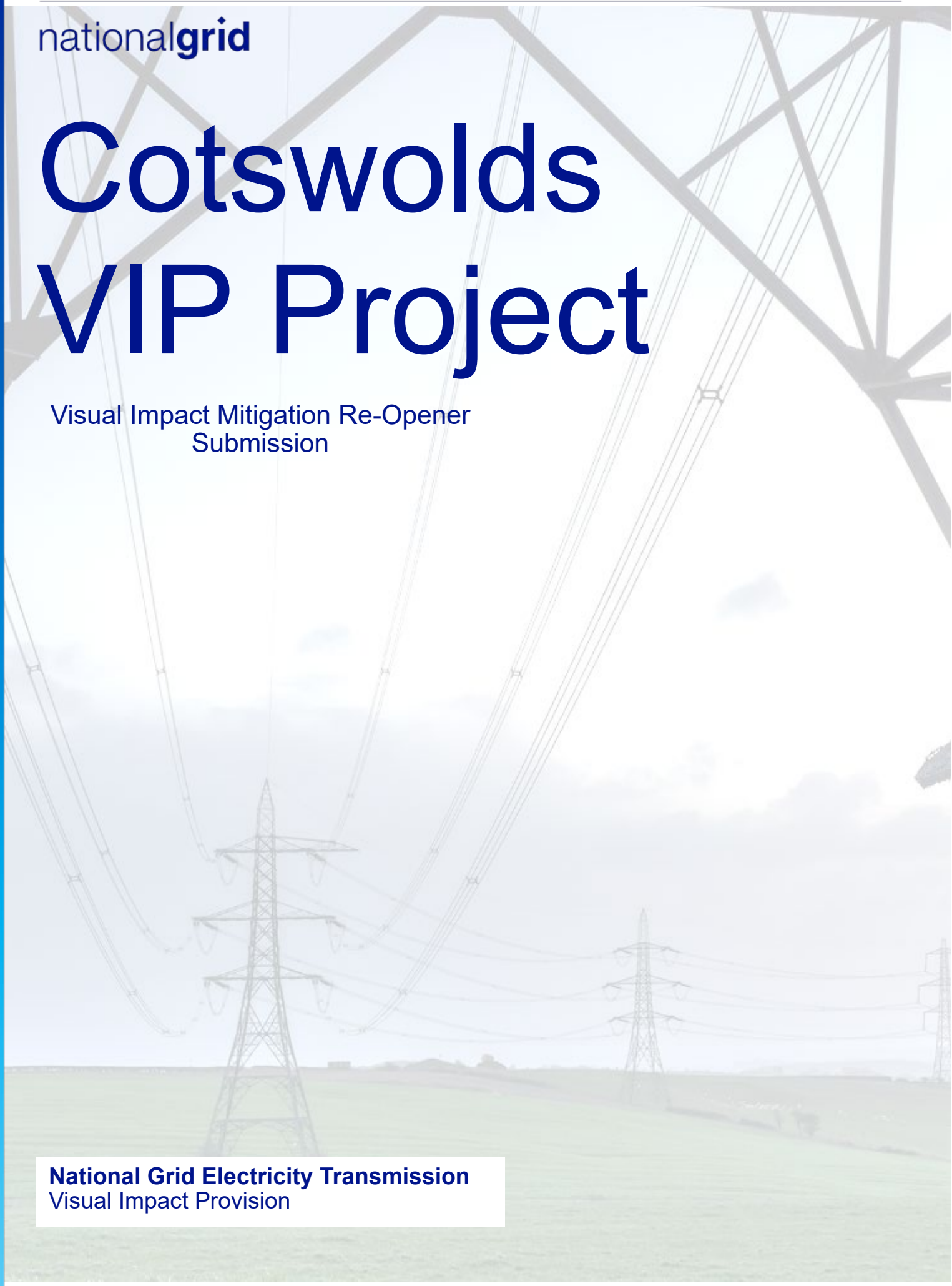
nationalgrid

# Cotswolds VIP Project

## Visual Impact Mitigation Re-Opener Submission



**National Grid Electricity Transmission**
Visual Impact Provision

May 2025

# Investment Summary

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| **Project Name** | Cotswolds Visual Impact Mitigation Project | **Delivery year** | 31/12/2030 |
| **Relevant licence condition** | Special Condition 3.10 (Visual Impact Mitigation Re-opener and Price Control Deliverable and Enhancing Pre-existing Infrastructure Projects allowance (VIMREt and EPIt)). | | |
| **Drivers for the Investment** | This project is being delivered as part of NGET's Visual Impact Provision initiative, a programme established by Ofgem to reduce the visual impact of existing high-voltage transmission infrastructure in nationally protected landscapes across England and Wales.<br><br>Within the Cotswolds National Landscape, the overhead line section identified for intervention was assessed by an independent landscape and visual impact assessment and our Stakeholder Advisory Group (SAG) as having an impact of 'High Importance' under the agreed landscape and visual impact assessment criteria, making it a priority for investment under the VIP programme.<br><br>The project has been shaped through sustained public and stakeholder engagement, building strong community support since public its public introduction in 2021. It is therefore a long-standing, well-supported initiative reflecting local and environmental priorities, and is widely viewed as a justified intervention to reduce the visual impact of transmission infrastructure. | | |
| **Key considerations & challenges** | **Increasing system capacity:** The undergrounding section interfaces with an overhead line uprating project, which needs to be coordinated in terms of timing and design. The VIP project will uprate the existing circuit in line with the wider increase in capacity.<br><br>**Environmental:** The site lies within the Cotswolds National Landscape, requiring careful assessment of landscape and visual impacts, especially around high-sensitivity receptors and protected features.<br><br>**Challenging Topography:** The steep terrain and poor ground conditions in some areas require careful design and construction methods to manage construction risk.<br><br>**Stakeholder and Community Engagement:** As a high-profile project in a protected landscape, demonstrable and ongoing stakeholder engagement is essential to support the planning case and reduce objections.<br><br>**Planning Consent & Archaeology**: The project requires planning permission under multiple consent regimes. The project area has a high risk of archaeological presence, requiring careful attention and assessment to mitigate. | | |
| **Proposed Solution** | The Cotswolds VIP project will remove a net amount of 16 pylons and approximately 7.4 km of overhead electricity transmission line from within the Cotswolds National Landscape and replace them with approximately 7km of underground cable, significantly reducing visual impact in this protected area. This section of overhead line selected for undergrounding via the project was prioritised by our VIP Stakeholder Advisory Group (SAG).<br><br>To support the undergrounding of the transmission line, two shunt reactors will also be installed at Feckenham and Melksham substations, ensuring system stability and ongoing network performance. | | |
| **Outputs of the Investment** | The Cotswolds VIP project will deliver a substantial and enduring improvement to the nationally protected setting of the Cotswolds landscape through the removal of the overhead line section.<br>By restoring uninterrupted views and enhancing the natural character of the surrounding area, the project directly fulfils stakeholder priorities focused on improving landscape quality and promoting public enjoyment. It will improve the experience for those accessing the area on foot, by bike, or for leisure, reinforcing the value of protected landscapes as places of tranquillity, recreation, and scenic appreciation.<br>The investment outcome realises the benefit of the funding provision, as outlined Ofgem's RIIO-T2 Final Determinations: *Restoring the quality of visual amenity in National Parks, Areas of Outstanding Natural Beauty and National Scenic Areas for the enjoyment of current and future consumers.* | | |

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| **PCD Primary Outputs** | Remove a 7.4km section of 400kV double circuit overhead line (OHL) and 18 towers with associated conductor and fittings and replace with 7km of 400kV double circuit underground cable in the Cotswolds National Landscape area. Associated construction of two new towers at sealing end compounds, resulting in net removal of 16 towers.<br>Install two new sealing end compounds to connect the new section of underground cable to the existing overhead line.<br>[redacted] | | |
| **Forecasted Cost (price base 2018/19)** | Our forecast total cost for the investment and funding allowance being sought is (in 2018/19 Prices):<br>• The current estimated total cost of the project is £190,246,552<br>• The total direct cost of the project – the funding this request seeks – is £ 177,558,711 | | |
| **Spend profile (Direct)** | **T2 (FY2022 – FY2026):**<br>[redacted] | **T3 (FY 2027 – FY2031):**<br>[redacted] | **T4+ (FY 2032+):**<br>[redacted] |
| **Historical funding interactions** | [There are no Early Asset Write-Off costs associated with these investments.] | | |

# Contents

# 1. Executive summary

## 1.1 Context

This submission paper presents our proposal for undergrounding a 7.4km subsection of two 400kV overhead line circuits (Feckenham – Minety and Feckenham – Walham) which form part of the ZF route double circuit, and associated removal of pylons within the Cotswold National Landscape, in accordance with NGET's Visual Impact Provision (VIP) policy.[1] The section will be replaced by an underground cable system. Approval for this investment is requested under Special Condition (SpC) 3.10 of NGET's RIIO-T2 licence, which makes provisions for funding requests for projects aimed at mitigating the visual impact of existing transmission infrastructure in designated landscapes.

This submission seeks to secure the necessary allowances, including efficient costs incurred, to enable us to proceed with financial commitments with the supply chain so that we can deliver the project in line with our programme and proposed system access dates, which are aligned with other customer connection projects, thereby not adding additional burden to the transmission system.

## 1.2 What is the background to this Investment?

The transmission network and related business activities can have adverse impacts upon the environment and stakeholders expect the companies to take appropriate steps to mitigate their environmental impacts, including visual amenity issues relating to infrastructure.

As part of the RIIO-T2 price control framework, Ofgem has established a £465m provision (18/19 prices) for electricity transmission owners (TOs) to reduce the impact of pre-existing electricity transmission infrastructure in designated and protected landscapes in England and Wales. This funding provision was informed by consumer valuation, as determined through a Willingness to Pay (WTP) study, which highlighted the public's desire for improved visual amenity and preservation of scenic quality in these valued landscapes. The provision reflects Ofgem's commitment to aligning transmission investment with consumer priorities concerning the presevation of valued lanscapes.

An electricity transmission licensee can propose a new Visual Impact Mitigation PCD Re-opener and request funding for projects under the RIIO-T2 price control frameworks, as long as it has a policy in place for working with stakeholders on the selection of visual impact improvement projects within their transmission area. Ofgem approved NGET's latest VIP policy for the RIIO-T2 period in November 2023, confirming support for its implementation in project selections for the RIIO-T2 period. The North Wessex Downs VIP project was our first submission in RIIO-T2 under the updated VIP Policy, receiving funding approval in 2024. As with North Wessex Downs, and other VIP projects, the Cotswold VIP project meets the principles outlined in our VIP Policy.

The project was formally agreed to be taken forward for development for RIIO-T2 by the VIP Stakeholder Advisory Group (SAG) in 2020, after Ofgem confirmed the visual impact provision framework would be retained from RIIO-T1. The selection process for the project involved reconsideration of an initial landscape and visual assessment carried out in 2014 of all 571km of NGET transmission lines in National Parks and National Landscapes[2] in England and Wales, which led to the identification of a section of the transmission line in the Cotswolds as having landscape and visual impacts of high importance. We progressed on SAG's proposal and agreed to carry out more detailed development and survey work to determine the feasibility of the project.

**Why was this section of overhead line selected for the project?**

This section of overhead line was identified by an independent landscape and visual impact study as having some of the greatest landscape and visual impacts within a protected area. It runs through the Cotswolds National Landscape, a Category V protected area of environmental and cultural significance.

[1] In November 2023, Ofgem confirmed its support to National Grid in implementing our policy in its Assessment of National Grid Electricity Transmission's revised visual impact provision policy 2023

[2] When Ofgem established the visual amenity provision, it referred to National Parks and Areas of Outstanding Natural Beauty. In 2024, the latter were rebranded to 'National Landscapes' however their legal designation remains unchanged. These terms are therefore used interchangeably throughout this document.

The line is visually intrusive and affects key viewpoints and receptors, including users of the Cotswold Way National Trail, Belas Knap Neolithic burial site, and Cleeve Common. Its removal is expected to deliver a significant visual improvement in a highly valued and widely enjoyed landscape, aligning directly with the purpose of the funding provision.

This investment forms part of a carefully selected portfolio of projects delivered under the VIP policy. As we undertake the infrastructure investment needed to support net zero and economic growth, it remains essential to address stakeholder expectations around the impact of our network activities on the environment and landscapes. This includes taking appropriate steps to mitigate adverse effects on visual amenity. In identifying the Cotswolds VIP project as an impactful and beneficial project to address these concerns, we ensure that value is delivered to consumers and to stakeholders who value and enjoy national landscapes, and that the project is supported by the communities it affects.

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

The optioneering process for the siting of key project elements was guided by a robust qualitative assessment framework that considered stakeholder input, environmental, socio-economic, technical, and cost-related criteria to deliver the project in the best interest of the landscape's stakeholders and consumers. This framework was applied to all project elements where alternatives were available, while in other areas practical or other constraints meant limited or no viable options were present.

Main Works

**Cable Sealing End Compounds (CSECs**): Siting options were assessed at both ends of the undergrounding section, three in the north and six in the south. Preferred locations were selected based on balancing technical feasibility with visual impact and ease of access.

**CSEC Permanent Access Roads:** Three permanent CSEC access roads were considered in the north, with the preferred option guided by stakeholder engagement. The southern access road selected required no optioneering due to its direct roadside location.

**Underground Cable Routing:** Route development was split into three sections, with preferred alignments selected within each section to minimise environmental impact, construction risk, and disruption to landowners. In Section 3, a hybrid of two options was selected to navigate both steep terrain and visual sensitivities.

[redacted] *We request a timely 'minded to' decision on the project submission by December 2025, as set out in Ofgem's reopener guidance, to finalise the project's Main Works contracts.*

Additional Assets

**Shunt Reactors:** Two new reactors are required for voltage control (not part of the main works contract). Feckenham substation was the only viable location in the north, with seven possible layout options reviewed at the substation. In the south, Melksham was selected from a broader qualitative assessment, evaluating 13 options across five substations. Melksham 400kV substation was identified as the preferred option, providing the necessary space and network integration with the least disruption.

[redacted]

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

The preferred option for the Cotswolds VIP project is to underground a section of the existing 400kV Feckenham – Walham and Feckenham – Minety overhead line double circuit.

The project scope includes:

- Cable Undergrounding: Replacement of approximately 7.4km of existing overhead line with 7km of underground XLPE 400kV cabling, using two cables per phase, between towers ZF308 and ZF325.
- Cable Sealing End Compounds (CSECs): Installation of transition compounds at both ends of the cable route to transition circuits back to the overhead line, with permanent access from public highways.
- Temporary Works: Construction of temporary access roads and temporary bypassing of the 400kV overhead line to facilitate safe construction of CSECs, particularly avoiding oversailing conductors.
- Shunt Reactors: at Feckenham and Melksham 400kV substations to support system voltage stability.
- Removal and Reinstatement: Permanent removal of existing overhead conductors, pylons, and foundations, with full land reinstatement to restore the landscape.
- Circuit Uprating: Uprating of the underground circuits from their existing overhead line ratings, in line with wider system reinforcement drivers identified through the transitional Centralised System Network Planning (tCSNP) framework and customer connection requirements.

By delivering this scope of work, the Cotswolds VIP project will significantly reduce the visual impact of high-voltage infrastructure in this valued landscape and will uprate the circuit and increase network capacity in the area. The removal of pylons and overhead lines will enhance views for both local residents and the c.23 million annual visitors (who add approximately over £1bn to the local economy), helping to preserve the natural beauty of the Cotswolds National Landscape, in line with stakeholder and public expectations.

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

The Cotswolds VIP project has been closely coordinated with interfacing uprating projects for the 400kV Feckenham – Walham and Feckenham – Minety overhead line circuits. These separate uprating works have been identified as necessary to meet customer connection requirements and wider drivers set out under the tCSNP framework.

The underground cable design aligns with the following continuous rating requirements:

- Winter ratings - Continuous 2830 MVA
- Spring-Autumn ratings - Continuous 2770 MVA
- Summer ratings - Continuous 2680 MVA

These ratings are designed to to strengthen the capability of the transmission system, ensuring the system is capable of meeting current and future demands. There are three main benefits to this solution.

1. Alignment with the separate interfacing overhead line uprating projects means that the ratings across the entire circuit length will be delivered.
2. Physical proximity of the two projects allows for shared materials, resources, and coordination, reducing duplication and costs.
3. Both projects will be delivered during the same planned system outage periods, minimising operational disruptions and reducing the burden on the transmission system.

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

[redacted]

**Risk Contingency**

The risk management approach for the Cotswolds VIP project ensures risks are managed effectively and economically by the parties best positioned to do so. A comprehensive portfolio of risks to be managed by NGET has been identified through workshops and monthly risk reviews, with Quantitative Cost Risk Analysis (QCRA) conducted based on the project's risk register. [redacted]

# 2. Introduction

## 2.1 Context

This paper sets out NGET's funding request for the Cotswolds Visual Impact Provision (VIP) Project under the established RIIO-T2 Visual Impact Mitigation Price Control Deliverable (PCD) reopener. This reopener submission is made in accordance with Special Condition (SpC 3.10[3]) of National Grid Electricity Transmission (NGET) Transmission's Licence, which details the RIIO-T2 framework requirements for project proposals to mitigate the visual impact of existing transmission infrastructure in designated landscapes.

The Cotswold VIP project aims to permanently remove a section of the existing 400kV Feckenham – Minety and Feckenham – Walham overhead line circuits (ZF.2(B)) and associated pylons from the Cotswold National Landscape, replacing it with an underground cable solution. By 31/12/2030, the targeted section, which crosses the visually sensitive Cotswold Landscape will be removed, significantly reducing visual intrusion and helping to preserve and enhance the natural character of the area.

### Regulatory Framework and Policy Context

In the RIIO-T2 Sector Specific Methodology Decision (SSMD), Ofgem affirmed that a core objective of the RIIO-2 framework is for network owners to reduce the adverse environmental impact of their network activities and support the UK's transition to Net Zero. As part of this, Ofgem chose to retain the existing RIIO-T1 provision to mitigate the visual impact of existing transmission infrastructure in protected landscapes and continue addressing visual amenity issues associated with electricity transmission assets, in line with clear consumer and stakeholder support.

In the RIIO-T2 Final Determinations[4], Ofgem set an overall funding provision of £465 million (2018/19 prices) for the three electricity Transmission Owners to undertake VIP interventions in RIIO-T2. This was deemed to strike the right balance of allowing:

*"for the delivery of visual amenity outputs that are highly valued by consumers at an exceptional time when there will be high competing demand on the TOs to deliver on Net Zero imperatives, and the financial position of some consumers are under intense pressure from the economic fallout of the COVID-19 pandemic"*

The funding allowance determined by Ofgem was underpinned by robust stakeholder engagement and updated evidence on consumer willingness to pay. The Cotswolds VIP investment has been developed and falls within this framework and funding allowance set by Ofgem for RIIO-T2.

### Stakeholder-Led Development

The Cotswolds VIP project has been developed fully in accordance with NGET's revised VIP Policy[5], which was reviewed and approved by Ofgem as a pre-requisite for any visual impact mitigation reopener submission during the RIIO-T2 period. This means that the project has been carefully selected and shortlisted based on objective visual impact criteria, developed in

[3] Visual Impact Mitigation Re-opener and Price Control Deliverable and Enhancing Pre-existing Infrastructure Projects allowance.
[4] www.ofgem.gov.uk/sites/default/files/docs/2021/02/final_determinations_et_annex_revised.pdf (Paragraph 2.138)
[5] NGET VIP Policy

close collaboration with local communities, statutory consultees, and professional bodies, and reflects a project that is highly anticipated and publicly supported. This submission demonstrates how the project has been developed in line with the VIP Policy and provides evidence of the efficient costs associated with delivering the proposed works.

**Beyond RIIO-T2**

For RIIO-T3, we have followed Ofgem's recommendation not to initiate any new VIP projects during RIIO-T3. The rationale is to avoid limiting the network's ability to deliver on wider strategic and Net Zero priorities during that period. Instead, NGET will focus on completing the three in-flight VIP projects agreed with the VIP Stakeholder Advisory Group, including the Cotswolds project. These projects are expected to deliver significant visual and landscape enhancements while also contributing to the capacity upgrades required to increase network capability and connect low-carbon generation in the future.

## 2.2 Chronology to the Request

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| RIIO-T1<br>Establishment of the Visual Impact Mitgation Provision | • As part of the RIIO-1 price control framework, Ofgem introduced a £500m visual impaction mitigation provision for TOs to mitigate the impacts of pre-existing transmision infrastructure in designated areas.<br>• Ofgem approved NGET's original VIP policy in March 2014, which set out how we will work with stakeholders during RIIO-T1 to identify visual impact improvement projects and to maximise the benefits of these for consumers. |
| Development of a Stakeholder Advisory Group | •Our VIP Policy outlined that we would establish a dedicated Stakeholder Advisory Group (SAG) to assist in identifying, evaluating, and prioritising visual mitigation projects.<br>•The group would comprise organisations with national remits for England and Wales. In April 2014, we established our SAG which included representatives from 15 organisations, including Ofgem, focused on landscape and countryside protection across England and Wales. |
| NGET Landscape and Visual Impact Assessment | In 2014, NGET commissioned a Landscape and Visual Impact Assessment (LVIA) of all 571km of transmission lines in National Parks and Landscapes in England and Wales. The outcome of this assessment was the basis for all VIP projects taken forward by NGET for further consideration. |
| RIIO-T2<br>Retained Visual Impact Mitigation Provision | • In its RIIO-T2 Final Determinations in December 2020, Ofgem retained the existing visual impact mitigation provision with a £465m provision for TOs.<br>• SAG confirmed that the North Wessex Downs (NWD) and Cotswold VIP (2020) projects should be taken forward for the RIIO-2 price control.<br>• Ofgem approved our updated VIP policy in 2023. |
| RIIO-T2<br>Project Submissions | • The NWD VIP re-opener application was submitted to Ofgem in February 2023 as the first of NGET's VIP project submissions for the RIIO T2 period.<br>• Ofgem acknowledged, in its funding Decision for NWD VIP in August 2024, that NGET intended to submit the Cotswold VIP project under the RIIO-T2 price control. |

## 2.3 The importance of the project

The Cotswolds VIP project represents a significant opportunity to deliver transformational visual and environmental benefits to one of the most valued and protected landscapes in England. The project is designed to restore the natural skyline and improve scenic views across the Cotswold Landscape, including along iconic public access routes such as the Cotswold Way National Trail. The project will also protect the visual setting of important heritage assets, including Belas Knap Neolithic burial site and Cleeve Common, safeguarding their cultural and landscape context for future generations. In doing so, the project will enhance the visual accessibility and enjoyment of the landscape, supporting local wellbeing, tourism and the rural economy. The landscape welcomes approximately over 23 million visitors a year, generating in excess of £1 billion annually for the local economy.

The project has been developed through a collaborative approach, shaped by sustained engagement with local communities, statutory bodies, professional organisations including the SAG. Since 2021, we have been actively engaging with the public and local stakeholders to shape the project solution with the strongest possible community support and consent. Through multiple rounds of consultation events and community engagement sessions, we have kept local stakeholders informed and incorporated their feedback into the project development. This extensive engagement undertaken has ensured that the project reflects community and environmental priorities, as well as planning considerations. As a result, the Cotswolds VIP project is not only technically robust but is also supported by public stakeholders and is viewed as a highly anticipated and well-justified intervention to mitigate the visual impacts of transmission infrastructure within the Cotswolds landscape.

While the formal purpose of VIP projects under the RIIO-T2 framework is to address the visual impact of existing infrastructure, the Cotswolds VIP project has been carefully developed to deliver wider system benefits where possible. Specifically, its delivery has been aligned with the planned uprating works on the Feckenham–Walham and Feckenham–Minety overhead circuits. By coordinating outages and integrating the work programmes, the project will avoid outage duplication and minimise disruption to the transmission system, to the benefit of consumers. Delivering the project in this coordinated way is considerably more efficient than delivering it in isolation at a later stage.

Additionally, when considering the future NGET portfolio of underground cable projects, the Cotswolds VIP Project plays a key role in upskilling resources and developing specialist skills within the external supply chain. This will help build the expertise necessary for delivering larger, net-zero-focused cabling projects during the RIIO-T3 period and beyond.

## 2.4 Regional context

The Cotswolds National Landscape, formerly known as the Cotswolds Area of Outstanding Natural Beauty (AONB), is the largest of the 38 designated National Landscapes in England and Wales. The landscape sits at the heart of a historically and environmentally significant region of southern and central England. It holds significant importance, not only for its scenic and ecological value but also for its cultural heritage and recreational use, which attracts millions of visitors annually.

The landscape is internationally recognised as a Category V protected area by the International Union for Conservation of Nature (IUCN), highlighting its importance as a lived-in, working landscape shaped by the interaction between people and nature.

The VIP project lies within the eastern part of the Cotswolds National Landscape, situated between Cheltenham and Cirencester. Located to the north of the Cotswolds, Feckenham serves as a key transmission node. The Feckenham–Minety and Feckenham–Walham 400kV double-circuit overhead line (ZF) passes through the Cotswolds National Landscape and links these major substations. The prominence of the line as it enters the Cotswolds National Landscape from the northeast near Ashton under Hill, rises through Prescott, and descends toward the southeast edge of Cheltenham, has been identified for its visibility and impact on landscape character.

*Figure 1 – ZF overhead line circuits within the Cotswolds National Landscape*

South of the VIP project area, Minety is a key substation supporting power flows to the southwest. It plays an important role in balancing generation and demand across Wessex and the Severn Vale. The ZF route continues toward Minety from within the VIP project area. Located to the west of Cheltenham, Walham is a critical grid site both for conventional (e.g. fossil fuel-based power stations) and non-conventional generation (e.g. solar power and battery storage) sources.

The ZF route closely parallels the Cotswold Way National Trail and intersects with other regional walking and cycling routes, including the Winchcombe Trail and key access points to Cleeve Common and Belas Knap Neolithic burial site — all locations of high recreational and cultural value. These areas attract millions of walkers, cyclists, and tourists annually. Most of the area is covered by farmland and rich limestone grassland, with the Cotswolds holding over half of the country's flower-rich Jurassic limestone grassland, a unique ecological feature that underscores the region’s environmental significance.

To the southeast of the Cotswolds, the North Wessex Downs National Landscape forms another protected landscape of national significance, with direct relevance to the VIP programme, notably, the North Wessex Downs was the subject of NGET’s first VIP project submitted under RIIO-T2. While the North Wessex Downs area is not directly crossed by the ZF route, its proximity highlights the regional concentration of high-value landscapes impacted by overhead transmission infrastructure.

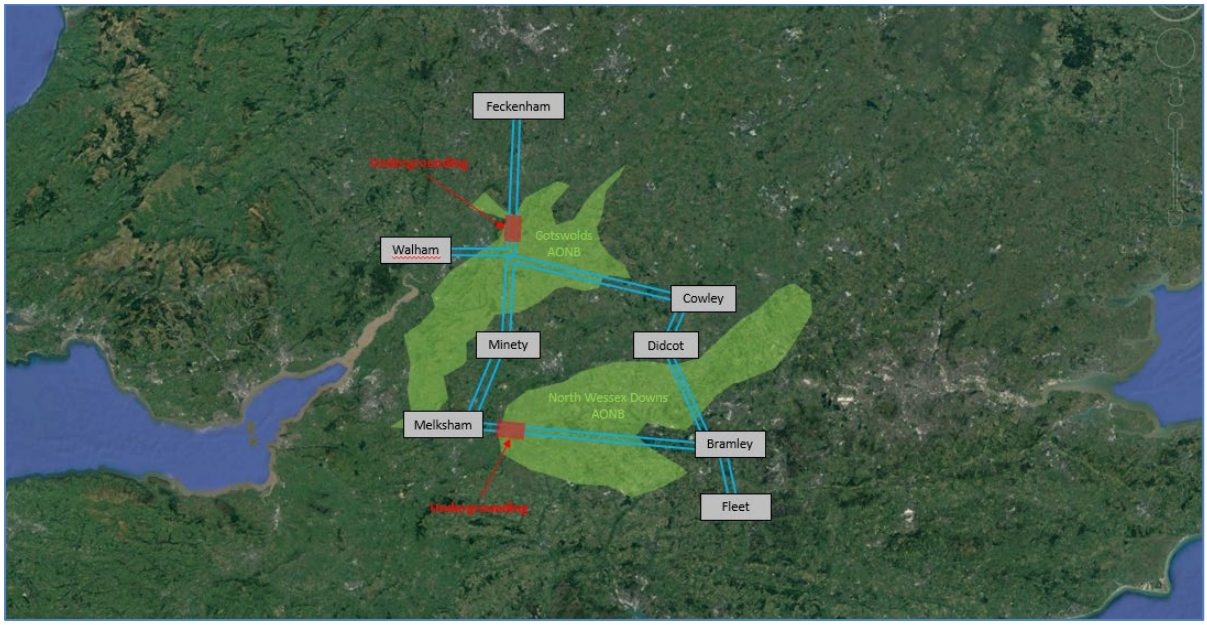


*Figure 2: Geographical Context to the Cotswold VIP Project*

## 2.5 Scope of the Cotswold VIP Submission

The remainder of this submission sets out the selection of, and the justification for, the technical scope of the proposed visual impact mitigation works. It outlines the specific intervention measures proposed, stakeholder engagements carried out, and an evaluation of the delivery programme, alongside efficient cost estimates, and the project's benefits for the landscape stakeholders. The submission also provides a thorough assessment of the risks associated with the project, along with mitigation strategies to manage them effectively.

# 3. Needs Case and Project Selection

**Key Messages**

This chapter outlines the project's needs case, and our process in line with our VIP Policy, for identifying eligible visual impact mitigation projects, and the subsequent shortlisting that resulted in the selection of the Cotswold VIP Project for further development.

- The need for the Cotswolds VIP project is underpinned by strong public and stakeholder support for the environmental and cultural preservation of protected landscapes, as recognised by Ofgem in the RIIO-T2 Sector Specific Methodology Decision (SSMD).
- An independent landscape assessment of NGET transmission lines and input from the VIP SAG prioritised a section of overhead line in the Cotswolds as a strong candidate for intervention during RIIO-T2.
- In line with our VIP Policy, our considerations for a technical and financially viable project in the best interest of consumers, led to the selection of a specific subsection of the prioritised overhead line as the focus of intervention for the Cotswold VIP project.

## 3.1 Establishing Need

### Protected National Landscape

The Cotswolds is recognised by the International Union for Conservation of Nature (IUCN) as a Category V protected landscape, a designation reflecting its national and international importance as an area managed primarily for landscape protection and recreation. It is one of the most extensive and ecologically valuable National Landscapes in England. The landscape is dominated by historic farmland, rolling escarpments, and extensive recreational access routes. Cultural and historic assets such as the Cotswold Way National Trail, Belas Knap Neolithic burial site, and Cleeve Common are directly affected by the visual presence of the existing overhead line. The existing pylons and overhead line detract from the landscape's natural beauty, diminishing the quality of experience for local stakeholders and millions of annual visitors to the landscape.

### Enduring Public Support and Stakeholder Consensus for Visual Impact Mitigations

Since RIIO-T1, Ofgem has made clear its expectation that Transmission Owners take greater responsibility for the visual impacts of transmission infrastructure, particularly in nationally designated landscapes. This reflects long-standing and consistent stakeholder concern and public sensitivity around the issue. The continuation of the visual impact mitigation framework into RIIO-T2 is therefore a response to clear societal expectations.

In its RIIO-T2 Sector Specific Methodology Decision[6] (SSMD), Ofgem reaffirmed that the visual presence of high-voltage infrastructure can have a significant and lasting impact on the enjoyment and character of the UK's most valued landscapes. These impacts affect public access to and appreciation of cultural, scenic, and environmental heritage. Ofgem's framework enables Transmission Owners to address such legacy infrastructure impacts efficiently and in a way that aligns with public sentiment.

[6] RIIO-2 Sector Specific Methodology Decision - Electricity Transmission

The strength of support for the visual impact mitigation framework is clearly evidenced in the RIIO-T2 SSMD, where 31 out of 32 stakeholders expressed support for extending the visual impact mitigation framework for RIIO-T2[7]. Respondents emphasised the framework's alignment with Ofgem's statutory obligations, particularly the duty to conserve and enhance natural beauty within National Parks and National Landscapes. Public support is also further demonstrated through robust consumer willingness-to-pay (WTP) evidence. Updated WTP research conducted by NGET for RIIO-T2 reaffirmed that consumers value, and are willing to fund, visual improvements in protected landscapes, reinforcing the framework's importance.

The Cotswolds VIP project has benefited from sustained community and stakeholder engagement since it was first publicly announced in 2021. It has attracted ongoing interest and constructive input from residents, local authorities, and professional bodies, including the SAG. The local investment in the development of the scheme reflects both the strength of support for the project and the expectations it has created. Delivering on this commitment is therefore important not only in line with Ofgem's regulatory framework but also in upholding trust with the communities who have helped shape the project.

**Independent Assessment of Visual Impact**

An independent landscape assessment (see further in Chapter 3.4), commissioned by NGET, identified a section of the 400kV overhead line circuits between Feckenham, Walham, and Minety as having visual impacts of 'High Importance'. The route passes through elevated and open terrain, where towers are visible across long distances and from highly sensitive public viewpoints. The assessment prioritised this section of line for potential mitigation based on both the sensitivity of the landscape and the magnitude of visual intrusion.

*Figure 3: Visual intrusion presented by the ZF.2 overhead line and pylons*

**Delivering on Statutory Duties to Protect Designated Landscapes**

[7] RIIO-2 Sector Specific Methodology Decision - Electricity Transmission - Paragraph 3.197

The development of the Cotswolds VIP project is reflective of the statutory responsibilities placed on both NGET and Ofgem to protect the environment and uphold the special status of designated landscapes.

As a licensed transmission owner, NGET is required under Section 9 of the Electricity Act 1989 to develop and maintain an efficient, coordinated, and economical system for the transmission of electricity. This responsibility is complemented by further duties under Schedule 9 of the same Act, which require licence holders to:

*"have regard to the desirability of preserving natural beauty, conserving flora, fauna and geological and physiographic features of special interest, and protecting sites, buildings and objects of architectural, historic or archaeological interest."*

The Cotswolds VIP project fulfils our responsibilities, in light of these duties, by mitigating the enduring visual impact of overhead transmission infrastructure to conserve the qualities of the Cotswolds National Landscape.

Similarly, Ofgem has environmental and public interest responsibilities when exercising its regulatory functions. These include having regard to:

- *The environmental impact* of network activities;
- *The purposes of National Parks, the National Landscapes*;
- *The conservation of biodiversity*; and
- *The interests of individuals residing in rural areas.*

## 3.2 Our VIP Policy

The Visual Impact Provision (VIP) Policy is the cornerstone of NGET's approach to visual amenity project selection. It sets out our approach to achieving our visual amenity objectives, including identifying a set of guiding principles, the creation of a Stakeholder Advisory Group (SAG) consisting of stakeholders with national remits for England and Wales, and ways of engaging other stakeholders.

The policy outlines a collaborative process, developed in consultation with stakeholders, to ensure that identified projects are not only aligned with stakeholder expectations but are also optimised to deliver enduring value for consumers. This includes working closely with environmental groups, local communities, and statutory bodies to determine where visual impact improvements will have the most meaningful effect.

In compliance with SpC 3.10.6 of our RIIO-T2 licence condition[8], we conducted a comprehensive review of our existing VIP policy, proposing minor revisions to enhance its effectiveness and alignment of the policy with priorities at the time. The revised policy document was submitted to Ofgem in 2021, where it underwent thorough review and received Ofgem's formal approval in 2023[9], reaffirming its role as a key element in driving impactful, consumer-focused project selection, where further potential updates are being considered to make the VIP more suitable to the current market. It had also been noted that updates to how major undergrounding projects are approved for funding was to be considered but based on the current price control ending in the near future this was deemed not appropriate.

### 3.2.1 Landscape and Visual Impact Methodology

Alongside our initial VIP policy, we also published a supplementary Landscape and Visual Impact methodology[10] which sets out a summary of the process and methodology that we

[8] National Grid Electricity Transmission Special Conditions 03 09 2021
[9] Assessment of National Grid Electricity Transmission's revised visual impact provision policy 2023
[10] NGET Landscape and Visual Impact Methodology

would apply to identify existing NGET infrastructure that has the greatest impact on National Parks and National Landscapes and offers the greatest opportunities for visual enhancement.

The methodology was prepared on behalf of NGET by Professor Carys Swanwick, a recognised expert in the field of landscape assessment. It gives an overview of the general approach to be implemented at our assessment stages for identifying and prioritising the sections of NGET transmission infrastructure in designated areas that have the most important adverse impacts on the landscape and visual amenity.

The Landscape and Visual Impact Methodology, and subsequent assessment framework, is based on the framework set out in *Guidelines for Landscape and Visual Impact Assessment (GLVIA) (3rd Edition) (2013*) published on behalf of the Landscape Institute and the Institute of Environmental Management and Assessment.

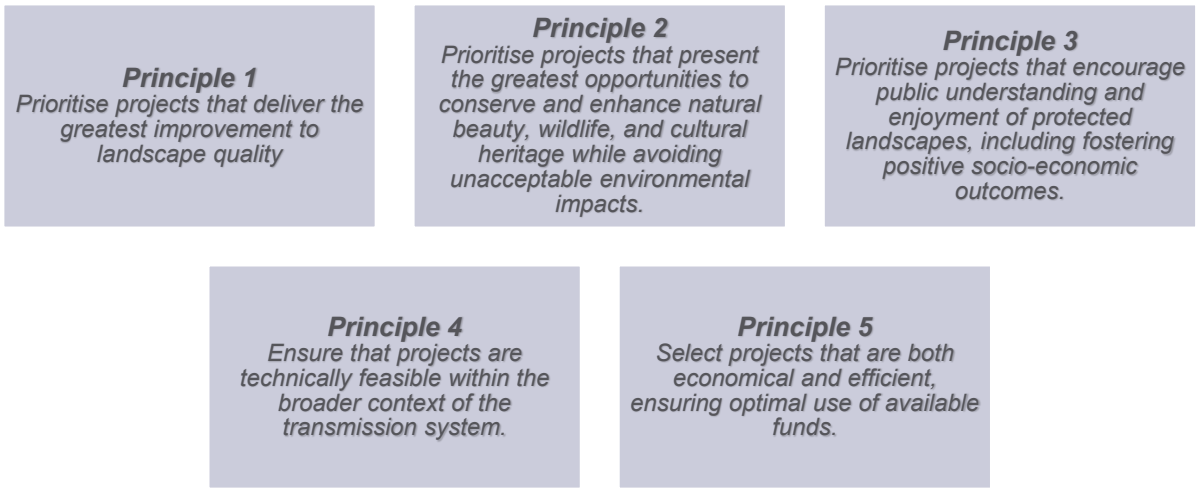
## 3.3 VIP Policy Implementation to Identify Potential Candidate Projects

| NGET VIP Policy Objective | *"To achieve the maximum enhancement to the landscape in England and Wales from the available funds whilst ensuring that no significant adverse impacts arise as a result".* |
|---|---|

The overarching objective of our VIP Policy is clear in that we aim to reduce the visual impact of our existing transmission network infrastructure in the most valued and protected landscapes in England and Wales, and in doing so, we seek to ensure that there no significant adverse impacts on the surrounding areas or environment as a result.

### 3.3.1 Guiding Principles

To fulfil our objective, our VIP Policy is guided by five key principles (outlined below). These principles serve as a foundation in our prioritisation process with stakeholders, helping to identify projects that maximise the benefits of our VIP programme. Recognising the potential for conflicting priorities, the policy also emphasises the importance of carefully balancing the below principles in decision-making.




These guiding principles have informed our considerations for VIP project selection and further shaped our development decisions for the Cotswolds VIP project and its intended outcomes, reflecting our commitment to responsible and effective visual impact mitigation of existing NGET infrastructure.

*Table 1: Cotswolds VIP Project against VIP Principles*

| VIP Principle | How does the Cotswolds VIP Project meet this Principle ? |
|---|---|
| **Prioritise projects that deliver the greatest improvement to landscape quality** | Our landscape and visual impact assessment covered 571km of existing NGET transmission lines. The section of overhead line selected for undergrounding through this project has been assessed as having landscape impacts of 'high importance' in our Landscape and Visual Impact Assessment (See Chapter 3.3.4.).<br>Chapter 7.2.1 demonstrates that the project will enhance the combined visual and landscape impact of the existing overhead line, improving its score from a red rating (score of 24) to yellow (score of 5), a notable reduction in impact. |
| **Prioritise projects that present the greatest opportunities to conserve and enhance natural beauty, wildlife, and cultural heritage while avoiding unacceptable environmental impacts.** | The project removes a prominent section of overhead line from a nationally protected landscape, significantly enhancing natural beauty and key views. The project's optioneering considerations avoids unacceptable environmental impacts through sensitive design and routing (See Chapter 5). |
| **Prioritise projects that encourage public understanding and enjoyment of protected landscapes, including fostering positive socio-economic outcomes.** | The project enhances public enjoyment by removing a section of visually intrusive overhead lines within proximity of well-used footpaths and viewpoints within the National Landscape (Chapter 7). It fosters understanding through community engagements (Chapter 8.3), while supporting positive socio-economic outcomes by improving the setting for nearby communities, tourism and outdoor recreation. |
| **Ensure that projects are technically feasible within the broader context of the transmission system.** | The project ensures ongoing operability of the transmission system during construction through the use of a temporary tower bypass/diversion |

| | |
|---|---|
| | [redacted] (See Chapter 5). Additionally, the cable design accommodates for the uprating of the transmission line, ensuring compatibility with network demands (See Chapter 4.1). |
| **Select projects that are both economical and efficient, ensuring optimal use of available funds.** | Undergrounding the full 17 km ZF.2 route was found to be neither economical nor efficient (Chapter 3.4.6). An appraisal identified the section with the highest landscape impact, allowing the project to focus investment where it would deliver the most significant benefits, ensuring optimal use of funds. |

### 3.3.2 Stakeholder Engagement

The Cotswolds VIP project selection also reflects our commitment to embedding stakeholder engagement in our decision-making, in line with our VIP Policy and our broader stakeholder engagement principles. Recognising the importance of collaboration for the development of the Cotswolds project, we structured our engagement around two main avenues: the Stakeholder Advisory Group (SAG) and broader local stakeholder engagement. This approach ensured that the project is shaped by both national expertise and local insights, delivering effective and valuable solutions that align with public and environmental priorities. Chapter 8 of this document provides further details our stakeholder engagement for the project.

#### Stakeholder Advisory Group

The Stakeholder Advisory Group (SAG), which we established in 2014 as proposed in our VIP Policy and is chaired by leading environmentalist Chris Baines, has played a key role in guiding the selection and prioritisation of VIP projects to date. Comprised of senior representatives from 15 national organisations, including Ofgem[11], the National Trust, Natural England, and Historic England, the SAG provides a collaborative forum to evaluate projects based on principles established in our VIP Policy. The SAG's input has therefore guided the prioritisation of the Cotswolds project as a candidate project for RIIO-T2. In consideration of our VIP principles, the SAG confirmed in 2020 that the Cotswolds VIP project should be progressed for RIIO-T2, leading to the progression of further development work.

As set out in our VIP Policy, the role of the SAG is to:

- help to identify initial priorities for the use of the VIP
- based on the guiding principles, consider the technical inputs provided by NGET
- consider the input of wider stakeholders who are not directly represented on the SAG (e.g. specific feedback on where use of the VIP might be beneficial, or where there is evidence of public support)
- identify the specific infrastructure and locations which would most benefit from VIP
- define the projects which should be taken through to the development phase
- re-consider or re-assess priorities as the project development progresses

The SAG typically convenes on a six-monthly basis. The minutes of these meetings are available in the SAG section of our VIP website[12].

[11] Ofgem had a representative on the VIP SAG who attended regularly up until March 2022. At that point, their responsibilities changed and Ofgem has been unable to send a replacement. Ofgem attended VIP SAG meetings when the Cotswolds VIP project was discussed 'virtually' (November 2020, September 2021 and March 2022).
[12] Stakeholder Advisory Group | National Grid ET

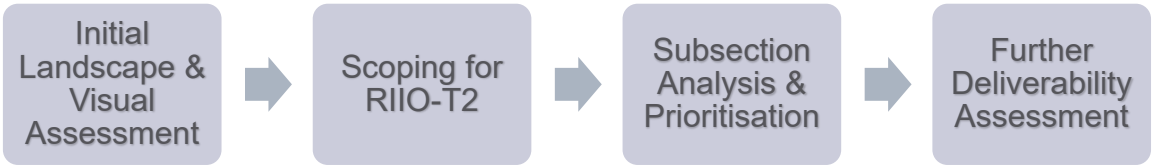
**Broader Local Stakeholder Engagement**

Beyond the SAG, NGET has engaged a wide range of local stakeholders to ensure their participation in shaping decisions for the Cotswold VIP project. This includes engagement with an established Stakeholder Reference Group[13] (SRG), working closely with statutory bodies, landscape officials, landowners, planning authorities, and consultations with local residents. This inclusive approach allowed us to capture local insights and address concerns related to project planning, route alignment, environmental impacts, and land access needs. By engaging with the local community early and consistently, we built a foundation of support and ensured that the project reflected the unique environmental and heritage values of the Cotswold landscape.

To further enhance transparency, NGET has made project updates and documentation accessible to the public through dedicated websites and formal consultations, reinforcing our dedication to stakeholder-led decision-making throughout the project planning stages.

## 3.4 Selection Process for the Cotswold VIP Project

The technical selection of the Cotswold Visual Impact Provision (VIP) project, and subsequent project development, were underpinned by the guiding principles of our VIP Policy as described in the section above. The project's selection was a multi-stage process based on stakeholder engagement, rigorous landscape and visual assessment and review, and detailed technical feasibility studies.




### 3.4.1 Initial Landscape and Visual Assessment (LVIA) - 2014

As described in Section 3.2.1, our Landscape and Visual Impact Methodology defines the process and methodology implemented in our assessment of NGET infrastructure that has the greatest visual impact on National Parks and National Landscapes.

In 2014, NGET commissioned a comprehensive Landscape and Visual Impact Assessment[14] (LVIA) of all transmission lines within England and Wales to identify sections that have the most important impacts on their surrounding landscapes (See Appendix A.1 for the full LVIA report). A scoring system was applied, allowing for comparative assessments based on the significance of their associated landscape and visual impacts. This process resulted in a shortlist of potential candidate projects for consideration by the SAG.

From this shortlist, the SAG reviewed, discussed and agreed on the projects to be taken forward for further detailed technical assessment.

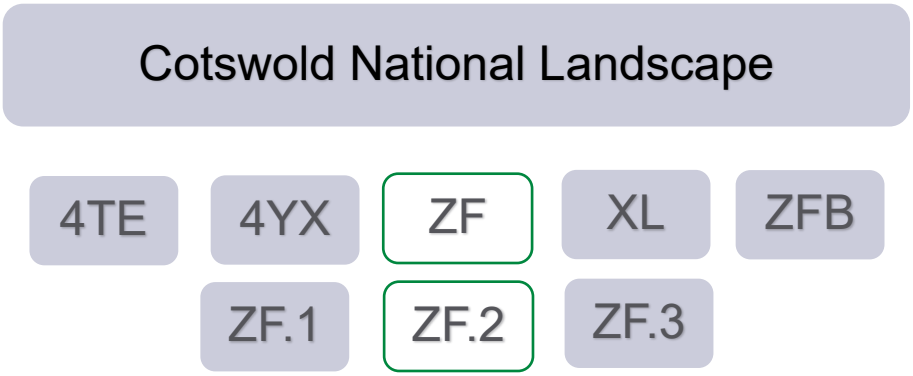
[13] SRG's are set up by the VIP project team in each of the shortlisted National Parks or National Landscapes. For Cotswolds, this included local representatives from Gloucestershire County Council, Tewkesbury Borough Council, Cotswold District Council, Cotswolds National Landscape, Cotswold Way National Trail & Access Partnership, Historic England, Natural England, the Environment Agency, and Gloucestershire Wildlife Trust.
[14] VIP Landscape and Visual Impact Assessment

### 3.4.2 LVIA Assessment approach

Reflective of our VIP Principle 1, the LVIA assessment covered 571 km of existing NGET transmission lines and aimed to pinpoint sections where mitigation would have the greatest impact on enhancing protected landscapes.

The LVIA assessment method applied was based on the established *Guidelines for Landscape and Visual Impact Assessment (GLVIA3)*. Specifically developed and adapted for NGET's VIP projects, this approach was designed and formalised by Carys Swanwick. Unlike a conventional LVIA, which assesses the potential impact of new infrastructure, this method represented a "reverse LVIA" process, as it assessed impacts from already existing infrastructure.

### 3.4.3 Defining the ZF.2 subsection in the LVIA




**LVIA Segmentation of transmission lines**

The LVIA assessed a total of 50 sections of overhead lines across 26 designated areas. These were further divided into 122 subsections, each separately assessed. Additionally, a further 6 sections of line that run adjacent to 4 additional designated landscapes were assessed and divided into 8 subsections.

The Cotswold National Landscape is crossed by five sections of transmission line - 4TE, 4YX, XL, ZF and ZFB, all shown on (See Figure 4). Section ZF (**the 400kV Feckenham – Walham / Feckenham – Minety double circuit)** is located to the north west of the landscape, entering it to the east of Ashton under Hill from where it runs broadly southward, leaving and re-entering the landscape before heading south, and finally leaving the landscape via the north of Cirencester. Section ZF was divided into three subsections for assessment due to its length:

- **Subsection ZF.1** commences to the east of Ashton under Hill where it runs broadly southward before leaving the landscape to meet subsection 2 to the north-east of Dixton.
- **Subsection ZF.2** runs back into the landscape from the north-east of Dixton and heads in a southerly direction, rising up to Prescott where it turns south-east across high ground before descending into subsection 3 south-east of Cheltenham.

- **Subsection ZF.3** starts to the south-east of Cheltenham at the top of the scarp slope at the junction with ZFB and 4TE. It runs broadly southeast through the undulating High Wold and High Wold Valley landscape, crossing the River Churn valley and paralleling the western side of the valley before it again crosses the river at Bagendon. It runs next to the A417 before leaving the landscape to the north of Cirencester.

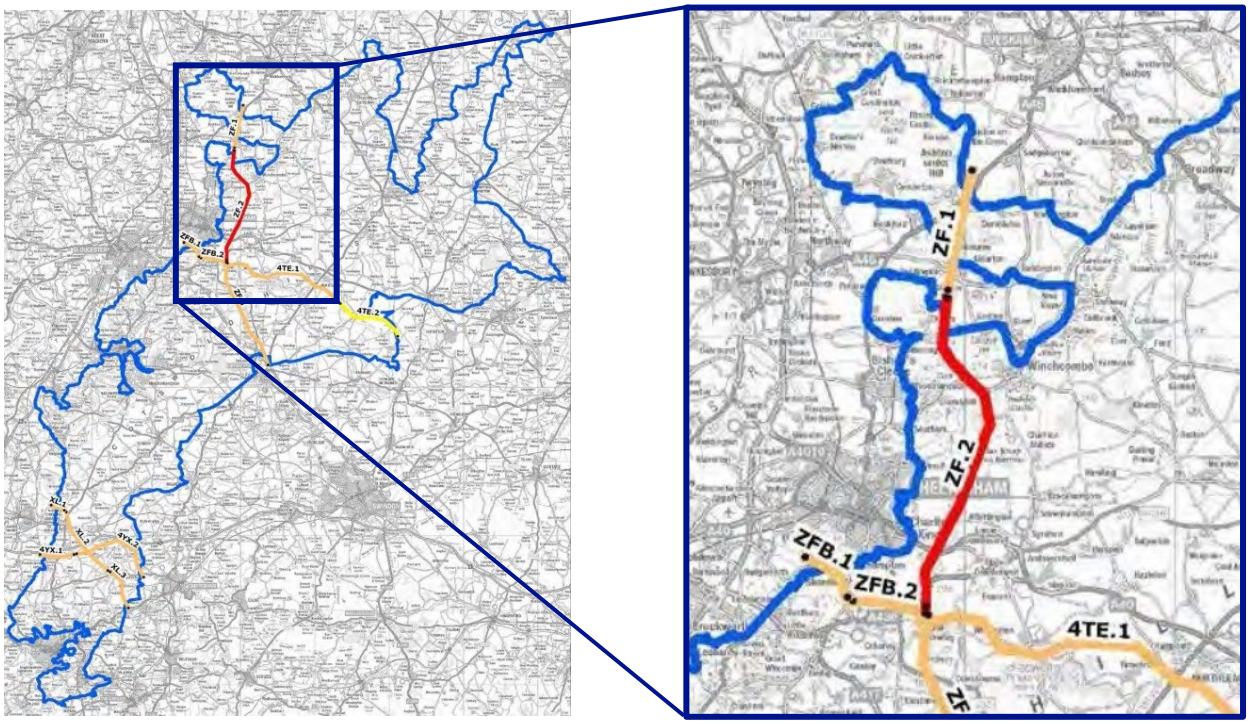



*Figure 4: Division of the ZF overhead line into 3 subsections*

### 3.4.4 LVIA Assessment outcome for ZF.2

The 2014 LVIA assessment determined that the subsection ZF.2 possesses combined landscape and visual impacts of high importance.

With regards to **landscape impact**:

*"ZF.2 runs through a large-scale landscape which has few overt human influences, is of high quality and contains many features that are representative of the special qualities of the AONB. Expansive views across sparsely settled farmland and the distinctive skylines of the escarpments give the area a high scenic quality. The pylon line is a prominent feature which alters the rural qualities and tranquil nature of the landscape. Overall, the subsection is judged to have **landscape impacts of high importance**."*

With regards to the **visual impact**:

*"although the scale of impact of ZF.2 varies, pylons are clearly visible from many locations. The nearby town of Winchcombe and some small dispersed settlements have views of the pylon line, but the wide geographical spread of these impacts and the numbers of people affected means that overall the importance of visual impacts on communities is considered to be moderate. Local public rights of way are mainly concentrated around the scarp slopes with fewer footpaths on the high ground. Although in places pylons are very visible, overall the importance of impacts on these receptors is also considered to be moderate. The Cotswolds Way National Trail runs along the top of the scarp and there are*

*also a number of regional trails in the area. High importance impacts are recorded for these recreational receptors. There are also a number of visitor locations within this subsection including Sudley Castle and other heritage sites, panoramic viewpoints and a number of car parks. The presence of these encourages people to access the area. Visitors over a wide area are affected by views of pylons. High importance visual impacts are recorded for these receptor groups. This subsection is therefore judged to have* ***visual impacts that are of a high level of importance****."*

The 2014 LVIA concluded that 12 subsections emerged as having the highest level of combined landscape and visual impacts. These 12 subsections are highlighted in Table 2 below.

*Table 2: The 12 subsections shortlisted in the 2014 LVIA for possessing the highest level of landscape and visual mitigation impacts*

| Designated Area | Subsection |
|---|---|
| Tamar Valley AONB | YF. 1 |
| Peak District NP | 420.4 |
| Dorset AONB | 4YA.7 |
| Peak District NP | 4ZO.2 |
| Peak District NP | 4ZO.3 |
| Brecon Beacons NP | 4YU.3 |
| North Wessex Downs AONB | YYM.4 |
| Eryri (Snowdonia) NP | 4ZC.1 |
| Dorset AONB | 4VN.2 |
| Dorset AONB | 4YA.5 |
| High Weald AONB | 4ZJ.1 |
| New Forest NP | 4YB.2 |

The LVIA applied a five-step scoring and ranking process to prioritise subsections with the highest impacts. Each subsection was evaluated based on factors such as visibility, landscape sensitivity, and proximity to receptors. Sections scoring high or very high on these criteria advanced to the top rankings.

Although the Cotswold subsection ZF.2 was identified within the LVIA as having high visual and landscape impacts, it ranked just outside the top 12 most impacted sections in the assessment (i.e. 13$^{th}$) and was not shortlisted for consideration by the SAG in this initial selection round of projects for the RIIO-T1 price control. Four of the twelve subsections listed within Table 2 have since been approved for funding for major undergrounding projects by Ofgem.

### 3.4.5 Reassessment of the LVIA and Scoping for RIIO-T2 (2018)

In 2018, the Stakeholder Advisory Group (SAG) began deliberations on potential Visual Impact Provision (VIP) projects to take forward as part of the 2021–2026 RIIO-T2 price control period. These discussions were informed by the Landscape and Visual Impact Assessment (LVIA) conducted in 2014.

As part of this reassessment, the SAG reviewed:

- The remaining subsections from the original shortlist of 12 that had not been progressed for RIIO-T1 submission,
- The 11 next-highest scoring sections from the 2014 LVIA that narrowly missed inclusion in that shortlist — including the Cotswolds ZF.2 section.

Each candidate subsection was evaluated using route and constraints maps, photographic evidence, the original 2014 LVIA scores, and a summary of engineering options alongside environmental and technical constraints. Throughout this process, the SAG maintained a strong interest in advancing further opportunities for landscape enhancement in both the North Wessex Downs and the Cotswolds, noting that these sections had achieved scores at the higher end of the LVIA ranking system in alignment with VIP Principle 1.

The North Wessex Downs National Landscape was ultimately prioritised by the SAG as a replacement for the paused New Forest VIP project under RIIO-T1[15]. In parallel, the Cotswolds National Landscape, specifically the ZF.2 subsection, was identified for further feasibility work due to its landscape sensitivity, potential for undergrounding, and the viability of delivery within the RIIO-T2 period.

Between 2019 and 2020, preparatory work began for North Wessex Downs alongside early scoping activities in the Cotswolds. NGET presented to the SAG the results of preliminary landscape assessment work in the Cotswolds, including a route appraisal for potential undergrounding (see Appendix B.1 – VIP Cotswolds Appraisal 2020). NGET also shared possible ideas for non-undergrounding visual enhancement measures that could be implemented within the RIIO-T2 period.

By late 2020, Ofgem had confirmed that funding would be made available for VIP projects under RIIO-T2. In response, the SAG advised NGET to further develop a project on the Cotswold plateau, based on the strength of the LVIA evidence, the feasibility of delivery, and the opportunity to deliver nationally significant landscape benefits.

From 2021 to 2023, NGET significantly expanded its feasibility work in the Cotswolds, focusing on potential cable route alignments (Appendix C.1) and siting options for cable sealing end compounds (CSECs) (Appendix D.1). Initial stakeholder engagement, including discussions with officers from the Cotswolds National Landscape, provided early support for the project. These discussions were accompanied by landowner engagement and survey activity to inform design development and environmental assessment.

### 3.4.6 Further Division of ZF.2 and Establishment of ZF.2(B)

Given the length of Cotswold ZF.2 subsection (approx. 17km), it was recognised that undergrounding the entire section would involve substantial cost. In alignment with VIP Principle 5, which emphasises the selection of projects that are economical and efficient, a review of ZF.2 was therefore undertaken with the objective of taking forward a project that

[15] The RIIO-T1 New Forest VIP project was formally paused after legal and regulatory advisors highlighted complex European regulations around habitat protection, which posed significant and untested risks for the project's approval within the RIIO-T1 period ending in March 2021.

would be both technically and financially viable in the best interests of consumers, as well as one that could still provide the greatest benefits in terms of landscape and visual mitigation for the landscape users and stakeholders.

Landscape consultants, Gillespies, were engaged to carry out a high level, desk-based appraisal of the ZF.2 transmission line (See Appendix B.1 - VIP Cotswolds Appraisal 2020). Their review identified the opportunity to split ZF.2 further into three smaller subsections to allow for more detailed route appraisal, including topography assessment of the landscape and visual impacts of the separate sections, and the scope for effective mitigations. The subsection ZF.2 was therefore split further into three smaller sub-sections (A), (B) and (C) to allow for appraisal of the route in more detail – see Figure 5 below.

The ZF.2(B) section is approximately 7.4km long, starting immediately south of the B4632 road near Postlip/Postlip Mills. From Breakheart Plantation, the overhead line runs southwest, passing:

- East of Cleeve Common SSSI
- Wontley, Drypool, and Wood Farms
- Dowdeswell Wood

This subsection falls within the Cotswolds High Plateau, characterised by a combined elevated open plateau with large scale arable fields, relatively few trees and a flat topography. Figure 6 further below is representative of a view from higher ground at Cleeve Common looking towards ZF.2(B). The pylons of ZF.2(B) are visually intrusive against the skyline.

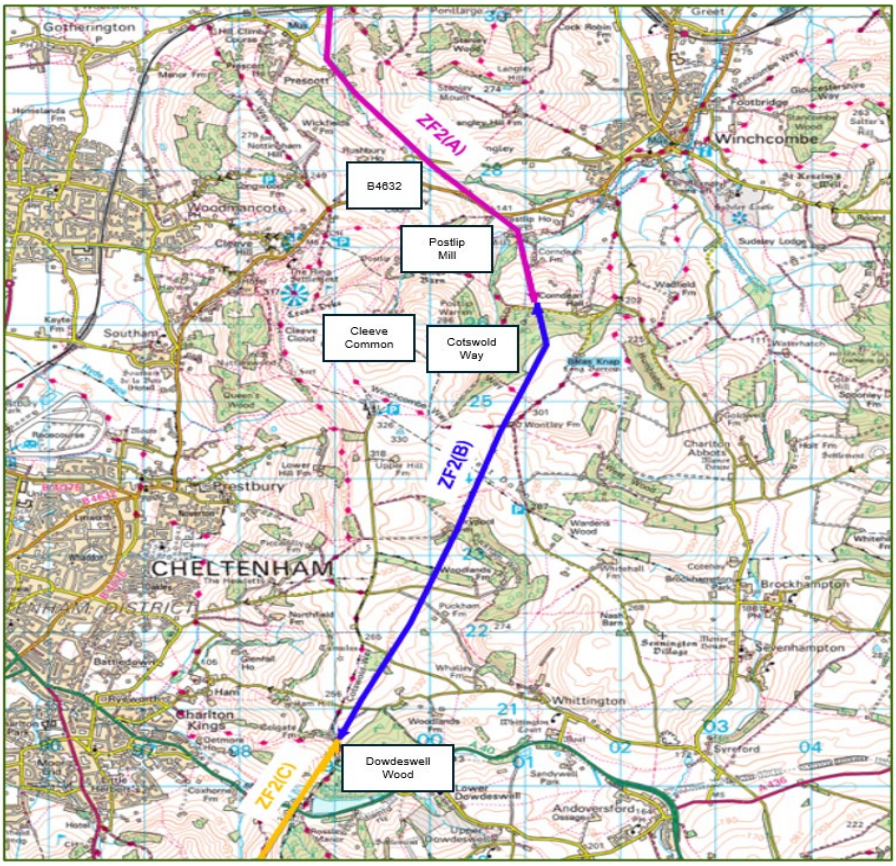



*Figure 5: Map of the ZF2 overhead line subsection route near Cheltenham*

*Figure 6: Representative view of ZF.2(B) from a local right of way and open access land near Cleeve Common*

The appraisal concluded that undergrounding the central subsection of ZF.2, ZF.2(B), would result in the most significant visual benefits to the widest range of key visual receptors. Although alternative visual mitigation options such as alternative pylon designs or rerouting the overhead line in this area could be explored, it was considered that these options would not provide sufficient visual mitigation of any of the three subsections of ZF.2. This is reflective of lessons learned from previous VIP projects such as North Wessex Downs VIP where we explored alternatives to undergrounding. Additionally, when considering non undergrounding alternatives on North Wessex Downs VIP, factors such as additional consents and land requirements, the additional outage requirements and also the relatively low visual impact improvement, these alternatives had proven to be not feasible.

Feedback from senior officers from the Cotswold National Landscape was positive, and there was considerable enthusiasm for a project in the area. There was also recognition of the wider opportunities that VIP could create including the potential to augment the ongoing grassland restoration project in the area and wider archaeological works. The officers agreed that undergrounding sub-section ZF.2(B) was a sensible option.

With support from the SAG and landscape stakeholders, we progressed with our proposal for Section ZF.2(B) to be removed and replaced with an underground cable. It was noted that such an undergrounding project would present challenges, primarily around access to the plateau itself (there are few existing roads) and the steepness of the terrain.

## 3.5 Acceptability Testing and Willingness to Pay

As part of our stakeholder engagement process for the Cotswolds VIP project, NGET conducted a willingness-to-pay survey (2024). This was undertaken in line with previous surveys used to support previous VIP reopener submissions, ensuring that our VIP investments effectively balance the interests of local communities and stakeholders, with wider public sentiment and affordability.

The research used combined qualitative and quantitative approaches to provide a rounded view from consumers across England, Wales and Scotland. The participants were established from varying socio-economic and demographic backgrounds. For clarity, these respondents were not those living in proximity to the ZF transmission but rather a representative population sample.

The survey results indicated strong public support for the Cotswolds VIP project:

- 82% of 2,000 respondents supported the project, including the projected bill impact of £0.13 per year for 25 years. This reflects that consumers view that visual impact mitigation initiatives deliver value for money.
- No subgroup within the survey sample showed less than 47% support for the project.
- Variability in support levels was observed across different socio-economic, demographic, and geographic groups.

Additionally, focus group participants largely echoed these findings. While some negative sentiments were expressed, they were primarily directed at the energy sector in general and concerns over bill increases, rather than opposition to the specific project itself. The full details of the Acceptability Testing can be found in Appendix E.1.

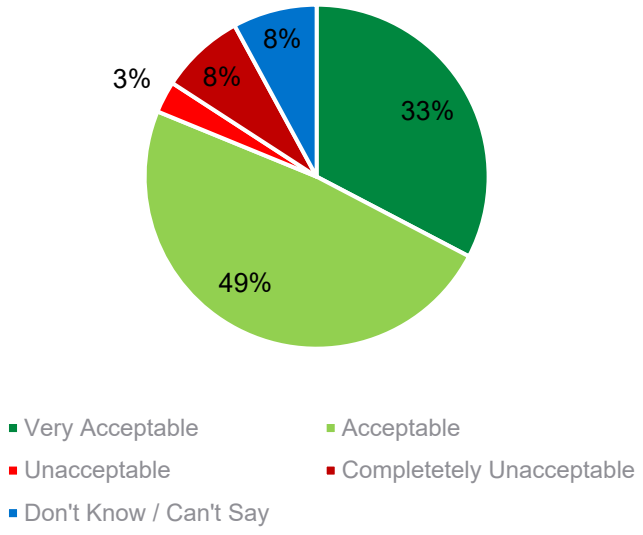



*Figure 7: Cotswolds undergrounding project acceptability 2024 (full survey sample, n = 2000)*

# 4. Strategic Delivery Optioneering

Coordinated Delivery

This chapter summarises the strategic decision-making process underpinning the delivery timing and coordination of the Cotswold VIP Project to find the most efficient delivery strategy for consumers, with particular consideration given to its interface with other relevant projects. The CBA presented supports our decision to undertake the project as planned in the best interest of consumers.

- As part of our initial assessment, we considered five delivery options (A – D), including a "Do Nothing" scenario.
- Each option was considered in the context of broader, separately driven projects to uprate the full extent of the ZF overhead line circuits (Feckenham – Minety and Feckenham – Walham).
- These separate uprating works are identified as necessary to meet customer connection requirements and wider drivers set out under the transitional Centralised System Network Planning (tCSNP) framework.

The separate needs case to reinforce the ZF circuits is already well established. Accordingly, our optioneering exercise is focused on identifying the most effective way to align the delivery of the Cotswold VIP project with those essential network upgrades in the best interest of consumers.

## 4.1 ZF Circuit Uprating Context

NGET are undertaking an interacting major project to uprate the entire ZF overhead line, covering the Feckenham – Minety and Feckenham – Walham circuits. These projects are driven by two distinct needs: wider system reinforcements identified through the tCSNP framework and customer connection requirements.

The tCSNP framework focuses on strengthening the capability of the transmission system in a coordinated manner. Across the West Midlands and Southwest of England regions, the uprating of Feckenham – Minety (FMR2 in tCSNP2) will require the replacement of existing conductors with higher-capacity alternatives. However, the Feckenham – Walham circuit uprating[16] is driven by customer-related needs [redacted]

[redacted]

[16] This was initially recommended under the tCSNP2 framework as FWRE however it was subsequently indicated under tCSNP2 as not proceeding. The uprating is now being triggered by a customer connection driver.

Collectively, the uprating of both circuits supports increased boundary transfers across the B9, LE1 and SC1Rev boundaries. NESO and NGET network studies have determined that a winter post-fault rating of 3100 MVA is required to accommodate these demands.

The Cotswold underground cable section has therefore been designed to match the upgraded rating of the wider ZF uprating projects to ensure its integration within the circuits and therefore support the delivery of future network boundary reinforcements in line with Net Zero commitments, by increasing the transmission network's capability for power transfer.

To minimise disruption to residents and maximise efficiency in terms of avoiding repeated outages that would be individually required for both the Cotswolds VIP undergrounding of the ZF.2(B) section and the load-related uprating projects, the Cotswold VIP project has been strategically aligned with the delivery programme for the ZF uprating project. The alignment, through the bundling of required outages, reduces the need for separate network interruptions and additional constraint costs and is therefore in the best interests of consumers. This is reflected in the CBA presented in Chapter 4.3 below.

When selecting the cable system, additional scrutiny has been applied to ensure that there are no constraints built into the system. Due to the properties of cable systems, in a post fault scenario the ratings that can be delivered by a cable system far surpass that of the OHL conductor. Short term post fault scenarios therefore pose no additional constraint to the system.

## 4.2 Assessment of all options

A summary of our initial options assessment for delivery of the Cotswold VIP Project is in Table 6 below.

*Table 6: Summary of initial delivery options assessment*

| Option | Option title | Option description | Taken Forward to CBA | Rationale |
|---|---|---|---|---|
| **A** | Do Nothing | Stop the Cotswolds VIP undergrounding project and stop uprating of the ZF overhead line | **Not taken forward** | **Fails to address visual impact mitigation drivers and system needs**<br>• The Cotswolds VIP project has progressed significantly since its public announcement, with extensive stakeholder engagement, tendering, planning permissions, and early archaeological work already undertaken.<br>• Stakeholder expectations, including those of local communities, environmental groups, and statutory bodies, have firmly established the visual mitigation needs case. Halting the Cotswolds project would damage trust and hinder future planning and community engagement efforts.<br>• The ZF overhead line must be uprated to meet system drivers identified by the tCSNP framework and contracted customer connections. |
| **B** | Stop the Cotswolds VIP Project but Deliver the ZF Uprating on Time | Under this option, the Cotswold VIP project would be stopped but the ZF overhead line would still be uprated as planned by 2029. | **Not taken forward** | **Fails to address visual impact mitigation drivers**<br>• The broader environmental and social benefits, as valued by consumers, of the Cotswolds VIP project would be lost. The project's needs case would not be met.<br>• As above, this would have significant negative consequences for NGET's stakeholder relationships, including supply chain partners and environmental stakeholders to the Cotswold Landscape. |
| **C** | Deliver the Cotswolds VIP Project as Planned (2030) in Strategic Coordination with the ZF Uprating (2029) | This option entails delivering the VIP undergrounding works in 2030 while executing the overhead line uprating in 2029. | **Taken forward to detailed assessment** | • This approach meets long standing stakeholder expectations to deliver significant visual and landscape enhancements, benefiting local communities and visitors to the Cotswold Landscape.<br>• The Cotswold VIP undergrounding can be aligned with the ZF circuits uprating to address system requirements, allowing shared 2028 and 2029 outages. This coordination minimises consumer costs by reducing the need for additional outages and mitigating constraint costs. |

| | | | | |
|---|---|---|---|---|
| | | | | • This option contributes to enhancing external supply chain capability and maintains positive stakeholder relationships, fostering trust and efficiency for future infrastructure delivery. |
| **D** | Delay the Cotswolds VIP Project to 2033 While Delivering the ZF Uprating as Planned (2029) | This option mirrors Option C above but defers the VIP undergrounding works until 2033 to reflect a theoretical delay into RIIO-T4. | **Taken forward to detailed assessment** | • This is a viable option that would meet the system needs and customer connection driver and then subsequently meet the visual impact mitigation driver several years later – hence reflecting the impact of a delay to the Cotswolds VIP project.<br>• The delay to the Cotswolds VIP project introduces uncertainty and prolongs stakeholder engagement efforts, increasing the risk of reputational damage and diminishing public trust.<br>• The option is less efficient but ultimately still delivers the visual mitigation objectives. The inefficiency is related to the early asset write-off of conductors and associated components installed as part of the ZF uprating works in 2029, that would then need be decommissioned just a few years later when undergrounding of the ZF.2(B) section proceeds. This undermines the efficiency of both projects and would not represent value for consumers.<br>• While this still meets the system need and customer connection drivers, it also loses the efficiency benefits of aligning outages, resulting in higher costs to consumers. |
| **E** | Deliver the Cotswolds VIP Project on Time (2030) Without the ZF Uprating | This option would involve delivering the Cotswold VIP undergrounding works in 2030 but not uprating the ZF overhead line route. | **Not taken forward** | **Fails to address identified system needs**<br>• The ZF uprating is required due to an economic tCSNP driver on one circuit and customer connection requirements on the second circuit, making this option inappropriate. |

## Conclusion

Following our initial assessment, three options were discounted and two were taken forward for further cost-benefit analysis. Options A, B and E were ruled out on the basis that they either failed to meet established system needs under the tCSNP framework and customer connection drivers or did not deliver the visual enhancement benefits to the protected Cotswold Landscape as intended by the visual impact mitigation framework (as well as adversely impacting stakeholder relationships and consumer value).

Options C and D were taken forward for detailed assessment as both deliver the visual enhancement objectives of the VIP policy while enabling the essential uprating of the ZF overhead line circuits. The key distinction between these is the timing and degree of coordination with the wider network works, factors that have implications for consumer cost, stakeholder confidence, and overall delivery efficiency.

## 4.3 Cost Benefit Analysis

A cost-benefit analysis (CBA) has been undertaken to quantitatively assess the two shortlisted delivery options. The “Do Nothing” option was excluded from this analysis, as it would fail to meet both the visual impact mitigation objectives of the Cotswold VIP project and the essential system requirements identified through network planning.

The two core options considered in the CBA are therefore:

- Option 1: Deliver the Cotswold VIP Project as Planned (2030), in strategic coordination with the ZF uprating (2029)
- Option 2: Delay the Cotswold VIP Project to 2033, while delivering the ZF uprating as planned (2029)

These two core options evaluated in the CBA were designed to highlight the implications of a delay to the planned delivery of the VIP project. Specifically, exploring the potential implications of deferring the Cotswold undergrounding works by three years, while still delivering the essential ZF overhead line uprating on time.

To capture the full value of the project’s visual enhancement benefits, sub-options (1a and 2a) were also developed:

- Option 1a: Same as Option 1, but accounts for visual enhancement benefits delivered.
- Option 2a: Same as Option 2, but accounts for visual enhancement benefits delivered.

These sub-options incorporate the monetised value of visual amenity improvements using a Willingness to Pay (WTP) approach. As described in Chapter 3.5, a WTP survey was used to determine consumer acceptability of contributions through their energy bills for a period of 25 years for improved visual mitigation project in the Cotswolds.

The value of £0.13 per person per year was applied to both estimated local residents and annual visitors to estimate the total societal benefit of the project. The use of WTP is both appropriate and justified in this context, as the primary benefit of the project (in the enhancement of visual amenity in a nationally designated landscape) is a non-market value that is highly regarded by the public.

### 4.3.1 Lifetime Cost-Benefit analysis (CBA)

The CBA was carried out using the NGET CBA/NPV (net present value) tool which is based on Ofgem’s RIIO-T2 CBA template spreadsheet, assuming a capitalisation rate of 85% and a pre-tax (weighted average cost of capital) WACC of 3.19%, in line with Ofgem’s guidelines.

A summary of the lifetime CBA results is presented in table 7 below. Costs and benefits are discounted at a rate of 3.5% for the first thirty years, and at 3% after that, in line with Ofgem guidance.

The results shown in the table below demonstrate that Option 1a, which takes into account the assumed visual enhancement benefits of the project and delivers the project as planned, has the most favourable NPV. This can be attributed to avoided constraint costs of delivering the project later (as with Option 2 and 2a), and the visual benefits being accounted for.

*Table 7: Lifetime Cost-Benefit analysis (discounted 2018/19 prices)*

| Options | Total (£m) | | |
|---|---|---|---|
| | Costs (£m) (discounted) | Benefits (£m) (discounted) | NPV (£m) |
| **1) Deliver VIP as Intended:**<br>- Cotswold (2030)<br>- ZF Uprating (2029) | -159.04 | 0 | -159.04 |
| **1a) Deliver VIP as Intended (inc. monetised visual enhancement benefit assumption)**<br>- Cotswold (2030)<br>- ZF Uprating (2029) | -159.04 | 17.38 | -141.66 |
| **2) Deliver VIP three years later than intended.**<br>- Cotswold (2033)<br>- ZF Uprating (2029) | -278.38 | 0 | -278.38 |
| **2a) Deliver VIP three years later than intended. (inc. monetised visual enhancement benefit assumption)**<br>- Cotswold (2033)<br>- ZF Uprating (2029) | -278.38 | 17.38 | -261.00 |

### 4.3.2 Costs

#### 4.3.2.1 Capex costs

All capex estimates are derived from the NGET Project Development Cost Book (August 2024 with 2018/19 prices), which is based on historical tender returns and project data. The cost estimations at this stage were based on pre-tender award estimates and are subject to change based on actual tendered solutions.

We have used Estimating Units Lines (EULs) to generate cost estimates based on the scope of work and the new assets to be constructed for each option, including risk contingency.

*Table 8: Summary of costs (undiscounted 2018/19 prices)*

| Option | Total capex (£m) | Carbon cost of construction (£m) | Total (£m) |
|---|---|---|---|
| **1) Deliver VIP as Intended:**<br>- Cotswold (2030)<br>- ZF Uprating (2029) | -180.32 | [redacted] | [redacted] |
| **1a) Deliver VIP as Intended (inc. monetised visual enhancement benefit assumption)**<br>- Cotswold (2030)<br>- ZF Uprating (2029) | -180.32 | [redacted] | [redacted] |

| Option | Total capex (£m) | Carbon cost of construction (£m) | Total (£m) |
|---|---|---|---|
| **2) Deliver VIP three years later than intended.**<br>- Cotswold (2033)<br>- ZF Uprating (2029) | -180.32 | [redacted] | [redacted] |
| **2a) Deliver VIP three years later than intended. (inc. monetised visual enhancement benefit assumption)**<br>- Cotswold (2033)<br>- ZF Uprating (2029) | -180.32 | [redacted] | [redacted] |

**Early Asset Write-Off Costs**

Pursuing the option to delay the Cotswolds VIP project to 2033 while delivering the ZF uprating in 2029 ( i.e. Options 2 and 2a) would introduce material early asset write-off (EAWO) costs, which have not been reflected in this CBA. Under this scenario, conductors and associated uprated equipment installed on section ZF.2(B) in 2029 would be decommissioned and removed just a few years later to facilitate undergrounding, rendering their remaining asset life and value stranded. [redacted]. While this cost may not be visible as additional consumer spend within the current CBA, it nevertheless presents an economic loss and undermines value for money for consumers.

#### 4.3.2.2 Opex costs

**Annual maintenance costs [applies to no option]**

Given that the maintenance costs do not differ materially amongst options, and that estimation of these costs would be heavily assumption-driven, annual maintenance costs have been excluded from the CBA.

**Constraint costs [applies to Options 2 and 2a]**

Constraint costs have been applied to Options 2 and 2a, both of which involve delivering the Cotswold VIP project three years later than originally intended. This is because, under these scenarios, the delivery of the undergrounding works would no longer coincide with the planned outages required for the ZF uprating. As a result, additional separate outages would be necessary to complete the underground cabling works, therefore incurring additional constraint costs. These uncoordinated outages are expected to increase constraint costs on the transmission system. Accordingly, the CBA reflects these additional constraint costs to Options 2 and 2a, recognising the inefficiencies introduced by decoupling the delivery of the Cotswold VIP project from the ZF circuit uprating activities.

These constraint costs have been created using a constraint cost estimating tool. We used the tool to calculate how much an outage across a given boundary would cost. It was relevant to include these costs where outage requirements differ between options (1a & 1b compared to 2a & 2b). Following an assessment of the boundaries across the Cotswolds VIP project, it has been identified that the B9 boundary was the most constrained. Therefore, the B9 boundary had been selected for the calculation of constraint costs.

*Table 9: Summary of Constraint costs (2023/24 base prices)*

| Option | Boundary Under Constraint | Number of Days Under Constraint | Total Additional Constraint Costs (£m) |
|---|---|---|---|
| **1) Deliver VIP as Intended:**<br>- Cotswold (2030)<br>- ZF Uprating (2029 | - | - | - |
| **1a) Deliver VIP as Intended (inc. monetised visual enhancement benefit assumption)**<br>- Cotswold (2030)<br>- ZF Uprating (2029) | - | - | - |
| **2) Deliver VIP three years later than intended.**<br>- Cotswold (2033)<br>- ZF Uprating (2029) | B9 | [redacted] | [redacted] |
| **2a) Deliver VIP three years later than intended. (inc. monetised visual enhancement benefit assumption)**<br>- Cotswold (2033)<br>- ZF Uprating (2029) | B9 | [redacted] | [redacted] |

### 4.3.3 Benefits

#### 4.3.3.1 Carbon costs of construction [applies to all options]

The construction of new assets under all options will lead to carbon emissions.

*Table 10 – Summary of Carbon Costs of Construction (2023/24 base prices):*

| Option | Capital carbon ($tCO_2e$) | Carbon cost of construction (£m) |
|---|---|---|
| **1) Deliver VIP as Intended:**<br>- Cotswold (2030)<br>- ZF Uprating (2029 | 21,683 | [redacted] |
| **1a) Deliver VIP as Intended (inc. monetised visual enhancement benefit assumption)**<br>- Cotswold (2030)<br>- ZF Uprating (2029) | 21,683 | [redacted] |
| **2) Deliver VIP three years later than intended.**<br>- Cotswold (2033)<br>- ZF Uprating (2029) | 21,683 | [redacted] |
| **2a) Deliver VIP three years later than intended. (inc. monetised visual enhancement benefit assumption)**<br>- Cotswold (2033)<br>- ZF Uprating (2029) | 21,683 | [redacted] |

#### 4.3.3.1 Visual Enhancement [applies to Option 1a and 2a]

Options 1a and 2a were developed to capture the visual enhancement benefit of the Cotswold VIP project, which would otherwise remain unquantified in a standard cost-benefit analysis. These options are included for demonstrative purposes, as they incorporate the results of the Cotswold WTP survey to assign a monetary value to the non-market benefits of the project by determining the amount individuals are willing to pay for an improvement in their environment.

The survey found that 82% of respondents considered an additional £0.13 per year on their energy bill, sustained over 25 years, to be acceptable in exchange for the visual improvement delivered by the undergrounding of the overhead line in the Cotswolds.

To estimate the scale of benefit, it was assumed that the Cotswold area has approximately 150,000 residents and attracts around 23 million visitors annually[17]. A conservative assumption was applied, whereby 50% of these individuals are likely to experience the landscape in proximity to the section of overhead line being undergrounded and are therefore affected by its visual intrusion.

Applying the £0.13 per person per year WTP value over a 25-year period to this affected population provides a monetised estimate of the visual enhancement benefit delivered by the project. All monetised benefits are presented in a 2018/19 price base. The total to monetise visual benefits can be found Appendix F.3.

*Table 11: Estimated monetised visual enhancement benefits*

| Option | Estimated No. of people benefiting from the project | Monetised Visual Enhancement £m (18/19 prices) |
|---|---|---|
| **1) Deliver VIP as Intended:**<br>- Cotswold (2030)<br>- ZF Uprating (2029 | - | - |
| **1a) Deliver VIP as Intended (inc. monetised visual enhancement benefit assumption)**<br>- Cotswold (2030)<br>- ZF Uprating (2029) | 9,491,500 | £23.98 |
| **2) Deliver VIP three years later than intended.**<br>- Cotswold (2033)<br>- ZF Uprating (2029) | - | - |
| **2a) Deliver VIP three years later than intended. (inc. monetised visual enhancement benefit assumption)**<br>- Cotswold (2033)<br>- ZF Uprating (2029) | 9,491,500 | £23.98 |

[17] Caring for the Cotswolds - Cotswolds National Landscape

# 5. Optioneering - Project Siting

**Project Scope of works**

The Cotswolds VIP project aims to replace a 7.4km section (ZF.2(B)) of the existing Feckenham – Walham and Feckenham – Minety 400kV (ZF) overhead line with permanent underground cables. To achieve this, the following scope of works is required:

- **Cable Sealing Ends (CSEC):** at either end of the new cable route, where the underground cables will transition back onto the existing ZF overhead line, including permanent access routes to the CSECs
- **Cable Undergrounding:** selected route between towers ZF308 and ZF325, with each circuit becoming two cables per phase (XLPE 400kV cables).
- **Temporary Infrastructure:**
  - temporary access routes to the undergrounding and CSEC works during the construction phase.
  - temporary tower diversions of the 400kV overhead line to allow the construction of the cable sealing ends whilst being clear of oversailing conductors
- [redacted]
- **Voltage Management:** via shunt reactors at Feckenham and Melksham 400kV substations.

Following the identification of overhead line section ZF.2(B) for undergrounding through the LVIA and appraisal process, this chapter outlines how NGET has identified and qualitatively assessed the siting options for the key infrastructure and elements required to deliver that undergrounding. These elements, including the underground cable route to replace the ZF.2(B) section, define the scope of the Cotswolds VIP project. The siting of these elements and infrastructure has been carefully considered to deliver the project in a way that best serves the landscape, its stakeholders and users, and energy consumers. In line with VIP Principle 4, all siting decisions were made with regard to technical feasibility and the broader requirements of the transmission system.

Our general approach to options appraisal is explained in detail in Appendix E.2 setting out the principles we apply in our qualitative comparison of project options and the impact they may have across a wide set of criteria. We have applied this framework to our Cotswolds VIP project development to qualitatively evaluate project siting options based on their impacts across the following set of criteria (where applicable):

- **Environmental**: includes landscape and visual amenity, ecology, historic environment, local air quality, noise and vibration, soils and geology and water resources.
- **Socio-economic**: considers economic activity, traffic and transport, aviation and defence.
- **Technical**: covers technical complexity, construction/project delivery (including resource use and waste), suitability of technology, network capacity, network efficiency /benefits (including energy efficiency)
- **Cost**: qualitative consideration of potential costs.

Our options assessment process has been informed by a combination of insights from surveys, desk-based assessments, site inspections and stakeholder engagements, as applicable. Where there were environmental or socio-economic constraints or considerations, we have prioritised navigating these in the best interest of local stakeholders in the surrounding region. Additionally, technical and environmental

assessments, along with input from stakeholders and the SAG, influenced our final project decisions.

Figure 8 below depicts the position of the ZF.2(B) overhead line section to be undergrounded in relation to the Cotswolds National Landscape.


*Figure 8: ZF.2(B) Section of Overhead Line Route to be Undergrounded*

## 5.1 Cable Sealing End Compound (CSEC) Siting

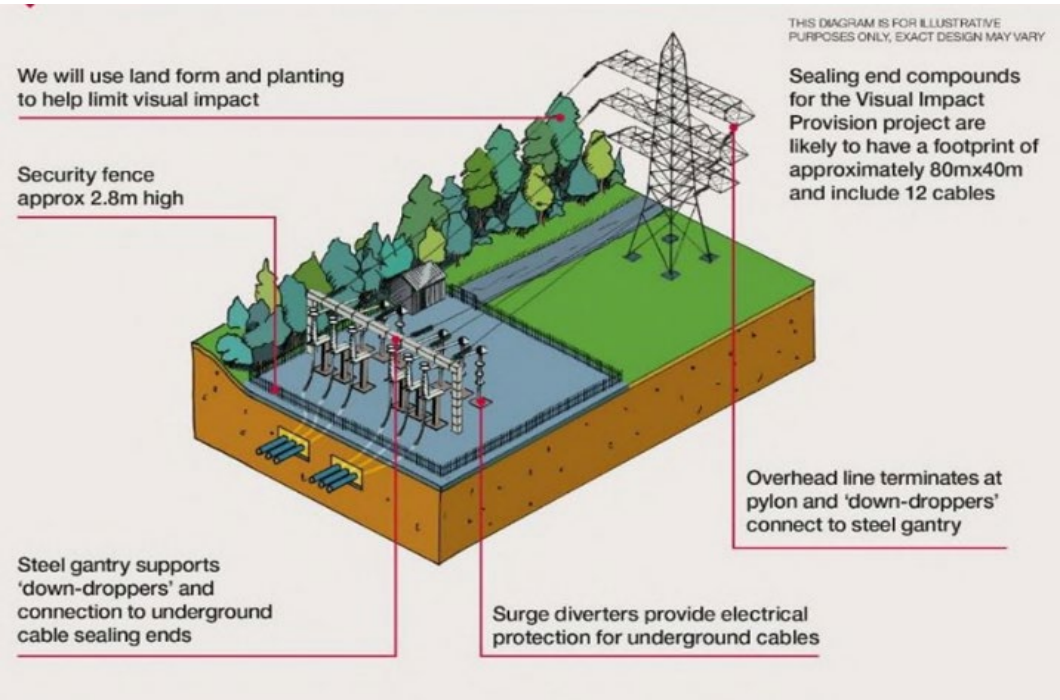
When a new cable system is installed within a section of overhead line, as is the case for the Cotswolds VIP project, there is a need for a CSEC on each end of the underground cabling section to terminate the cable section ends back to the rest of the ZF overhead line (see Figure 9 for a general illustration). The CSEC is required to be carefully located to minimise its impact upon the criteria outlined in our appraisal criteria above.

The siting process for the CSECs prioritised identifying suitable siting locations with the aim to position them as close as possible to the existing overhead line and adjacent towers, minimising the distance required to connect the cable back into the original overhead line route. The configuration and alignment of nearby towers affect the technical requirements and complexity of the connection, influencing both cost and feasibility.

Given the highly constrained and sensitive nature of the search area, technical feasibility, socio-economic and environmental considerations were given a greater weighting in our process. More specifically, our optioneering considered the land use and availability to provide sufficient screening, avoid and minimise ecology and archaeology impacts and positioning in areas within suitable topography to minimise civils works. Furthermore, proximity to roads was assessed to balance efficient construction and maintenance access with the need to manage traffic disruption, whilst crucial for both construction and long-term maintenance access.

We commissioned landscape consultants, Gillespies, to undertake a landscape and visual appraisal of potential CSEC siting zone options (see Appendix D.1 – CSEC siting) for the VIP Cotswolds project in order to identify the most suitable locations for the construction of two CSECs, one at either end of the underground cable route (North and South).

*Figure 9:Illustration of CSEC components*




**CSEC Search Areas**

Two CSEC Search Areas were considered in this study - one to the north and one to the south of the proposed undergrounding section. These were areas within which it would be feasible to site a CSEC and associated infrastructure, as well as areas that would be neutral to any existing environmental designations. A total of ten possible CSEC Siting Zones were identified across the Northern and Southern CSEC Search Areas.

### 5.1.1 Northern Cable Sealing End Compound

In line with our VIP Principles, we aimed to optimise the CSEC placement for the Cotswolds VIP project to ensure effective integration with minimal impact on local communities and the environment. A Northern CSEC will facilitate the transition from overhead line to underground cable section by providing the mechanical support for the termination of the overhead conductors and safely connecting them to the underground cable.

**Description of Options**

The Northern CSEC search area covered an area of approximately 23 hectares and comprises of land to the north and south of the B4632 near Postlip Mills. Existing towers ZF304 to ZF308 fall within the search area.

The options we considered for the placement of the Northern CSEC are illustrated in Figure 10 below:

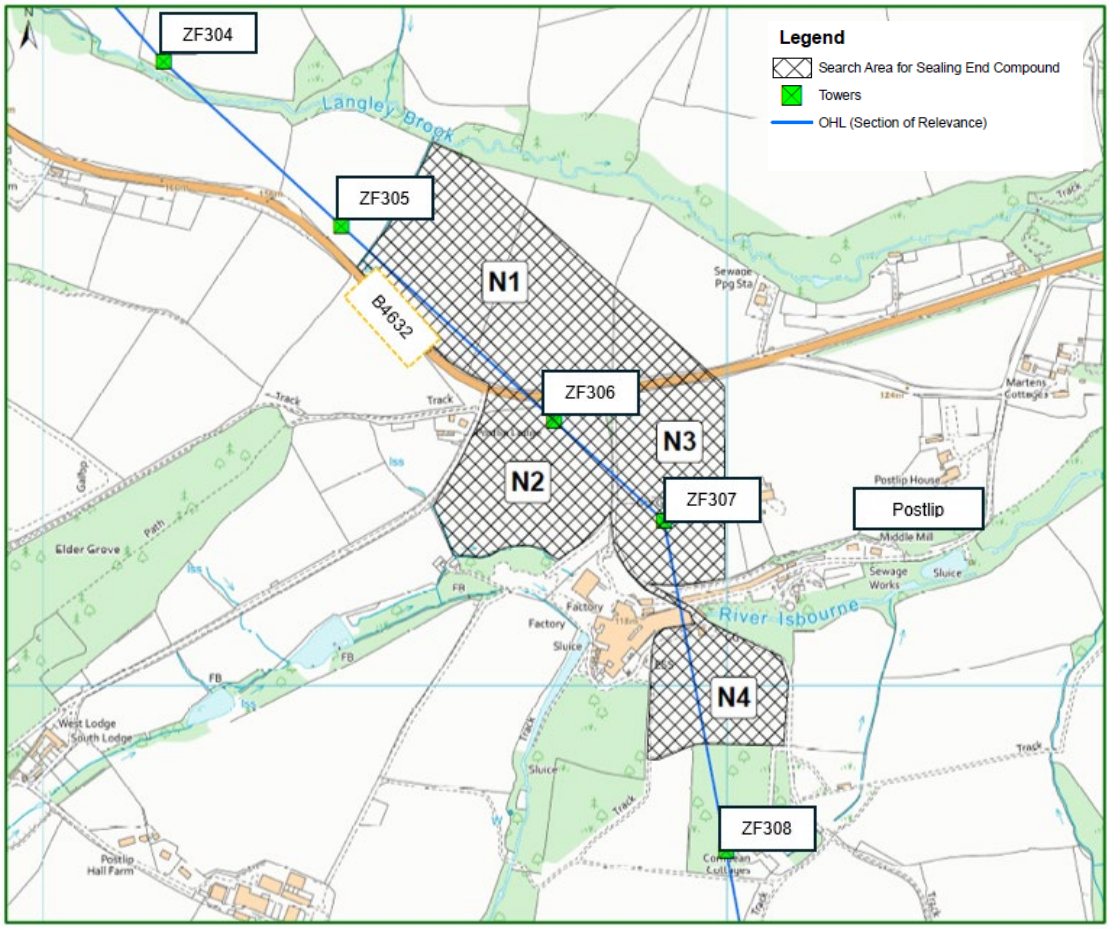



*Figure 10: illustration Northern CSEC Siting Options*

**Option N1** - Land north of B4632 and tower ZF306.

From an environmental perspective, option N1 has good access routes, however, siting in this location would cause a visual impact, due to visibility of CSEC from nearby areas, which would detract from the surrounding landscape. There would also be some socio-economic impact to local homeowners/businesses with the option as it would involve crossing of the B4632 road, leading to some traffic concerns and therefore inconvenience for the local community. Crossing of the B4632 would also represent an engineering challenge as it would require traffic restrictions during construction or costly additional measures, such as Horizontal Directional Drilling (HDD), to minimise road disruptions.

**Option N2** - Land south of B4632 adjacent to tower ZF306

Similar to option N1, option N2 also provides good access routes and could also be sited in a way that could provide natural screening. Additionally, there would be minimal socio-economic impact with the location. However, there are significant engineering challenges with this option, related to the final terminations of the existing overhead line to the CSEC. The configuration of tower ZF306 therefore requires complex design solutions to achieve the connection.

**Option N3** - Land south of B4632 and north of tower ZF307

Option N3 similarly has good access routes and also does not represent any socio-economic concerns. Cabling in this area however would be problematic due to the presence of the existing paper mill. Interfacing and overcoming this engineering challenge would be difficult and would also impose additional costs.

**Option N4** - Land south of Postlip Mills and south of tower ZF307, north of tower ZF308

This option has no major environmental concerns. The location is well screened by the paper mill, providing natural screening that reduces the visual impact of the CSEC. The access route to this area had also been considered and provided an option that added good value. There will be challenges with the final terminations but due to the adjacent tower being a tension tower, this could be easily overcome with suitable design considerations.

**Preferred Solution for siting of the Northern CSEC**

Based on the findings of the options appraisal above, Option N4 was identified as the initial preferred option for the Northern CSEC. The Environmental and Socio-Economic factors are consistent across all four options but siting in N4 location addressed some of the more difficult engineering challenges to the configuration of the existing overhead line into the CSEC.

*Table 12: Overview of Northen CSEC appraisal*

| | N1 - Land north of B4632 and ZF306 | N2 - Land south of B4632 adjacent to ZF306 | N3 - Land south of B4632 and north of ZF307 | N4 - Land south of Postlip Mills and south of ZF307, north of ZF308 |
|---|---|---|---|---|
| Environmental / Visual Impact | Good access routes, but high visual impact | Good access routes, potential for natural screening | Good access route and no notable visual concerns | No major concerns, well-screened by paper mill |
| Socio-Economic Impact | Impact on homeowners/businesses community due to B4632 crossing; traffic concerns | Minimal socio-economic impact | No socio-economic concerns | No socio-economic concerns |
| Technical | Traffic restrictions or HDD needed for B4632 crossing, adding costs | Significant challenges with final terminations due to tower configuration | Engineering complexity with paper mill interface, adding costs | Minimal challenges: tension tower nearby allows for efficient design |
| Cost | High, due to HDD or traffic restrictions | Moderate to high, due to complex final termination | High, due to engineering adaptations needed to cable beneath paper mill | Low to Moderate; engineering challenge on the final termination needs to be overcome. |
| Preferred Option | No | No | No | **Yes** |

### Northern CSEC Towers and Angles

As part of the assessment, consideration was given to the position, orientation, and alignment of the surrounding towers near the Northern CSEC. A key constraint was that the underground cable route would connect to the overhead line at a fixed location. This necessitates adjustments to the alignment of the existing overhead line to ensure a smooth transition to the CSEC within engineering tolerances.

Each tower on the transmission line is designed to accommodate specific mechanical loads and conductor tensions. When an overhead line changes direction, particularly to connect into a new infrastructure point like a CSEC, the deviation angle introduced at the towers becomes critical. Larger angles create greater tension and load, requiring more robust or specially designed towers (e.g. angle towers or terminal structures).

The assessment evaluated whether to retain or replace towers based on the deviation angles required by the new alignment between the CSEC and existing overhead line. Specifically:

- **ZF305**: Considered for replacement with either a D10 or D30 angle tower, depending on the final alignment.
- **ZF306**: Considered for replacement with a D30 angle tower.
- **ZF307**: Evaluated under several options:
    - Replace with a D60 or D90 angle tower,
    - Alternatively, retain the existing D60 angle tower if alignment permits.
- **ZF308**: Considered for replacement with either:
    - A terminal tower[18], or
    - A Full Line Tension (FLT) gantry, depending on final engineering preference and spatial constraints at the CSEC.

The preferred and chosen configuration for the connection between the Northern CSEC and the ZF overhead line is to utilise tower ZF307 (D60 angle) as it could manage the required turn towards the CSEC, and to replace tower ZF308 with a terminal tower, since it marked the end of the section of the line to be undergrounded.

### Permanent Access Road Considerations for the Northern CSEC

In addition to the Northern CSEC itself, the project will require both temporary and permanent access roads. Temporary access roads will support construction traffic, while permanent access roads will facilitate long-term maintenance. These roads will connect from the existing highway network to the CSEC, which is located several hundred metres from the nearest public highway.

Three permanent access route options, NTAR1, NTAR2, and NTAR3 (See Figure 11 below), were evaluated based on our qualitative assessment criteria. Stakeholder engagement, particularly with local homeowners and representatives from the nearby paper mill, were a critical factor in our assessment.

[18] A terminal tower is a type of transmission tower used to terminate an overhead power line at a substation or transition point, such as where the overhead line connects to underground cables. It provides structural support for the conductors as they transition from a suspended state to a fixed point.

Through our engagement, NTAR3 emerged as the most favourable option, receiving the most positive feedback from stakeholders such as the neighbouring paper mill and the local authority. The route was identified as the most suitable when considering visual displays from the public highway and also suitability for long-term maintenance access and egress. NTAR1 & NTAR2 presented key concerns to paper mill and the neighbouring public right of way, therefore NTAR3 was selected as the preferred solution.

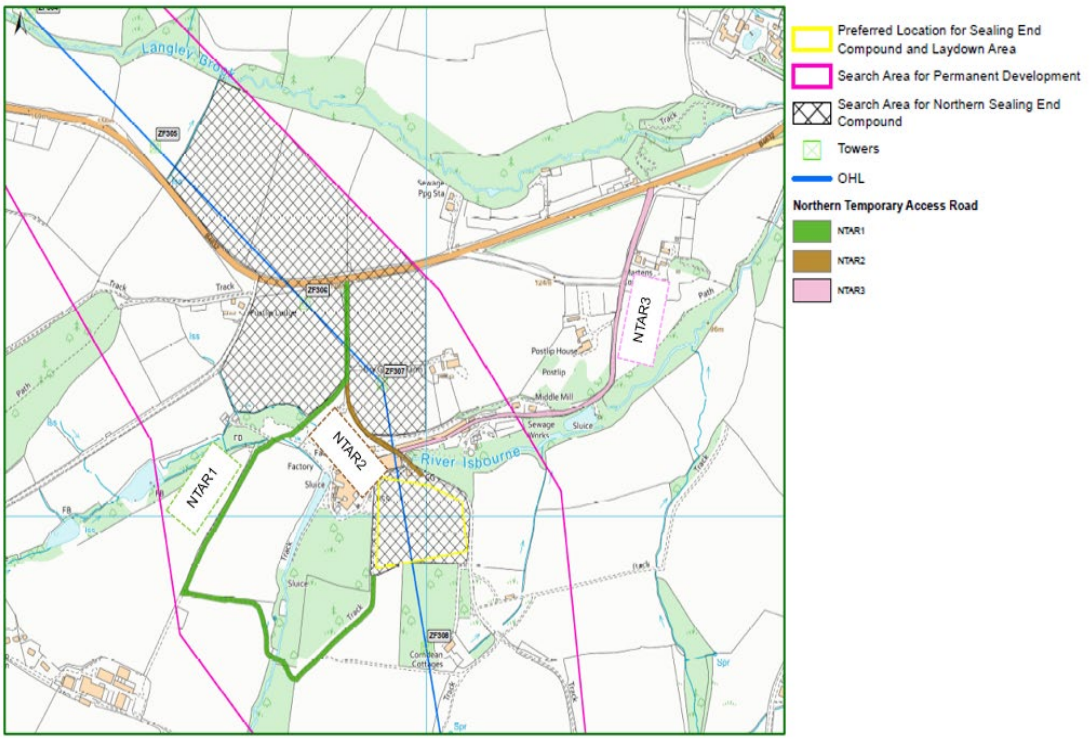



*Figure 11:Access Route to Northern CSEC*

### 5.1.2 Southern Cable Sealing End Compound

A Southern CSEC is required to provide the necessary termination point of the underground cable at the southern end, therefore marking where the underground cable section transitions back to the overhead line. As with the Northern CSEC, it houses the cable sealing ends that provide the required mechanical support.

**Description of Options**

The Southern CSEC search area comprised of land to the north and south of Ham Road (minor road) near Upper Colgate Farm, Middle Colgate Farm, Wood Farm and Hill Farm. It also covered tow smaller disjointed areas to the south of the A40. Existing towers ZF323 to ZF328 also fall within this Search Area.

The siting options for the Southern CSEC are as illustrated in the Figure 12 below:

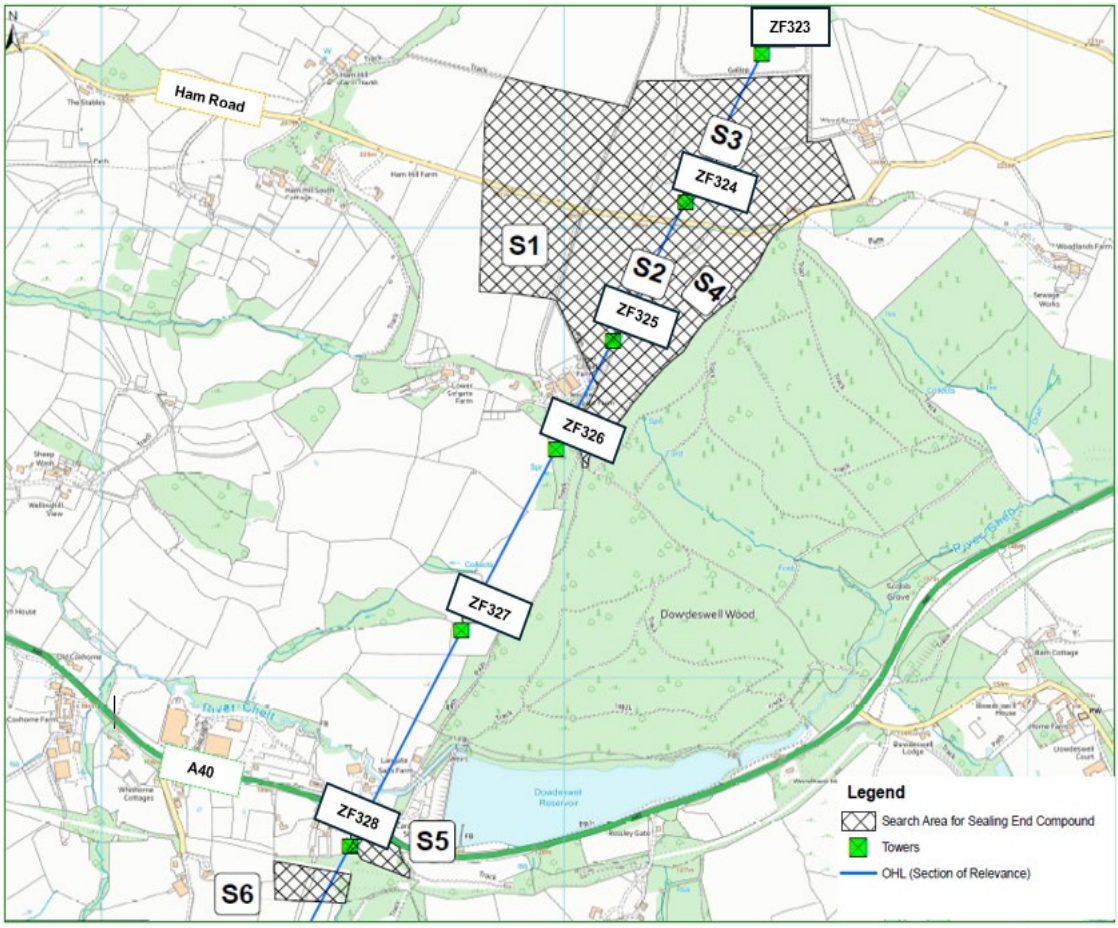



*Figure 12: Southern CSEC Siting Options*

**Option S1** - Land south of Ham Road, West of tower ZF325

Option S1 did not represent any significant environmental nor socio-economic concerns. However, it would create a greater visual impact, as it is further away from the current overhead line. Additionally, this location presents an engineering challenge due to the potential cable angle required to locate the CSEC.

**Option S2** - Land underneath existing OHL, south of Ham Road between towers ZF324 and ZF325

Positioned directly beneath the existing OHL, Option S2 has some constructability concerns that would have needed to be addressed make this option feasible. However, it benefits from natural screening, posing minimal environmental and socio-economic concerns, Access to the area is easily achieved from Ham Road, making it a feasible option.

**Option S3** - Land north of Ham Road between towers ZF323 and ZF324

This option posed some environmental challenges as this area is located closer to an ancient woodland at Arle Grove. This area however does have very similar characteristics to S2 otherwise and has good access routes into this site.

**Option S4** - Land south of Ham Road and east of option S2 above

This option does not pose any clear environmental nor socio economic differentiators but would cross beneath the existing overhead line causing some constructability and safety concerns. Good access routes are also available here.

**Option S5** - Land South of the A40 and east of tower ZF328

Option S5 would involve a longer cable route over challenging topography. This option also involves a difficult crossing of the A40 which would have some socio-economic impact. From an engineering and cost perspective, this option presents some challenges due to more material costs on cable and also challenging topography.

**Option S6** - Land to south of the A40 and south of tower ZF328

Option S6 is very similar to S5 and would likely lead to additional costs due to requiring a longer cable and the engineering difficulty of the road crossing if the southern CSEC was to be located here.

**Preferred Solution for Siting of the Southern CSEC**

The preferred location for the southern CSEC selected was Option S2, located underneath the existing OHL, south of Ham Road between towers ZF324 and ZF325. This option was selected due to its effective natural screening, ease of constructability and optimal positioning for the final terminations to the existing overhead line. Option S2 offers convenient access from Ham Road, providing both permanent access for maintenance and temporary access for construction activities. The siting of the Southern CSEC at S2 would require installation of a temporary bypass to avoid the overhead line directly above (i.e. the Southern CSEC construction is sited directly under the existing overhead line) – see section Chapter 5.3

**Southern CSEC Towers and Angles**

Subject to final clearance assessments, the preferred configuration for connecting the Southern CSEC to the existing ZF overhead line involves replacing tower ZF324 with either a terminal tower or a Full Line Tension (FLT) gantry. This is necessary as ZF324 marks the point where the underground cable section transitions back in to the ZF overhead line. No angle towers are required at this location, as the alignment of the overhead line continues in a straight line beyond the CSEC, with no significant change in direction following construction.

*Table 13: Overview of Southern CSEC appraisal*

| | Option S1 - south of Ham Road, West of tower ZF325 | Option S2 - underneath existing OHL, south of Ham Road between towers ZF324 and ZF325 | Option S3 - Land north of Ham Road between towers ZF323 and ZF324 | Option S4 - Land south of Ham Road and east of option S2 above | Option S5 - Land South of the A40 and east of tower ZF328 | Option S6 - Land to south of the A40 and south of tower ZF328 |
|---|---|---|---|---|---|---|
| Environmental/ Visual Impact | Greater visual impact as it is further from the current overhead line | Minimal impact due to natural screening | Proximity to woodland at Arle Grove presents challenges | No significant environmental concerns | Longer cable route over challenging topography | Similar to S5 |
| Socio-Economic Impact | No significant concerns | Minimal impact | No significant concerns | No significant concerns | A40 crossing presents socio-economic impacts | Similar to S5 |
| Technical | Engineering challenge due to potential cable angle required | Requires a temporary bypass and tower ZF324 replacement | Similar to S2 but with environmental constraints | Constructability and safety concerns due to crossing beneath overhead line | Challenging topography and longer cable route | Similar to S5 |
| Cost | More cost would be incurred due to engineering challenge of cable angle. | Temporary tower diversion is required due to close vicinity to current OHL. | Greater than S2 due to more environmental constraints. | More works underneath the existing overhead line introducing extensive construction constraints. | Greater cost due to longer cable and difficult road crossing. | Greater cost due to longer cable and difficult road crossing. |
| Preferred Option | No | **Yes** | No | No | No | No |

**Permanent Access Road Considerations**

No formal access optioneering was required due to the site's advantageous location directly adjacent to Ham Road, a local highway. This proximity allows immediate and uncomplicated access without the need for new permanent road construction, minimising cost to consumers, land disruption, and environmental impact.

## 5.2 Cable Routing

The cable route for the proposed Cotswolds VIP undergrounding works was carefully assessed to identify an optimal alignment that balances feasibility with the best interests of the landscape's stakeholders and the wider interest of consumers. The selected route

enables the complete removal of the existing ZF.2(B) overhead line upon completion of installation to meet the core objectives of the investment.

### 5.2.1 Underground Cable Route Optioneering

To thoroughly evaluate the most suitable underground cable route, considering technical feasibility, stakeholder impacts and environmental considerations, a preliminary route and corridor was established [redacted] This preliminary route was then divided into three distinct sections, each with several routing options, as illustrated in Figure 13 below.

Within each section, the options were assessed individually, with their advantages and disadvantages evaluated through a qualitative comparative analysis. This process enabled the identification of the preferred route for each section, resulting in the determination of a complete route in the best interests of the landscape's stakeholders and consumers. A full report presenting the cable route assessment can be found in Appendix C.1 (BakerHicks Cable route selection report).

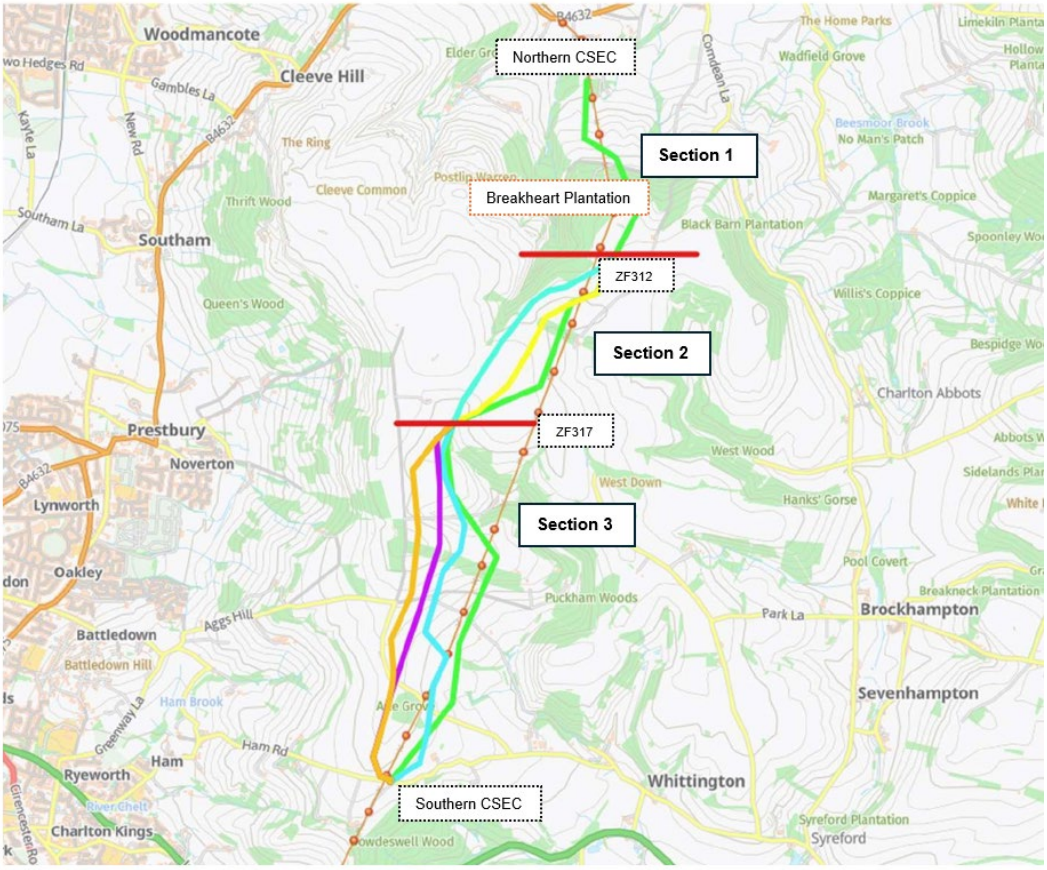



*Figure 13: Undergrounding Cable Route Options (split between sections)*

## Section 1 – Northern CSEC to ZF312

Only one feasible route was identified for this section, shown in green in Figure 13 above. This was determined as the only practical and feasible route for installing underground cables from the

Northern CSEC to tower ZF312, crossing Breakheart Plantation. It provides the shortest and most efficient path.

Alternative routes to the east or west were assessed and discounted as non-viable due to environmental, heritage, residential, and cost implications. The western option would impact Cleeve Common, a Site of Special Scientific Interest (SSSI), while the eastern route would affect the Cotswold Way, Sudeley Castle, ancient woodland, and nearby homes. Both alternatives would also result in a much longer route, increasing costs, complexity, and construction risks.

Despite Breakheart Plantation's steep terrain presents challenges, including the need to clear ~350 metres of trees, it remains the most viable option. A longer route would likely increase costs and pose higher health and safety risks. Some tree clearance will be required for cable installation and a temporary haul road, designed with curved alignments to navigate steep gradients.

Key risks include existing utilities, topography, and an overhead line crossing near ZF309. Utilities will be managed through standard diversion or clearance practices. Steep gradients will be mitigated through grading, specialised equipment, and enhanced safety measures.

Despite these challenges, all risks are manageable. Given its shorter distance, lower environmental impact, and fewer construction risks, this route is the preferred and most feasible option for Section 1. No other practical or significantly more advantageous route is identified

## Section 2 – Between Towers ZF312 to ZF317

Following on from Section 1, there had been three viable route options identified in Section 2.

| | |
|---|---|
| **Route A (Light Blue)**<br><br>**Preferred Option** | - Shortest of the Section 2 routes, reducing cost and construction timelines.<br>- No major technical concerns for design or construction<br>- Minimal tree clearance required in comparison to other routes for this section.<br>- Follows field boundaries more closely, reducing landowner and stakeholder impact.<br>- Route follows stakeholder (landowner) fence lines, limiting additional land disruption. However, the routes crosses Cotswold Way and the Common Land which presents a slight disruption to users.<br>- Terrain is manageable with a 10% topography[19].<br>- Must cross ZF overhead line at ZF312-ZF313, requiring safety measures to manage impressed voltages[20] on cables. |
| **Route B (Yellow)**<br>**Discounted** | - Runs diagonally across open fields, increasing land impact.<br>- Requires ~90m of tree/shrub clearance near Wontley Farm.<br>- Less aligned to field boundaries, making construction more intrusive.<br>- Must cross ZF overhead line at ZF312-ZF313, requiring safety measures.<br>- No clear advantage over Route A determined, but a number of disadvantages identified. |

[19] Topography % refers to the gradient or slope of the terrain, expressed as a percentage. It indicates how steep a surface is.
[20] Crossing the overhead line (OHL) poses a risk of impressed voltages, where electromagnetic induction from the high voltage transmission system can create unwanted electrical charges in nearby buried cables and equipment, potentially leading to insulation stress, safety hazards, and the need for additional mitigation measures such as grounding and shielding.

| | |
|---|---|
| **Route C (Green)**<br>**Discounted** | - Similar to Route B but follows ZF overhead line for a longer distance.<br>- Similar attributes to route B but has the advantage of a more manageable topography<br>- Also requires vegetation clearance ~90m of tree/shrub clearance near Wontley Farm.<br>- Prolonged proximity to ZF overhead line poses greater safety concerns associated with impressed voltages.<br>- No benefits over Route A. |

*Table 14: Cable Route Section 2 Optioneering*

## Section 3 – ZF317 to Southern CSEC

Following on from Section 2, four viable route options were identified within Section 3.

| | |
|---|---|
| **Route A (Orange)**<br>**Discounted** | - Route follows field boundaries, reducing stakeholder/landowner impact<br>- Manageable slopes (max 10% topography)<br>- The route requires ~120m of tree clearance near tower ZF319.<br>- Crossing of ZF overhead line may not be required, depending on circuit entry.<br>- Less optimal start of route when compared to Route C, which better avoids tree clearance. |
| **Route B (Purple)**<br>**Partly Preferred Option for the later part of Section 3.** | - Similar benefits to Route A, following field boundaries.<br>- Utilises an anticipated clearing near tower ZF319, reducing woodland impact – a key advantage<br>- Crossing of ZF overhead line may not be required.<br>- Determined as a stronger choice for the later portion of Section 3 due to minimised woodland impact.<br><br>**This route in combination with Route C is preferred.** |
| **Route C (Light Blue)**<br>**Partly Preferred Option for the earlier part of Section 3.** | - Preferred for the start of Section 3 as it avoids the need for tree clearance near Drypool Farm.<br>- Follows field boundaries, minimising landowner impact.<br>- Encounters steeper gradients (up to 25% topography) near Drypool Farm. Despite this, it is deemed manageable for the initial portion of section 3<br>- As the route progressed down south it becomes less favourable due to increasing proximity to ZF overhead line (impressed voltages) and Wood Farm, increasing safety and land-use concerns. Later section of the route was therefore discounted.<br><br>**This route in combination with Route B is preferred.** |
| **Route D (Green)**<br>**Discounted** | - This route is the most challenging from a technical perspective as there is topology around 20-30% in areas.<br>- Longest route, increasing cost and complexity.<br>- Closely follows ZF overhead line, requiring strict safety measures for impressed voltages.<br>- No significant advantages over other routes. |

*Table 15: Cable Route Section 3 Optioneering*

**Summary of the preferred Solution for underground routing of the ZF.2(B) section**

The preferred underground route follows the defined route in Section 1, the shortest and only viable option minimising environmental impact while managing steep terrain. Route A in Section 2 is then preferred for its alignment with field boundaries, minimal tree clearance, and reduced land disruption. In Section 3, a combination of Route C (initially) and Route B (later) is chosen, as Route C avoids tree clearance at the start, while Route B reduces safety risks near the overhead line and minimises woodland impact. This combined undergrounding route balances constructability, landowner, environmental considerations, and safety considerations, making it an efficient undergrounding solution for ZF.2B.

### 5.2.2 Temporary Access Roads

Temporary access roads will be required during the construction phase to ensure safe and uninterrupted access across the entire worksite. The alignment of these temporary routes is primarily determined by the location of the underground cable route, as outlined in Chapter 5.2, since this defines the core area of construction activity. A central haul road has been positioned along the centreline of the cable route, removing the need for further optioneering. Access points from the public highway to the cable corridor have been carefully selected through the Town and Country Planning process to minimise disruption to landowners and the local community.

## 5.3 Temporary Diversion Towers

A temporary line bypass is required for part of the ZF overhead line to enable the safe construction of the Southern cable sealing end compound (CSEC), ensuring works remain clear of oversailing conductors. The location of this temporary diversion is highly constrained and must be sited in a specific area. As such, no optioneering is required or possible. The temporary tower diversion is required on the Feckenham to Walham circuit only.

Once both the Northern and Southern CSECs and the underground duct system are in place, the existing ZF overhead line will be diverted onto two temporary terminal towers. This diversion enables the removal of existing towers located in the path of the underground cable route. During this phase, the ZF overhead line will be safely transferred to the temporary towers, maintaining system operability throughout the works.

## 5.4 Shunt Reactors

When installing cables onto the high voltage system, there is a requirement for greater voltage management. Shunt reactors are a very reliable for this purpose during load variations. For the Cotswolds VIP project, our system modelling determined that two additional shunt reactors are required to manage the voltage effects introduced by the underground cables. These reactors will offset voltage rises, maintain system stability, and ensure reactive power levels remain within operational limits, particularly under light load conditions. Without them, excessive voltage could compromise network resilience and operational security, making their installation essential for the successful integration of the underground cable system.

**Shunt Reactor Siting Considerations**

The siting considerations for a shunt reactor differ to those taken for cable routing or CSECs. The considerations that are made are outlined below:

- Existing NGET substations: A shunt reactor must connect directly to the high voltage system, and the most efficient way to achieve this is by installing it within an existing 400kV NGET substation. Building a new substation solely for this purpose would be impractical due to disproportionately high associated costs and engineering complexity.
- Proximity to the area of increased system voltages: The effectiveness of a shunt reactor decreases with distance from the cabling project. A substation closest to the affected area is therefore preferred.
- Plans for future development: Potential sites must be assessed for any planned developments that could impact their suitability.

### 5.4.1 Shunt Reactor (1 /2)

Based on the considerations described above, Feckenham 400kV substation was identified as the only viable location for Shunt Reactor 1. Other substations were assessed and ruled out, as Feckenham was the only viable substation within suitable proximity to the project for the placement of a shunt reactor to have the intended effectiveness. [redacted] Given its proximity to the cabling project and direct access to the high voltage system, no alternative sites were considered, as Feckenham fully meets all technical and operational requirements.

With Feckenham selected as the location for Shunt Reactor 1, we considered 7 possible configurations for its placement within the substation. The options were assessed based on physical space, engineering feasibility, and integration with existing infrastructure.

The Feckenham shunt reactor configuration options considered are described in Table 16 below:

*Table 16: Overview of options considered for the configuration of Shunt Reactor 1 at Feckenham*

| Option | Description | Technical Considerations |
|---|---|---|
| **Option 1:** New bay opposite Bus Coupler 1<br><br>**Preferred Solution** | This option utilises a large open space within the existing substation boundary, providing ample room for the shunt reactor and switchgear. It avoids complex modifications and integrates with existing infrastructure. With minimal constraints, it offers a relatively straightforward and efficient solution. | Relatively low complexity, standard solutions. |
| **Option 2:** Opposite an existing populated bay | This option places the shunt reactor opposite an already populated bay, introducing space constraints for both the reactor and its switchgear. The limited physical space would complicate construction and increase engineering challenges, making this option impractical. | High complexity, unlikely to be feasible due to space constraints. |
| **Option 3:** Connection to reserve bus bars only | This option would connect the shunt reactor to the **reserve bus bars alone**, rather than using a dedicated bay. However, physical constraints on switchgear placement and operational challenges in integrating with the substation layout make this option unfeasible. | High complexity, unlikely to be feasible due to space constraints. |

| Option | Description | Technical Considerations |
|---|---|---|
| **Option 4:** Opposite an existing populated bay | Although this option benefits from an existing gantry and connection facility, it faces the same space limitations as Option 2. The presence of existing equipment makes installation complex, requiring modifications that add risk and cost. | High complexity, unlikely to be feasible due to space constraints. |
| **Option 5:** Extending the fence line | Fence line extension to create additional space to accommodate a bay for the shunt reactor. This requires modifications, adding complexity. While technically feasible, equivalent solutions exist within the current boundary, making this option less favourable. | Medium complexity, requiring additional work or modifications. |
| **Option 6:** an empty fenced compound outside the main compound | [redacted] While technically feasible, additional cabling and integration work make it slightly more time intensive than the preferred solution. | Low complexity, standard engineering solutions available. |
| **Option 7:** Replacing SGT4 and utilising its bay | This option repurposes Super Grid Transformer 4 (SGT4)'s existing bay. [redacted] | Low complexity, standard engineering solutions available. |

**Preferred Solution (Option 1) for Siting of Shunt Reactor 1**

The preferred solution is to install a new 400kV 200MVar shunt reactor and cooler bank within the existing Feckenham 400kV substation fence line (Option 1). A new fully populated bay will be constructed opposite Bus Coupler 1, which provides sufficient space for the reactor and associated switchgear.

Option 6 had been discounted as it would involve additional cabling works, meaning additional technical challenges and underground hazards being introduced. [redacted]

The preferred solution, Option 1 includes:

- New bunded area to house the shunt reactor and cooler bank, integrated with the existing substation oil/water drainage system.
- A noise enclosure to mitigate operational noise.
- Utilisation of the existing earthing system.
- Piled foundations to support the new equipment.
- Diversion of an existing cable before construction can begin.
- New substation roadway section to provide operational access.

The works fall under permitted development rights, requiring no additional land acquisition or additional planning consents. However, an upgrade to a 225m access track outside the

substation fence will be necessary to facilitate delivery (see Figure 15 below). This track is entirely within NGET-owned land and currently used for livestock grazing.

### 5.4.2 Shunt Reactor (2/2)

In contrast with Shunt Reactor 1, where Feckenham was the only viable location, the siting of Shunt Reactor 2 required a broader assessment across multiple substations in consideration of existing NGET sites in proximity to the southern end of the circuit. This introduced more engineering considerations and more options for where the shunt reactor could be located.

Our qualitative selection process considered technical feasibility, land availability, integration with existing infrastructures, and future development plans. Several substations were assessed to determine the most suitable site that could accommodate the reactor without compromising ongoing or planned works, while also ensuring effective system performance.

After evaluating 13 options across 5 substations, Melksham 400kV substation was identified as the preferred option, [redacted] The full qualitative assessment overview of alternatives is outlined below.

**Shunt Reactor 2 Site Optioneering Overview**

*Table 17: Overview of Options considers for the siting of Shunt Reactor 2*

| Substation | Options and Description | Outcome |
|---|---|---|
| **Melksham** | Option 1: Westward extension into golf course for new shunt reactor bay (preferred). | **Preferred** – Provides necessary space while minimising disruption. Non-SF6 solution can be implemented. |
| | Option 2: an extension into the field to the east of site. | **Discounted** – Space [redacted] |
| **Minety** | Option 1: Laydown area south of the substation requiring cross-site cabling. | **Discounted** – Feasible, but requires long cable run due to distance, increasing costs without a clear consumer benefit. Additionally, potential customer connection may occupy this space. |
| | Option 2: Extend site northward by acquiring new land. | **Discounted** – Feasible but requires [redacted] |
| **Bramley** | Option 1: Compact GIS solution within existing fence line. | **Discounted** – Feasible but requires use of SF6. |
| | Option 2: Extend site west into woodland. | **Discounted** – Environmental constraints due to woodland. |
| | Option 3: Extend site east into woodland. | **Discounted** – Environmental constraints due to woodland. |
| **Fleet** | No viable options: Lack of connection points and suboptimal voltage control location. | **Discounted** – No connection points and suboptimal voltage control location. |
| **Didcot** | Option 1: Use Spare Bay 1 with 90-degree bus bar arrangement. | [redacted] |
| | Option 2: Use Spare Bay 3 with 90-degree bus bar arrangement. | |
| | Option 3: Extend main/reserve bus bars, create new bay on eastern site end. | |

| Substation | Options and Description | Outcome |
|---|---|---|
| | Option 4: Extend main/reserve bus bars, cable 60m to reactor location. | **Discounted** – [redacted] NGET system studies have indicated that the position of Didcot on the network would not provide an optimum node for injecting voltage control and that other sites are favourable. |
| | Option 5: Extend main/reserve bus bars, cable 300m to reactor location. | |
| | Option 6: Integrate shunt reactor bay into wider site extension plans. | **Discounted** – [redacted] System studies have indicated that the position of Didcot on the network would not provide an optimum node for injecting voltage control and that other sites are favourable. |

**Description of Substations and Options Considered for Shunt Reactor 2**

Detailed descriptions for the options considered across the five substations, for the siting of Shunt Reactor 2, presented in Table 17 above are as follows:

Melksham

- Option 1: An extension of the site to the west, over the golf course. Extension of main and reserve bus bars and creation of a new bay for the shunt reactor.
- Option 2: an extension into the field to the east of site.

To accommodate the second shunt reactor for the Cotswolds VIP project, we first explored siting it within the existing fence line at Melksham. However, space constraints resulting from planned works meant this was not viable.

We then assessed an eastern busbar extension (Option 2), but this was already occupied by the second non-VIP shunt reactor project, and further expansion east would interfere with overhead line reconfiguration works

As a result, we pursued a western extension (Option 1), which involves expanding the fence line over part of and extending the main and reserve busbars to create a new shunt reactor bay. This option was identified as the only feasible solution.

Minety

- Option 1: Tee off the proposed new SGT bay at Point A. Cable to Point B. Create a new shunt reactor bay adjacent to (south of) the 132kV substation site, in the “laydown area”.
- Option 2: Tee off the proposed new SGT bay at Point A. Create a new shunt reactor bay within an extension of the substation site within new land (purchased) to the north of site.

We considered options at Minety substation. Initial observations within the existing fence line yielded no feasible options, as the site is densely populated with bays and switchgear.

The focus turned to an area of land to the southeast of the Minety substation (Option 1) which is traditionally used as a laydown area for works at the site. This land has the space to accommodate a shunt reactor bay. However, it is physically far away from the only available connection location on the mesh. A cross-site cable run would therefore be required between Mesh Corner 3 (Point A on Figure 17 above) and the "laydown" area location (Point B).

Option 2 considered purchase of adjoining land to the north and an extension to the site fence line. A new shunt reactor bay could be created off Mesh Corner 3. The option would involve a section of cable to connect between the new bay and the substation bus bars, depending on which area of land is purchased. Subject to the progression of a land purchase and gaining planning permission/consent for the extension of the site involving the clearance of some woodland, this option offered a potential solution.

Bramley

- Bramley Option 1: Extend main and reserve bus bars, create GIL/GIS interface, create new shunt reactor bay adjacent to Melksham 1 feeder bay.
- Bramley Option 2: Extend site to the west into the ancient woodland. Extend main and reserve bus bars and create new AIS shunt reactor bay.
- Bramley Option 3: Extend site to the east into the ancient woodland. Extend main and reserve bus bars and create new AIS shunt reactor bay.

We considered options at Bramley. Initial observations within the existing fence line yielded one potential option. This was to extend the main and reserve bus bars using a GIS solution to keep the footprint compact enough to remain within the existing fence line. Subject to being able to find an SF6-free solution, this option offered a potential solution.

An extension to the west of Bramley substation was then considered. This would involve extending the site fence line out over part of the adjacent woodland that encircles the site. Then extending the main and reserve bus bars to create a new shunt reactor bay in the newly extended part of the site.

An extension to the east of Bramley substation was also considered. This would involve extending the site fence line out over part of the adjacent ancient woodland that encircles the site. Then extending the main and reserve bus bars to create a new shunt reactor bay in the newly extended part of the site.

Fleet

Solutions within the fence line at Fleet were very limited given that all mesh corners are populated

Furthermore, system studies have indicated that the position of Fleet on the network would not provide an optimum node for injecting voltage control and that other sites are favourable.

Extending the site may offer additional space for siting a shunt reactor unit but there would still be a lack of electrical connection point.

Didcot

- Didcot Option 1: Spare bay 1 - 90 degree bus bar arrangement (or extend fence and build bay in straight line). Re-use concrete structures for circuit breakers, remove other concrete structures. May need to divert drainage systems. No fire

barrier wall envisaged. Utilise existing bar disconnectors. Block house has power and wall/racks are vacant.

- Didcot Option 2: Spare bay 3 - 90 degree bus bar arrangement (or extend fence and build bay in straight line). Re-use concrete structures for circuit breakers. Relocate cess pit and drainage systems. Fire barrier wall needed to protect office. Utilise existing bar disconnectors. Block house has power and wall/racks are vacant.
- Didcot Option 3: Extend main and reserve bus bars and create new bay on eastern end of site. Move existing fence-line by circa 5 metres to make space for wider road. Shunt reactor and cooler alternative layout (coolers behind unit).
- Didcot Option 4: Extend main and reserve bus bars and create new bay on eastern end of site. Move existing fence-line by circa 5 metres to make space for wider road. Cable 60 metres to shunt reactor location adjacent to Bramley 1 circuit.
- Didcot Option 5: Extend main and reserve bus bars and create new bay on eastern end of site. Move existing fence-line by circa 5 metres to make space for wider road. Cable 300 metres to shunt reactor location adjacent to SGT2.
- Didcot Option 6: Integrate new shunt reactor bay into wider site extension plans.

Whilst Didcot currently has two spare bays that could each accommodate a new shunt reactor bay, [redacted] The only potential solution at Didcot is to accommodate a new shunt reactor bay within [redacted] at the site. However, system studies have indicated that the position of Didcot on the network would not provide an optimum node for injecting voltage control and that other sites are favourable.

**Preferred Solution for siting of Shunt Reactor 2**

The preferred solution is to extend the Melksham 400kV substation fence line westward, [redacted] and install a new 400kV 200MVar shunt reactor and cooler bank. A new fully populated bay will be built within the extended area, with a new bunded area to contain the unit and cooler bank. Existing substation oil/water drainage and earth matting will be extended. The new unit does not require a noise enclosure. A new section of substation roadway is required to serve the new shunt

reactor position. The new unit will be delivered to its final position using substation internal roadways.

The works require Town and Country Planning permission. The golf club land will be acquired via a Compulsory Purchase Order (CPO). An existing stone track running north-south outside the existing western substation fence line, serving a third-party battery storage facility, is required to be diverted to a position further away from the substation to make space for the site extension.

# 6. Technical Project Scope

**Key Summary**

Following our optioneering process outlined in the previous chapter for key project elements and infrastructure to deliver the undergrounding works, this chapter outlines the technical scope of the Cotswolds VIP project and provides further detail on the works required for NGET to meet the visual impact mitigation objective. The project's technical scope to be delivered consists of:

- Installation of Northern and Southern CSECs
- Ducted underground Cable Installation
- Numerous enabling/additional works to support project constructability
- Deployment of two Shunt Reacors
- Existing Overheadline section and Pylon/Tower Removal

-

## 6.1 Existing Arrangements

The existing ZF overhead line consists of the Feckenham – Walham and Feckenham – Minety 400kV circuits. Figure 21 below depicts a section of the existing overhead line with an L2 tower type and Twin Rubus overhead conductors.

The ZF.2(B) section of the overhead, which is set for removal via the Cotswolds VIP project, extends from northeast of Cheltenham (near Winchcombe) to southeast of Cheltenham (near Whittington). This stretch runs parallel to the Cotswold Way National Trail for much of its length and intersects with several regional trails.

*Figure 21: Existing ZF Overhead Line*

## 6.2 Technical Project Scope Overview

Table 18 below provides an overview of the scope to deliver the Cotswolds VIP project. The project involves the permanent removal of the ZF.2(B) section of the overhead line, between towers ZF308 and ZF324, and replacing it with approximately 7km of underground cables to reduce the visual impact within the Cotswolds National Landscape. ZF308 and ZF324 are tower designations within the ZF.2(B) section of the transmission line; these represent the start and end points of the undergrounding work.

The transition between the overhead line and underground cabling sections will take place at two new Cable Sealing End Compounds (CSECs) in the North and South, where the overhead line will terminate, and the underground cables will begin or reconnect. The underground cable system will be designed and installed using 7km of XLPE (cross-linked polyethylene) insulated cables with a 2500mm$^2$ conductor in a buried ducted installation system.

The introduction of underground cables to replace the ZF.2(B) section of overhead line has necessitated additional voltage control measures. To address this, the project includes the installation of two new shunt reactors, which will support the management of voltage levels in this part of the network. The optimal connection points for these reactors were identified as Feckenham and Melksham 400kV substations, as detailed in Chapter 5.

In addition to the key elements of works summarised above, there are also various additional works required to support project constructability. This includes:

- **Temporary diversion towers at key locations to support the overhead line during transition phases:**

  During the transition from overhead lines to underground cables, sections of the existing transmission circuit need to be decommissioned in stages. Temporary towers will support the overhead line conductors while permanent towers are dismantled, and underground cables are installed. These towers prevent network outages by keeping the system energised where possible, reducing the need for planned outages in the best interests of consumers.

- **Enabling works and temporary works to deliver the underground cabling:** The enabling works of the project covers different disciplines that enable the delivery of the physical underground cabling. This involves and is not limited to the below:
  - Temporary drainage installation across arable fields, including any required attenuation features
  - Vegetation clearance across the construction swathe
  - Haul road installation to allow safe access and egress to construction work areas

- Cotswolds stone wall removal across the construction swathe
- Bellmouth installation to allow safe access and egress from public highways into the construction work area
- Enabling access to third parties across the construction work area, including Public Rights of Way and private farmer access tracks.

Incorporating these elements into the Cotswolds project scope will ensure that the project is delivered with minimal disruption and avoids unnecessary cost to consumers.

*Table 18: Cotswolds VIP Project Scope Overview*

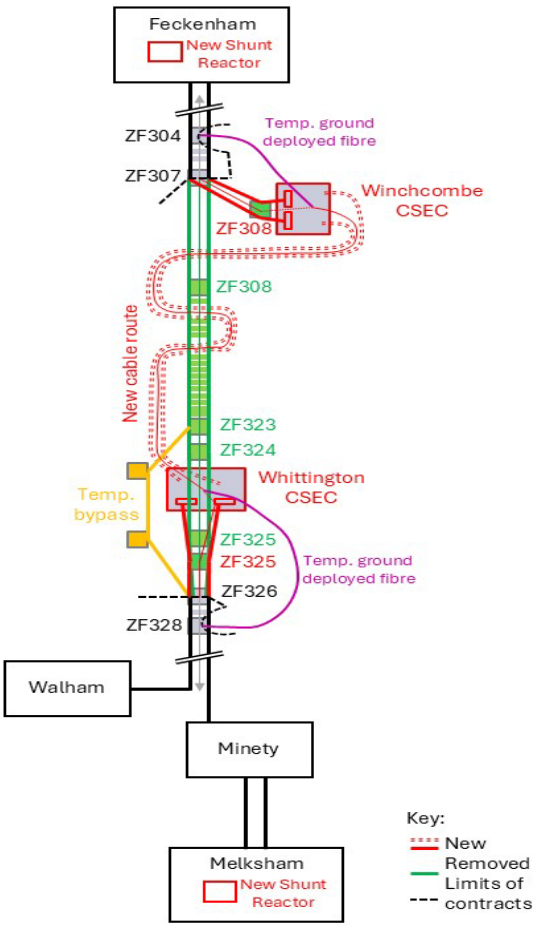



**Figure 22: illustration of the Cotswolds VIP project scope**

| Component | Description |
|---|---|
| **Overhead Line Removal/Decommission** | Removal of overhead line section ZF.2(B), including dismantling of towers ZF308 to ZF324. |
| **New Underground Cable Installation** | Installation of approx. 7.4km XLPE-insulated 2500mm² copper conductor cables in a buried (cement bound sand) ducted system.<br><br>The project will deliver a new 400kV double circuit (Feckenham – Minety and Feckenham – Walham) underground electrical cable route. Each circuit will be two cables per phase; therefore, the solution comprises twelve cables in total. |
| **Cable Sealing End Compounds (CSECs)** | Construction of two new CSECs at ZF308 and ZF324 to facilitate overhead line to underground cabling transitions.<br>• North - Winchcombe CSEC<br>• South - Whittington CSEC<br>Necessitates two tower replacements. |
| **Shunt Reactors** | Installation of two shunt reactors at Feckenham and Melksham 400kV substations to provide voltage control and maintain system stability. |
| **Range of Temporary/ Enabling Works** | Deployment of temporary towers, fibre links, temporary bypass towers, temporary haul roads and offline constructions to ensure network continuity during works. |

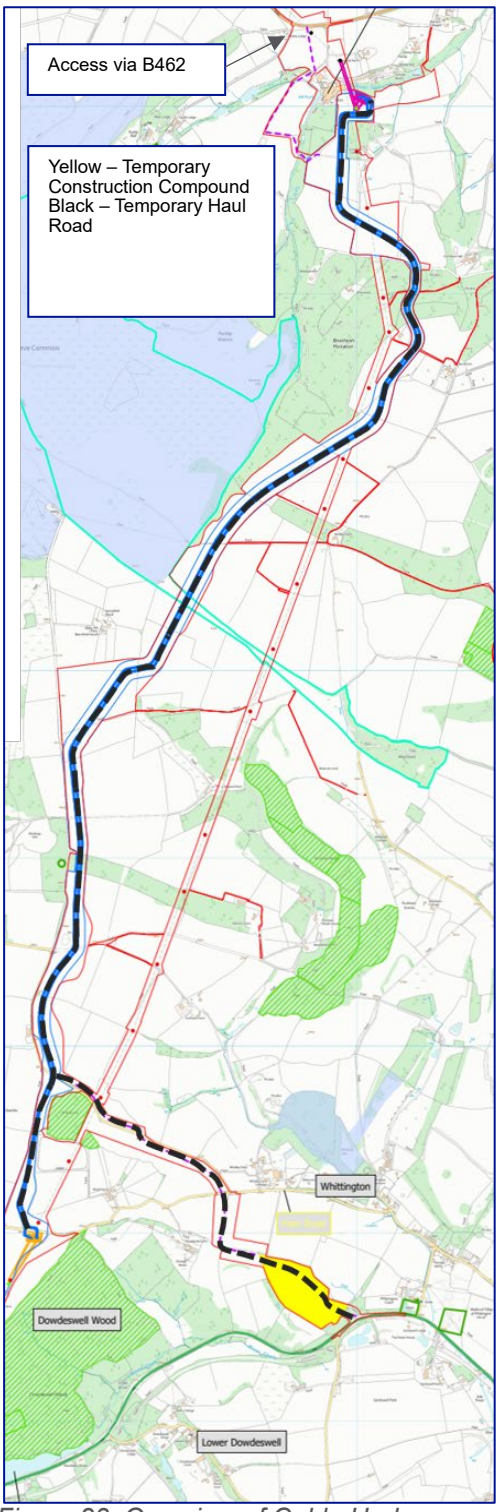



*Figure 23: Overview of Cable Underground Route*

## 6.3 Temporary Haul Road and Site Access

**Temporary haul road**

The temporary haul road will be constructed to support underground cable installation and later used for the overhead line removal works (see Figure 23). The haul road will typically have a 7m wide running surface, ensuring sufficient space for construction vehicles and equipment. Temporary access to the works will be taken from both the north and the south of the route corridor.

**Land Drainage Considerations**

One of the primary concerns for landowners along the underground cable route is the impact of construction on land drainage. NGET acknowledges that the successful reinstatement of land depends on the quality of drainage design and installation. To ensure this:

- A specialist land drainage consultant will be appointed by the project contractor.
- Landowners will be consulted throughout the drainage restoration process.
- Landowners will have the opportunity to inspect drainage works as they progress

**Site Access Points**

| Northern |
| --- |
| • The northern site access is on the B4632<br>• Approximately 80m to the west of an existing private access road to a paper mill and residential property.<br>• Accessible via a priority T-junction<br>• Will accommodate 30% of construction traffic. |
| **Southern** |
| • A new access point will need to be developed on the A40 to accommodate construction needs.<br>• The new access will be built where an existing layby is located.<br>• A priority T-junction with a right-turn bay will be created for vehicles entering from the A40 (east).<br>• The site access road will be 7m wide, designed to accommodate HGVs and Abnormal Indivisible Loads (AILs). |

## 6.4 Permanent Access

The project area can be accessed from the north by the B4632 through Postlip Village to the northern CSE compound. Access to the southern end of the route is via Ham Road, where the UGC route is proposed to cross to the southern CSE compound.

## 6.5 Underground Cable Route

The majority of the selected underground cable route, as described in Chapter 5.2, passes through agricultural land within the Cotswolds landscape, characterised by steeply sloped terrain, dry-stone walls, hedgerows, and significant areas of woodland. The route also crosses several areas of archaeological interest and common land[21], requiring careful planning from NGET to mitigate any potential impacts. There are no major roads along the route, only B-roads, which influences construction access and logistics.

### 6.5.1 Installation of Underground Cables

The replacement of the ZF.2(B) section of the overhead line with underground cables will follow a structured installation process. The overhead line will only be removed after the underground cable system has been fully installed and commissioned to ensure network continuity.

The installation of underground cables will require a construction swathe (also referred to as the cable corridor or working width) that is approximately 80 metres wide along the cable route. This width is necessary to:

- Accommodate the excavated cable trenches[22].
- Provide space for a 7m wide central haul road to facilitate the movement of construction vehicles.
- Allow for storage areas for stripped topsoil and subsoil from the trench excavation.
- Incorporate temporary and permanent land drainage solutions to protect the surrounding environment.

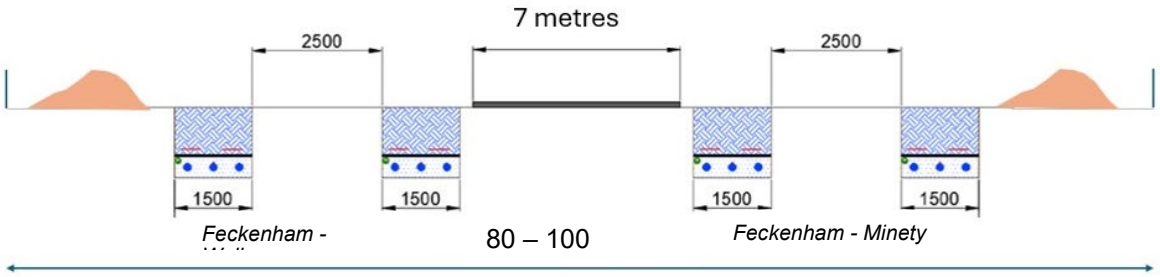



*Figure 24: Illustration of a typical construction swathe (measurement are subject to detailed design)*

The underground cable system will use a ducted installation method, where the XLPE insulated cables are pulled through pre-installed ducts. These ducts will be placed in the excavated trenches, maintaining a specified spacing and surrounded by a compacted layer of cement bound sand. Once the ducts are in place, the remainder of the trench will then be backfilled with a sub soil, sourced from excavated material wherever possible.

The cable installation process takes a two-phased approach:

[21] Common land is owned, for example by a local council, privately or by the National Trust.
[22] Trenches are excavated to install protective cable ducts, which house the underground cable.

**Civil Engineering (Phase 1)**

- Excavation of trenches to the required depth and width
- Installation of protective ducts at a specified spacing within the trench
- Surrounding the ducts with a compacted layer of cement-bound sand
- Backfilling the trenches with sub soil, using excavated soil where possible

**Cable Installation (Phase 2)**

- Once the duct system is in place, XLPE-insulated cables are manoeuvred into position and pulled through the pre-installed ducts using a safe system of winches.
- The cable pulling locations and jointing points will be determined by the contractor during the detailed design stage
- Final cable installation will be subject to NGET's technical assurance process before construction drawings are issued

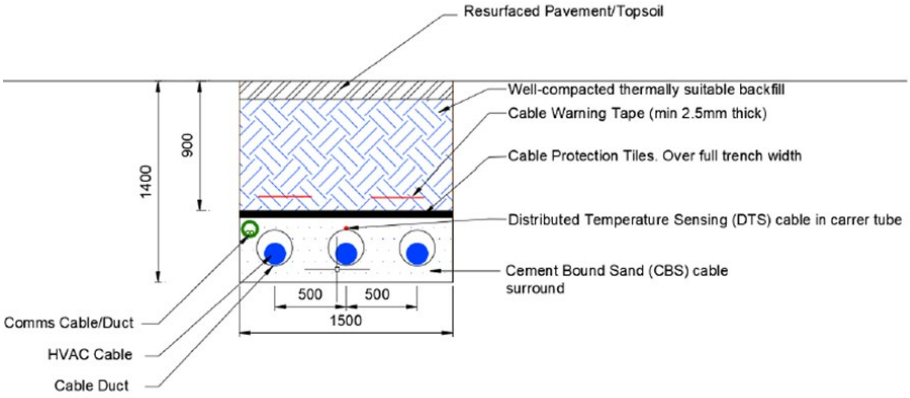



*Figure 25: Illustration of a typical trench installation (measurements are subject to detailed design)*

### 6.5.2 Cable Ratings and Specifications

The appropriate system requirements for the underground cable section have been determined by considering the thermal ratings of the entire ZF overhead line (OHL), to which the cables will connect to via the new Cable Sealing End Compounds (CSEC).

The cable specification for the Cotswolds VIP project has been developed in line with the wider requirement to uprate the Feckenham–Minety and Feckenham–Walham circuits. These upgrades are driven by system needs identified under the tCSNP framework and anticipated future customer connections. Table 19 below outlines the current and future circuit ratings. The new cable ratings ensure the Cotswolds VIP project supports these wider system upgrades and delivers a future-ready solution at the right time.

The underground cable section has been specified to match the ratings of the future conductor. Each respective circuit will consist of two cables per phase, resulting in a total of twelve cables to deliver a fully compliant and resilient solution.

*Table 19: Cotswolds VIP System Design Table*

### 6.5.3 Cable Route Description

The cable route is built up of three main sections starting at the new Winchcombe CSEC at the north and terminations at the new Whittington CSEC in the south. The main sections are as follows:

- Winchcombe 400kV CSEC to Tower ZF313
- Tower ZF313 to Access to Drypool Farm (near Tower ZF320)
- Access to Drypool Farm (near Tower ZF320) to Whittington 400kV CSEC

### 6.5.4 Offline Build of Ducted System

The first major activity linked with introducing a cable system onto the network will involve an offline build of the ducted system. This is primarily a civils engineering activity, digging trenches, laying the duct and back filling with CBS and soils. This is completed in a sequence and creates the ducted system for the cables to be safely pulled into. The below illustration summarises this stage of the works. The temporary towers are also commenced at this stage whilst not on the live system.

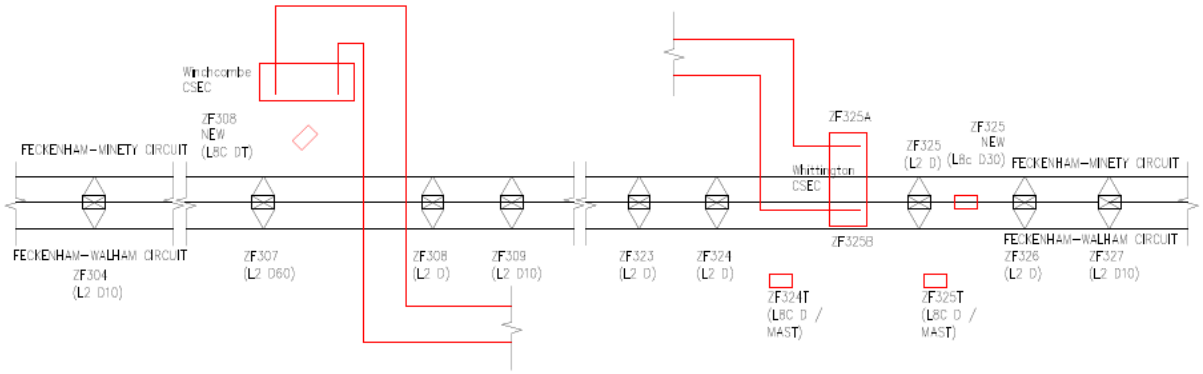



*Figure 26: Offline build of ducted system & Temporary Towers.*

### 6.5.5 Link Pillars for Earthing and Monitoring

At regular intervals along the cable route, above-ground link pillars will be installed at cable jointing locations. These link pillars will be positioned as close as possible to the designated cable installation points while prioritising locations near field boundaries, where feasible and compliant with the approved design. The link pillars will serve as monitoring points for cable earthing.

*Figure 27: Example illustration of link boxes*

## 6.6 Diversion of the ZF Overhead Line onto Temporary Towers

Once the Northern and Southern CSECs and underground duct system are in place, the existing ZF overhead line will be diverted onto two temporary terminal towers (ZF34T L8C D/MAST and ZF325T L8C D/MAST in Figure 28 below). This allows for the disconnection and removal of the existing towers that are in the path of the underground cable installation. During this phase, conductors are safely transferred to the temporary towers to maintain system operability.

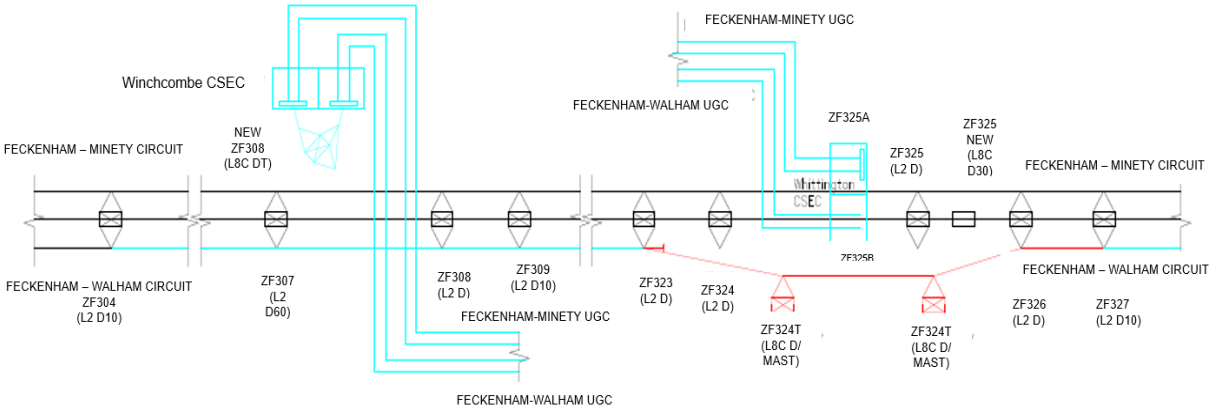



*Figure 28: Circuit diversion to temporary bypass towers*

## 6.7 Offline Construction of Cable Sealing End Compounds (CSECs)

The CSECs facilitate the transition from overhead lines to underground cables. Each CSEC will house cable sealing ends, surge arresters, motorised earth switches and gantries. Both the Northern and Southern CSECs will be constructed offline, while the ZF overhead line remains operational to minimise outages required, in the best interest of consumers. Gantry structures are not installed at this stage, allowing for work to proceed without interference with the existing network.

Temporary towers will be prepared to facilitate later transitions (See Chapter 6.6 above), and the underground duct system is constructed in readiness for the installation of underground cables. This offline approach ensures that the primary network remains fully operational while essential infrastructure is put in place.

Table 20 below gives a brief overview of what would likely be required in terms of constructing and operating of both CSECs.

*Table 20: CSEC Requirements*

| Component | Specification |
|---|---|
| **Compound Dimensions** | Approximately 80 metres by 40 metres |
| **Contained Equipment** | - Cable terminations (cable sealing ends)<br>- Electrical equipment<br>- Support structures enclosure, secured by security fencing.<br>- Terminal pylon, located either inside or close to the CSEC, acting as a support for the conductor system and 'down-leads' feeding each circuit onto the cable sealing ends.<br>- Landing Structures (Gantries) to provide connection to electrical equipment and designed to withstand tension forces. |
| **Maximum Equipment Height** | Full line tension gantries reaching approximately 14.5 metres. |
| **Temporary Construction Compound** | - Approximately 75 metres by 75 metres adjacent to each CSEC site.<br>- Includes laydown areas, soil storage, parking, welfare facilities, waste facilities, and security.<br>- Removed and area restored post-construction |
| **Permanent Access Track** | - Constructed from existing highway network.<br>- Minimum width of 5 metres for maintenance purposes |

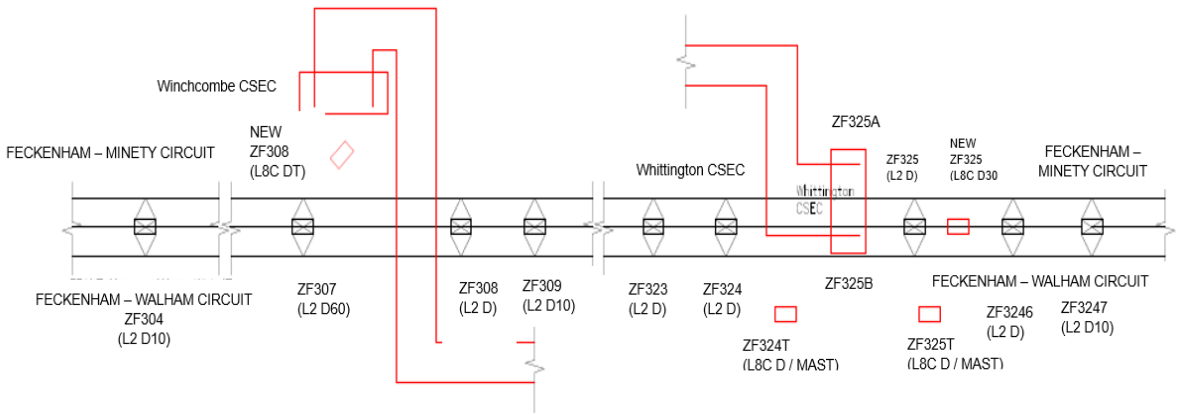



*Figure 29: Offline build of the Northern and Southern CSECs*

### 6.7.1 Northern CSEC – Winchcombe

- At the northern end of the cable route, the Winchcombe CSEC will be constructed offline, adjacent to the existing ZF307-308 overhead line span[23].
- The overhead line span ZF307-308 will be “turned-in” via a replacement of the ZF308 (L2 D) tower, which slightly increases the deviation angle from ZF307. The new tower ZF308 will be a terminal tower (L8C DT).
- The new span ZF307-308 will be strung with new conductors and new optical ground wire (OPGW) earthwire, as will the downleads from ZF308 which will terminate to new gantries within the cable sealing end compound.
- Permanent access to the CSEC will require upgrades to existing tracks and construction of new roadway sections from the B4632 road approximately 800 metres away, for cars and light goods vehicles. Whilst infrequent, HGV visits through the operational life of the CSEC will access via the nearby paper mill site.

### 6.7.2 Southern CSEC – Whittington

- At the southern end of the cable route Whittington CSEC will be built partly offline, beneath the existing overhead line span ZF324-325, then completed during a series of circuit outages.
- The Feckenham – Walham overhead line circuit will be temporarily diverted onto two temporary bypass towers (see Chapter 6.5 above). The Feckenham – Minety overhead line circuit will then have an outage to allow for the installation of a new ZF325 tension tower (L8C D30), shortening the ZF324-325 span. This new span will be strung with new conductors and OPGW earthwire.
- The final span will also be strung in the same manner before the CSEC which will terminate at new full line tension gantries (ZF325A and ZF325B) within the cable sealing end compound.
- Permanent access will be from the B-road which is immediately adjacent to the site, allowing direct access for construction and maintenance.

## 6.8 Final Terminations

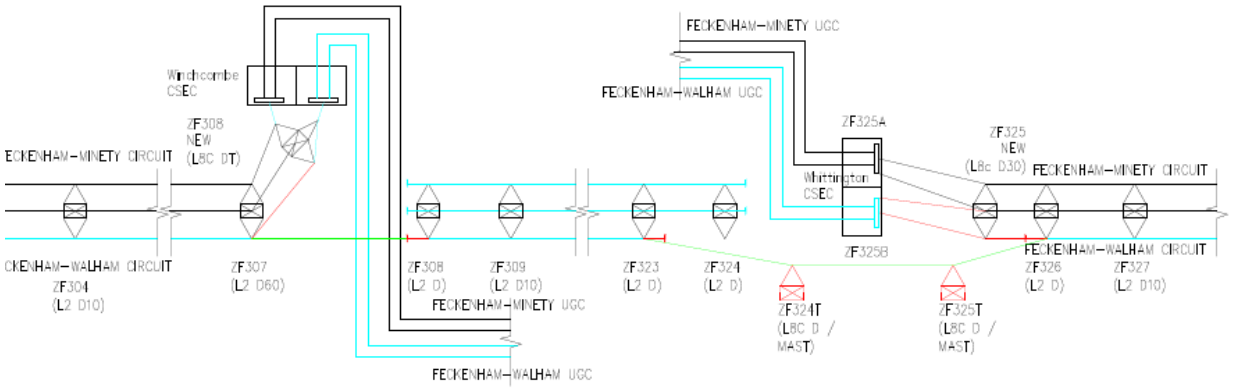



*Figure 30: Final Terminations*

[23] Overhead line span refers to distance between two towers.

With the overhead line diverted, outages are scheduled to allow for the integration of the new underground cable system. This phase includes turning in of the OHL conductor onto the newly constructed ZF308, ZF325A, ZF325B and terminating of the cable through the cable sealing end compound, onto the gantry structures. The full high voltage testing of the newly installed cable system will need to be complete prior to this final termination.

## 6.9 Decommissioning the ZF.2(B) Section of Overhead Line

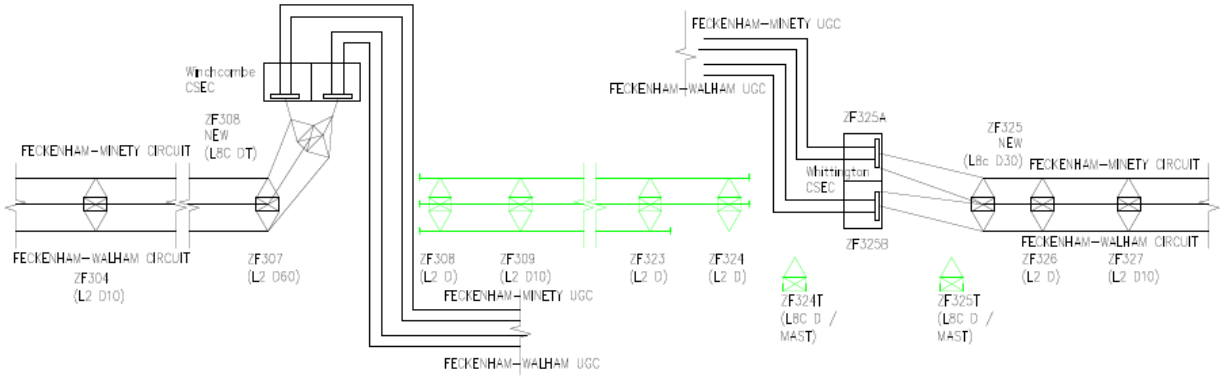



*Figure 31: Decommissioning of the overhead line section*

The removal and dismantling of the now redundant section of the ZF overhead line (ZF2.B) will take place from tower ZF308 in the north to ZF324 in the south (See Figure 31 above), resulting in the decommissioning of 16 towers. The scope of works includes:

- Tower ZF308 will be removed and replaced with a new termination tower.
- Towers ZF309 to ZF324 will be fully removed.
- Tower ZF325 will be removed and replaced with a new tower, along with a span to full line tension gantries.

Most towers will be accessed via the temporary haul road constructed during earlier cable works, while all towers remain accessible through individual access routes established under existing easement and wayleave agreements with landowners and farmers.

The removal of towers and conductors marks the completion of the transition from overhead to underground transmission for the ZF.2(B) section. This phase also includes land restoration and drainage reinstatement, ensuring that any environmental or agricultural impacts caused during construction are fully addressed.

## 6.10 Installation of two shunt reactors

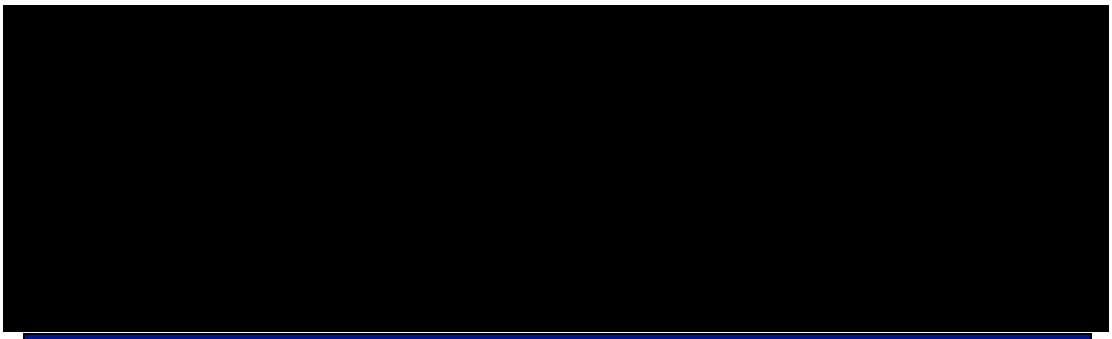
As outlined in Chapter 5, two new shunt reactors required for voltage management will be installed at Feckenham and Melksham 400kV substations.

### 6.10.1 Feckenham 400KV substation – Shunt Reactor 1

Table 21 below outlines the associated works required at Feckenham substation to accommodate for Shunt Reactor 1:

*Table 21: Scope of works required for the installation of Shunt Reactor 1*

| |
|---|
| **Shunt Reactor Installation** |
| • Installation of a new 400kV 200MVAr shunt reactor and steel sectioned noise enclosure |
| **Primary Plant and High Voltage** |
| • Installation of 3x new 1-phase 400kV surge arresters to protect against voltage surges.<br>• Installation of 1x new 3-phase 400kV earth switch for safe grounding operations.<br>• Installation of a new 400kV circuit breaker with point-on-wave switching capability, ensuring controlled reactor switching.<br>• Installation of 1x 400kV pantograph-type disconnector (3x single phase) with a single earth switch for circuit isolation.<br>• Installation of post current transformers to monitor electrical currents.<br>• Installation of new busbars, connections, and connectors. |
| **Cable Infrastructure** |
| [redacted]<br>• Installation of cable ducts for multicores and power supplies to the new bay and shunt reactor. |
| **Structural and Civil Works** |
| • Installation of post insulators and associated structures to support the electrical infrastructure.<br>• Installation of steelwork plant support structures for various components<br>• Construction of new piled foundations for:<br>- 6x earth switches<br>- 3x circuit breakers<br>- 9x post insulators<br>- 3x surge arrestors<br>- 3x current transformers |
| **Drainage & Environmental** |
| • Installation of a Type 1 above-ground containment bund, compliant with TS 2.10.01, and with a noise enclosure.<br>• Installation of new oily water drainage pipework for the shunt reactor bund, directing runoff to a new NS10 Class 1 full retention oil separator to account for the discharge of the new Shunt Reactor bund. |



| Site Access & General Works |
| --- |
| • Extension of the site road alongside the shunt reactor bund to facilitate access.<br>• Reinstatement of substation surfacing following excavation works.<br>• Replacement of existing fixed lighting column with new hinged downdrop type lighting column to facilitate safe maintenance clearance to adjacent busbars and equipment. |

### 6.10.2 Melksham 400KV substation – Shunt Reactor 2

Table 22 below outlines the associated works required at Melksham substation to accommodate for Shunt Reactor 2:

*Table 22: Scope of works required for the installation of Shunt Reactor 2*

| Shunt Reactor Installation |
| --- |
| • Installation of a new 400kV 200MVAr shunt reactor |
| **Primary Plant and High Voltage** |
| • Installation of 3x new 1-phase 400kV surge arresters to protect against voltage surges.<br>• Installation of 3x new 3-phase 400kV earth switch for safe grounding operations.<br>• Installation of a new 400kV circuit breaker with point-on-wave switching capability, ensuring controlled reactor switching.<br>• Installation of 2x 400kV pantograph-type disconnector (3x single phase) with a single earth switch for circuit isolation.<br>• Installation of post current transformers to monitor electrical currents.<br>• Installation of new busbars, connections, and connectors. |
| **Cable Infrastructure** |
| [redacted] |
| **Structural and Civil Works** |
| • Demolition of section of existing macadam road within the existing substation including kerbs due to the obstruction it causes to the planned busbar extension and replaced with 75mm chippings on a minimum of 300mm type 3 sub-base.<br>• Demolition of Battery Facility access track in the vicinity of the substation extension area.<br>• Site clearance of scrub and foliage in the vicinity of the substation extension area to prepare for construction.<br>• Installation of post insulators and associated structures to support the electrical infrastructure.<br>• Installation of steelwork plant support structures for 400kV Surge Arresters, Earth Switches, Post Insulators, Pantograph Disconnectors, Circuit Breakers and Current Transformers.<br>• Earthworks to facilitate the substation extension including topsoil strip, cut & fill and formation level. Topographical and Ground Investigation survey to be undertaken to determine extent of earthworks.<br>• Installation of HV plant foundations for the equipment.<br>• Service diversions as deemed necessary. Ground Penetrating Radar survey to be undertaken to determine services in the area. |
| **Drainage & Environmental** |
| • Installation of a Type 1 above-ground containment bund, compliant with National Grid Technical Specifications. |

- Installation of a new NS10 Class 1 full retention oil separator to account for the discharge of the new Shunt Reactor bund.
- Installation of new oily water drainage pipework for the shunt reactor bund, directing runoff to the new NS10 oil separator.

[redacted]

Site Access & General Works

- Demolition of the westerly substation perimeter fence.
- Installation of new perimeter electrified fence around the substation extension shunt reactor bay.
- Installation of new substation access road within the extension area.
- Relocation of existing lighting columns in the vicinity of the busbar extension.
- New lighting columns and foundations to suit the new bay within the extension area.

[redacted]

# 7. Project Benefits

**Key Summary**

This chapter sets out the benefits of the Cotswolds VIP Project, consisting of our assessment of the tangible and intangible impacts of the project in the implementation of an undergrounding cable system to replace the ZF.2(B) section of the existing ZF overhead transmission line. We considered the project's benefits alongside our Ofgem approved VIP Principles (See Chapter 3 and Appendix A.2), to ensure that the project benefits are aligned with the best interests of landscape's stakeholders.

- Most notably, The Cotswolds National Landscape welcomes over 23 million visitors a year, generating in excess of £1 billion annually for the local economy. The area's visual quality, tranquillity, and accessible network of trails are key to its appeal for quiet recreation and tourism. The visual enhancement delivered by the VIP project therefore helps to protect and strengthen the landscape qualities that underpin this economic and recreational value, ensuring the area remains attractive to visitors over the long term.2

Beyond landscape and visual impact enhancements to the Cotswold National Landscape, the Cotswolds VIP Project delivers both system and consumer benefits by integrating the undergrounding of the ZF.2(B) section with wider projects to uprate the capacity of the ZF overhead line.

## 7.1 Tangible Project Benefits

### 7.1.1 tCSNP & Customer Connection Driver and Outage Coordination

The Cotswolds VIP project delivers a tangible network benefit through its strategic alignment with the wider ZF uprating programme, as detailed in Chapter 4. The underground cable section has been designed to match the enhanced capacity requirements driven by tCSNP and customer connection needs. The project therefore supports increased boundary transfer capability and facilitates future low-carbon power flows.

Coordinated outage planning has further strengthened the efficiency of the project by avoiding duplication of outages and reducing associated constraint costs, delivering enhanced value for consumers. It is more economical to deliver both the Cotswolds project and the ZF circuit uprating within shared outage windows, rather than deferring either to a later date. This approach results in a clear and measurable benefit through the avoidance of further constraints and associated outage-related costs.

### 7.1.2 Supply Chain Capabilities and Future Readiness

While the Cotswolds project delivers near-term landscape and amenity benefits for the Cotswold National Landscape, it is also positioned to play a foundational role in developing NGET's external supply chain readiness for a significant ramp-up in underground cabling activity expected in the future. [redacted]

[redacted]

**Alignment with RIIO-T3 Objectives**

The Cotswolds VIP project directly supports our RIIO-T3 strategic objective to *"maintain world-class levels of network performance and resilience, and ensure that the new network we build is designed to reflect future security and climate challenges."*

[redacted]

### 7.1.3 Unique and Time Sensitive Opportunity

The Cotswolds VIP undergrounding project represents a unique opportunity to preserve the beauty of the Cotswold National Landscape in the long-standing interest of the landscape's users and stakeholders. If the ZF overhead line undergoes a full uprating without incorporating the undergrounding of the ZF.2(B) section, it would become significantly more complex, costly, and inefficient to justify the removal the ZF.2(B) section of the line in the future. This is because once the ZF.2 circuit is uprated, any future removal of ZF.2(B) section for undergrounding would require redundancy of cabling assets that have only recently been installed and commissioned as part of the ZF.2 uprating. This would not represent value for consumers as it would be an unnecessary duplication of costs and resources.

It is therefore optimal to integrate the undergrounding of the ZF.2(B) section with the uprating of the ZF overhead line in a strategically coordinated programme to ensure that the necessary network upgrades and visual mitigation measures are delivered in the best interests of consumers.

## 7.2 Intangible Project Benefits

This section outlines the key intangible benefits of the Cotswolds VIP project, focusing on the visual and landscape enhancements, as well as the broader social and community value. While these outcomes cannot be precisely quantified, they represent significant long-term gains for the area's character, public enjoyment of the landscape, and the well-being of those who live in, work in, or visit the Cotswolds.

### 7.2.1 Re-scoring of the ZF.2(B) Cotswolds Subsection for Landscape and visual Impact of the subsections

To qualitatively highlight the landscape and visual benefits that will result from the Cotswolds VIP project, the ZF.2(B) Cotswolds subsection was re-scored on its landscape and visual impact using the same method as the 2014 LVIA assessment (excluding accommodation and roads/scenic routes). This reassessment provides a comparison of the subsection's impact prior to the undergrounding and post-undergrounding, therefore capturing the change in landscape and visual impact.

In the original[24] 2014 LVIA, landscape impact received a single score to ensure consistency across multiple subsections nationwide. However, in this reassessment, scores were calculated based on actual landscape character areas affected, with an overall average score applied. The new scores represent the remaining impacts once the mitigation project is complete.

The final column in Table 23 below shows the colour-coded ranking shift of ZF.2(B) resulting from the Cotswolds VIP project, using the 2014 assessment criteria where:

- Purple (Score of 25+): Very high landscape and visual impact
- Red (Score between 20-24): High impact
- Orange (Score between 10-19): Moderate impact

[24] It is not appropriate to use the scoring system used in the original 2014 LVIA framework, as this was developed prior to establishment of the shorter ZF.2(B) sub-section, and therefore the scoring in the original LVIA based on the longer section of the ZF overhead line which is not representative of ZF.2(B) . The same method applied for scoring in this 2014 LVIA was applied to the shorter subsection ZF.2(B) to attain a more representative view its landscape and visual imp

- Yellow (Score between 0-9): Low impact

The outcome of the re-scoring highlights that the undergrounding of the ZF.2(B) improves the overall landscape and visual impact of the existing overhead line from a red rating (score of 24) to yellow (score of 5)—a notable reduction in impact.

*Table 23: Assessment of overall importance of landscape and visual impacts for ZF2.B*

| | Importance of Landscape impacts | | | Importance of visual impacts | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Cotswolds High Wold Plateau area/High Wold Landscape | Winchcombe to Dover's Hill area/Escarpment landscape | Overall landscape score (Average) | Communities | Trails and cycleways | Rights of Way and Open Access Land | Visitor attractions | Overall visual score | |
| Original subsection (ZF.2) | n/a | n/a | **6** | 3 | 6 | 3 | 6 | **18** | 24 |
| Before undergrounding mitigation project (ZF.2(B)) | 6 | 6 | **6** | 3 | 6 | 3 | 6 | **18** | **24** |
| After undergrounding mitigation project (ZF.2(B)) | 0 | 1 | **1** | 1 | 1 | 1 | 1 | **4** | **5** |

### 7.2.2 Visual Enhancement Benefits

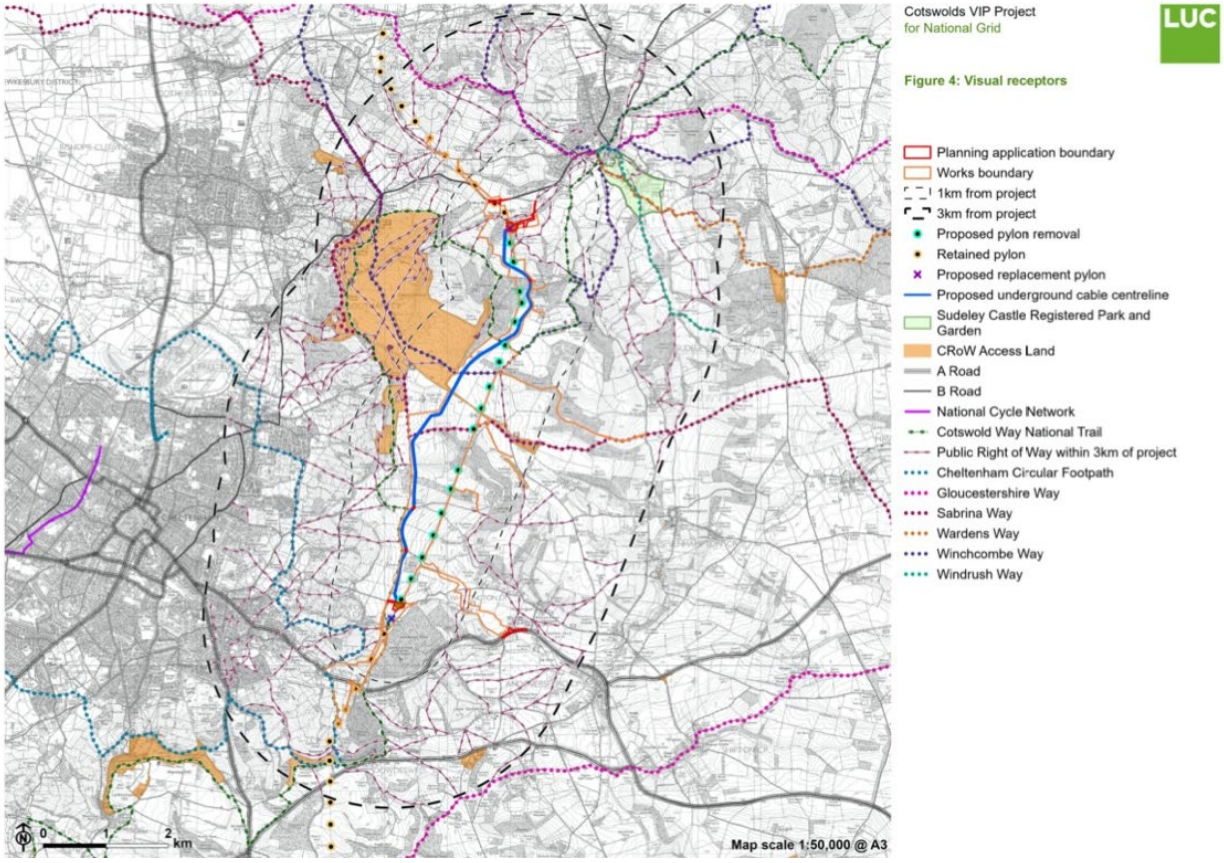



*Figure 35: Cotswolds Landscape Visual Receptors*

The Cotswolds Project delivers a range of visual enhancement benefits for different groups of people (receptor groups), who will be affected by changes to their views and visual amenity, through the removal of the existing overhead transmission line and pylons along section ZF.2(B). These groups include:

**1. Local communities**

The Cotswolds VIP project will deliver significant visual enhancement for a range of people affected by the removal of the overhead transmission line along section ZF.2(B), particularly local communities living in close proximity. These communities experience the visual intrusion of the infrastructure on a daily basis, making them key receptors whose enjoyment of the landscape is most directly and consistently impacted.

The area between Breakheart Plantation and West Down contains a number of scattered homes with varying degrees of visibility toward the existing pylons. While some properties are partially screened by agricultural buildings or woodland, others, particularly those on open sloping ground, experience more prominent views of the transmission infrastructure.

During construction, temporary features such as haul roads and trenching will be visible in some areas, particularly where vegetation is sparse or removed. These effects, however, will be short-term and will lessen as replanting takes hold. Beyond West Down, a further group of isolated properties is located near the existing line, where the current pylons

already impact visual amenity. Although elements of construction may be visible, they will generally appear in the same views as the existing infrastructure they are set to replace.

In the long term, the removal of pylons will substantially improve views across these dispersed residential areas. The 2014 LVIA previously rated the transmission line's impact on local communities as of moderate importance; following undergrounding, these effects are expected to reduce to a low level, reflecting a meaningful improvement in visual amenity.

*Figure 36: View near Arle Grove, showing the landscape before and after pylon removal, highlighting the visual enhancement delivered by project.*

**2. Users of promoted footpaths, key trail cycle routes bridleways and open land**

The surrounding Cotswolds project area is rich in promoted recreational routes, of which users, including the millions of annual visitors of the landscape, will enjoy the visual enhancement benefits delivered by the project.

i. Visitors to Publicly Accessible Sites

There are four key visitor destinations in the area. They are the Cleeve Common promoted viewpoint, Sudeley Castle and Gardens, Belas Knap Neolithic burial site, and Kilkenny Nature Reserve promoted viewpoint and open access land. Of these, visitors to Cleeve Common and Belas Knap will experience important visual enhancements benefits as a result of the Cotswolds VIP undergrounding project.

Cleeve Common includes two trig[25] points (317m and 330m AOD[26]) and extensive elevated panoramic views that currently feature the overhead line. These views will be significantly enhanced once the pylons are removed. Belas Knap, a Neolithic scheduled monument, is adjacent to the Cotswolds Way and Winchcombe Way. While views are limited by woodland, the transmission line is visible on the skyline from the barrow and its entrance. Its removal will deliver a noticeable improvement in the setting of this historic site.

The 2014 assessment identified the visual intrusion of the transmission line to these sites as highly significant. The changes resulting from the undergrounding of the line, particularly at Cleeve Common, but also for Belas Knap Neolithic burial site, will bring major to moderate benefits to these sites overall.

*Figure 37: Long-distance views from near Belas Knap Neolithic burial site before and after pylon removal, revealing the enhanced visual connection to the surrounding landscape delivered by the project.*

[25] Elevated trig points (short for triangulation points) are fixed survey markers placed at high points in the landscape, typically on hilltops or ridges. They were originally used for mapping and geodetic surveying by national mapping agencies. These points are often concrete pillars.
[26] Above Ordnance Datum is a standard measure of elevation used in the UK, where height is measured relative to mean sea level.

*Figure 38: View near Cleeve Common before and after pylon removal, illustrating the significant visual enhancement delivered by the project*

ii. Cotswold Way National Trail

This popular and well utilised long-distance trail runs from Winchcombe up to Belas Knap Neolithic burial site, then crosses the open High Wold landscape before descending through Breakheart Plantation and continuing to Cleeve Common. Elevated locations, such as the viewpoint on Cleeve Hill (within Cleeve Common), currently offer views of the pylons. Project Construction will be noticeable, but once the ZF.2(B) section of the overhead line is undergrounded, users will experience moderate to major visual enhancements along this key section.

South of Cleeve Common, the trail continues towards farmland and common land where views of the overhead line is mostly screened by the landscape. As it joins minor roads west of Warrens Farm, some open views to the line emerge. Long-term visual benefits here will be moderate due to limited visibility.

iii. Winchcombe Way long distance path

This 42-mile trail showcases the northern Cotswolds for walkers. From Winchcombe, it ascends to Belas Knap Neolithic burial site before crossing agricultural land before continuing westwards into central parts of Cleeve Common.

While construction impacts will be noticeable, particularly where the line is crossed, the long-term visual enhancements are expected to be of moderate to major significance, given the visibility of pylons in some sections.

The transmission line and pylons are notably visible from some sections of this route, and although there will be short term construction impacts on users, the long-term visual enhancement benefits will be of moderate to major significance.

iv. Sabrina Way, part of the National Bridle Route network

The Sabrina Way is a long-distance route primarily designed for horse riders. It runs from Gloucestershire to the Peak District in Derbyshire and is part of the national bridle route network. The route passes directly through the project area via a restricted byway (ASM140) and continues along a minor road on the approach to the Cleeve Hill Common car park before following the western edge of Cleeve Common.

Some 2.5km of the route directly crosses the ZF transmission line, hence once the transmission line is undergrounded and the pylons removed there will then be some major visual enhancement benefits for users, especially where the bridle route is closest to and crosses the transmission line.

v. Users of the Local Rights of Way Network and Open Access Land

There are numerous Public Rights of Way (PROWs) in the vicinity of the project. These include routes around Postlip Mill, between the River Isbourne and Breakheart Plantation, linking Ham Road to the Cotswold Way National Trail, and several paths around Lower Dowdeswell and north of the A436. These routes include both low-lying and elevated routes, offering a range of visual perspectives across the landscape.

The extent of visual enhancement delivered by the project will vary depending on the location of the routes. For users of more peripheral or lower-lying paths, long-term visual improvements are likely to be relatively limited. In contrast, users of routes that cross Cleeve Common or pass close to popular trails such as the Cotswold Way National Trail and the Winchcombe and Sabrina Ways are expected to experience greater visual benefit, due to the removal of prominent pylons and sections of overhead line currently affecting key views.

In addition to PROWs, three main areas of Open Access Land accessible to the millions of annual visitors: Cleeve Common, Longbarrow Bank, and Kilkenny Nature Reserve. Of these, Cleeve Common will experience the most substantial visual enhancement. It is an extensive and highly valued area of common land, crossed by several public paths and key recreational trails, and is a popular destination for both local communities and visitors to the National Landscape.

The original 2014 LVIA (see Appendix A.1) judged the impact of the ZF line on the PROWs and open access land in the area to be of moderate importance. The changes resulting from the undergrounding of the ZF.2(B) section, especially for Cleeve Common, will bring major to moderate benefits overall and mean that the remaining impacts will be of less significance.

*Figure 39: Before and after views of pylon and overhead line removal in the vicinity of Breakheart Plantation along the Cotswold Way, demonstrating the project's contribution to restoring visual tranquillity.*

vi. Users of Transport Routes

The roads in the vicinity generally give only transient views of the transmission line and pylons and occupants of vehicles are not likely to be particularly engaged with surrounding views. However, there will be some moderate benefits for people travelling along minor roads to the north-west of Whittington Village. Elsewhere, for other users of transport routes the benefits that are likely to result from the project are minor.

**Summary of visual enhancement benefits**

The removal of the overhead line and pylons along subsection ZF.2(B) is expected to deliver long-term visual benefits for a wide range of receptors. The most significant improvements will be experienced by:

- Users of the Sabrina Way, Winchcombe Way, and Cotswold Way National Trail
- Visitors to Cleeve Common and Belas Knap Neolithic burial site.
- Residents in scattered local communities between Breakheart Plantation, West Down, and Arle Grove.

Additional, though more moderate, benefits will be realised by users of other recreational routes, visitors to other publicly accessible sites, and road users throughout the surrounding area.

### 7.2.3 Landscape Enhancement Benefits

In line with our VIP Principle 1, the prioritisation of the Cotswolds VIP project reflects our commitment to a project that delivers the greatest improvement to landscape quality.

Landscape enhancement benefits refer to the positive changes made to the visual and physical character or relevant landscapes as a result of the Cotswolds VIP project. These improvements can include the reduction of visual intrusion, restoration of natural landscape features, and improving public access and enjoyment.

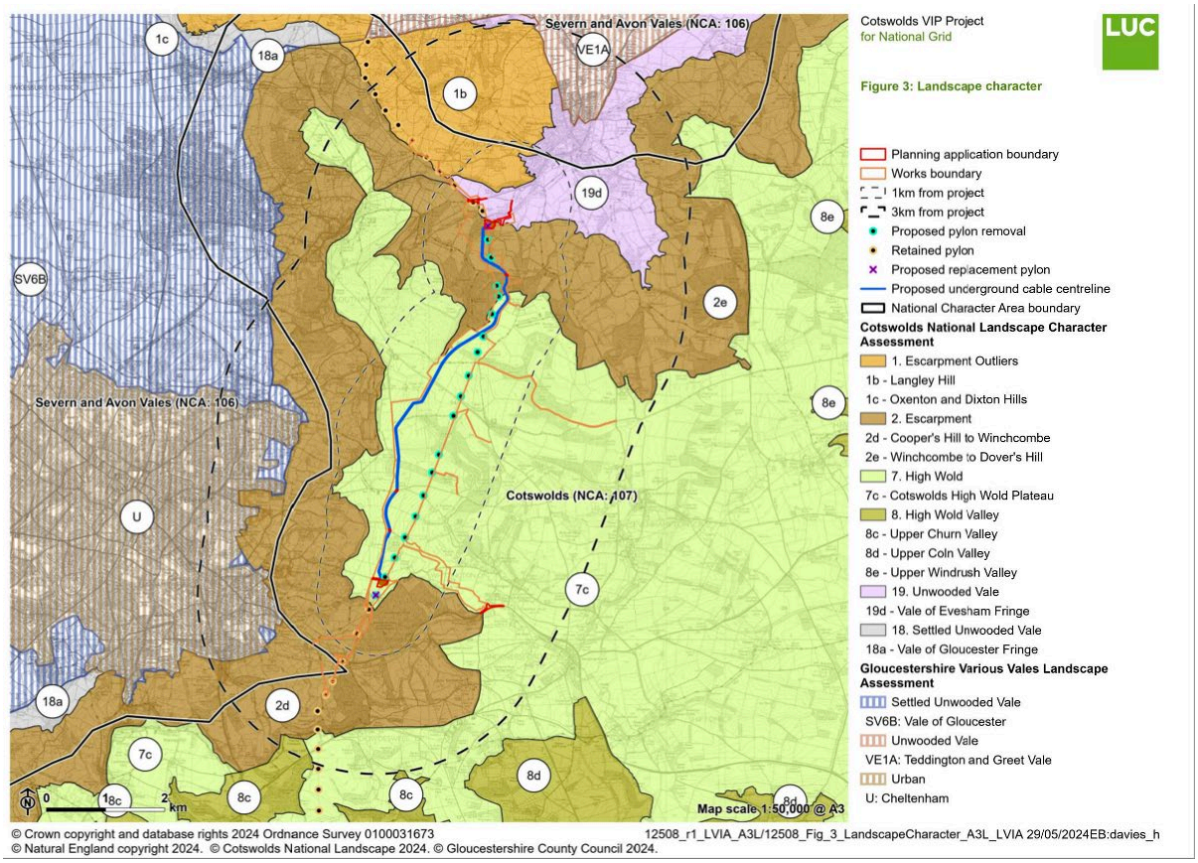



*Figure 40: Surrounding Cotswold Landscape Overview (LVIA 2014)*

Figure 40 highlights the areas of landscape impacts as a result of the Cotswolds VIP project. The most significant landscape benefits will be observed in the High Wold Landscape (Cotswolds High Wold Plateau) (2e in Figure 40), with more modest but still positive effects are observed in the Escarpment Landscape (Winchcombe to Dover's Hill area) (2d in Figure 40).

#### High Wold Landscape (Cotswolds High Wold Plateau)

The High Wold landscape, part of the Cotswolds High Wold Plateau, is characterised by a broad, elevated, gently undulating terrain, with deeply incised dry valleys and expansive views. Cleeve Common is a notable historic and visual feature within this setting.

The existing ZF overhead line ascends the escarpment and crosses this plateau, where pylons are currently prominent and visually disruptive, detracting from the open, tranquil

character. The Cotswolds VIP project will remove over 5km of line and 13 pylons from this landscape, significantly reducing visual intrusion and enhancing landscape character. While some pylons will remain beyond the Cable Sealing End Compounds (CSECs), these will be lower and further away, with a reduced impact. In the long term, the project is expected to deliver major beneficial effects to the High Wold landscape, with moderate to major improvements.

**Escarpment Landscape (Winchcombe to Dover's Hill area)**

The Escarpment landscape, stretching from Winchcombe to Dover's Hill, features a steep, west-facing slope with dramatic views across the Severn Vale to Wales and the Malverns. It is partly cloaked in ancient woodland and shaped by deep gullies and valleys, merging into areas of common land like Cleeve Common at higher elevations.

In this area, the project will remove 4 pylons along just over 1km of line. However, construction is likely to require vegetation clearance in the Breakheart Plantation, unless Horizontal Directional Drilling[27] (HDD) is used, though this is technically challenging and currently considered unlikely. In addition, the new Winchcombe CSEC and a replacement pylon will be introduced.

Due to these constraints, short-term benefits to this landscape are expected to be minor, but as new planting matures, moderate beneficial effects are anticipated over the longer term.

### 7.2.4 Impacts of the project on the natural beauty of the Cotswolds

In line with our VIP Principle 2, the prioritisation of the Cotswolds project reflects our commitment to delivering a project that present the greatest opportunities to conserve and enhance natural beauty and cultural heritage while avoiding unacceptable environmental impacts.

The Cotswolds National Landscape is designated for its outstanding natural beauty, which is defined through a set of 'special qualities' outlined in the Cotswolds National Landscape Management Plan 2023 – 25[28]. These special qualities reflect rich historical, cultural, geological, ecological, and scenic features.

The effectiveness of the project in achieving conservation and enhancement of natural beauty largely reflects the landscape and visual enhancement benefits set out under Principle 2 of our VIP Principles. Overall, there will be major benefits to the natural beauty of the National Landscape because of specific impacts on the special qualities relating to landscape. They can be summarised as follows:

- Landscape character: The removal of subsection of the ZF overhead line will bring major enhancements to the visual characteristics of the High Wold Plateau and the Escarpment landscapes within the National Landscape.

- Tranquillity: In its removal of detracting features, the project will generally have significant benefits in terms of enhanced tranquillity in the surrounding area around subsection ZF.2B and for scenic areas in the vicinity.

[27] Horizontal Directional Drilling is a steerable trenchless method of installing underground pipe, conduit, or cable in a shallow arc along a prescribed bore path by using a surface-launched drilling rig, with minimal impact on the surrounding area.
[28] Cotswolds National Landscape Management Plan - Cotswolds National Landscape

- Recreation and tourism: The Cotswolds National Landscape welcomes over 23 million visitors a year, generating in excess of £1 billion annually for the local economy. The area's visual quality, tranquillity, and accessible network of trails are key to its appeal for quiet recreation and tourism.

The Cotswolds VIP project will enhance the visual experience for users of iconic recreational assets such as Cleeve Common, Belas Knap Neolithic burial site, the Cotswold Way National Trail, the Sabrina Way, the Winchcombe Way, and other popular rights of way, by removing visually intrusive ZF.2(B) section of pylons and overhead line. In line with our VIP Principle 3, the Cotswolds project was prioritised for its potential to deliver benefits to the millions who visit the area each year. The project supports the long-term sustainability of tourism in the Cotswolds and helps protect this important contributor to the local economy.

*Figure 41: Before and after views showing the removal of pylons and overhead lines, revealing the restored natural beauty of the Cotswolds landscape*

### 7.2.6 Impacts of the project on cultural heritage[29]

The cultural heritage within the project area has been subject to a comprehensive programme of archaeological assessment, including a Desk-Based Assessment (2021, updated 2023), geophysical survey (2024), and further archaeological investigations. These inform the Archaeological Management Strategy and Statement (2024), which conclude that the area holds evidence of prehistoric, Roman, and post-medieval activity. Notable features include two Scheduled bowl barrows, a possible Iron Age hillfort (Arle Grove Camp), and multiple Roman villa sites, including Waltham, Whittington, and a likely villa at Arle Grove. Post-medieval remains include Listed Buildings, ridge and furrow cultivation, and quarry earthworks.

No adverse effects from the project have been identified on the significance of any designated heritage assets within the planning application boundary. In fact, the removal of pylons and overhead lines is expected to deliver heritage benefits by enhancing the setting of various designated assets. One minor adverse effect has been identified in relation to the Upper Mill Paper Mill, a non-designated heritage asset, due to the construction of the CSEC compound. However, this is considered to be limited in extent and offset by the visual enhancement resulting from the removal of the overhead line infrastructure.

### 7.2.7 Socio-economic Benefits

The Cotswolds VIP project aligns with Principle 3 of our VIP by offering opportunities to enhance public understanding and enjoyment of the protected landscape, while also generating socio-economic benefits for the local community.

Initial outreach and stakeholder engagement have identified opportunities to integrate the project with local initiatives that encourage public use and appreciation of the landscape, such as the Cotswolds Walking Festival. By removing intrusive section of overhead line from sensitive ridgelines and viewpoints, the project enhances the quality of recreational experiences for walkers, cyclists, and visitors to the area. These improvements are expected to generate lasting amenity value and reinforce the region's identity as a destination for landscape's 23 million annual visitors, rooted in natural beauty and cultural heritage.

The project builds on the legacy of previous VIP projects, where National Grid funding has supported circular walking routes (e.g. in the Peak District), enhancements to community facilities (e.g. in Dorset), and inclusive outdoor access projects.

#### 7.2.7.1 Local Employment and Economic Impact

The Cotswolds VIP project is expected to result in modest but positive employment and economic impacts during the construction phase. Evidence from with previous VIP projects already nearing completion, or underway, demonstrates this.

In the Dorset VIP project, a local firm was contracted to deliver the majority of civil engineering works, with other regional suppliers providing services in areas such as landscaping, security, and site cleaning, particularly important during the COVID-19 pandemic. Similarly, in the Peak District, local contractors were employed to restore traditional drystone walls, and a commercial partnership with the Yorkshire Wildlife Trust supported delivery of environmental education initiatives in local schools. In Eryri (Snowdonia), local consultancies have undertaken ecological and archaeological

[29] This section draws on the Cotswold Archaeology '*Visual Impact Provision (VIP) Cotswolds National Landscape: Archaeological Statement.*

assessments, with additional local companies engaged for services such as fencing, office cleaning, and translation.

Based on these precedents, it is anticipated that the Cotswolds project will create similar opportunities for local businesses and contractors, supporting the regional economy during the delivery phase of the project.

#### 7.2.7.2 Temporary socio-economic impacts

Temporary negative socio-economic impacts may occur during the construction period due to increased traffic, construction noise, and general disturbance affecting local residents and visitors. These impacts are a recognised and typical feature of major infrastructure works. However, every effort has been made in the planning of the Cotswolds VIP project to minimise disruption wherever possible.

Construction activities have been carefully phased, and measures will be implemented to manage potential disturbance. A programme of open and transparent communication with local communities will be maintained throughout the delivery of the project, enabling issues to be raised and addressed proactively. This will help to reduce the severity of any adverse effects and ensure the project remains sensitive to the needs of the local area and its visitors.

# 8. Stakeholder Engagement

**Key Summary**

Our VIP Policy sets out how we work with our stakeholders to identify opportunities to maximise the benefit of the visual impact mitigation fund provision established as part of the RIIO-T2 price control.

The purpose of this chapter is to provide an overview of the stakeholder engagement that has been carried out on the Cotswolds VIP project. This ranges from groups that we have formed, through to the engagement with individual stakeholder groups and landowners. The chapter covers the planning and consents process and what has been achieved to date. Finally, this chapter runs through our plans for resolving the environmental and construction challenges that the project faces.

## 8.1 Overview of Stakeholder Engagement

The proposals for the Cotswolds VIP project have been shaped through close collaboration with a wide range of stakeholders, forming an inclusive and ongoing partnership throughout the project's development. We have actively sought input through a variety of engagement methods to ensure diverse views are captured – from statutory bodies to local residents. This has included:

- Engagement with the Stakeholder Reference Group (SRG)
- Public consultation with local residents
- Individual topic-specific meetings with key stakeholders
- Direct liaison with landowners and occupiers affected by the need for temporary or permanent land rights
- Guidance from the Stakeholder Advisory Group (SAG), which holds an overarching role in shaping the project.

The Cotswolds VIP project has been stakeholder-led from the outset. The SAG played a central role in developing the ethos behind the visual Impact provision and continues to provide strategic direction. Their involvement, alongside the SRG, is essential to ensuring that visual improvements are made in the most effective and locally supported areas.

We have undertaken several rounds of non-statutory consultation, providing meaningful opportunities for individuals and organisations to share their views. Feedback gathered through these stages has directly informed key decisions made by NGET, the SRG, and the SAG.

Throughout the development of the project, we have maintained close working relationships with statutory bodies and key stakeholders, including:

- Tewkesbury Borough Council
- Cotswold District Council
- Gloucestershire County Council
- Natural England
- Environment Agency
- Historic England
- Parish and town councils in the area

This collaborative approach has helped ensure that the project reflects both the needs of the local community, and the technical and environmental considerations required for delivery.

The feedback from this ongoing engagement has shaped the proposals submitted for planning and consents under the Town and Country Planning Act 1990, Commons Act 2006, and Electricity Act 1989, as well as informing the use of permitted development rights under the Town and Country Planning (General Permitted Development) Order 2015.

## 8.2 Stakeholder Groups

### 8.2.1 Stakeholder Advisory Group (SAG)


*Figure 42: VIP SAG*

To ensure Visual Impact Provision (VIP) funding delivers the greatest landscape benefit, NGET established the SAG in April 2014. This independent group, chaired by environmentalist Chris Baines, brings together senior representatives from several national organisations across England and Wales. Members include Cadw, Campaign for National Parks, Campaign to Protect Rural England (CPRE), The Campaign for the Protection of Rural Wales, Historic England, the Landscape Institute, the National Association for Areas of Outstanding Natural Beauty (now National Landscapes), National Parks England, National Parks Wales, the National Trust, Natural England, Natural Resources Wales, The Ramblers, Visit England and Visit Wales.

The SAG advises on identifying and developing VIP projects and guides effective engagement with local stakeholders. It also includes senior representatives from National Grid and Ofgem. The Group plays a continuing role throughout each project, helping shape consultation approaches and making key decisions.

Ofgem's decision to remove the Visual Amenity PCD and Re-opener for existing infrastructure during RIIO-T3 means that there will be no more major undergrounding projects commencing in the RIIO-T3 period. This was a difficult message to convey to the Stakeholder Advisory Group, who were concerned that momentum would be lost given the valuable progress made to date in establishing the process. Not all SAG representatives agreed with Ofgem's opinion that, "*We do not consider that this decision conflicts with the duty in the National Parks and Access to the Countryside Act 1949.*"

A key mitigating factor was that there would be major undergrounding projects in delivery throughout the RIIO-T3 period, i.e. Eryri (Snowdonia), North Wessex Downs and the Cotswolds VIP projects. These live projects were seen as acting to retain the focus on

existing infrastructure in designated landscapes, alongside an increasing interest in the visual and wider environmental impact of new infrastructure being constructed as part of the transition to 'Net Zero'. The positive engagement of wider stakeholders (including those represented on SAG) is a fundamental part of achieving net zero milestones with challenging timescales.

### 8.2.2 Stakeholder Reference Group (SRG)

At the local level, SRGs have been established in each VIP project area. The Cotswolds SRG, formed in 2022, plays a vital role in guiding project development by providing local insight, helping to identify priorities, and ensuring open dialogue before planning applications are submitted.

The group includes representatives from the Cotswolds National Landscape, local councils (Cotswold District, Cheltenham Borough, Tewkesbury Borough, Gloucestershire County), statutory bodies such as Natural England, the Environment Agency, Historic England, and the Gloucestershire Wildlife Trust.

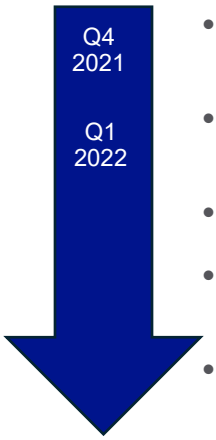
The Cotswolds SRG met in February 2022, March and September 2023, and most recently in February 2024. National Grid will continue working closely with the SRG and other stakeholders to shape proposals and deliver a project that maximises benefits for the local landscape and community.

## 8.3 Early Engagement Programme

NGET recognises the importance of involving local communities and organisations early in the planning and development process. For the Cotswolds VIP project, we have adopted a proactive and inclusive approach to engagement from the outset.

### 8.3.1 Phase One – Initial Engagements (Pre-Planning Application Engagement)

Engagement began in 2021 to gather technical information, understand local views, and shape the project in response to early feedback. Key activities included:




- Site visit to the live Dorset VIP project with senior representatives from the Cotswolds National Landscape team, to share lessons learned and explore local opportunities.
- Early briefings with stakeholder organisations and local representatives such as Gloucestershire Wildlife Trust, Cleeve Common Trust, the Open Spaces Society, Winchcombe Town Council and Charlton Kings Parish Council.
- Ongoing dialogue with landowners and tenants, facilitated by NGET's dedicated Lands Team.
- Launch of a project email address (visualimpact@nationalgrid.com), community helpline, and email for public questions and feedback throughout the project's development
- Creation of a 360° virtual tour, enabling residents to visualise the removal of pylons and understand the scale of works.

### 8.3.2 Phase Two – Public Events and Workshops

Q3 2022

Q3 2023

- In August 2022, the first round of public drop-in events was held, hosting members of the public Cleeve Common, Winchcombe, Charlton Kings, and at the Winchcombe Country Show. These were well-attended, including by local stakeholders and MP Alex Chalk (Cheltenham).
- A Trails and Access Workshop followed in October 2022, bringing together representatives from Gloucestershire County Council, Cotswolds National Landscape, Cleeve Common Trust, Winchcombe Walkers, Parish wardens, and Head Warden for the Cotswolds to discuss trails and access through the project area.
- In July 2023, a second round of public drop-in events took place at multiple local venues, including Cleeve Hill, Charlton Kings, and Winchcombe.
- As part of the Cotswolds Walking Festival, NGET hosted a five-mile guided walk in July 2023 with local group 'Winchcombe Walkers are Welcome'. The walk offered first-hand views of the 7km route where 16 pylons are proposed to be removed, helping participants visualise the transformation the project will bring to the landscape.
- A second Trails and Access Workshop was held in August 2023, co-hosted with the Cotswolds Trails & Access Partnership, and attended by many of the same stakeholders, ensuring continuity of input and engagement.

*Figure 43: Walking and talking pylons at the Winchcombe Walking Festival*

### 8.3.4 Early Engagement Feedback

Table 24 below summarises the key project feedback from stakeholders during the early phases of our public engagement.

*Table 24: Cotswold Early Engagement Feedback*

| Summary of Early Briefing Feedback | |
|---|---|
| **Topic** | **Feeback** |
| **Landscape Enhancement** | • Strong support for the project's potential to improve the local landscape, with enthusiasm for the visual benefits of removing pylons.<br>• Stakeholders emphasised the importance of continuing collaboration to:<br>  ○ Minimise negative impacts on wildlife.<br>  ○ Maximise archaeological opportunities, with reference made to the success of the Dorset VIP project, where over 40,000 artefacts were recovered, including items dating back to 13,000 BC.<br>• Some questioned the scope of pylon removal, including:<br>  ○ Why more pylons were not being removed, particularly further north.<br>  ○ Why the removal route does not extend further south to capture additional pylons.<br>  ○ Concerns about whether the cleared area might be used for wind turbine development, given the plateau's exposure to high winds. |
| **Localised Concerns** | • A small number of landowners in Winchcombe raised concerns about a new pylon being introduced near their property.<br>• Some questions were raised over the prominence of the CSECs as compared with the current existing pylons. |
| **Technology and Environment** | • Interest in the engineering and technology involved in the undergrounding process.<br>• Interest on the project's attention to ecological and archaeological protection. |
| **Traffic and Construction Access** | • Concerns about traffic impacts, particularly:<br>  ○ Increased pressure on the A40.<br>  ○ Disruption from construction traffic and access to the main site entrance.<br>• Questions about the temporary construction compound and access road, including how public interfaces, noise, and traffic movements would be managed. |
| **Cost and Value** | • Some attendees raised concerns about project costs, questioning:<br>  ○ Whether funds might be better used elsewhere.<br>  ○ The value of the project in the context of the cost-of-living crisis, suggesting investment could instead help reduce energy bills. |

| | |
|---|---|
| | • A small number expressed that they had no issue with the existing pylons and saw limited benefit in their removal. |
| **Project Timelines** | • There was widespread interest in the timeline and phasing of the project, with many attendees keen to understand when construction would begin and how long it would take. |

### 8.3.5 Pre-Application Engagement – Phase Three

In February 2024, NGET held a further round of public drop-in events to share updates and gather feedback on the Cotswolds VIP project. These events took place at:

- Stanton Hall, Charlton Kings – Friday 23 February 2024
- Abbey Fields Community Centre, Winchcombe – Saturday 24 February 2024
- Whittington Village Hall – Tuesday 27 February 2024

These sessions were widely promoted through local stakeholder websites and social media, resident letters, and press coverage by Gloucestershire Live, the Cotswold Journal, the Gloucestershire Echo, and Punchline.

At the events, attendees had access to information folders, physical examples of the cable and ducting, and large display banners covering:

- Project timeline and visual outcomes
- Case studies from previous and current VIP projects – e.g. Dorset and the Peak District
- Details on the Stakeholder Advisory Group, Stakeholder Reference Group, and Landscape Enhancement Initiative

NGET's Cotswolds Project team members were on hand to answer questions and explain specific aspects of the proposals. Feedback was largely positive, with strong public support for the project's aims and enthusiasm for the outcomes of other VIP projects. However, several recurring concerns emerged, consistent with previous engagement in Phase one and two, including:

- Project cost justification
- Environmental impact, including traffic, land access, and visual intrusion during construction
- Carbon footprint of the project and calls for greater transparency
- Commitment to achieving at least 10% Biodiversity Net Gain (BNG)
- Access and disruption concerns from nearby landowners

The project team responded by highlighting National Grid's successful track record on similar projects and reaffirmed its commitment to community collaboration and environmental best practice.


*Figure 44: NGET hosting public information events within the local area, seeking to keep the community informed on developments on the project*

**Further Presentations**

To ensure wider access, a further online webinar was held on Thursday 29 February, featuring a 40-minute presentation followed by a Q&A session. In addition, the fourth Stakeholder Reference Group (SRG) meeting took place on Tuesday 27 February in Cheltenham, with representatives from the Cotswolds National Landscape, Tewkesbury Borough Council, Gloucestershire County Council, Historic England, Cotswold Way National Trail & Access Partnership.

Further presentations in 2023/24 were delivered to a range of local organisations, including: Gloucestershire Local Access Forum, Gloucestershire Wildlife Trust, Cleeve Common Trust, Butterfly Conservation, Cotswolds Rangers, Cheltenham Borough Council Cabinet, Gloucestershire Local Nature Partnership.

## 8.4 NGET Responses to Stakeholder Engagement Concerns and Consultation Feedback

The vast majority of stakeholder and community feedback has been very positive, with many urging NGET to *"get on with the work"*. However, as is typical for complex infrastructure projects of this type, and as highlighted above, some concerns have been raised through our engagements and consultation. These are a normal and expected part of the engagement process.

Stakeholders have shared valuable local knowledge, which has helped the NGET team identify potential issues. In response, we have provided explanations to alleviate concerns, and several changes have been made to the project to reflect this feedback and better align with local needs and sensitivities.

*Table 25 Stakeholder Response Log*

| Issue Raised / Matter | NGET Response / Action |
|---|---|
| **Cost of the project**<br>*Some questioned the cost of the project* | - NGET explained that funding provision comes from Ofgem's Visual Impact Provision (VIP) project, based on stakeholder lobbying and public support.<br>- Highlighted new duties under Section 254 of the Government's 'Levelling Up and Regeneration Act'[30] which places responsibility on NGET and Ofgem to support National Parks and National Landscapes.<br>- NGET explained the wide consumer support for the projects as evidenced by the Willingness to Pay (WTP) research and the relatively small proportion of consumers' energy bill is comprised of NGET's work. |
| **Environmental impact (ecology and archaeology)**<br>*concern about the impact such a large construction project would have on the natural and historic environment.* | - Extensive ecological and archaeological survey work (Appendix G) undertaken and used to inform project design.<br>- Plans developed with ecological and archaeological specialists and agreed with Natural England, Historic England, and County experts.<br>- Land returned to agricultural use post-construction with evidence from the Dorset VIP project showed that this can be achieved to some extent. |
| | **Changes made in response to feedback include:**<br>- Re-routing the cable through a less sensitive area of Breakheart Plantation to avoid veteran trees and bat corridors, targeting an area with ash dieback.<br>- Adjusting the route to avoid established hedgerows.<br>- Conducting additional surveys for Roman Snails (none were found within the project area).<br>- NGET is committed to following a Written Scheme of Investigation (WSI) during construction. This ensures that all archaeological finds and areas of interested are mapped and recorded correctly. |
| **Biodiversity Net Gain (BNG)**<br>*Concerns expressed on NGET's commitment to delivering 10% BNG* | NGET provided assurance on the commitment to exceeding the legal 10% BNG requirement. An 18% BNG was achieved on the Peak District VIP project. Works with the Cotswolds National Landscape team continues to deliver meaningful gains. |
| **Traffic and local disruption**<br>*Concerns were raised about the impact of construction traffic on the A40, through Winchcombe and on the local roads in the area* | NGET addressed these concerns:<br>- All activity is subject to a Traffic Management Plan, as agreed with the local highway authority (Gloucestershire County Council). This will ensure that traffic around the main site entrance off the A40 is carefully managed and that no construction traffic will pass through Winchcombe (CSEC construction area).<br>- Temporary stone haul road to contain traffic within the construction site. There will be no NGET construction traffic on local roads or through villages. |

[30] Levelling Up and Regeneration Act 2023

| Issue Raised / Matter | NGET Response / Action |
|---|---|
| | |
| **Community relations** | - A Community Liaison Group will be established.<br>- A Project Information Centre will be created for public engagement.<br>- An educational programme and a Community Grant project will also be launched. |
| **Footpath access and closures**<br>*Frequent concerns raised was the restriction of access and footpath closures* | - NGET informed that all public rights of way will remain open during construction.<br>- Managed crossings (e.g. traffic lights, staffed crossings) will be used.<br>- Minor diversions agreed with Gloucestershire County Council. |
| | **Changes made in response to feedback include:**<br><br>- NGET held two workshops with local access groups (e.g. British Horse Society, Ramblers, Cotswolds National Landscape) to understand access priorities.<br>- In response, the Cotswold Way will remain on its current route during construction, allowing users to observe works.<br>- Interpretation materials, including QR codes, will be installed at key crossing points to explain the project.<br>- Workshops helped identify the most-used paths and key local events.<br>- NGET committed to ongoing engagement to ensure access is maintained and disruption minimised. |
| **Carbon cost of the project**<br>*Concerns raised the issue of the carbon cost of the project* | - Carbon cost assessment is included within the CBA.<br>- Estimated carbon footprint has been included within the CBA. |
| **Engagement with Persons with an Interest in Land (PILs)** | - Engagement began in Autumn 2021. 152 land interests identified; regular communication and collaboration ongoing.<br>- Offer letters issued from May 2024 fin relation to the acquisition of freehold land for the SECs, permanent rights for the underground cable and temporary rights for the construction compound and accesses. Based on the responses from our engagement to date we believe that voluntary agreement can be reached with all parties<br>- A significant number of site meetings, telephone discussions and email exchanges have taken place to progress the project proposal in collaboration between the project and the PILs. |
| **CSEC land** | - For both Northern and Southern CSECs, the land is to be purchased, with sufficient surrounding areas to be able to landscape and screen where required to mitigate visual impact |

| Issue Raised / Matter | NGET Response / Action |
|---|---|
| | - This will also be combined with measures for Biodiversity Net Gain (BNG). |
| **Land rights approach** | - Permanent cable easement offered via Deed of Easement (approx. 40m wide).<br>- Terms offered in line with NGET's Land Rights Strategy, with values assessed at 80% of agricultural land value.<br>- Temporary rights secured by lease<br>- Further consideration will be taken for all other losses and disturbances with construction; they will be agreed on each individual claim on completion of works and reinstatement. |

# 9. Planning Consents

| Key Summary | The Cotswolds VIP project comprises multiple components, several of which require formal planning and statutory consents. A range of consent routes have therefore been pursued to reflect these different project elements.<br>This Chapter outlines the consent routes and provides their statuses. |
|---|---|

## 9.1 Overview of Consenting Regimes

**1. Town and Country Planning Act 1990 (TCPA) – CSEC Applications**

Full planning permission is required under the TCPA for both Cable Sealing End Compounds (CSECs):

- Northern CSEC (Winchcombe): Application submitted to Tewkesbury Borough Council in June 2024.
- Southern CSEC (Whittington): Application submitted to Cotswold District Council in June 2024.

The planning application for the southern CSEC has been approved by Cotswolds District Council in April 2025. The Northern CSEC is currently being determined by Tewkesbury Borough Council and is anticipated in June 2025.

**2. Electricity Act 1989 (Section 37 Consent) – Overhead line Diversion**

Section 37 consent is required for the temporary overhead line diversion (See Chapter 6 on Technical Scope) to connect to the southern CSEC. While exemptions under the Overhead Lines (Exemption) (England & Wales) Regulations 2009 were considered, the diversion will be in place for longer than six months and therefore requires formal consent.

The Section 37 consent has now been approved and all required consent to build the temporary overhead line diversion is in place.

**3. Commons Act 2006 (Section 38 Consent) – Restricted Works**

Consent under Section 38 of the Commons Act is required for works on Cleeve Common, including:

- The removal of a section of 400kV overhead line that over sails the Common.
- The installation of underground cables across the Common to replace the removed ZF.2(B) section.

Consultation on this consent has been held with consultees and the Section 38 consent is now approved (February 2025) and in place.

**4. Shunt Reactor – Melksham Substation (TCPA 1990)**

A separate planning application was prepared for the Shunt Reactor at Melksham Substation (See Chapter 5.4.2), also prepared under the TCPA 1990.

This was submitted to Wiltshire Council in June 2024, this application is subject to an determination period, with planning permission approved in April 2025.

## 5. Other Project Elements

Other components of the project either:

- do not constitute development under Section 55 of the TCPA;
- are covered by permitted development rights under the Town and Country Planning (General Permitted Development Order) 2015; or
- are exempt from Section 37 consent under the Overhead Lines (Exemption) Regulations 2009.

### Summary of Consenting regimes

To provide clarity on the various consents required for each project element, a comprehensive summary is provided in Table 26 below.

*Table 26: Summary of relevant consenting requirements*

| Project Component | Consent Required | Determining Authority | Status |
|---|---|---|---|
| 2 x Cable Sealing End Compounds (approximately 80m x 40m) | Planning permission required under Town and Country Planning Act 1990. | - Cotswold District Council (Whittington / Southern CSEC)<br>- Tewkesbury Borough Council (Winchcombe / Northern CSEC) | Southern CSEC approved. Northern CSEC yet to be determined – anticipated by June 2025 |
| Whittington CSEC Temporary line diversions and temporary towers to facilitate the construction of the CSEC | S37 of The Electricity Act 1989 due to temporary towers being situ for 24 months (exceeds 6-month threshold). | - Department for Energy Security and Net Zero (DESNZ) | Approved |
| Underground cable section (approximately 7km) | Permitted Development – General Permitted Development Order (GPDO) 2015 Schedule 2, Part 15, Class B(a)<br>All restrictions and conditions met. | N/A | N/A |
| Replacement of the Overhead Lines to the Sealing End Compounds | Exempt under The Overhead Lines (Exemption) (England & Wales) Regulations 2009 (criteria met). | N/A | N/A |
| Replacement of terminal/ tension pylon. | Exempt under The Overhead Lines (Exemption) (England & Wales) Regulations 2009 (criteria met). | N/A | N/A |
| Temporary stoned haul roads and stoned laydown / site compound areas. | Permitted Development – GPDO 2015 Schedule 2, Part 4, Class A<br>All restrictions and conditions met. | N/A | N/A |
| Removal of the existing overhead line | Not applicable - Does not constitute 'development' and falls under National Grid's statutory undertaking as it relates to 'renewing' the existing line. | N/A | N/A |

| | | | |
|---|---|---|---|
| Works within Cleeve Common | Section 38 of the Commons Act 2006 – works on Common Land. | - Planning Inspectorate: the Department of Environment, Food and Rural Affairs (Defra) | Approved in February 2025 |
| Construction of a shunt reactor at Melksham 400kV Substation | Planning permission required under the Town and Country Planning Act 1990. | - Wiltshire Council | Approved in April 2025. |

### 9.1.1 Environmental Impact Assessment

In December 2023, National Grid submitted formal screening requests under the relevant EIA regulations to determine whether the Cotswolds VIP project constitutes EIA development. These were submitted to:

- Cotswold District Council under the Town and Country Planning (Environmental Impact Assessment) Regulations 2017 (Appendix G.1), and
- Tewkesbury Borough Council under the same regulations (Appendix G.2),
- Alongside a parallel screening under the Electricity Works (Environmental Impact Assessment - EIA) (England and Wales) Regulations 2017.

The purpose of EIA screening is to assess whether a proposed development is likely to have significant environmental effects that would necessitate the preparation of an Environmental Statement (ES).

**Screening Outcomes**

Cotswold District Council and Tewkesbury Borough Council issued responses in January 2024 and April 2024 respectively. Both councils concluded that formal EIA is not required for the Cotswold VIP project.

The separate EIA screening under the Electricity Works EIA Regulations for the temporary overhead line diversion also resulted in a negative screening opinion, confirming that EIA is not required.

**Implications for Delivery**

As the project is not classed as EIA development, the majority of the works, including the cable route, stone haul road, construction compound, and laydown areas can be delivered using Permitted Development rights under the Town and Country Planning (General Permitted Development Order) 2015.

Although a formal EIA is not required, NGET has still prepared a suite of topic-specific environmental appraisals and technical studies including arboriculture assessments, breeding bird surveys and BNG assessments (Appendix G) to support the CVIP project and ensure compliance with Schedule 9 of the Electricity Act 1989, which places environmental duties on electricity licence holders.

## 9.2 Secondary Consents

The full scope of secondary consents will be confirmed once planning conditions are fully known. Other secondary consents may also be required, for example relating to discharges into watercourses or diversion of any services. These will be identified as the project progresses and recorded in the project's consents and land rights strategy. However, based

on project knowledge to date and experience of similar cabling projects, it is likely that the following would be required:

- Approval of the detailed Archaeological Written Scheme of Investigation (WSI)
- European Protected Species licences (e.g. badgers, water voles)
- Access controls for Public Rights of Way (PRoWs)
- Ordinary Watercourse Consent

## 9.3 Environmental Management Plans (Outline submissions)

NGET have also developed supporting plans and documents (See Appendix G) in support of planning applications, setting out measures to minimise environmental impacts during construction. This includes:

- Archaeological WSI (Appendix G.3)
- Construction Environmental Management Plan (CEMP) (Appendix G.8)
- Construction Traffic Management Plan (CTMP) (Appendix G.4) and

These outline plans would be referenced in relevant planning submissions but will be developed further, in consultation with the statutory consultees as the project progresses. The findings of these plans are summarised below:

### 9.3.1 Outline Archaeological Written Scheme of Investigation (WSI)

Cotswold Archaeology has prepared a WSI for areas of the Cotswolds VIP project requiring planning permission, following consultation with local archaeological authorities and Historic England. The WSI is based on national best practice and informed by prior desk-based assessments and geophysical surveys, which identified evidence of prehistoric, Roman, medieval, and post-medieval activity in the area.

A programme of 24 trial trenches will be excavated to investigate geophysical anomalies and provide a representative sample of the site. The aim is to explore potential Bronze Age, Iron Age, Roman, and early medieval remains, and assess environmental potential.
All findings will be recorded in line with professional standards. Artefacts and environmental samples will be recovered, processed, and analysed. Trench reinstatement will follow excavation. A final report and summary for local publication will be produced, placing results in their local and regional context.

Fieldwork is expected to take three to four weeks and will follow all relevant health and safety procedures.

### 9.3.2 Outline Construction Environmental Management Plan (CEMP)

The Outline CEMP sets out how environmental impacts during construction of the Cotswolds VIP project will be managed. It covers all project elements, including CSECs, cabling, and access works.

Key features include:

- Defined roles and responsibilities for environmental management, including the Principal Contractor, Waste Manager, and Environmental Manager, supported by specialists such as an Ecological Clerk of Works (ECoW).
- A Consents Register to track environmental permits and planning conditions.
- Monitoring requirements covering noise, dust, vegetation clearance, biodiversity net gain, traffic, and waste.

- Control measures such as site inductions, pollution prevention, wheel washing, and mapping of sensitive areas.
- Emergency procedures for spills, hazardous materials, and unexploded ordnance.
- A Communication Plan to keep residents and stakeholders informed, supported by a project information line and regular updates

The final CEMP will be updated post-consent to reflect planning conditions, licences, and mitigation requirements.

### 9.3.3 Outline Construction Traffic Management Plan (CTMP)

The Outline Construction Traffic Management Plan (CTMP), included as an appendix to the Outline CEMP, will be further developed once a Principal Contractor is appointed. Based on the 2024 Transport Appraisal by Arcadis (Appendix G.4), the CTMP outlines measures to manage construction traffic safely and efficiently. These include access control through traffic marshals and security systems, dedicated pedestrian routes, and on-site parking and delivery areas to prevent highway obstruction. A booking system to regulate HGV movements, while vehicle standards, such as Euro V compliance, will be enforced. Road conditions will be monitored and maintained, reversing onto public highways will be prohibited, and wheel washing and load covering will be mandatory. The plan also includes contractor briefing materials, though a staff travel plan is not required due to low personnel numbers.

### 9.3.4 Outline Landscape and Ecology Management Plans (LEMPs)

The Outline Landscape and Ecology Management Plans (LEMPs) for the Whittington and Winchcombe CSEC sites, prepared by LUC and Arcadis (see Appendix G.14 and G.15) set out long-term measures to enhance and protect the landscape and ecological value of the sites.

Covering both construction and operational phases, the LEMPs detail how existing features will be safeguarded, and how new habitats, such as native hedgerows, woodland, and scrub will be created to support biodiversity and provide visual screening. The plans align with local and national policy, reflect the sites' location within the Cotswolds National Landscape, and include a five-year maintenance schedule. Responsibility for implementation will lie with NGET and appointed contractor.

# 10. Detailed Cost for Scope of Works

## 10.1 Introduction

This section provides a breakdown of the overall costs for the Cotswolds VIP, including an expenditure profile for all Regulatory Years of delivery. The following cost estimate breakdown represents our latest view of costs for the proposed investment and all costs are presented in 2018/19 price base, unless otherwise stated.

The costs submitted are primarily based on quotations and tender returns wherever possible to provide greater cost certainty. There have been elements of this cost submission that are based on internal cost estimates, utilising any recent knowledge and understanding of recently completed cabling projects.

There has been an extensive and thorough procurement process to establish the main works contractor cost for the cabling element of the scope. Chapter 12 details the full process and outcome of the procurement event.

This submission details the market tested pricing received as part of the procurement exercise and requests full funding allowances for the project.

Appendix H.1 Cost Model submitted alongside this document provides a breakdown of the costs in more detail and should be reviewed alongside this chapter.

This Chapter is broken down into the following sections:

- Total Allowance Request
- Cost Estimate
- Cost Firmness

## 10.2 Total Allowance Request

Total project costs are £190,246,552, of which NGET requests £177,558,711 allowance is provided through the VIP reopener mechanism to recover the direct portion of costs to deliver the scope of works. The VIP reopener mechanism is subject to the Opex escalator and therefore indirect costs will be funded under this route.

[redacted]

## 10.3 Cost Summary

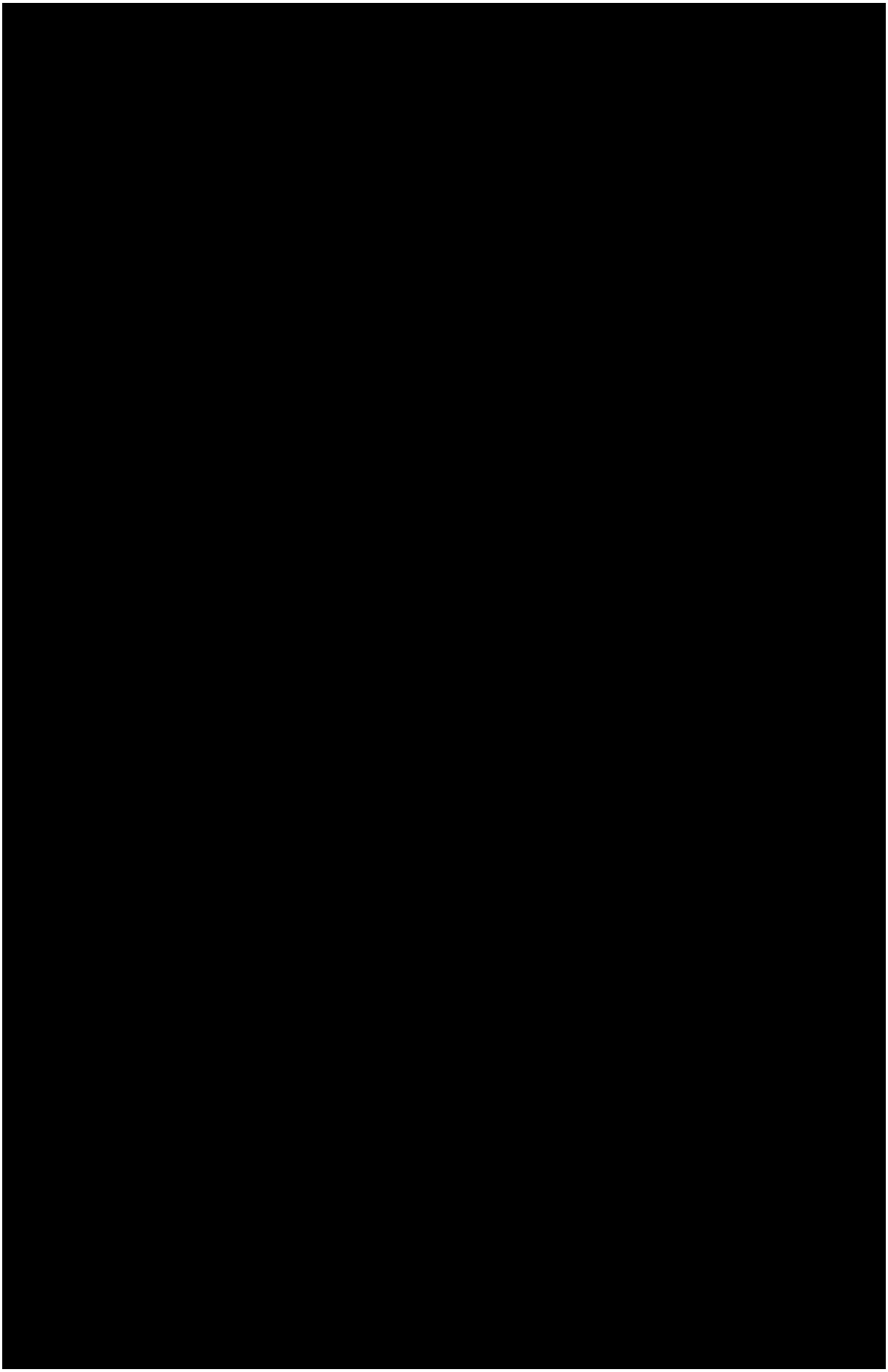
The total cost to deliver the Cotswolds VIP project has gone through a robust and thorough procurement process in order to provide greater cost certainty.

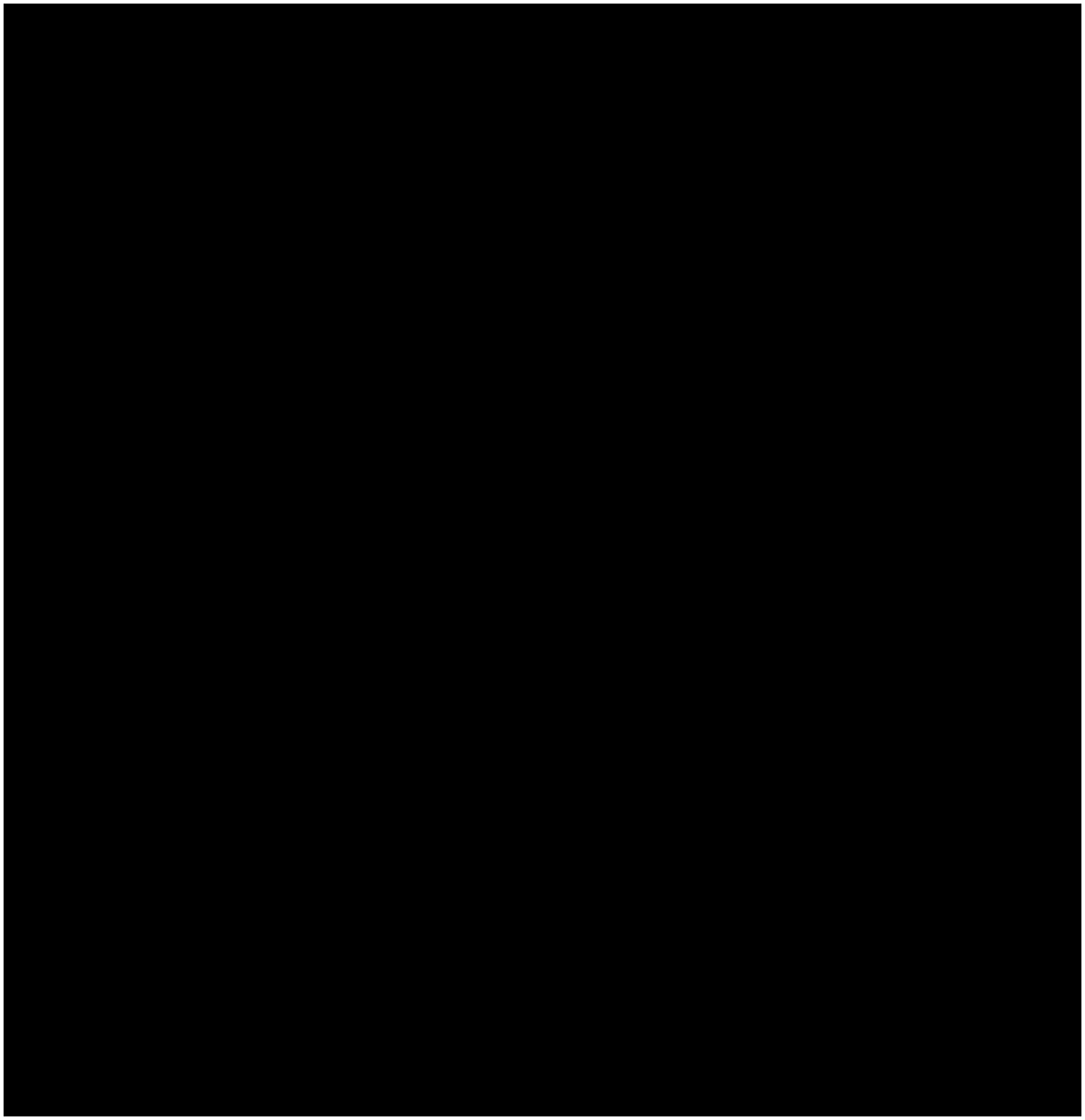
Table 28 below shows a summary of total project costs.

The calculations for RPEs can be found in Appendix H.2 – Estimated Inflation.

### 10.3.1 Detailed Breakdown of Direct Costs

#### 10.3.1.1 Main Works Contractor





#### 10.3.1.2 Third Party Costs

[redacted]

[redacted]

#### 10.3.1.3 FT Ops

[redacted]

#### 10.3.1.4 Direct Procurement

[redacted]

[redacted]

#### 10.3.1.5 Lands

[redacted]

## 10.4 Cost Firmness

Table 34 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 the majority of the total costs have been agreed and have reasonable cost certainty.

[redacted]

[redacted] A timely minded to decision (as clarified Chapter 11 Delivery Programme), is crucial to deliver the project as planned.

# 11. Delivery Programme

**Key Messages**

The Cotswold delivery programme has been developed on the basis that a "minded to" decision for the project will be received by December 2025. This is a critical milestone, as it enables the necessary internal governance to proceed, allowing for the award of the main works contract contract and timely procurement of the Shunt Reactors, which are long lead items on the project's critical path.

Should the "minded to" position be delayed beyond January 2026, there will be a material impact on the project's deliverability. If this delay extends to February 2026, the project will be undeliverable against the target programme, as delays to both procurement and contract award would mean that currently secured outages for the project would not be met.

This chapter describes the delivery of the Cotswolds VIP project and describes the timings for the key activities. It explains the overall programme of works that will be delivered during the construction phase and the approach to meeting the project requirements.

## 11.1 Overview of delivery requirements

The project scope comprises of the following key components (for a more detailed description of the scope please refer to Chapter 6):

- Installation of a double circuit 400kV underground cable route of approximately 7km in length.
- Installation of temporary towers and diversion to Feckenham - Walham circuit (to facilitate off-line build of the south CSEC) construction of two new Cable Sealing End Compounds (CSECs) required to connect the new underground cables to the remaining OHL.
- Dismantling and permanent removal of 7km of existing OHL including 16 pylons. (18 pylons will be removed in total, however, two will be replaced under Permitted Development). Visual mitigation planting for both CSECs and reinstatement of the land.
- Installing two shunt reactors: one at Melksham and one at Feckenham.

The project programme is based on receiving a 'Minded to' position from Ofgem by December 2025, which aligns with the six-month assessment period set out in Ofgem's standard reopener guidance. Securing this position on time is essential to allow for internal governance processes and to enable the timely award of the Main Works contract. Any delay beyond this point would lead to cost implications and increase delivery risk. Critically, if a 'Minded to' position is not secured by the end of February 2026, the project would no longer be deliverable within the currently secured outage windows, due to constraints associated with long-lead equipment and environmental timing.

The procurement of Shunt Reactors is particularly critical, given their extended lead time of approximately two years and current supply chain indications show that this lead time is very likely to extend beyond the current forecast of two years. An early, positive funding signal ahead of the December 2025 milestone would enable procurement to commence sooner, significantly reducing delivery risk associated with these long-lead components.

## 11.2 Development of the programme

The programme for the Cotswolds VIP project has been developed by NGET based on learnings from Mendips, Dorset and North Wessex Downs VIP projects. This has ensured that the system constraints and stakeholder commitments have been coordinated and aligned with the uprating of the ZF route.

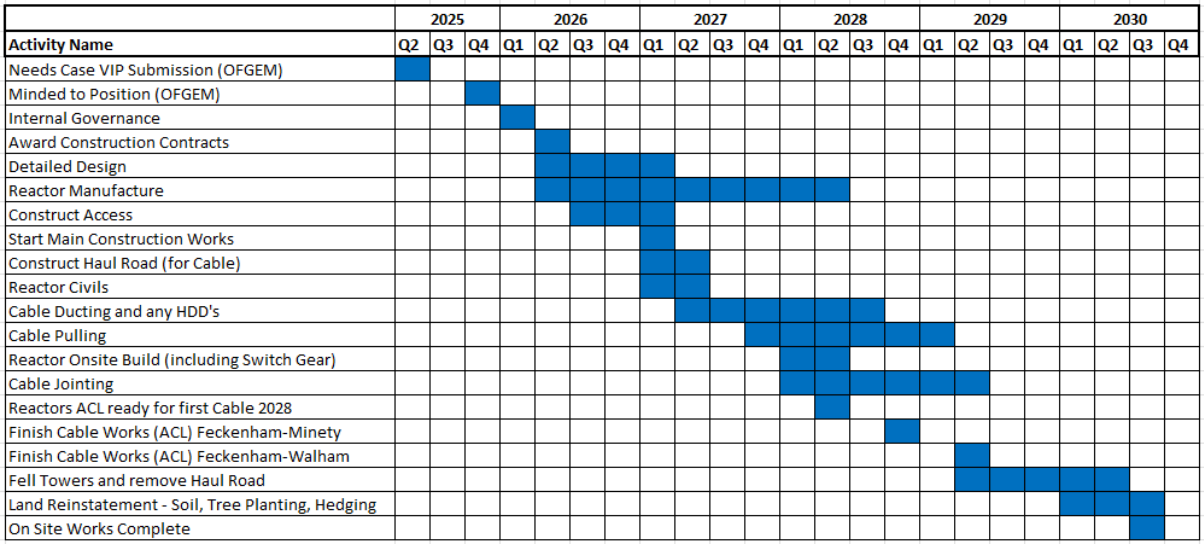



*Figure 45: Programme of works for the project (calendar years)*

The delivery programme is based on the assumption that all key pre-requisites, including planning permission, consenting agreements, funding approval, and land agreements, will be secured ahead of the Main Works Contract award. It also assumes that a “minded to” position from Ofgem will be received in time to allow for the early procurement of long-lead items, such as the Shunt Reactors, and to enable archaeological mitigation works to commence in 2026, helping to reduce programme risk in a sensitive area.

The project is expected to proceed through internal governance, move into delivery, and finalise contract arrangements during February and March 2026. To maintain the delivery timeline, contract award must take place no later than April 2026. A delay beyond this would risk pushing back the detailed design phase and missing critical outage windows. A decision by December 2025 would help to avoid such delays by allowing contract finalisation and the early ordering of long-lead equipment. Following contract award, detailed design will be carried out through late 2026 and early 2027

[redacted]

Construction works will follow a logical sequence, beginning with access and duct installation, then progressing to cable laying, jointing, and testing. Each of these stages presents key delivery risks and dependencies. Another important milestone is the

temporary diversion scheduled for late 2027, which is necessary to support the planned 2028 outages.

The total programme duration from contract award to final completion, including landscaping, is 64 months. Of this, 50 months are allocated from contract award to Asset Capability Live (ACL), assuming the Main Works Contract is awarded by April 2026.

## 11.3 Key Construction Milestones

*Table 35: Key Construction Milestones*

| Date | Description |
|---|---|
| April 2026 | Award Main Works Contracts – Cable Contract, Shunt Reactor purchase and Shunt Reactor works |
| April 2026 | Detailed Design commences on Cable Route |
| August 2026 | Cable Contractor secures factory slot for cable (awaiting full detailed design to finalise and order) |
| July 2026 | Mobilise works, vegetation clearance, ecology mitigation |
| August 2026 | Start building main site compound and access off A40 |
| October 2026 | Finalise Cable design and finalise factory lengths (if this is missed factory slot is at risk) |
| March 2027 | Start haul road build (weather dependant) |
| March 2027 | Mobilise civils for shunt reactors (to complete before winter) |
| April 2027 | Build foundations and towers for temporary diversion (before winter), start cable ducting |
| October 2027 | Temporary Diversion |
| September 2027 | Start Cable pulling |
| April 2028 | Shunt Reactors Delivery |
| May 2028 | Shunt Reactors ACL |
| October 2028 | Energise first circuit (FECKENHAM - MINETY 400KV) |
| June 2029 | Energise second circuit (WALHAM - FECKENHAM 400KV) |
| June 2029 | Start Land reinstatement and start felling towers |
| April 2030 | Felling towers complete and foundations removed |
| August 2030 | All non-NG Land handed back to landowners. |

### 11.3.1 Statutory obligations and pre-construction activities

There are no environmental issues that would prevent the construction programme from proceeding as planned. However, a number of statutory obligations and pre-construction activities must be completed following contract award and prior to main construction activities commencing. These include:

- Pre-commencement condition discharge
- Ecology surveys and protected species licencing
- Hydrogeological risk assessment
- Pre-condition surveys

In advance of main construction, archaeological mitigation works (specifically Strip, Map and Record (SMR) excavations) will be required in targeted areas with high archaeological potential. These focus areas will be identified through earlier surveys, including desk-based assessments, geophysical (gradiometer) surveys, and evaluation trial trenching. The final mitigation strategy will be developed in consultation with the County Archaeologist. To maintain the delivery programme, these works must take place during 2026. In 2027, during trench excavation works, an archaeological watching brief will be required in areas of known archaeological sensitivity.

Main construction activities will begin in 2027, following the establishment of the main site compound. Initial works will include the construction of the haul road and other access infrastructure. Substation civils are also scheduled to begin early in 2027 to ensure completion avoids extending substation works into the winter period at Melksham.

## 11.4 National system access

The project requirements for system access were communicated with the National Energy System Operator (NESO) after alignment with the ZF circuit uprating projects to utilise and make efficient use of system access and resource (internal and external). Please refer to Chapter 4.1 – ZF Uprating Context for further detail.

As presented in Table 36 above, before each of the main overhead line outages are bird nesting outages to allow mitigation activities to be undertaken. Both the ZF reconductoring project and the Cotswold VIP project will utilise these outages for nest removal.

Outage 2 is taken late in 2027 to facilitate the temporary overhead line diversion to allow the first half of the southern CSEC to be completed. The temporary overhead line diversion is required to move the existing overhead line circuit away from the construction site of the new CSEC. Please see the stage-by-stage drawing in Chapter 6.5 for further detail.

Outages 5 and 7 are then scheduled during 2028 and 2029. Once outage 5 is undertaken, the new tower and completion of the southern CSEC can be completed. Outage 7 allows removal of the temporary diversion. These outages are longer than required for the VIP project to allow the ZF reconductoring project to complete necessary works.

## 11.6 Delivery readiness to proceed

NGET will lead the delivery of the Cotswolds VIP Project in accordance with all relevant technical specifications, statutory requirements, and internal governance procedures. NGET will oversee the safe and cost-effective management of the overall project and its associated contracts. This responsibility includes, but is not limited to:

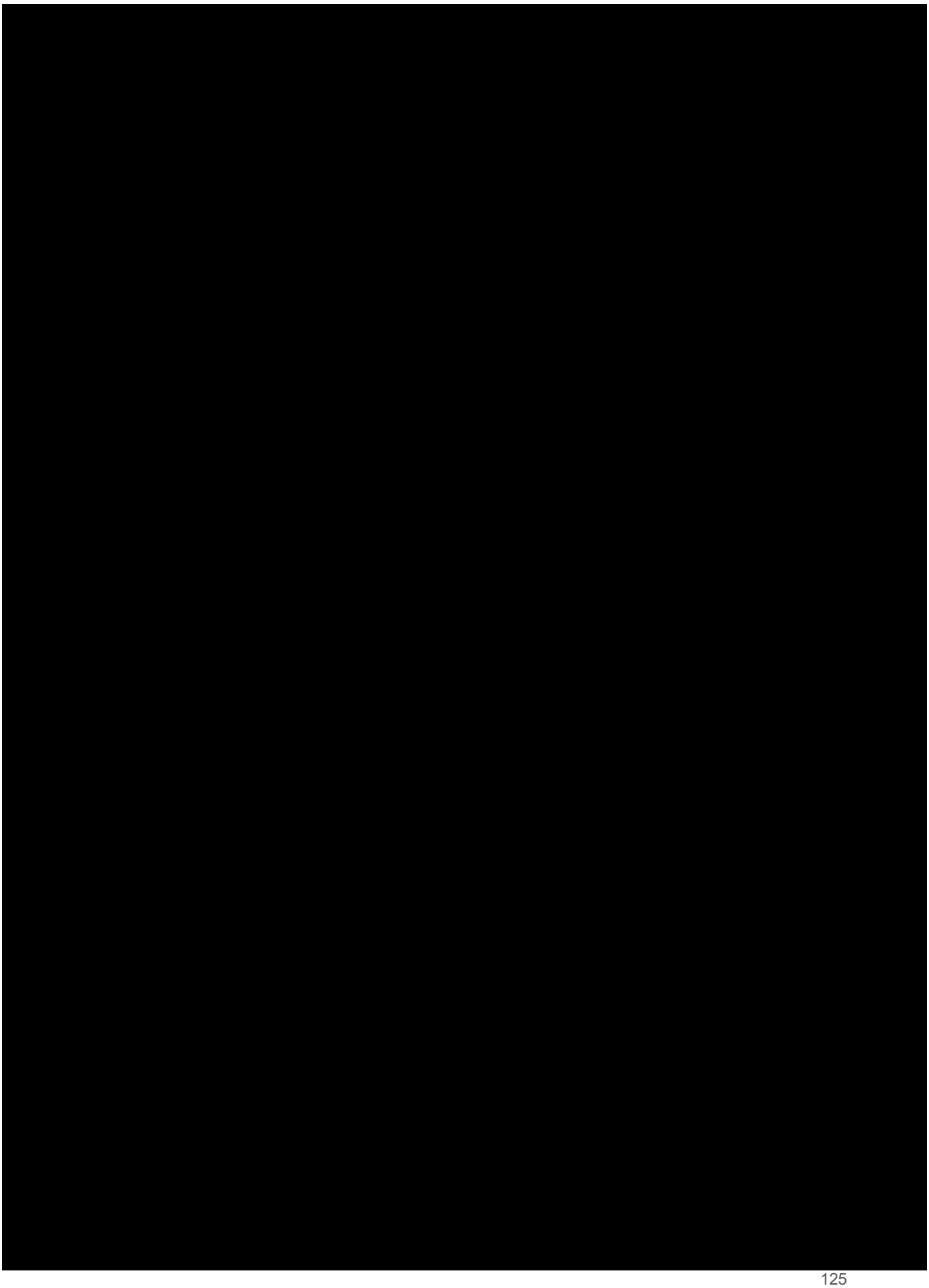
- Risk identification, mitigation, and management
- Contract and engineering management of the main construction activities
- Coordination and interface management between multiple Principal Contractors
- Continued engagement with landowners and other key stakeholders
- Monitoring activities – environmental work, safety, contract interfaces, quality, progress

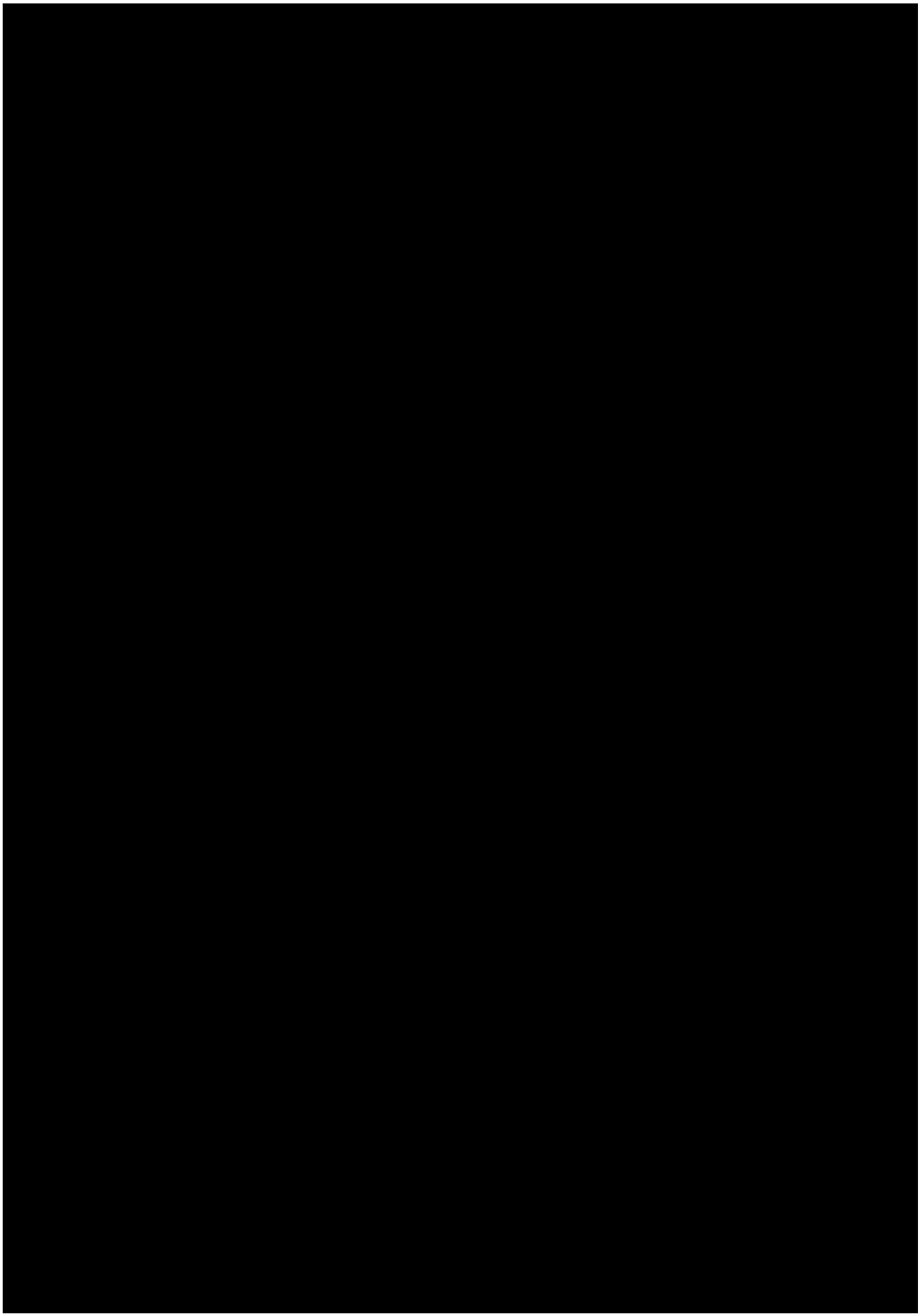
- Management of system access, security arrangements and operational support to maintain the network.

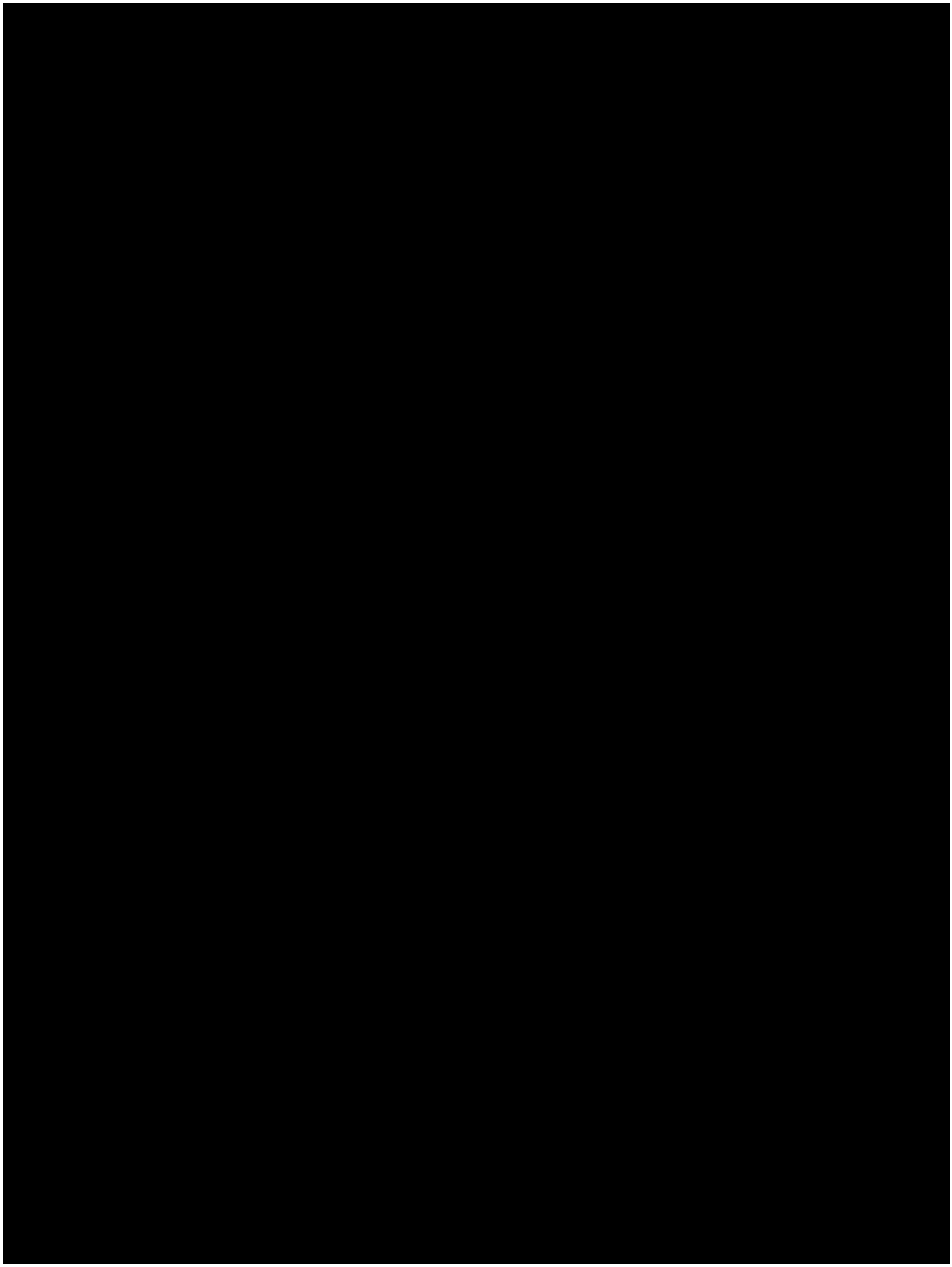
An organogram of our team structure required to deliver the Cotswolds VIP project has been produced and included in Appendix I.1.

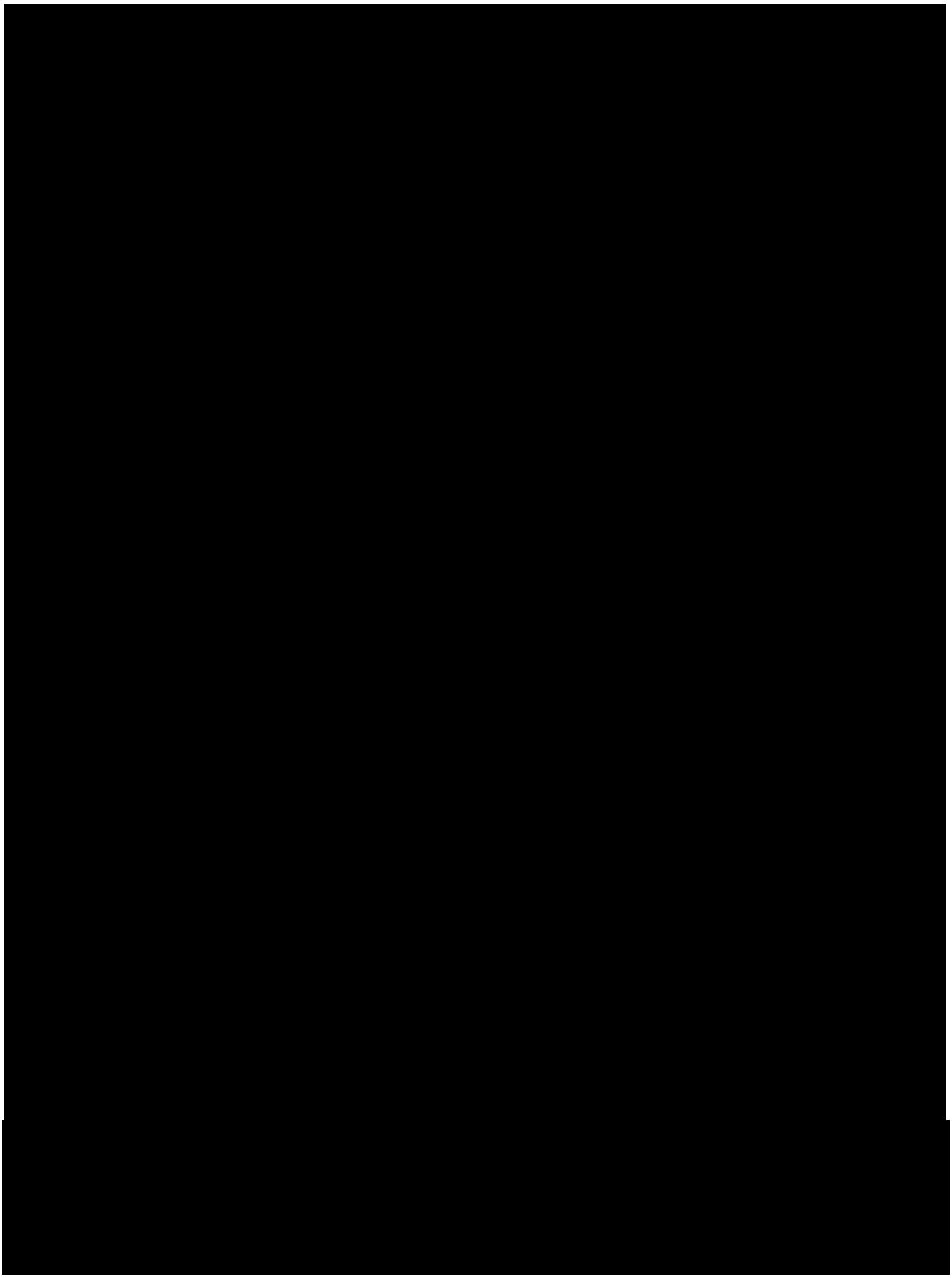
## 11.7 Regulatory Timeline

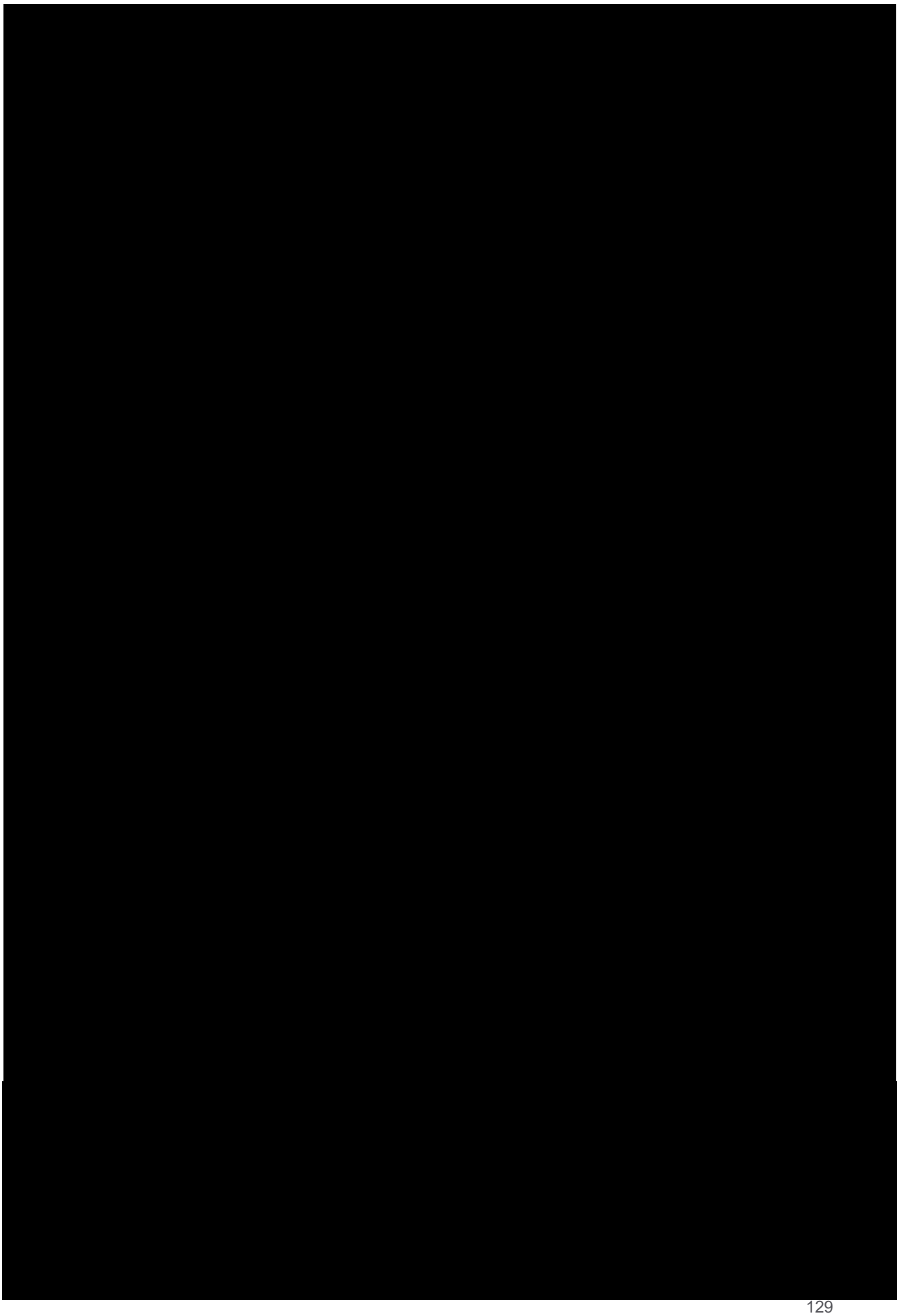
As emphasised throughout this chapter, timely regulatory assessment is critical to the successful delivery of the Cotswolds VIP Project and to realising the associated efficiencies and benefits. Ofgem's "minded to" decision is a key enabler for progressing contract awards and procuring long lead-time items. We do not seek to impose targeted timelines, rather we are requesting Ofgem to adhere to its stated six-month assessment window, which is particularly important in this context given the tight delivery constraints.

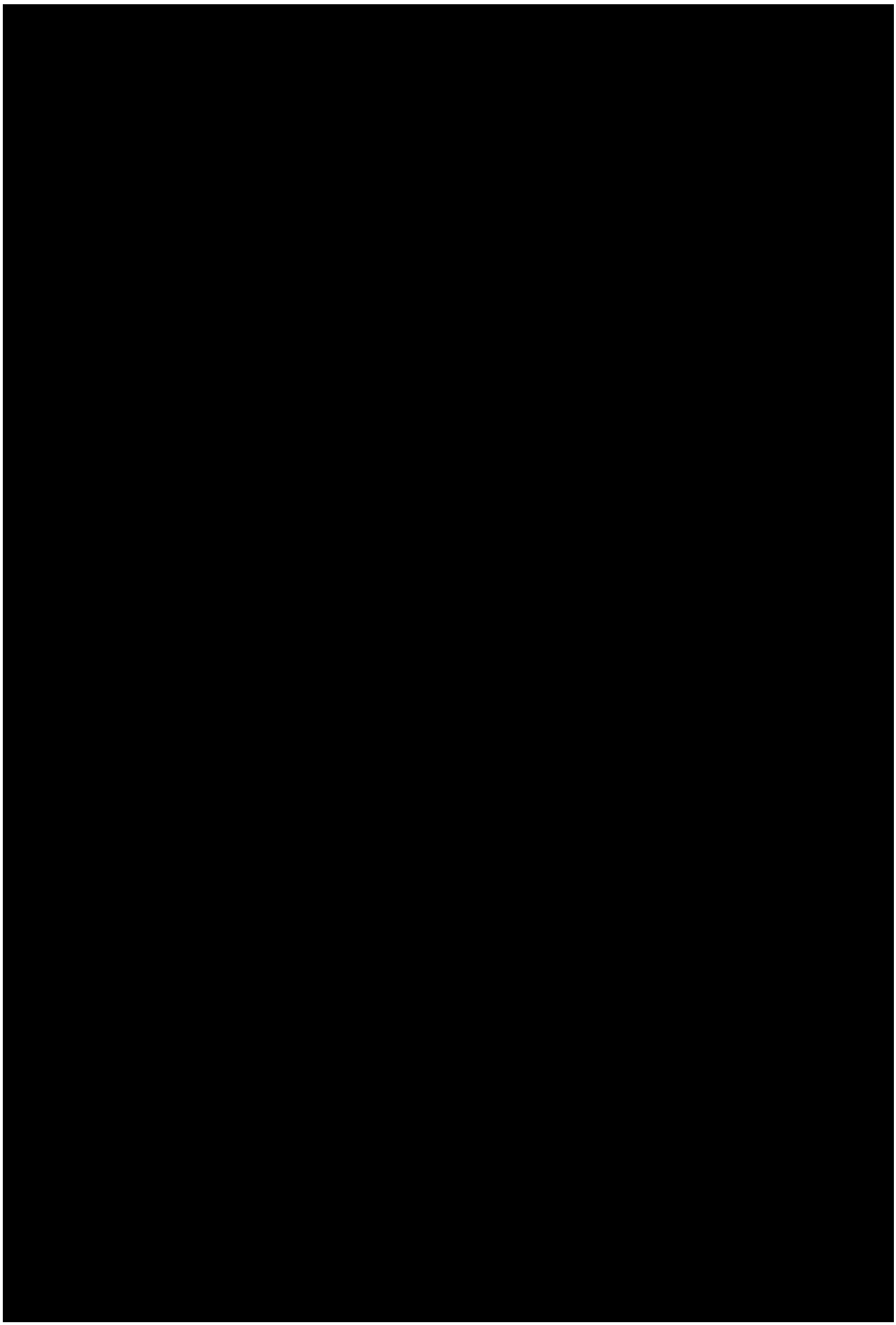


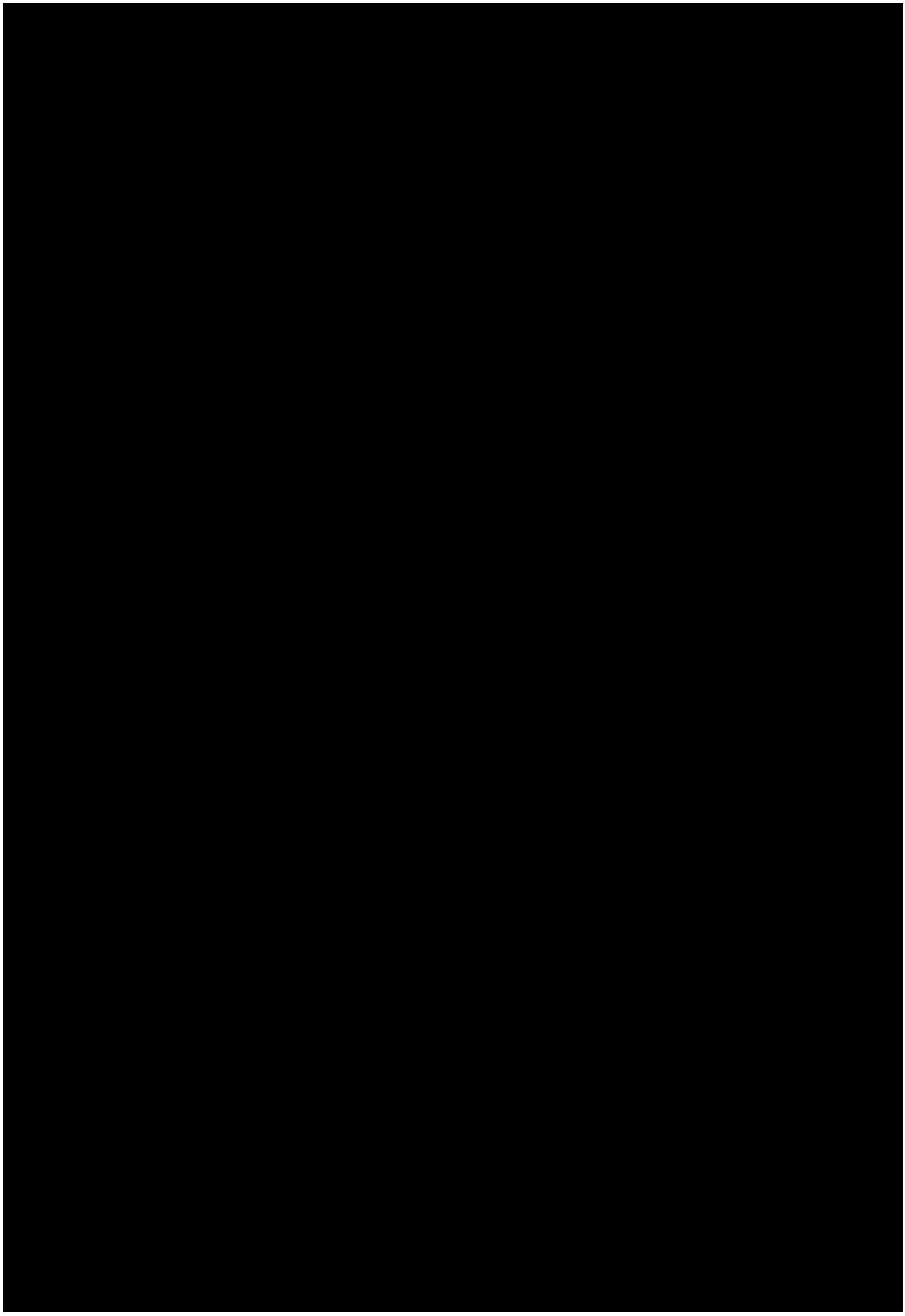












# 13. Risks

**Key Messages**

[redacted]

The purpose of this chapter is to provide an overview of the project's risk management approach. It outlines the risk processes undertaken, including the use of Quantitative Risk Analysis (QRA), and provides a summary of key risk themes, indicating whether individual risks are expected to be retained by NGET (Client) or transferred to the Contractor. It also presents the background, justification, and supporting evidence for the requested risk allowance.

Separate risk registers have been developed for each of the following work packages (full copies of these registers are included in Appendix H.1 Cost Model):

- VIP Cotswolds – Main Works
- VIP Cotswolds – Melksham Shunt Reactor
- VIP Cotswolds – Feckenham Shunt Reactor

The contingency value applied for in this Project Assessment reflects the combined P50 value across all three work packages. A P50 value indicates that there is an equal probability (50/50) of actual costs being above or below the estimated allowance during project delivery.

## 13.1 Overview

The project's risk management principle is that risks should be managed in the most effective and economical way, by the party best positioned to do so. Effective risk management is essential to the successful delivery of the project, and the adopted framework is designed to enable proactive identification, analysis, allocation, and mitigation of risk.

Initial risk identification was undertaken through qualitative assessments, followed by quantitative analysis to evaluate both the probability of occurrence and the potential cost impact. Once identified, risks have been categorised into two primary ownership groups: Project Risks (NGET) and Contractor Risks:

- **Project Risks** - Owned by NGET and within the potential for contract compensation events from the contractor or increased NGET costs.

- **Contractor Risks** - Owned by the contractor as agreed in the contract. [redacted]

[redacted]

Our risk management process has identified 84 risks (See within Appendix H.1 - Cotswolds VIP Reopener Cost Model) that could affect the project's outcomes, whether through time delays or cost increases. These include 41 risks within the Main Works register, 24 within the Melksham Shunt Reactor register, and 19 within the Feckenham Shunt Reactor register.

The overall risk approach aligns with the principles set out in *ISO 31000:2018 Risk Management – Guidelines*. Risk value estimates have been derived through Quantitative Cost Risk Analysis (QCRA), which involves the development of detailed costed risk registers and the use of Monte Carlo simulation to model a range of potential cost outcomes. The QCRA software calculated risk are based P50 outcomes, indicating an equal probability (50/50) of actual costs being above or below the estimated allowance during project delivery.

A comprehensive portfolio of risks was identified through a structured programme of workshops and monthly risk reviews held throughout 2024. These sessions brought together subject matter experts (SMEs) to ensure the registers reflect evolving project circumstances, new information, and wider risk influences. Risks were assessed across all relevant project dimensions, including scope, programme, cost, and SHESQ (Safety, Health, Environment, Sustainability, and Quality). Team members contributed technical knowledge, project-specific insight, and lessons learned from previous experience to support the identification of risks and their associated cost impacts. For each risk, minimum, most likely, and maximum cost and schedule implications were captured.

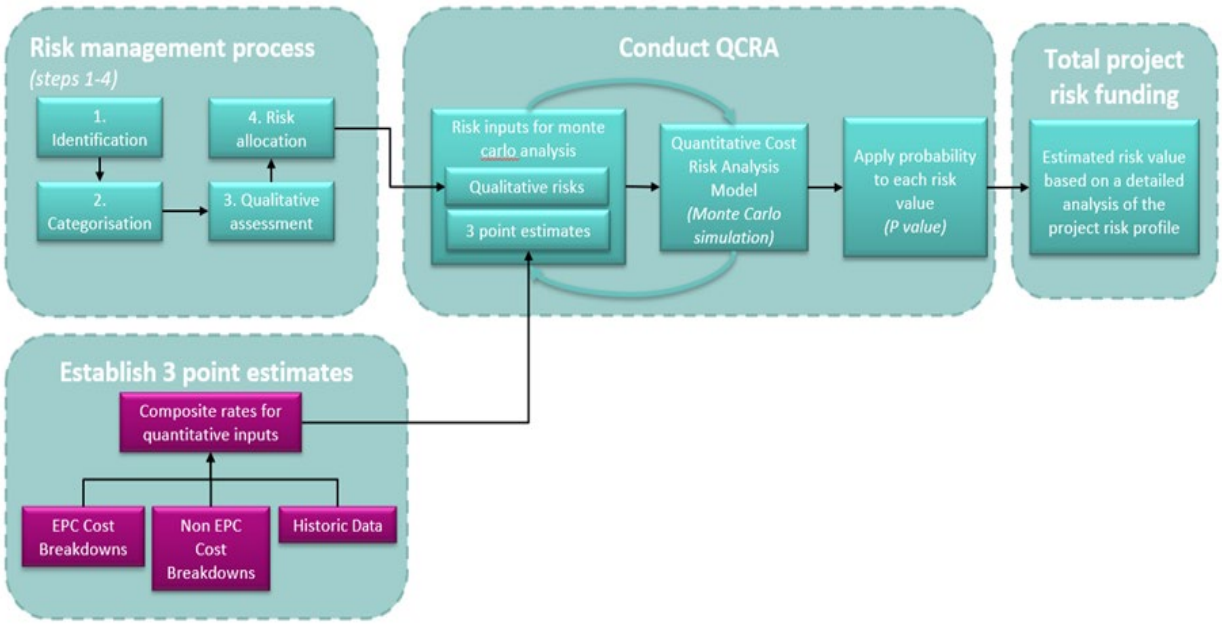
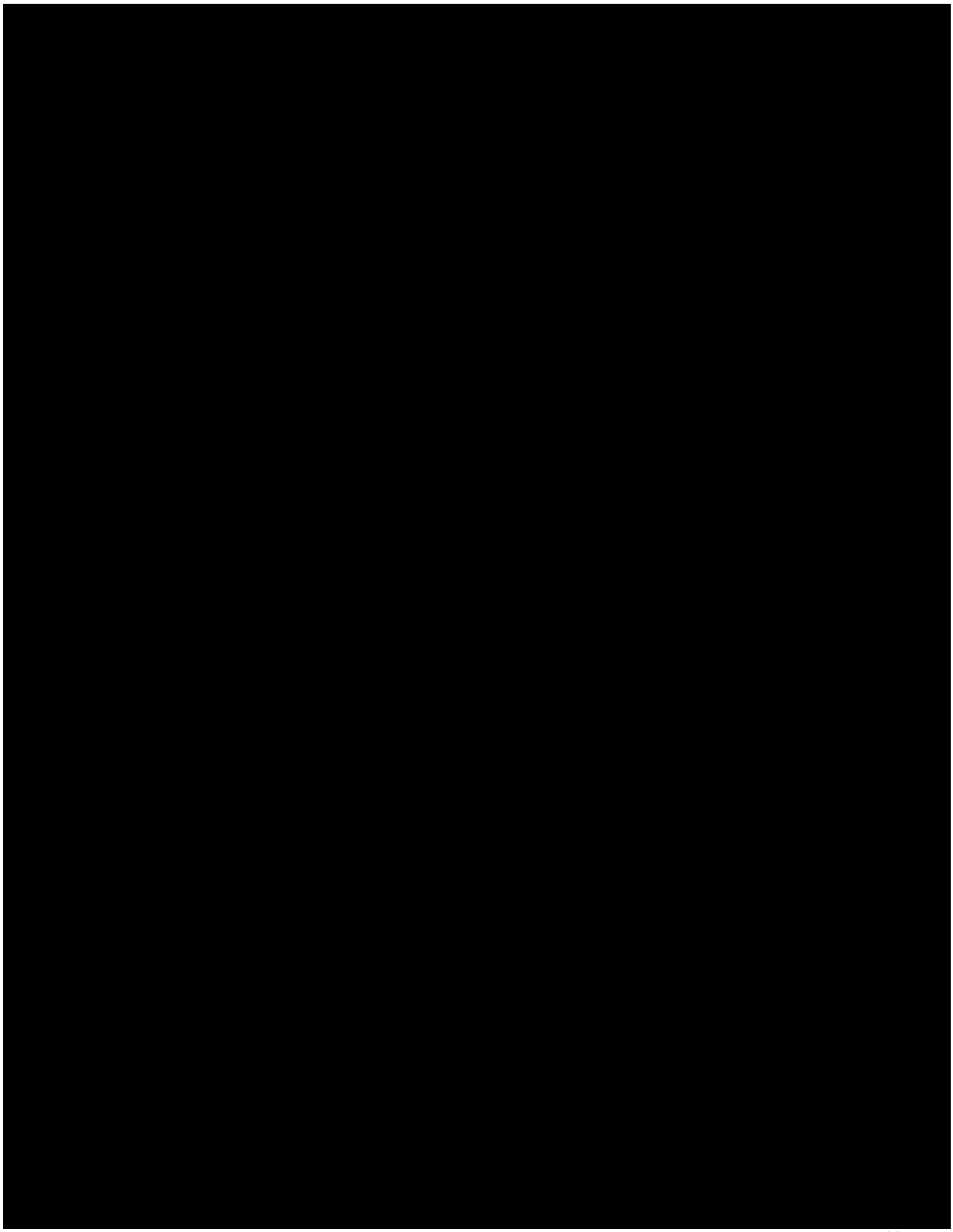
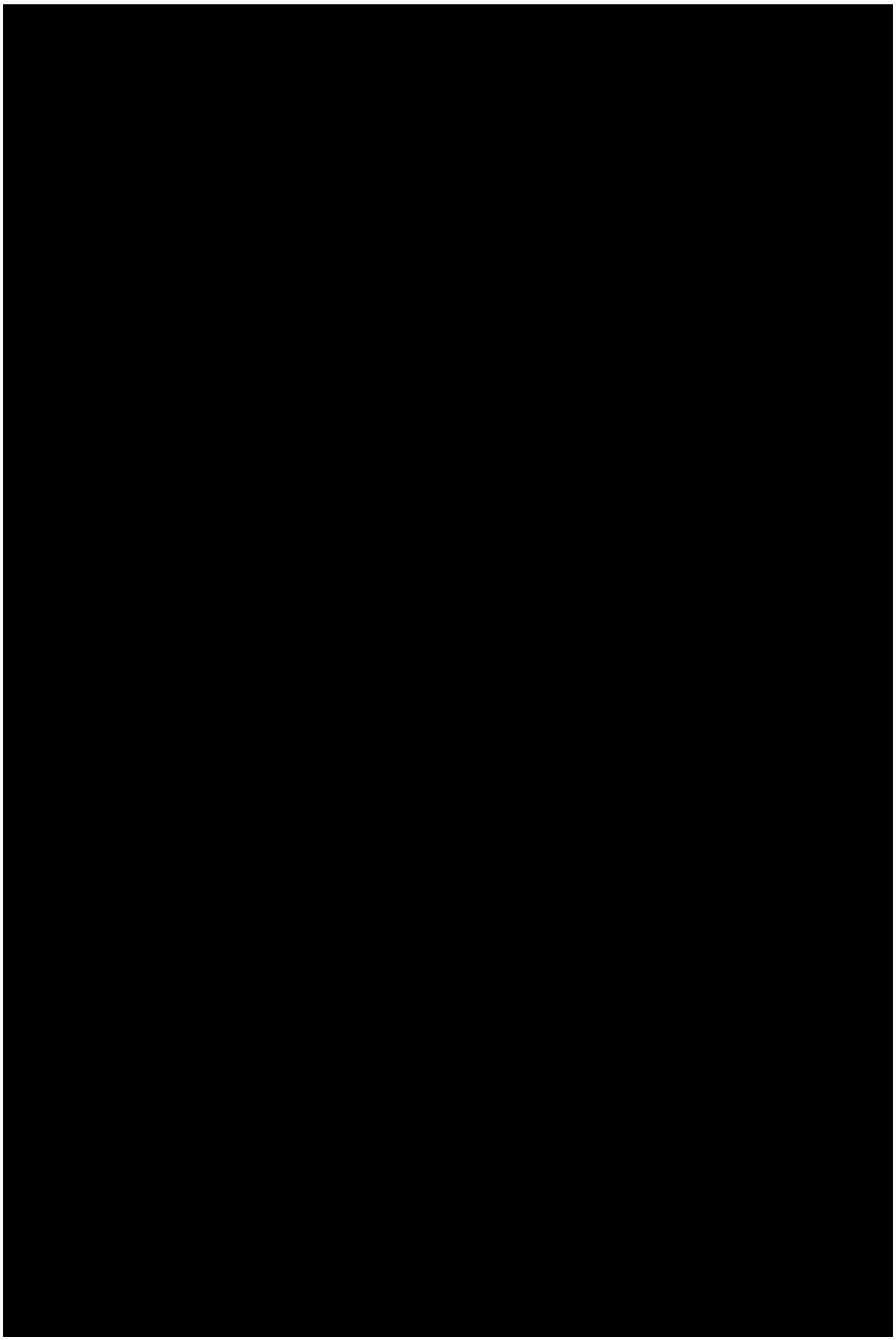


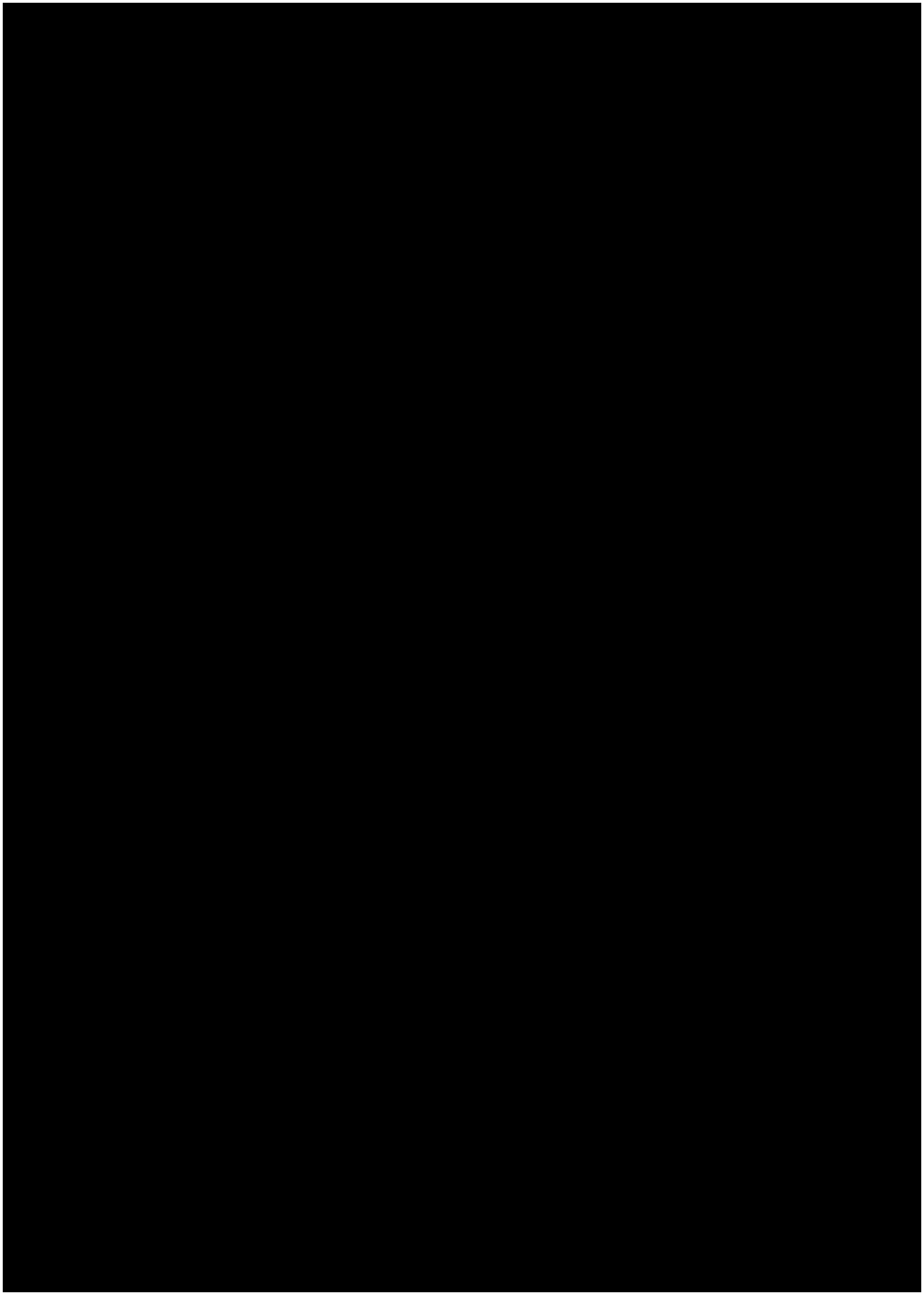

*Figure 46: Quantitative Cost Risk Analysis Process*

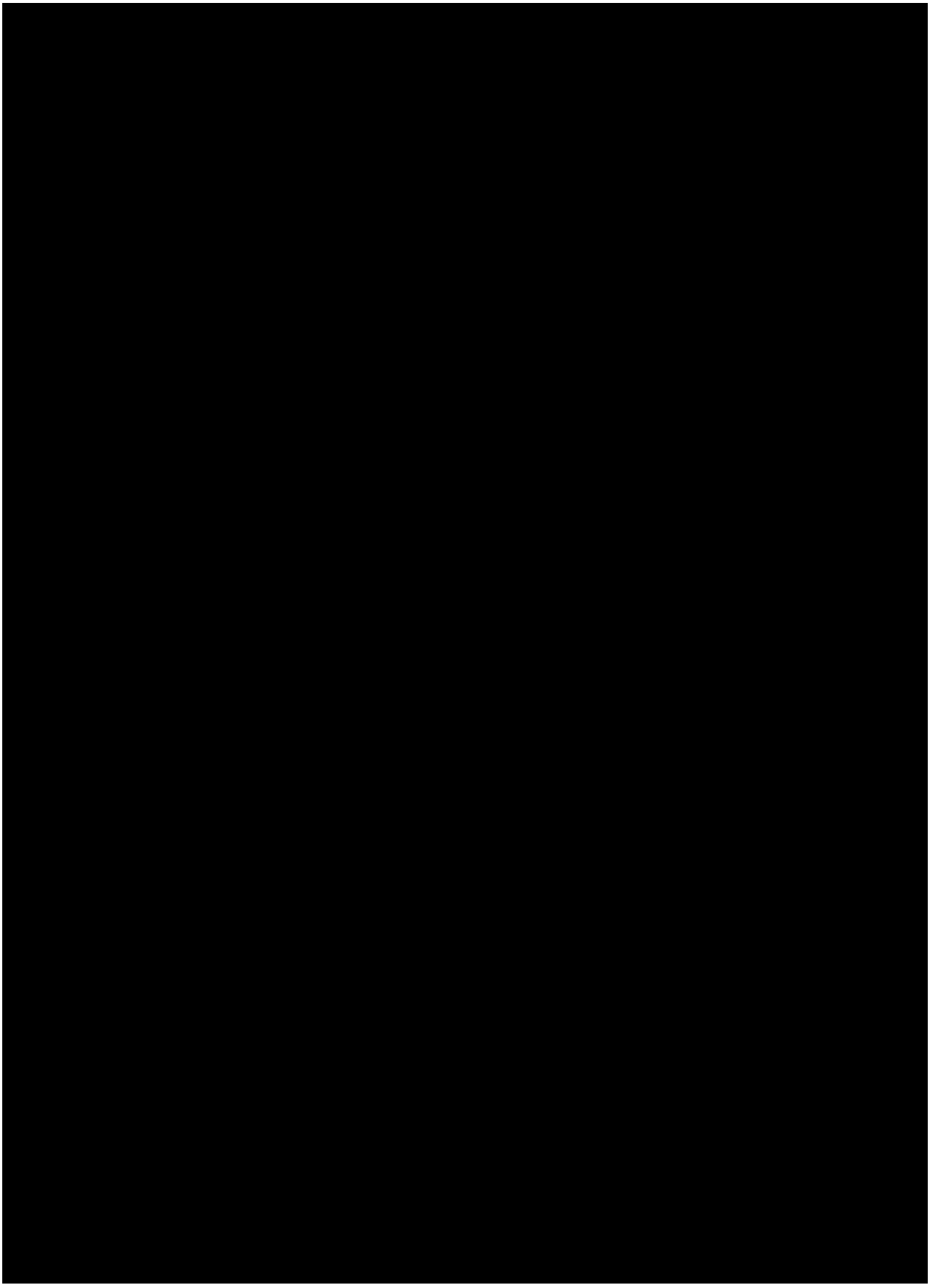
## 13.2 Summary of the Main Project Risks (NGET)

All risks in the register are owned by NGET and are risks carried by NGET into project delivery. During the tender assessment/tender review process, we clarified ownership and any jointly-owned risks were split to reflect single ownership with clearly demarked ownership boundaries.



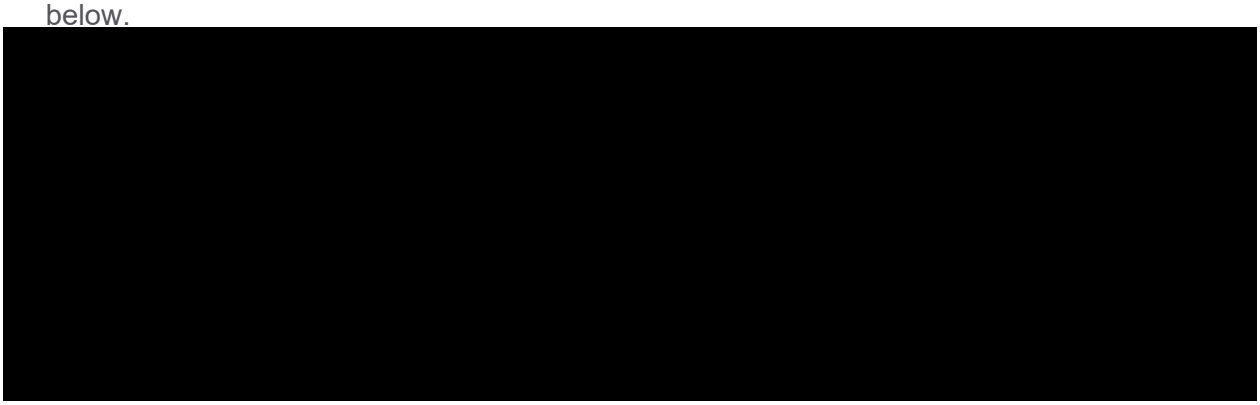






## 13.4 Summary of Risk Position

The total of the three packages making up the Cotswolds risk pot is as shown in Table 41 below.



# Conclusion

This document is NGET's Visual Impact Mitigation re-opener submission to Ofgem for the Cotswolds Visual Impact Provision project. It is submitted with reference to Special Condition 3.10 of NGET's Transmission Licence.

| | |
|---|---|
| **Main drivers** | This project is being delivered as part of NGET's Visual Impact Provision initiative, a programme established by Ofgem to reduce the visual impact of existing high-voltage transmission infrastructure in nationally protected landscapes across England and Wales.<br><br>Within the Cotswolds National Landscape, the overhead line section identified for intervention was assessed by an independent landscape and visual impact assessment and our Stakeholder Advisory Group (SAG) as having an impact of 'High Importance' under the agreed landscape and visual impact assessment criteria, making it a priority for investment under the VIP programme.<br><br>The project has been shaped through sustained public and stakeholder engagement, building strong community support since public its public introduction in 2021. It is therefore a long-standing, well-supported initiative reflecting local and environmental priorities, and is widely viewed as a justified intervention to reduce the visual impact of transmission infrastructure. |
| **Selected Option** | The Cotswolds VIP project will remove a net amount of 16 pylons and approximately 7.4 km of overhead electricity transmission line from within the Cotswolds National Landscape and replace them with approximately 7km of underground cable, significantly reducing visual intrusion in this protected area.<br><br>To support the undergrounding of the transmission line, two shunt reactors will also be installed at Feckenham and Melksham substations, ensuring system stability and ongoing network performance. |
| **Estimated Cost**<br><br>**(18/19 Price Base)** | Our forecast total cost for the investment and funding allowance being sought is (in 2018/19 Prices):<br>• The current estimated total cost of the project is £190,246,552<br>• The total direct cost of the project – the funding this request seeks – is £ 177,558,711<br><br>[redacted] |
| **Outputs** | The Cotswolds VIP project will deliver a substantial and enduring improvement to the nationally protected setting of the Cotswolds landscape through the removal of the overhead line section.<br><br>By restoring uninterrupted views and enhancing the natural character of the surrounding area, the project directly fulfils stakeholder priorities focused on improving landscape quality and promoting public enjoyment. It will improve the experience for those accessing the area on foot, by bike, or for leisure, reinforcing the value of protected landscapes as places of tranquillity, recreation, and scenic appreciation.<br><br>The investment outcome realises the benefit of the funding provision, as outlined Ofgem's RIIO-T2 Final Determinations: *Restoring the quality of visual amenity in National Parks, Areas of Outstanding Natural Beauty and National Scenic Areas for the enjoyment of current and future consumers.* |

| | |
|---|---|
| **PCD Primary Outputs** | Remove a 7.4km section of 400kV double circuit overhead line (OHL) and 18 towers with associated conductor and fittings and replace with 7km of 400kV double circuit underground cable in the Cotswolds National Landscape area. Associated construction of two new towers at sealing end compounds, with net removal of 16 towers.<br>Install two new sealing end compounds to connect the new section of underground cable to the existing overhead line.<br>Reinstatement of essential fibre optic data cable during undergrounding. |

# Assurance and Point of Contact

Attached to this submission (Appendix J.1) 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.

[redacted] They provide the following statements below regarding how this Visual Impact Mitigation project 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 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.

[redacted]

# Appendices

The Cotswolds VIP submission is accompanied by a number of appendices, provided as separate attachments. To support ease of navigation, Table 42 below lists each appendix included in the submission along with a brief description of its content.

*Table 42 - Appendices*

| Appendix | Title / Description |
|---|---|
| A.1 | Landscape Visual Impact Assessment |
| A.2 | VIP Principles |
| B.1 | VIP Cotswolds Appraisal 2020 |
| C.1 | Cable Route Assessment |
| D.1 | Cotswolds CSEC VIP Siting Study |
| E.1 | Acceptability Testing |
| E.2 | Our Approach to Options Appraisal |
| F.1 | T2 Cost Benefit Analysis Cotswolds VIP |
| F.2 | T3 Cables TOTEX3 BP500 Milestones |
| F.3 | Monetisation of the Visual Enhancement Benefits for the Cotswolds VIP Project |
| G.1 | Cotswolds EIA |
| G.2 | Tewkesbury EIA |
| G.3 | Archaeology WSI |
| G.4 | Construction Transport Management Plan (CTMP) |
| G.5 | Cotswolds VIP Bat Survey & Impact Assessment |
| G.6 | Cotswolds VIP Breeding Bird Survey & Impact Assessment |
| G.7 | Ecology Desk Study |
| G.8 | Outline Construction Environmental Management Plan (CEMP) |
| G.9 | Whittington CSEC Biodiversity Net Gain Assessment |
| G.10 | Whittington CSEC Ecological Impact Assessment |
| G.11 | Winchcombe CSEC Biodiversity Net Gain Assessment |
| G.12 | Winchcombe CSEC Construction Dust Assessment |
| G.13 | Winchcombe CSEC Ecological Impact Assessment |
| G.14 | Whittington CSEC LEMP |
| G.15 | Winchcombe CSEC LEMP |
| H.1 | Cotswolds VIP Reopener Cost Model |
| H.2 | Cotswolds VIP Estimated Inflation |
| I.1 | Cotswolds VIP Organogram |
| J.1 | Assurance Statement |