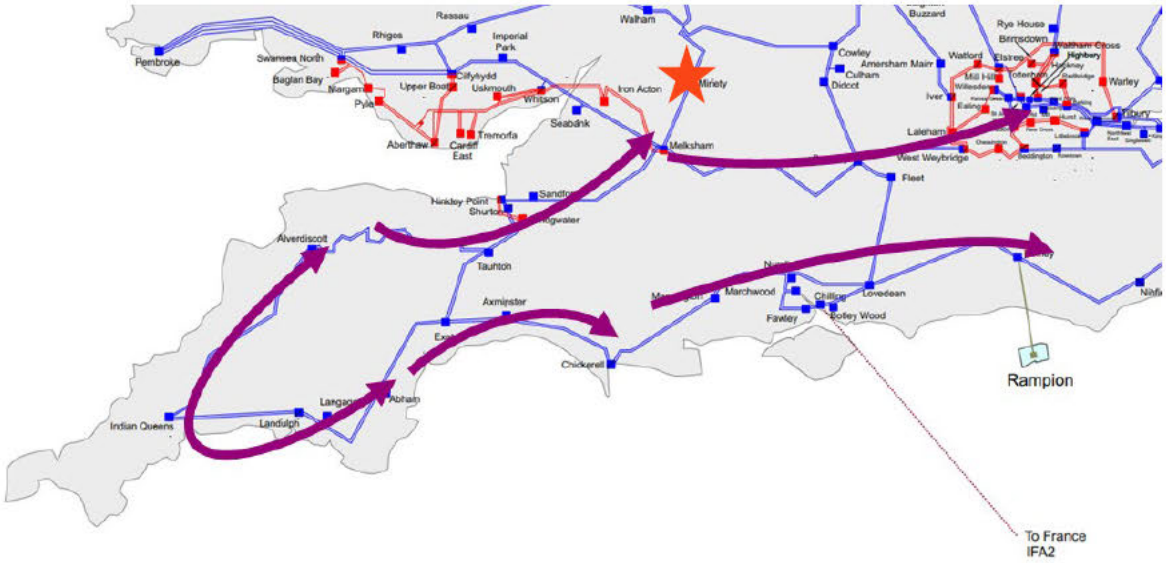


Figure 3: NGET South West Network & Power flow direction. Source: South West FNB Brochure

A 150MW battery storage project is located on land adjacent to the Minety 400kV substation. This project consists of three 50MW battery storage facilities and is owned and operated by a private company with an independent distribution network operator (IDNO). The project has adopted the 132kV distribution network via the Minety substation. [redacted] These new generation connections will require significant reinforcement of the high-voltage (HV) network in the region.

3.3.2. Asset Health

The main driver for this investment is to mitigate the potential of a double circuit fault at Minety 400kV substation, and as a result, site asset health has been given limited consideration during the project's development. High-level overview of Minety substation suggests that most of the assets are low risk (in good condition). It is important to highlight that this assessment is based on primary health drivers, such as family condition, age, and technical limitation and does not consider other factors such as visual condition assessment, oil/SF6 top-ups, maintenance compliance, plant status issues, or open defects.

Any asset health-related works at Minety substation will be efficiently managed through programmes of work or asset health intervention windows as part of T2, or through T3. Therefore, NGET are not seeking additional funding to address any asset health issues through this MSIP.

4. Optioneering

This section summarises our assessment of potential options to address the need to remove the double circuit fault. In line with our optioneering process the project assessed six high level options across five overarching categories prior to shortlisting.

- **Category A:** Do Nothing (1 Option, could not provide a connection to customer)
- **Category B:** Market Based Solution, connection made through procurement of ancillary services (1 Option, could not provide a connection to customer)
- **Category C:** Whole System Solution - connection made through facilitated through DNO services - (1 Option, could not provide a connection to customer)
- **Category D:** Making use of existing substations/assets (2 options shortlisted)
- **Category E:** Construction of new assets/substation (1 Option, considered excessive)

Details of the optioneering process are provided below. The optioneering for this project was considered as part of a comprehensive site solution to enable the simultaneous delivery of the Grid Park and circuit breakers. Constraints were considered in terms of the substation's land footprint and capacity.

- **Options A-C** were discounted because they would not deliver a compliant customer connection at Minety Substation.
- **Option E** was discounted as the relative size of investment was considered excessive from the perspective of cost to consumers in the delivery of this needs case.

As part of Category D, a high-level assessment of two options were considered, involving site extension works on the Cowley-Minety and Minety-Melksham 1 OHL (overhead line) circuit bays to facilitate the installation of two new circuit breakers while utilising the existing substation.

These options included:

- **Option D-1:** [redacted]
- **Option D-2:** [redacted]

4.1 Assessment of high-level options

A summary of our assessment of the high-level options identified to meet the customer need is set out below. Each is assessed against the following criteria:

- Capacity and future development potential
- Design and technical complexities
- Operation and maintenance
- Safety, health and security
- Planning, land and consent
- Third party impact and network coordination
- Environment and Sustainability
- Timing of programme and resources
- Cost

A summary of our initial options assessment is in Table 4 below

Table 4: Summary of Initial Options Assessment

Category	Option title	Option description	Taken Forward to Detailed Optioneering?	Rationale
A	Do nothing	NGET does not undertake any activity to enable connection at Minety.	**Not taken forward** – the option does not comply with NGET licence obligations to provide connections.	Compliant customer connection not delivered.
B	Market-based solution	Increased customer demand is accommodated through procurement and use of ancillary services only.	**Not taken forward** – the option does not comply with NGET licence obligations to provide connections.	Compliant customer connection not delivered.
C	Whole systems solution	Required customer connection is accommodated by a Distribution Network Operator (DNO) instead of NGET.	**Not taken forward** – the option does not comply with NGET licence obligations to provide connections.	Customer is a DNO and is already a whole systems solution, compliant customer connection not delivered.

Category	Option title	Option description	Taken Forward to Detailed Optioneering?	Rationale
D	[redacted]	[redacted]	**Taken forward to detailed assessment** - Lowest cost and SGT8A delivery achievable in contracted timeline.	Cost saving - combining Cowley with SGT6 delivery - enables futureproofing for potential future demand.
D	[redacted]	[redacted]	**Taken forward to detailed assessment** - Access for future site development blocked and high risk of overhead line (OHL) tower undermined. High-cost option.	Option not viable as road between gantry and OHL tower is not negotiable for SGT delivery and is very restrictive to achieve SEPD easement route. Plan takes no account of the ground level differences which makes this option unviable.
E	Construction of new assets/substation	The required customer connection is facilitated by the construction of a new substation.	**Not taken forward** determined to be excessive for relative size of customer connection - the cost of purchasing land/ impact on local environment too great in comparison to need for investment.	Option would require land being purchased to expand at high cost and impact on surrounding environment. Option considered excessive for delivery of SSEN Active Network Management scheme.

The conclusion of the assessment is that Options D-1 & D-2 were carried across into detailed option analysis. Both options satisfied the specific space availability within the designated area of the substation.

4.2 Qualitative options analysis

Table 5 summarises the detailed qualitative assessment of the technical, environmental, planning, and socio-economic considerations for the two options.

Table 5: Summary of Qualitative Analysis of Shortlisted Options

Option #	D-1	D-2
Option title	**Hybrid OHL CBs Solution**	**AIS OHL CB solution**
Capacity & future development potential Preferred option: Option D-1	• Provides available space for substation development and asset access routes to facilitate future customer connections. • Cowley can be combined with future SGT delivery.	• May obstruct intended access and delivery routes for future substation development.
Design & technical complexities Preferred option: Option D-1	• Compact modular asset design. • Hybrid technology may present additional technical complexities. • Existing delayed auto reclose (DAR), and protection and control can be modified to accept CB functionality.	• Potential risk of acquiring additional land, relative to option D-1.
Operations & maintenance Preferred option: Option D-2	• Single module could add complexity to operations & maintenance. • Potential issues of using a single module as a point of isolation.	• AIS only solution eases operations & maintenance.
Safety, health & security Preferred option: Option D-1	• Live parts encapsulated in a grounded aluminium tank, filled with SF6 gas - disconnector contacts will likely not require any maintenance during the product life, thus increasing the availability of the substation and the safety of the operators[3].	• Retaining wall will need to be built, posing a risk to the OHL tower. Civil design engineering may be required.

[3] Manufacturers fact sheet description

Option #	D-1	D-2
Option title	**Hybrid OHL CBs Solution**	**AIS OHL CB solution**
Planning, land & consent Preferred option: equal	• Planning permission for development on both circuits granted under series of conditions. Natural England licences (Great Crested Newts (GCN), Dormice) is dependent on the conditions being met. • Biodiversity Net Gain (BNG) maintenance required for 30 years. Habitat mitigation land maintenance land maintenance required for lifetime of development.	• Planning permission for development on both circuits granted under series of conditions. Natural England licences (GCN, Dormice) is dependent on the conditions being met. • BNG maintenance required for 30 years. Habitat mitigation land maintenance land maintenance required for lifetime of development.
Third party impact & network coordination Preferred option: equal	• Natural England licencing dependant on discharge of conditions. • Diversion of SEPD 132kV cables required.	• Natural England licencing dependant on discharge of conditions. • Diversion of SEPD 132kV cables required.
Environment & sustainability Preferred option: Option D-2	[redacted] • Dormice & GCN licence required.	• Dormice & GCN licence required. • Further woodland clearance may be necessary, obtaining consent may be less difficult due to the proximity to existing ancient woodland
Timing of programme & resources Preferred option: Option D-1	• [redacted]	• Delivery of connection by the proposed dates may not be feasible.

5. Detailed options analysis

This section provides a detailed qualitative and quantitative assessment of the two shortlisted options in section 4. The section concludes by setting out our preferred option.

5.1 Description of the options

The two shortlisted options for this development differ in terms of technology configuration for the OHL circuit breakers. Preferred option drawings are also included at larger scale within Appendix 1.

5.1.1 Option D-1: SEPD OHL CBs - Hybrid Approach

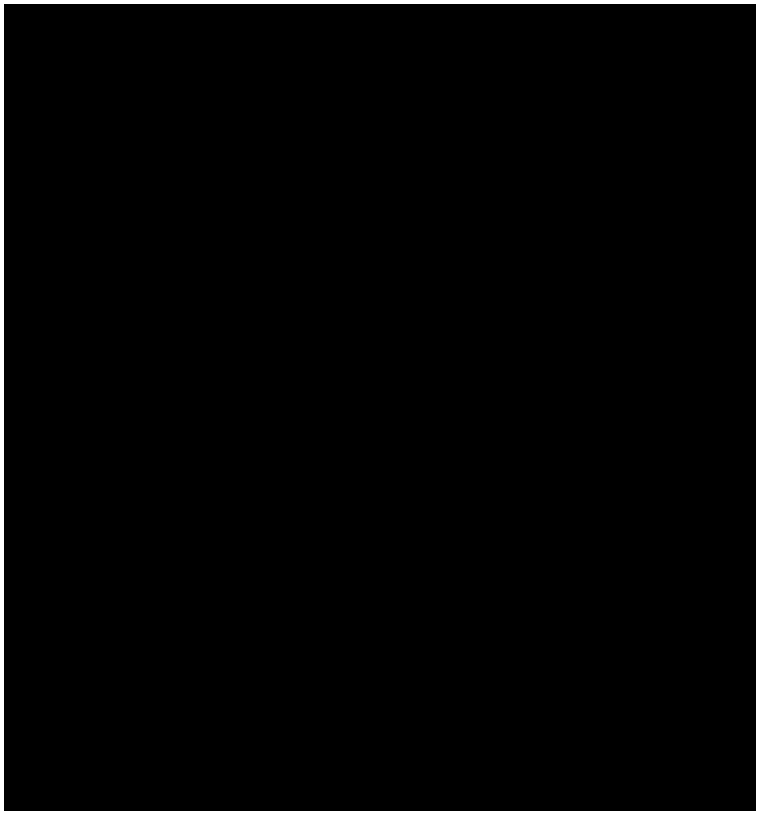
Site Solution: D-1 involves installing two circuit breakers (CBs) on the existing overhead line (OHL) circuits at the Minety 400kV substation. An SF6 AIS circuit breaker will be installed on the Cowley Circuit to the north of the substation on Mesh Corner 2. Additionally, a single module SF6 insulated CB solution, such as the [redacted] will be installed on the Melksham 1 circuit to the southwest of the substation on Mesh Corner 4 to mitigate the space restrictions.

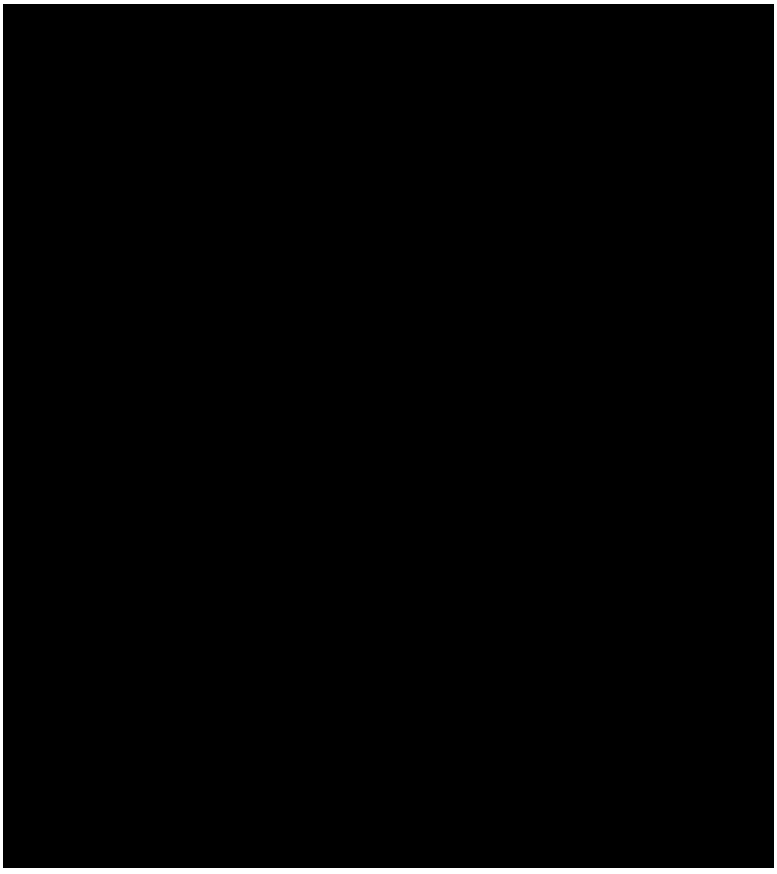
The delivery of the Cowley CB will require land purchase compound extension and the removal of an area of woodland. Associated modifications to Mesh Corner protection & control is required. Compound extension for CB delivery will also require associated earthworks, and ground raising to bring up to the same level of the existing substation. The implementation of the circuit breaker on the Melksham 1 Circuit will likely require the use of SF6 switchgear, as non-SF6 400 kV rated switchgear is not yet commercially available and would delay the delivery and associated consumer benefits.

Figure details Option D-1. The scope for this MSIP includes both the CB extension and earthworks shown in green and red, respectively. Whilst SGT6 is out of scope, the associated additional ground raising and associated earthworks to east of Cowley CB extension will be carried out for future project delivery. The Grid Park extension shown in blue on the left side is also out of scope of this MSIP submission.

Technology Solution: Option D-1 proposes the installation of two CBs at Minety 400kV substation. One AIS CB, mesh corner disconnector, and earth switch on Mesh Corner 2 Cowley-Minety OHL circuit. One single module SF6 insulated CB solution on Mesh Corner 4 Melksham-Minety OHL circuit.

Using the PASS as an example, SF6 gas is used within the metal-encapsulated compartment that houses the key component such as the circuit breaker, disconnectors, earthing switch, current and voltage sensors. It is crucial for the efficient and safe operation of these high-voltage components as it acts as an insulating and arc-quenching medium. Due to the key components being encapsulated within a single module significantly reduces the footprint and therefore area required for installation.

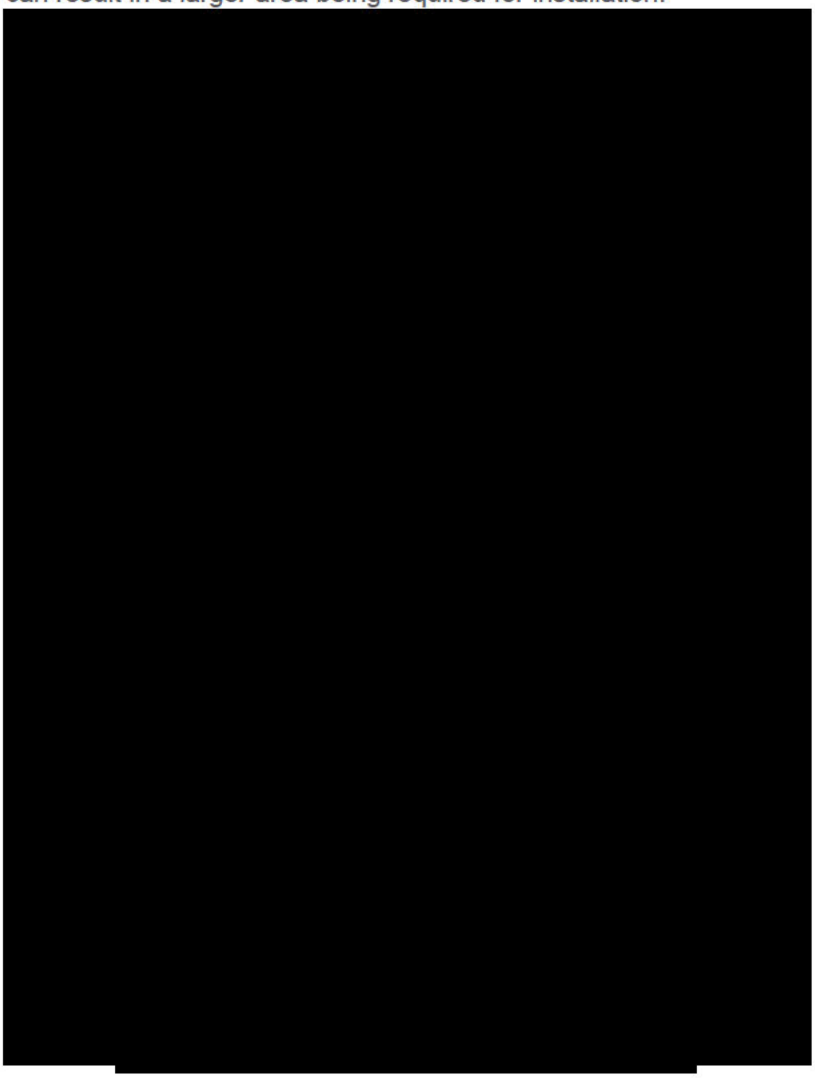




5.1.2 Option D-2: SEPD OHL CBs - Standard Approach

Site Solution: D-2 considers the installation of two AIS CB solution on the OHL at Minety 400kV substation. AIS CBs will be installed on the Cowley & Melksham circuits on Mesh Corner 2 and Mesh Corner 4 respectively. The installation of the CBs will require compound extension & extensive excavation to accommodate the AIS equipment delivery along with associated earthworks and ground raising. Associated modifications to Mesh Corner protection & control is required. A retaining wall is also required.

Technology Solution: D-2 proposed the installation of two AIS CBs at Minety 400kV substation. At each connection point an AIS CB, mesh corner disconnector, and earth switch will be installed. The different key components will likely be separated and often supported by independent mounting structures. This can result in a larger area being required for installation.



5.2 Quantitative options analysis

The multi-criteria process summarised above for selecting the preferred option did not require a detailed Cost Benefit Analysis (CBA) in line with Ofgem's guidance. We have concluded it would not be proportional to scale and cost of the investments proposed [redacted] to undertake a CBA process for this submission.

Our evaluation of the options indicates that the preferred solution provides the best value for consumers, the earliest connection date for the customer, and an appropriate level of technical and project risk. Furthermore, the underpinning purpose of the scheme has been planned and tendered by the DNO as a solution to drive long term consumer value through increased network flexibility.

5.3 Preferred solution for Minety 400kV Substation

The preferred solution for OHL CB delivery at Minety 400kV substation is summarised below. The recommendation is based on qualitative analysis provided above. Based on the qualitative analysis conducted we have recommended Option D-1: Hybrid OHL CB solution as the preferred solution for this investment driver, providing some futureproofing.

The solution provides the customer requirements as well as allowing space within and outside the substation for future development as well as asset delivery at Minety. [redacted] While Option D-1 does present some environmental concerns, such as the use of SF6 insulated switchgear and the removal of existing woodland, these issues are either mitigated or justified. The introduction of SF6 is necessary because non-SF6 400kV single module alternatives are not commercially available on the required timescales. Additionally, the spatial constraints of Option D-2 render it non-viable, particularly when compared to the compact design of Option D-1.

To mitigate against use of SF6 Option D-1 employs a hybrid solution: a single module SF6 CB solution at the constrained southern end of the site, and an SF6 AIS CB solution in the less restricted northern part of the site. To compensate for habitat loss, NGET will provide off-site Biodiversity Net Gain (BNG) land. Overall, these environmental detractors are outweighed by the licence obligation to the customer and the facilitation of future development in the region.

The scope of works for the preferred solution, Option D-1, comprises of design, supply, construction, and commissioning and the local works to facilitate this development include:

- On Mesh Corner 4, retrofit the bay for Melksham 1 OHL (A83A) to a full bay to include CB, Line Disconnector, Mesh Disconnector and Earth Switches. Due to space constraints, this will need to be installed as a compact single module SF6 insulted switchgear solution such as PASS.
- On Mesh Corner 2, retrofit the bay for Cowley OHL (A844) to a full bay to include CB, Line Disconnector and Earth Switches.
- Compound extension, land clearance, earthworks, and ground raising to bring up to the same level of the existing substation.
- Multicore cabling and associated trenching and ducting.

To facilitate this, a minimum of two outages will be required during 2027 and 2028 for the installation / commissioning of circuit breakers on the Melksham 1 and Cowley OHL circuits. Where possible, to minimise impact to the network, outages will be utilised for both the CB HL works as well as the Grid Park Project works.

In addition to the above, a joint Town and Country Planning application for the OHL CB and Grid Park Projects was submitted and approved in June 2024. This approval, subject to discharge of conditions, will allow for the development to be extended on to the newly acquired land to the north of the site and supports the necessary ecological licences. We are currently in the final stages of the land purchase, which includes the land required for BNG and habitat mitigation offset.

6. Detailed Cost for Preferred Solution

This section provides a high-level summary of the overall costs for the proposed delivery of Minety substation OHL CB works, including an expenditure profile for all regulatory years of delivery. The costs presented in this section represent our latest view of costs for the proposed investment; all costs are presented in 2018/19 prices, unless otherwise stated.

The Contractor's quotation return for delivery works associated with the Minety project are due to be received in March 2025, therefore initial costs included within this MSIP submission are internal estimates only at this stage, based on the defined scope as detailed within the direct allocation documentation. Upon completion of the procurement process and agreeing final contractor costs, NGET will provide an updated cost submission for this MSIP Re-opener subsequently. This submission will detail the market tested pricing received as part of the procurement exercise and request full funding allowances for the scheme.

6.1 Total Allowance Request

Total project costs are £[redacted] NGET requests [redacted] 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 6: Allowance request – Cost Model tab reference 1.0

	2018/19 price base (£)										
	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	Total
Total project costs	[redacted]										
CAI	[redacted]										
Direct project costs	[redacted]										

6.2 Cost Estimate

The total cost to develop and deliver the investment at Minety is [redacted] including indirect costs and costs incurred to date.

Table 7: Cost Summary - Cost Model tab reference 1.1

2018/19 price base (£)		
Element	Total	CAI/Direct
Contractor Costs		
Main Works Contractor	[redacted]	Direct
Third Party Costs		Direct/CAI
National Grid Costs		
ET Ops		Direct
Project Management		CAI
Project Services		CAI
Support Functions		CAI
Lands		Direct
Legal		Direct
NGET Portfolio Costs		CAI
Other		
Estimated Inflation		Direct
Risk		Direct
Total		

6.3 Cost Firmness

Error! Reference source not found.8 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 only [redacted] of the total costs (firmness 1 and 2). We have low cost certainty because we are yet to have full tendered costs. This is also the reason why we have agreed to do a delayed cost submission later in 2025. Cost firmness will increase in later submissions.

Table 8: Cost Firmness - Cost Model Tab reference 1.9

Cost Firmness	Total (2018/19 Prices, £)	Notes
1 - Fixed	[redacted]	Actuals
2 - Agreed remeasurable		
3 - Agreed remeasurable future information		
4 - Estimated	[redacted]	Risk, Contractor, NG costs, Third Party (less actuals)
5 - Early Estimate		
Total	[redacted]	

7. Deliverability and risk

7.1 Deliverability

This section sets out a summary of the key activities pertaining to the delivery of the Minety project, including the current high-level programme, procurement strategy and anticipated risks.

7.1.1 Delivery Programme

The project programme is illustrated in **Error! Reference source not found.**Table 9.

Table 9: Delivery Programme for Minety OHL CBs

Activities	Date
Sanction	[redacted]
Gate C	[redacted]
ITT / Direct Award	[redacted]
Contract Award	[redacted]
First Site Access (post clearance)	[redacted]
Outages Start (proposed)	[redacted]
Site Works Complete	[redacted]
Gate D	[redacted]
Gate E	[redacted]

7.1.2 Procurement and Contracting Strategy

The procurement and contracting strategy for Minety adheres to the NGET procurement approvals process, ensuring that all projects meet strategic goals and technical requirements. This comprehensive approach involved a thorough assessment of different procurement options for the project, whereby the project has been procured via an established framework.

The project will be executed using the [redacted]

The main works contract is expected to be awarded using a [redacted] This offers a flexible contract approach that includes a gain share mechanism, making it suitable considering the market constraints and pending detailed design.

It is assumed that all materials and equipment required to complete this project will be procured and managed [redacted]

7.1.3 Risk and Risk Management

A risk management process has been used for managing reasonably foreseeable risks. The process is in line with ISO 31000:2009, Risk Management - Principles and Guidelines. Table 10 below lists the key risks and mitigation strategies for Mintey. A comprehensive risk register for the project is available within the cost model.

Table 10: Delivery risks for Project Minety

Description	Mitigation
Vegetation Clearance Tree and vegetation clearance is scheduled for [redacted] contingent upon obtaining the necessary consents. Any delays in the approval of these consents and licenses could potentially delay the program."	Discharge conditions well in advance of site clearance and start of development. Hold meetings with Wiltshire Council to understand detailed expectations required to discharge conditions.
System Outages Outages required at Minety must be carefully planned and agreed upon with Network planning Team and NESO. There is a risk that the necessary outages may not align with the current program dates or the proposed outages may not be available, leading to delays in completing the works.	Engage with Network Planners to check availability. Input from the contractor before contract award to minimise the likelihood of insufficient or unrealistic outages being booked.
Existing Site & Asset Conditions The condition of existing assets, including concrete and steel support structures, is uncertain. Variations in site conditions may necessitate additional remedial works, potentially increasing costs and rescheduling work activities.	Start early engagement between the Site ops team and main contractor to understand experience/knowledge of site conditions. Carry out surveys if required.
Unforeseen Ground conditions Ground investigation surveys have yet to be undertaken on site due to the planning and consent restrictions around clearance. Historical evidence indicates favourable ground conditions however this will need to be formally validated prior to completion of design. Since earthworks are likely to take place during the winter months, there is an increased chance of encountering undesirable ground conditions.	The main contractor and design assurance team should check existing records at the earliest opportunity. Required surveys should be conducted as soon as possible, and necessary actions should be implemented early and potentially during mid-clearance period. Collaborate with the main contractor to understand their mitigation plans for dealing with less favourable conditions, whether these impact the type of civil design or the constructability aspects of the earthworks.
System Outages – Cancellation Parts of the network can only be taken offline if the remaining network can compensate for the capacity loss. NESO may cancel NGET's pre-booked outage at any stage to address system issues elsewhere, ensuring adequate network supply and distribution. Other regional projects requiring outages at the same time pose a risk of cancellations, delays, or changes, potentially delaying the completion of works within the scheduled outage and therefore a risk to the overall programme of works.	Engage with Network Planners to discuss programme requirements and monitor outage constraints and interfaces. Identify potential risks of outage changes early to allow appropriate mitigation plans. To be agreed with the main contractor.

8. Conclusion

This document is NGET's MSIP submission to Ofgem for the installation of auxiliary assets to Minety 400kV substation to facilitate SEPD's Active Network Management scheme.

This investment is to provide two circuit breakers on OHL at Minety for SEPD's ANM Scheme, which will increase network stability and resilience. It is submitted with reference to Special Condition 3.14 of NGET's Transmission Licence. Table 11, below, summarises the main investment driver, the selected option, estimated costs and expected outputs.

Table 11: MSIP Investment Summary

<table>
<tr><td>Main drivers</td><td colspan="3">It is driven by a signed customer connection request for the mitigation of the double circuit fault through installation of auxiliary assets. This is to facilitate better functioning of the SEPD ANM Scheme to improve network resilience on the demand side and support more efficient customer connections.</td></tr>
<tr><td>Selected Option</td><td colspan="3">D- 1: Hybrid OHL CBs Solution
Installation of 400kV AIS CB solution on Mesh Corner 2 - Cowley-Minety OHL Circuit
Installation of 400kV single module SF6 insulated CB solution on Mesh Corner 4 - Melksham-Minety 1 OHL Circuit.
The solution encompasses the design, supply, and installation, including all associated works such as protection and control (P&C), compound extension, land purchase, land clearance, and earthworks.</td></tr>
<tr><td rowspan="2">Estimated Cost & Spend Profile (Direct Project Costs)</td><td colspan="3">Our total cost for the investment and funding allowance being sought is:
The current total cost of the project is: [redacted]
The total direct cost of the project - the funding this MSIP seeks is: [redacted]</td></tr>
<tr><td>T2 (FY2022 - FY2026): [redacted]</td><td>T3 (FY 2027 - FY2031): [redacted]</td><td>T4+ (FY 2032+):
N/A</td></tr>
<tr><td>Outputs</td><td colspan="3">This project will provide the installation of two circuit breakers and associate works at Minety 400kV substation to mitigate the impact of a double circuit fault on the overhead line circuits and improve network security. Improving the network resilience and flexibility will enable more efficient customer connections for SEPD via their ANM scheme, which will allow for greater renewable and low carbon energy integration within the electricity network.</td></tr>
<tr><td>PCD Primary Output</td><td colspan="3">Installation of a circuit breaker on both Cowley-Minety OHL circuit & Melksham-Minety 1 OHL circuit at Minety 400kV substation by [redacted]</td></tr>
</table>

Following the investment driver to address flexibility issues (SEPD) Active Network Management Scheme), we conducted a robust assessment of various detailed options for Minety 400kV substation. This assessment sought to balance the need to deliver the connection within the contracted deadlines, whilst facilitating the connection of future customers, minimising harm to the environment, and creating a network capability of handling a future low carbon energy system.

The conclusion of NGET's optioneering analysis is its proposal to install two circuit breakers on OHL circuits (Cowley & Melksham 1) at Minety 400 kV substation using a hybrid solution. The proposed design aims to provide the necessary infrastructure and ensure a reliable and efficient connection, and the greatest benefits in terms of consumer value.

9. RIIO-T1 and RIIO-T2 allowances

There were no investments proposed for this project during either RIIO-T1 or T2 business plans submissions. The Project does not have funding through any other price control mechanism.

10. Assurance and Point of Contact

Provided with the MSIP portfolio submissions is 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.

This confirmation is provided by the Head of Future Price Controls, Electricity Transmission. 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:

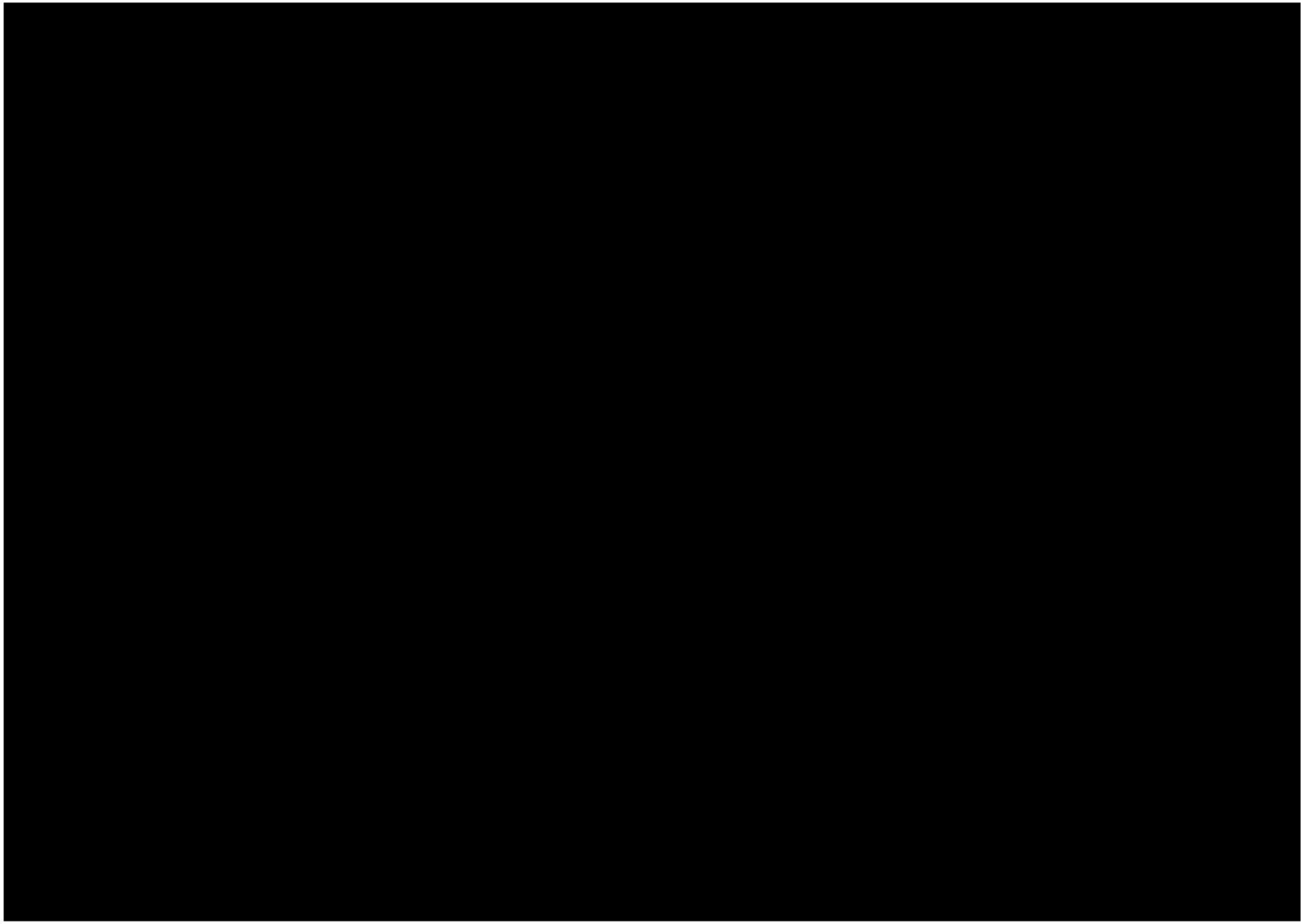
a. It is accurate and robust, and that the proposed outcomes of the MSIP submission are financeable and represent best value for consumers.

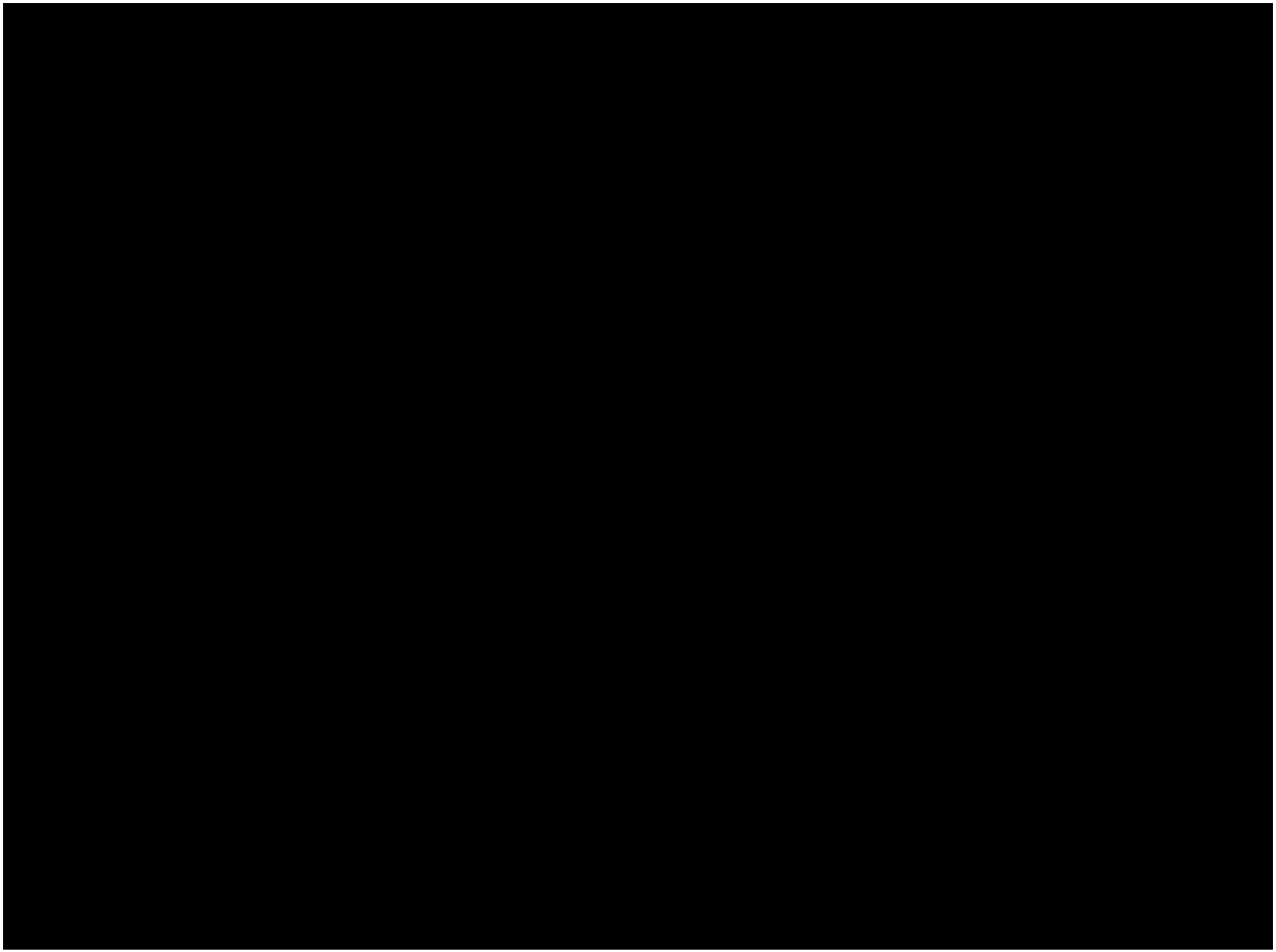
b. There are quality assurance processes in place to ensure the licensee has provided high-quality information to enable Ofgem to make decisions which are in the interests of consumers.

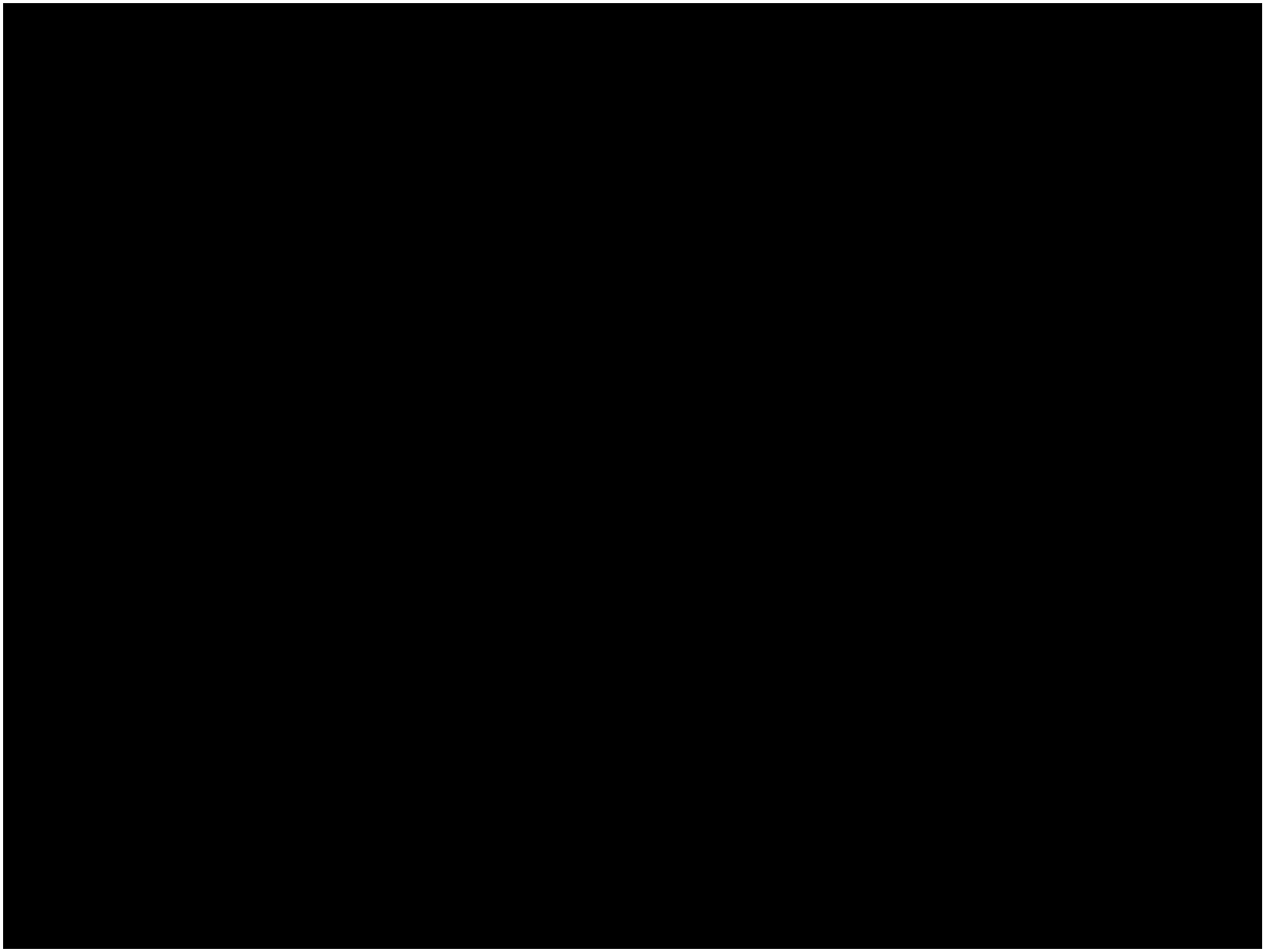
c. The application has been subject to internal governance arrangements and received sign off at an appropriate level within the licensee.

NGET's designated point of contact for this MSIP application is Leo Michelmore, Strategic Upgrade Regulatory Manager (leo.michelmore@nationalgrid.com).

Appendix A: [redacted]







Appendix B: Glossary

Acronym	Definition
AIS	Air Insulated Switchgear
ANM	Active Network Management
BNG	Biodiversity Net Gain
CAI	Closely Associated Indirect
CB	Circuit Breaker
CBA	Cost Benefit Analysis
CVT	Capacitive Voltage Transformer
DAR	Delayed Auto Reclose
DCB	Disconnecting Circuit Breaker
DNO	Distribution Network Operator
ECC	Engineering Construction Contract
ECI	Early Contractor Involvement
EPC	Engineering, Procurement, Construction
GCN	Great Crested Newt
GSP	Grid Supply Point
IDNO	Independent Distribution Network Operator
LPA	Local Planning Authority
MC	Mesh Corner
MH	Material Headroom
MSIP	Medium Sized Investment Project
MVA	Megavolt-Amperes
NESO	National Energy System Operation
NGET	National Grid Electricity Transmission
OHL	Overhead Line
RMHZ	Risk Management Hazard Zones
SEPD	Southern Electric Power Distribution
SF6	Sulphur Hexafluoride
SGT	Super Grid Transformer
SSEN	Scottish and Southern Energy Networks

Appendix C: Cost Model

Please see the accompanying Cost Models submitted alongside this MSIP: ‘Appendix C Minety – MSIP Jan 25 – Cost Model’

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