Dorset VIP – non-confidential summary

Introduction

This is a non-confidential summary of the funding request for delivering the outputs of the Dorset Visual Impact Provision (VIP) project. It also covers funding of the expenditure for establishing and developing VIP. The submission was made in accordance with Special Condition 6G of the National Grid Electricity Transmission (NGET) licence.

Background

Ofgem has established a £500m provision across Great Britain to help reduce the impact of existing electricity transmission lines in Areas of Outstanding Natural Beauty (AONBs) and National Parks. In 2014, National Grid created a policy document which set out the guiding principles for how we would select the schemes for VIP. Following stakeholder consultation by Ofgem, the Authority confirmed that they supported the implementation of the Policy. The principles of this were as follows:

- result in greatest landscape enhancement benefits
- result in greatest opportunities to conserve and enhance natural beauty, wildlife and cultural heritage whilst avoiding unacceptable environmental impacts
- result in greatest opportunities to encourage public understanding and enjoyment of the protected landscapes, including positive socio-economic impacts
- are technically feasible in context of the wider transmission system
- are economical and efficient.

The Dorset project was proposed for development in September 2015 by the Stakeholder Advisory Group (SAG). This group consists of independent stakeholder organisations working together to advise National Grid in identifying the areas that could benefit most from the provision. The selection process involved a landscape and visual assessment of all 571km of transmission lines in National Parks and AONBs in England and Wales. This was carried out by two firms of landscape consultants. It eventually led to the SAG shortlisting 12 sections of line, which were ranked as having the highest impacts on the landscape. Dorset was found to have the highest landscape and visual assessment score, which led to the SAG prioritising this project, along with three others.

As Dorset meets the principles of the VIP Policy, National Grid accepted the SAG's proposal and agreed to carry out more detailed development to determine the feasibility of the project.

Benefits

The Dorset project will remove 22 pylons by undergrounding 8.8km of the existing overhead line, creating major benefits for several landscapes in this part of the AONB. This will enhance the South Dorset Downs area by providing an unrestricted view of the rolling chalk landscape and improve the panoramic views out towards the coast. This will also improve the visual transition between different types of landscape such as the chalk escarpment and the clay vale, which is a unique part of this area. Sites of historical importance will benefit from improved settings, such as the Grade II listed Hardy Monument.

To illustrate the impact of removing these pylons, an artist's impression of a section in Dorset can be found below.

The removal of these pylons will provide improved enjoyment of the protected landscape. In particular, for users of rights of way, access land, promoted trails and cycle ways. Although there are likely to be minor impacts on local wildlife, these will be offset by proposed enhancement measures, leading to an overall net benefit.

The landscape enhancement benefits of the Dorset project overall reflect the different landscapes that the transmission line passes through. The project has the potential to influence four Local Landscape Character Areas:

- South Dorset Downs LCA

- South Dorset Escarpment LCA
- South Dorset Ridge and Vale LCA
- Upper Frome Valley LCA.

For the largest shortlisted subsection of overhead line, the majority of the positive landscape enhancement benefits of removing the 400 kV overhead transmission line would occur in the open chalk downland landscape of the South Dorset Downs character area. A large proportion of the undergrounding and removal of 16 pylons will take place within this landscape. The benefits would result from the removal of this substantial number of large-scale pylons and associated overhead lines from the broad rolling chalk upland landscape. This will enhance the sense of large open skies and views of distant horizons, which are among its key characteristics. The character of the small-scale valleys that are part of this landscape will also be enhanced by the removal of these large out of scale features.

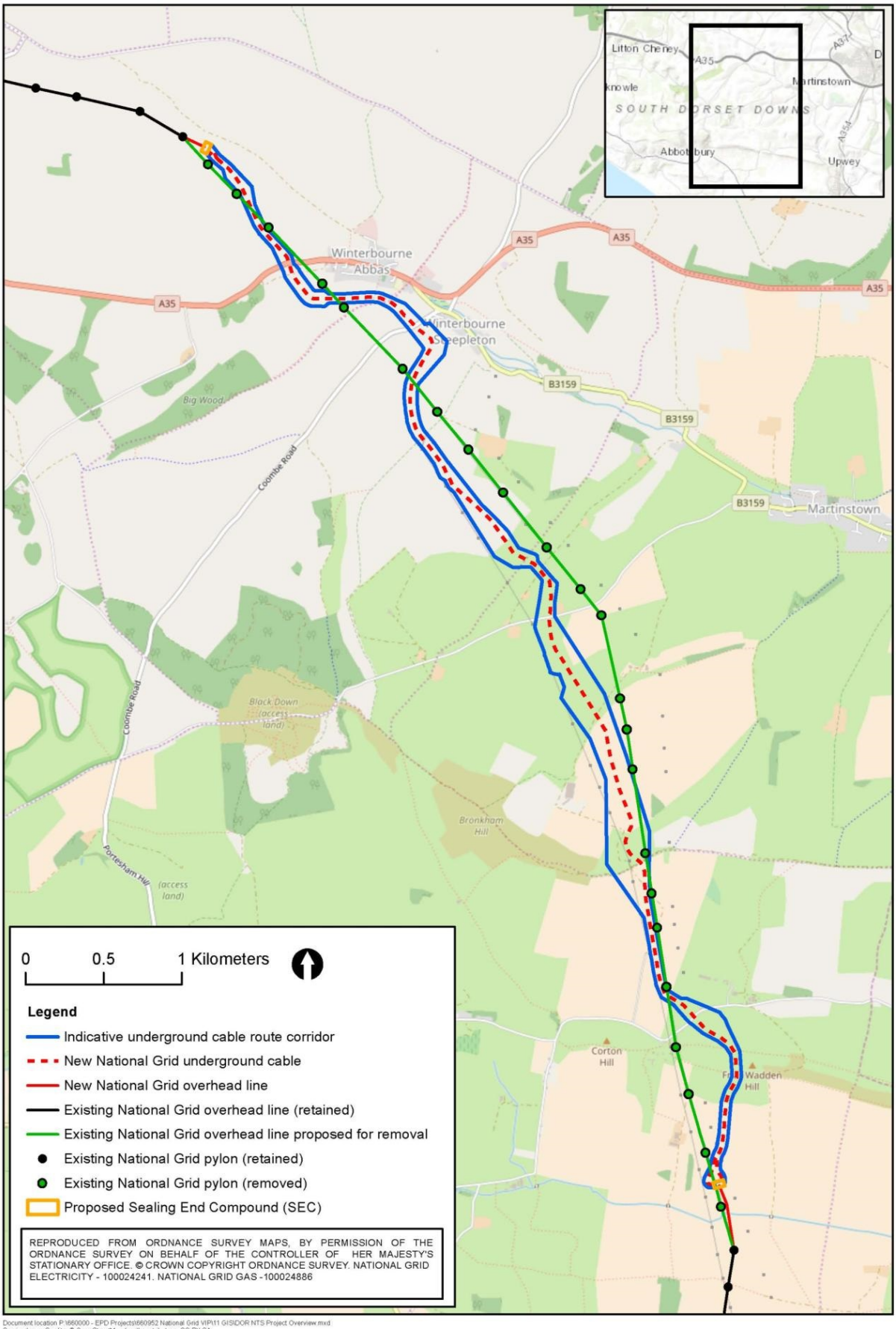
There would be some minor adverse impacts on this landscape as a result of the introduction of the permanent link pillars essential to the undergrounding work. They will give rise to localised impacts on landscape character, but these impacts will be very small in scale compared to both the impacts of the original overhead lines and pylons and the benefits of removing them.

In the adjacent subsection of overhead line to the south, two different landscapes will be affected by the project. A total of six pylons will be removed overall in this subsection. Initially the transmission line passes through the visually prominent, dramatic and exposed steep slopes of the parallel ridges of the South Dorset Escarpment landscape with its characteristic areas of rough unimproved calcareous downland and historic landscape features. Here the removal of the overhead line and four pylons from the chalk escarpment, which is an important and dramatic landscape feature, will have major beneficial impacts on the landscape.

To further quantify the benefits of the scheme, National Grid commissioned the services of a landscape expert to conduct a study of the overhead line impacts. For the longest section of overhead line that will be removed, a visual assessment score was determined based on the impact of the overhead line. A score of greater than 25 indicated an impact of ‘very high importance’, while a score from 0 to 9 indicated an impact of ‘lower importance’. The pre overhead line removal score for Dorset was 27 (indicating a very high importance). The score after the overhead line removal was 3. This indicated a significant landscape benefit from the implementation of the project.

The descriptions of the beneficial impacts of the mitigation project are based on the situation that will prevail 15 years after the implementation of the project is completed. This means that mitigation measures, such as replacement of hedgerows and planting of woodland to screen sealing end compounds, will have had time to mature to some extent.

The proposed route can be found on the following page:



Document location P:\660000 - EPD Projects\660952 National Grid VIP\11 GIS\DOR NTS Project Overview.mxd
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Stakeholder engagement

National Grid has worked with stakeholders throughout the development of the Dorset project and has engaged them through different ways to maximise contribution from various groups. This has included:

- Stakeholder Reference Group (SRG)
- public consultation events
- specific meetings with stakeholders
- landowners and occupiers
- Stakeholder Advisory Group (SAG).

The feedback gathered has been used to influence the proposals put forward to planning (under the Town and Country Planning Act and Electricity Act). These bodies have been involved with the development of the project and the identification of the mitigation proposals required. Planning was approved in June 2018.

One of the key groups has been the Stakeholder Reference Group (SRG). This is made up of local organisations and the local council to advise on local issues. The SRG has been essential in shaping the decisions on the project that drive the underground route, in particular the siting of the sealing end compounds (SEC). These connect an overhead line (OHL) to an underground cable. The locations were subject to extensive optioneering and were subsequently agreed by the SRG, AONB partnership and the SAG. A typical SEC is shown below:

In June 2016 and July 2017, National Grid held public drop-in and public consultation events on the project. These showed local people how plans for the project were developing and provided an opportunity to share their views.

A total of 95 people attended the public consultation events in 2017. The feedback received demonstrated strong support for the VIP proposals; over 80 per cent of those submitting a feedback form were in favour of the scheme. A clear majority supported the Dorset project and its potential to enhance the local landscape.

Throughout the development of the Dorset project, there has been regular dialogue with Ofgem, who are also a member of the SAG. This has been important in the development of VIP and the Dorset project. National Grid has also liaised with the two companies that own the Scottish transmission networks, who are developing their own visual mitigation projects. This ensures that the benefits of the allowance are maximised across England, Scotland and Wales.

In the early stages, National Grid and the Scottish Transmission Owners all shared ideas when developing their policy documents to benefit from good practice. This is reflected in some similarities in approach of the VIP projects, Scottish and Southern Energy's Project Vista and Scottish Power's VIEW. The three TOs have updated each other regularly on the portfolios of projects that they are considering, highlighting the status and progress of the individual elements and sharing lessons learned. Given the unique nature of the projects that are being proposed and the way they are being developed, this exchange of ideas and information has been greatly welcomed by us and has made a significant contribution to the effectiveness of the implementation of VIP.

Project consents

For consenting purposes, an Outline Construction Environmental Management Plan (CEMP) has been produced. The CEMP outlines how National Grid will ensure that adverse effects from the construction phase on the environment and the local communities are minimised. The CEMP was submitted with the Environmental Statement and includes the following:

- environmental management procedures
- environmental management measures that will be implemented e.g. pollution prevention,
- outline of management plans that the appointed contractor will need to develop, e.g. site waste management plan
- outline plans including:
    1. archaeological Written Scheme of Investigation (WSI)
    2. Construction Traffic Management Plan (CTM) and
    3. Landscape and Ecology Management Plan (LEMP).

1. WSI

Archaeology is the main environmental constraint for this project. There has been consultation with both Historic England and Dorset County Council archaeologists (also members of the Stakeholder Reference Group) to understand the possible implications on the project. Work undertaken to date includes:

- desk based study, mapping and site walkover
- archaeological watching brief for ground investigation works
- archaeological geophysical survey of the route (to inform targeted trial trenching)
- initial trial trenching on targeted areas agreed with Historic England and Dorset County Council.

An outline archaeological WSI was prepared in discussion with Historic England and Dorset County Council. The assessment found that, following the implementation of appropriate mitigation measures (through preservation), there would be no residual historic environment

effects. The assessment also considered potential visual impacts to heritage assets and the contribution made by setting. There are no predicted significant adverse visual effects on designated and non-designated heritage assets as a result of the project. In the majority of cases, there will be a net benefit to the surrounding heritage assets through removal of the overhead line.

2. CTMP

The outline CTMP addresses the potential disruptions associated with the project, and details the strategy and mitigation measures to be used during construction. In the formulation of this, consultation has been undertaken with Highways England and Dorset County Council. This included any issues relating to the A35 Strategic Road Network (SRN) and the Local Road Network (LRN), and availability of baseline traffic data. Further work undertaken to date to inform the baseline and outline CTMP includes:

- desk based study
- site visits to identify sensitive receptors, observe baseline traffic conditions providing access to cable route
- assessment of level of usage of public rights of way and cycle routes crossing the cable route.

Findings include the following mitigation measures:

- access improvements on Roman Road, to improve visibility and enhance the existing passing places
- management of the impact of construction vehicle movements (particularly HGVs) on the local highway network; and

public rights of way management, to keep footpaths, bridleways and byways open as far as possible during the construction programme whilst implementing measures to minimise conflicts between rights of way users and construction vehicles.

3. LEMP

The Landscape and Ecology Management Plan (LEMP) ensures that the on-site environment is protected appropriately. The scope of this was discussed at a meeting with the statutory consultees (Natural England and Dorset County Council) in March 2017. The preference from all parties was to combine the landscape and ecology elements into a single document that could be cited in the planning conditions. Work undertaken to date includes:

- desk based study (covering both landscape and ecological elements)
- site visits to identify landscape features, principal viewpoints and receptors
- wide range of ecological surveys (flora and fauna).

The focus of the outline LEMP is on two aspects:

I. mitigation for direct impacts
II. additional landscape and ecological enhancement.

Willingness to pay and acceptability testing

In 2012, National Grid commissioned a study[1] to assess how much domestic consumers were willing to pay to underground overhead lines in National Parks and AONBs. The research showed that, on average, consumers were willing to pay £11 per year (2016/17 price) for 8 years for up to 16km of existing overhead lines in National Parks and AONBs to be buried underground. To test that these 'willingness to pay' figures remain valid, National Grid commissioned further independent acceptability testing with consumers. This asked representative groups of bill-payers whether electricity bill increases relating to these VIP projects would be acceptable.

The research comprised of ten discussion groups, nine in depth interviews with vulnerable bill-payers and a quantitative survey of 2,002 bill payers aged 16 and over. In comparison to the willingness to pay figure, the estimated cost provided was more reflective. This was set at a cost of £0.60 per year for 25 years. Or if comparing across 8 years, it equated to £1.87 per year. When presented with the details of the project, 66% found it acceptable for its costs to be passed onto consumers. Only 15% of the research group found it unacceptable. Finally 19% did not provide a view either way. For the minority that opposed, their main reason was the rejection of the basic idea that consumers should foot the bill. The results also suggested that it was not a question of affordability, as the majority believed that the cost per household was easily affordable.

The perceived acceptability of the VIP projects is higher among rural bill payers and those living close to an AONB or National Park. Other than those in the lowest income bracket, the majority of people in other income levels found the projects acceptable.

This research demonstrates that the majority of end consumers are willing to fund the removal of overhead lines. This can be viewed as a positive step forward to improve the landscapes within AONBs and National Parks.

Technical scope

The 4YA OHL route was originally commissioned in 1965. Since then there has been asset replacement work undertaken to both re-conductor and replace the fittings in 1992.

The route is however due for refurbishment in RIIO-T2 due to its age and condition where the existing and now obsolete quad Zebra conductor will be replaced with Triple Araucaria conductor which is now the common standard. The cable will have an asset life of approximately 40 years, which means that it needs to match the capability of the OHL circuits.

Standard cable trenching techniques will be used for the majority of the route, however there are areas of special engineering difficulty outlined below:

1. high thermal resistivity
2. A35 road crossing
3. south ridge escarpment
4. proximity to distribution network OHL

1. Thermal resistivity

[1] https://www.nationalgrid.com/sites/default/files/documents/NationalGridWTPreport.pdf

Thermal resistance is a heat property and a measurement of a temperature difference by which an object or material resists a heat flow. As such it is important to consider the thermal resistivity of the surrounding ground when designing a cable solution to enable the cable to function as desired and meet the required ratings without overheating.

There are areas along the route where the route is affected by high TR values which need to be resolved. This will require further analysis during delivery to determine the final cable installation method with a view of maintaining the required system ratings.

2. A35 crossing

The A35 is a road in southern England, connecting Honiton in Devon and Southampton in Hampshire. It is a trunk road for some of its length. Most of its route passes through Dorset and the New Forest. The Dorset project has to cross this highway with a cable. In respect of thermal ratings, the A35 crossing is considered to be the most onerous section due to its depth.

3. South ridge escarpment

One section of the cable route known as the South Ridge escarpment, will require crossing a steep slope of approximately 50% gradient. Due to the steep incline specialist equipment will be required.

4. Proximity to distribution OHL

There are areas along the existing OHL route in close proximity to distribution network OHL and these must be considered for both the cable route and SEC construction activities as well as the dismantling of the towers.

The proposed southern SEC location is the most onerous area on the route and is in very close proximity to existing 33kV OHLs which run to both the west and east side.

To enable the safe construction of the proposed southern SEC and the temporary diversion, a safe working area is required. A section of two spans to the west and two spans to the east of the current National Grid line must be diverted to facilitate this.

Reactive compensation

Reactive power is measured in units of Volt Amperes reactive (VAr). Capacitance is said to generate reactive power which generally results in an increase to the local system voltage, and inductance absorbs reactive power which reduces the local system voltage.

Underground cables have a significantly higher capacitance than overhead lines operating at the same voltage and power rating. If a section of overhead line is replaced by an underground cable equivalent then the effect of the increased capacitance is to increase the voltage in that part of the system.

The most commonly used reactive compensation components are shunt reactors, mechanically switched capacitors (MSC) and static VAr compensators (SVC).

Shunt reactors are large inductors which absorb reactive power (VAr) and reduce the local system voltage. An MSC is a large capacitor which generates reactive power and increases the local system voltage. Both shunt reactors and MSCs deliver their fixed VAr rating all the time that they are in service. They are best suited to prevent voltage problems occurring rather than in response to unplanned events on the transmission system.

The system voltage has been calculated at selected points in the transmission network, electrically close to the proposed cables. The results are assessed against chapter 6 of the National Electricity Transmission System Security and Quality of Supply Standard (NETS SQSS) which details the pre-fault steady state voltage limits in planning timescales.

The studies show that if the Dorset project goes ahead, the local voltage will exceed the SQSS limits. The installation of two shunt reactors would be able to absorb the majority of the additional reactive power. Any surplus would be managed by the network operator by dispatching nearby generators and existing shunt reactors.

Selection of the preferred bidder

National Grid follows a robust procurement process to deliver the best value for every project. It undertook a competitive tender process on the overhead line and undergrounding elements of the project. This followed detailed development work to ensure that there would be a robust scope for the contractor. The post tender review process challenged both costs and risks put forward by all the contractors, and selected a preferred bidder through the balance of commercial and technical considerations. As a result of a highly robust and competitive submission, Morgan Sindall was selected as the preferred bidder, although this is subject to contract.

All bidders provided National Grid with two pricing options; a fixed price and a target cost[2]. National Grid has selected to use a fixed price contract on the Dorset project. This is because the differential between the two options was not significant enough to warrant the risk (borne by end consumers) of choosing a target cost. By selecting a fixed price contract, this moved more of the project delivery risks onto the contractor who are best placed to manage them.

As National Grid selected the fixed price option, most of the project risks were transferred onto the contractor, ultimately benefitting the end consumer. The top five outstanding risks that National Grid took on were related to the following, all of which would have mitigation measures in place:

- non-tendered specialist supplier estimating uncertainty
- archaeological discoveries in the ground
- unforeseen ground conditions
- landscaping costs for sealing end compounds
- additional drainage works.

Proposed outputs and efficient costs

The cost of delivering the output is shown in Table 1. This is also referred to as the Enhancing Pre-existing Infrastructure (EPI) output:

[2] A target cost means that any overspend or underspend from the target is shared between National Grid and the contractor

Table 1 EPI output

Cost element	Delivery Year	Outputs	Cost (17/18 price)
Dorset project	2022	Delivery of the underground cable and removal of existing overhead line	£117.9m

The cost of the scheme requested for funding is £117.9m (in 17/18 prices).

This submission also sets out the preliminary costs to develop the Dorset project, which are costs that have either been incurred or will be incurred ahead of contract award.

Finally, this submission covers the costs associated with the development of VIP, which led to the implementation of the VIP policy. This comes to a total of £1.6m. This has involved the extensive process of identifying the potential areas for improvement with our stakeholders and carrying out an assessment of their visual impacts. These underwent further detailed site surveys to determine what potential enhancements would provide the greatest benefit. The result of this led to the shortlisting of the prioritised areas to take forward as separate projects.

Funding request

National Grid is putting forward this project as the first major VIP project for funding approval. As stated under special condition 6G of the electricity transmission licence, it is requested that Ofgem determines a) whether the Dorset project is compliant with the VIP Policy and b) whether the proposed costs are economical and efficient. The total amount requested for funding is £117.9m.

In line with the VIP Policy, this funding assessment submission demonstrates how National Grid has worked closely with stakeholders to identify and develop the Dorset project. This has been driven by the opportunity to mitigate the visual impact of the existing transmission line in the AONB and enhance the landscape.