

A photograph of a sheep grazing in a lush green field. In the background, several high-voltage power line towers are visible against a cloudy sky. The image is used as a background for the document cover.

The Great Grid Upgrade

Cross Border Connection

Stage 1 Consultation Document

October 2025

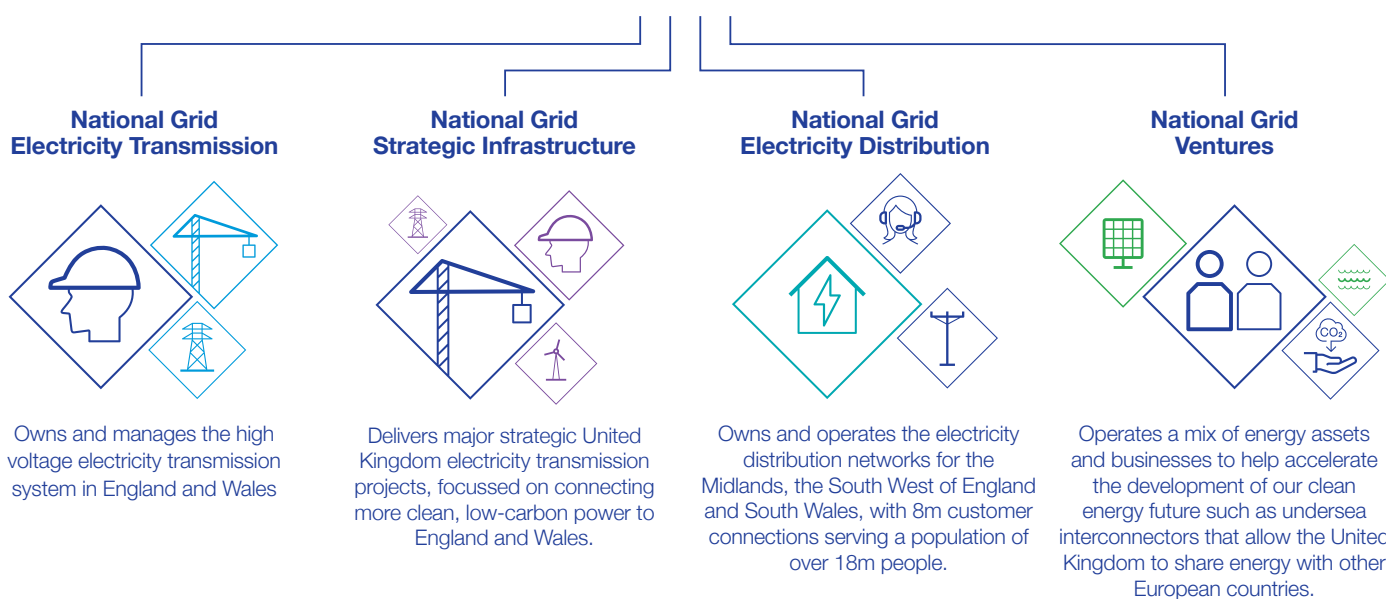
nationalgrid

About National Grid

National Grid delivers electricity safely, reliably and efficiently to the customers we serve – all while working towards building a cleaner, fairer energy system for the future.

nationalgrid

Group PLC



National Grid group of business areas

National Grid Electricity Transmission (NGET) sits at the heart of Britain's energy system, connecting millions of people and businesses to the energy they use every day. Every time a phone is plugged in, or a switch is turned on, we have played a part in connecting you to the electricity you need.

NGET is developing the proposals set out in this document. Under the Electricity Act 1989, NGET must develop proposals in an efficient, coordinated, and economical way, which also considers people, places and the environment. We have published 10 commitments to how we go about doing this in our stakeholder, community and amenity policy¹. To find out more about how we develop our proposals, please see our 'how we work' video².

NGET does not generate electricity. We own and maintain the high voltage transmission network in England and Wales, which transports large amounts of electricity from where it is generated to where it is needed. Local network operators then deliver electricity at lower voltages to individual homes and businesses.

Working with SP Energy Networks

Cross Border Connection is a joint project between NGET and SP Energy Networks (SPEN). National Grid is developing the section of the project located in England which extends from the Carlisle area to the England-Scotland border. SP Energy Networks is developing the section of the project located in Scotland, which extends from the proposed Gala North Substation to the Scotland-England border.

SP Energy Networks is responsible for the Scottish section of Cross Border Connection. SP Energy Networks has identified a proposed route for the Scottish section of the project up to the Scotland-England border, which was subject to public consultation in autumn 2024 and in spring 2025. They will submit their own separate consenting application for the Scottish section via the Energy Consents Unit to Scottish Ministers.

Further information about the SP Energy Network proposals, including detailed maps and consultation materials, are available on their project website: spenergynetworks.co.uk/pages/cross_border_proposal.aspx



¹ National Grid's commitments when undertaking works in the UK: Our stakeholder, community and amenity policy (National Grid, December 2016) – Available at nationalgrid.com/electricity-transmission/document/81026/download

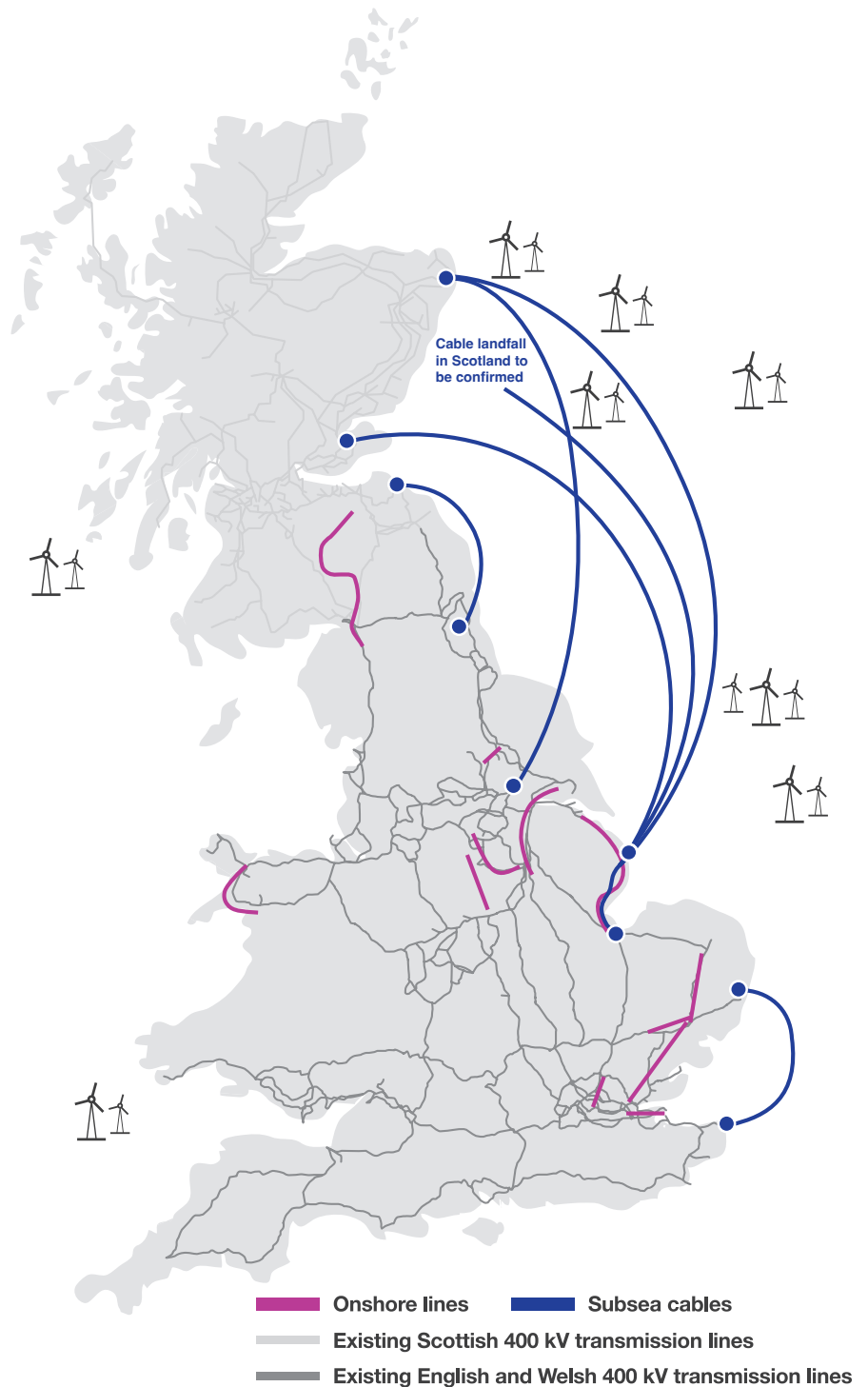
² National Grid Electricity Transmission, 'How we work' video players.brightcove.net/867903724001/default_index.html?videoId=6329276694112

The Great Grid Upgrade

The existing transmission system – the infrastructure including pylons, overhead lines and underground cables, which transports electricity around the country – was largely built in the 1960s. It was not designed to transport electricity from where it is increasingly being generated today – offshore and from solar.

New transmission infrastructure is needed because the existing network in the North does not have the capacity to deliver the required amount of electricity to where it is needed in the region and beyond. We need to prepare the grid for increasing electricity demand in the North and all over the country – a predicted increase of 40% by 2035.

The Great Grid Upgrade is the largest overhaul of the grid in generations and will future proof the grid for years to come, facilitating the transition to a clean and affordable energy future.



The Great Grid Upgrade will:



Contribute to lower energy bills over the long term and make the UK's energy more self-sufficient.



Support hundreds of thousands of jobs and contribute an average of £18.4bn to GDP.

Scan this QR code for more information on The Great Grid Upgrade, or visit our website at www.nationalgrid.com/the-great-grid-upgrade



Figure 1 – Map of existing high voltage electricity transmission network and projects currently proposed as part of The Great Grid Upgrade

³ Clean Power 2030, Department of Energy Security and Net Zero, December 2024, <https://assets.publishing.service.gov.uk/media/677bc80399c93b7286a396d6/clean-power-2030-action-plan-main-report.pdf>

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Foreword

Thank you for taking an interest in the Cross Border Connection project and our plans to upgrade the electricity grid in your area.

We're pleased to share our early ideas for the English section of the project as part of this Stage 1 consultation.

The Cross Border Connection project is a proposal to build a new electricity transmission link between the proposed Gala North Substation near Lauder in the Scottish Borders, and a new substation in the Carlisle area.

This new connection would help move more clean, renewable energy from Scotland into England. In fact, it could deliver enough home-grown power for up to six million homes.

The Scottish part of the project is being developed by SP Energy Networks, running from Gala North Substation to the Scotland-England border. In this consultation, we are asking for your views on the English part only – a new 400 kilovolt (400 kV) overhead line from the border to Carlisle, plus a new substation linked to the existing network.

This first stage of consultation runs from **12pm on Wednesday 15 October to 11:59pm on Wednesday 10 December 2025**. We encourage everyone to look at our proposals, ask us any questions and share feedback. Full details on how to take part are included in this document.



Angela Hosford
Project Director, Cross Border Connection (in England)



Figure 2 – Map of Cross Border Connection

Consulting on our proposals

The English section of Cross Border Connection is a project of national significance. This type of project requires a special type of planning consent known as a Development Consent Order (DCO)¹.

Consultation is an important part of the DCO process as it enables everyone to comment on the proposals. The English section of Cross Border Connection is in the early stages of development and feedback from all stages of consultation – along with the outcome of technical studies and environmental surveys and joint working with our partners at SP Energy Networks – will help us to develop our proposals before we submit a DCO application.

The Planning Inspectorate will examine our application and accept the submission of views from statutory stakeholders, as well as residents and other interested parties. The Planning Inspectorate will then make a recommendation to the Secretary of State for Energy Security and Net Zero (DESNZ), who will decide whether to grant consent for the English section of Cross Border Connection.

Our approach to consulting with communities

All infrastructure projects have impacts and benefits locally and nationally. We will work with the public, elected representatives and statutory stakeholders through all stages of the planning and construction process. Our aim is to minimise the impacts and maximise the benefits for local communities.

As part of The Great Grid Upgrade, Cross Border Connection would contribute to its aims of delivering social and economic benefits as well as providing a vital environmental service to Britain by decarbonising the electricity network.

Public consultation stages

Our consultation on the English section of Cross Border Connection is planned to take place in two stages. This Stage 1 consultation – running for eight weeks from **Wednesday 15 October to Wednesday 10 December 2025** – is designed to introduce our early proposals and gather your feedback.

The deadline for providing feedback is **11:59pm on Wednesday 10 December 2025**.

Our Stage 2 consultation will demonstrate how we have considered your feedback from our Stage 1 consultation, alongside the outcomes of technical assessments and environmental surveys. We will also include detailed information on our proposals, including specific locations of proposed infrastructure.

Our Stage 2 consultation will provide a further opportunity for you to share your views.

¹ More information on the DCO process is available at:
<https://national-infrastructure-consenting.planninginspectorate.gov.uk/decision-making-process-guide>

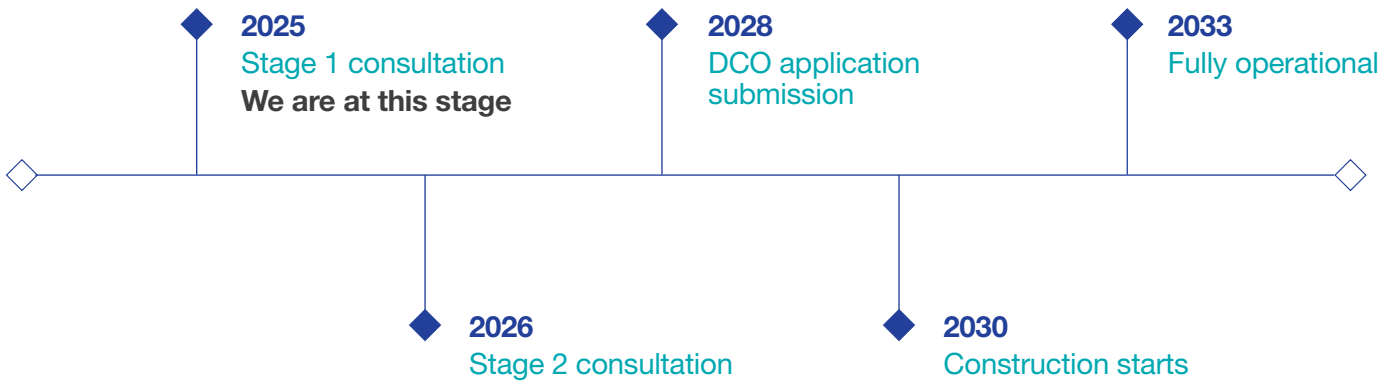


Figure 3 – Indicative project timeline

What are we consulting on?

During this Stage 1 consultation, we are seeking views on our proposals for:

- a new 400 kV substation in the Carlisle area ('new Carlisle substation')
- a new 400 kV overhead line between the new Carlisle substation and the England-Scotland border
- a connection from the new Carlisle substation to the existing network.

In particular, we are interested in hearing from you about:

- any concerns or questions you might have about our proposals, or any local factors we should consider
- local features that are important to you, including any relevant mitigation you would like to see
- whether there is anything else we should consider as we develop our proposals further.

We are currently considering two options for the location of the new Carlisle substation. More information on these options can be found on page 16.

Your feedback is important and all responses recorded will help us to develop and refine our plans.

Following the consultation, we will report back on the key themes raised and how we have responded to comments in the development of our plans. Please see our Stage 1 Consultation Strategy (available at: nationalgrid.com/cbc) for further details on our approach to this consultation.

Cross Border Connection in Scotland

National Grid is not consulting on Cross Border Connection infrastructure in Scotland. You can read more about the Scottish section in the Cross Border Connection in Scotland chapter on page 46 and on SP Energy Network's project website at: www.spenergynetworks.co.uk/pages/cross_border_proposal.aspx

Stage 1 consultation materials

This Stage 1 Consultation Document outlines our proposals alongside information about where to find out more and how to get involved in the consultation.

As part of this consultation, we have also published:

- **Stage 1 Consultation Community Newsletter** – summarising details of our proposals and our public consultation
- **Project website** – webpage hosting all project information, including downloadable versions of all consultation documents, FAQs, and the online Feedback Form: nationalgrid.com/cbc
- **Stage 1 Consultation Feedback Form** – to gather comments and feedback on our proposals
- **Interactive map** – an online map showing general locations of proposed infrastructure
- **Stage 1 Consultation Strategy** – a document detailing how we intend to carry out our Stage 1 consultation
- **Strategic Options Report (SOR)** – technical document that shows the need case for Cross Border Connection and what strategic options we considered to address it

- **Corridor Preliminary Routeing and Siting Study (CPRSS)** – technical document that outlines how we have carried out detailed environmental surveys and technical assessments to identify areas that may be more or less sensitive to the introduction of new infrastructure.

All consultation materials are published on our project website: nationalgrid.com/cbc

Paper copies of our Stage 1 consultation materials are also available free of charge upon request by contacting the project team at **0800 358 1781** or crossborderconnection@nationalgrid.com

If you require printed materials in a different format or language, then please get in touch.

We recommend that you read our consultation materials as they contain detail that could help inform your feedback.



How to find out more

During the consultation, we are holding six in-person public information events (see Table 1). At these events, we will present information about the proposals and members of the project team will be available to answer your questions. You will also be able to view copies of our maps and technical documents.



Table 1: Public information events

There is no need to register for the events – please just turn up on the day.

Venue	Date and time
Crosby-on-Eden Parish Hall , Crosby-on-Eden, Carlisle, CA6 4QN	Saturday 25 October, 11am – 4pm
Nicholforest Public Hall , Warwicksland, Penton, Carlisle, CA6 5QD	Tuesday 28 October, 2 – 7pm
Wetheral Village Community Hall , Cumwhinton Road, Wetheral, Carlisle, CA4 8HE	Saturday 1 November, 2 – 7pm
The Rockcliffe Centre , Rockcliffe, Carlisle, CA6 4AA	Tuesday 4 November, 2 – 7pm
Wreay Village Hall , Wreay, Carlisle, CA4 0RL	Thursday 6 November, 2 – 7pm
Longtown Memorial Hall Community Centre , Arthuret Road, Longtown, Carlisle, CA6 5SJ	Saturday 8 November, 11am – 4pm



Table 2: Webinars

We will run four online webinar sessions (see Table 2 for details), where we will present our proposals and hold a question and answer session.

Details on how to sign-up for a webinar are available on the project website, by calling us on **0800 358 1781** or by emailing **crossborderconnection@nationalgrid.com**

Webinar name	Locations covered	Date and time
Webinar #1	Core Route Options Section 1: England-Scotland border to B6318 Section 2: B6318 to Rae Burn Section 3: Rae Burn to Woodlands Industrial Park	Tuesday 11 November, 7 – 8pm
Webinar #2	Section 4 (Option A): Woodlands Industrial Park to A689 (including north of Carlisle substation) Section 4 (Option B): Woodlands Industrial Park to A689	Thursday 30 October, 12 – 1pm
Webinar #3	Section 5: A689 to Scotby Section 6: Scotby to Cocklakes Yard (including south of Carlisle substation)	Friday 14 November, 12 – 1pm
Webinar #4	General – overview of proposals	Monday 17 November, 7 – 8pm

**Table 3: Local information points**

Paper copies of the Stage 1 Consultation Document, Stage 1 Consultation Community Newsletter, Stage 1 Feedback Form (and envelopes) are available to collect at the below locations. Copies of the Corridor Preliminary Routeing and Siting Study (CPRSS) and Strategic Options Report (SOR) are available to view at the below locations – these are large documents so these copies are for reference only and not for taking away.

Local information point opening hours can be subject to change at short notice. Please check with the relevant venue for the most up to date opening hours.

Local information points	Address	Opening times
Carlisle Library	11 Globe Lane, Carlisle, CA3 8NX	Monday 9am – 5:30pm Tuesday 10am – 5:30pm Wednesday 9am – 5:30pm Thursday 9am – 5:30pm Friday 9am – 5:30pm Saturday 9am – 4pm Sunday Closed
Longtown Library	Lochinvar Centre, Longtown, Carlisle, CA6 5UG	Monday 1 – 5pm Tuesday Closed Wednesday 10am – 2pm Thursday Closed Friday 1 – 5pm Saturday Closed Sunday Closed
Harraby Library Link	Harraby Community Centre, Edgehill Road, Carlisle, CA1 3SN	Monday 9am – 5pm Tuesday 9am – 5pm Wednesday 9am – 5pm Thursday 9am – 5pm Friday 9am – 5pm Saturday Closed Sunday Closed
Brampton Library	1 Market Place, Brampton, CA8 1NW	Monday 2 – 5pm Tuesday Closed Wednesday 10am – 12pm & 2 – 5pm Thursday 2 – 5pm Friday 2 – 5pm Saturday 10am – 1pm Sunday Closed

How to give feedback

Our Stage 1 consultation runs for eight weeks from **12pm on Wednesday 15 October to 11:59pm on Wednesday 10 December 2025**.

You can respond in several ways:



Online Feedback Form

You can give your feedback by completing our online Feedback Form, available at nationalgrid.com/cbc



Email

You can send written feedback via email to crossborderconnection@nationalgrid.com



Paper Stage 1 Feedback Form

You can also pick up a paper Feedback Form from any of the public information events or local information points. Alternatively, you can request a consultation pack (Stage 1 Consultation Document, Feedback Form and envelope to be sent to you in the post).

You can download and print a copy of our Feedback Form from our website and post it back to us at **FREEPOST NATIONAL GRID CBC** (no stamp or other address details needed). You can also fill out a paper form at one of our public information events.



Letter

You can send a letter to **FREEPOST NATIONAL GRID CBC** (no stamp or other address details needed).

Important – to avoid any misinterpretation and to ensure we have an accurate record of what we have received, we normally only accept written feedback via the methods above. If for any reason someone is unable to provide written feedback, we may be able to take feedback over the phone. This will be decided on a case-by-case basis.

You are welcome to use our community information line **0800 358 1781** or speak to us at our events for information on the project or for any assistance you may need accessing or responding to the information provided.

The need for Cross Border Connection

Cross Border Connection would play an important role in building a more secure and resilient energy system by reliably transporting affordable, home-grown renewable energy from where it is generated to where it is needed.

Much of the energy infrastructure in the North of England was developed in the 1960s when energy generation was primarily from coal fired power stations.

Increasingly, the UK is generating energy from renewable sources that require significant upgrades to the transmission system which will strengthen our energy security and resilience.

Across the country, demand for electricity is rising, including here in the North of England. We need to build this new transmission infrastructure to help meet that increasing demand.



Reinforcing the transmission network between the North of England and the Scottish Borders

Cross Border Connection would form part of a major programme of reinforcement of the electricity transmission system to accommodate substantial and increasing power flows between Scotland and England.

Guidance from the National Energy System Operator (NESO) identified that the existing transmission network between Scotland and England does not currently have the capacity to reliably transport the increasing amount of energy needed to meet demand (see our Strategic Options Report for the detailed needs case).

Cross Border Connection would help to provide the increased capacity needed between Scotland and England. The project would transport around 6.9 GW of home-grown electricity – enough for six million homes.

Further information relating to sections of the connection route situated in Scotland is available on page 46 of this document, within the '**Cross Border Connection in Scotland**' section.



Figure 4 –The B6 boundary and Gala & Teviot areas

Boundaries

The electricity network system in Britain is split into boundaries. Each boundary has a limit to the amount of electricity that can flow through it. As more electricity is being generated in Britain and demand is growing, NESO assesses where the power flows between these boundaries will need to rise. The B6 boundary runs in proximity to the England-Scotland border, as shown above in Figure 4.

Cross Border Connection was one of the upgrades identified by NESO and is designed to strengthen the electricity network between England and Scotland, across the B6 boundary. This will connect the network to new proposed onshore wind farms in the Scottish Borders.

Assessment of options

In line with National Grid's duty to balance overall cost, environmental impact and transmission capacity, our assessment of the options for the English section of Cross Border Connection concluded that a new 400 kV overhead line between the Scottish Borders and a new substation in the Carlisle area represented the most appropriate and therefore preferred solution.

These proposals for the English section of Cross Border Connection have been developed following initial engineering and environmental surveys for the overhead line route and locations of supporting infrastructure.

Reinforcing transmission network across the North of England

A new substation is required to connect the English section of Cross Border Connection to the existing electricity network.

The new substation would also accommodate potential future projects identified by NESO as part of the broader upgrade to the North of England's transmission infrastructure.

One of the reinforcements identified was Carlisle to Newcastle, which is not as advanced as Cross Border Connection, but would also require a connection to the existing transmission network.

The project is currently at a formative stage and will be subject to public consultation at a later date. You can register for future updates on this project on the website: nationalgrid.com/ctn

Do you want more detail?

You can learn more about how we identified the need and our appraisal process in the:

- Strategic Options Report (SOR)
- Corridor and Preliminary Routeing and Siting Study (CPRSS)

You can find these at nationalgrid.com/cbc



Our proposals for Cross Border Connection in England

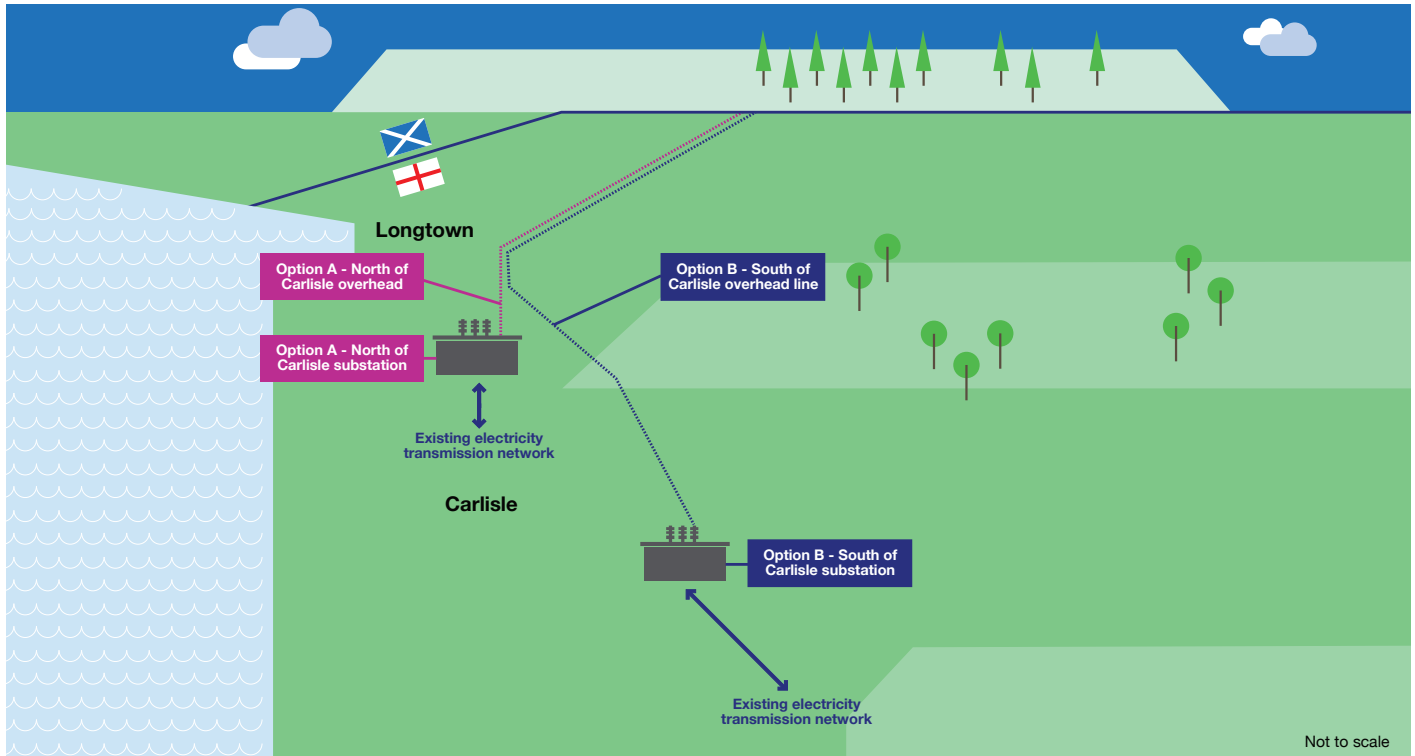


Figure 5 – Cross Border Connection in England

Cross Border Connection would upgrade the electricity transmission network by providing:

- a new 400 kV substation in the Carlisle area ('new Carlisle substation')
- a new 400 kV overhead line between the new Carlisle substation and the England-Scotland border
- a connection from the new Carlisle substation to the existing network.

We are currently considering two options for the location of the new Carlisle substation. More information on these options can be found on page 16.

More detail on the overhead line is available on pages 18 – 19 and more detail on the substation is on page 20.

Other requirements

We may use additional land to support the construction of the project or to protect the natural environment.

This includes, but is not limited to:

- temporary land for construction activities including working areas for construction equipment and machinery, site offices, welfare, storage and access
- land for mitigation, compensation and enhancement of the environment as a result of the environmental assessment process and delivering Biodiversity Net Gain.

Biodiversity Net Gain (BNG)

Biodiversity Net Gain (BNG) is a way to ensure that the environment is left in a better state after construction than it was before the work started.

From mid 2026, it is due to be made mandatory for Nationally Significant Infrastructure Projects in England, like the English section of Cross Border Connection, to achieve 10% BNG – this means the project would result in more or better-quality natural habitat than there was before development. This may be achieved through habitat creation and/or enhancement.

Why we are consulting on two options for where the substation could be located

Electricity demand is growing across the country, including the North of England. More and more electricity is being generated to meet that demand and the electricity transmission network needs to be reinforced so we can transport the power to where it is needed: our homes, businesses and public services.

The National Energy System Operator (NESO) continuously looks at how the transmission network must adapt to meet future energy needs. They recommend where upgrades are needed to deliver a reliable, secure and cleaner network. Due to the rising demand for electricity, more new transmission projects are likely to be required in the North.

Our responsibility as National Grid Electricity Transmission (NGET) is to develop proposals for new transmission infrastructure based on the recommendations from NESO. In doing that, we are required to strike a balance – reducing impacts on communities, the environment and important assets like the Frontiers of the Roman Empire World Heritage Site (Hadrian's Wall WHS), whilst delivering value for money for consumers. We as NGET do not have all the details yet about the additional transmission upgrades that might be needed in the North, but we anticipate there will be greater clarity over the year ahead.

We are currently proposing two alternative substation options, as the choice may well be influenced by other potential projects. We will also have high regard to the feedback we receive at this consultation, along with other technical and environmental assessments. As our plans evolve, we will come back to consult you again.

The two options

We are currently considering two options for the location of the new Carlisle substation:

Option A – a substation located in an area north of Carlisle.

This option would include approximately 28 kilometre (km) of proposed overhead line. This includes overhead line between the proposed substation and England-Scotland border, and between the proposed substation and existing Harker substation.

Option B – a substation located in an area south of Carlisle.

This option would include approximately 47 km of proposed overhead line. This includes overhead line between the proposed substation and England-Scotland border, and between the proposed substation and existing Harker-Hutton overhead line.

Identifying the location and developing our proposals

When a need to upgrade the transmission system is established by NESO, we then study and evaluate the potential options for meeting that need. When developing our proposals, we adhere to Government policy, legislation, regulation and industry rules, which inform the balance that needs to be struck between benefits and potential impacts.

Having identified the need for increased capacity through a new overhead line and substation, we explored options for their locations by identifying a 'study area' informed by the locations of built-up areas, natural features, protected sites and existing transmission corridors. This is the broad area where the new overhead line and substation would be located along the England-Scotland border, which allowed us to consider multiple starting points.

We then carried out environmental surveys and technical assessments to identify areas that may be sensitive to the introduction of new infrastructure within our initial study area. This allowed us to identify several preliminary corridors within which the new overhead line and substation could be located. Having identified these corridor options, they were further assessed and preferences identified.

Following the selection of preferred corridors and substation siting zones for our options, we then produced a 'graduated swathe' to show where within the corridors and siting zones infrastructure is more or less likely to be located. We have sought to minimise potential impacts on residential properties, landowners, the environment and communities.

More details on this process are available in the Corridor Preliminary Routeing and Siting Study (CPRSS) on our project website nationalgrid.com/cbc



To find out more about how we develop our proposals, please see our [video](#)² explaining how we work.

Technical definitions

Emerging preferred corridor

The emerging preferred corridor is an area within which infrastructure for Cross Border Connection may be located.

We are sharing two emerging preferred corridors as part of this consultation – one for Option A and one for Option B. Sections 1 to 3 are identical for both options and are referred to as the Core Route Options.

Siting zone/siting area

A siting zone is a large area within a study area where a substation could be located.

Inside a siting zone, there may be one or more 'siting areas', which are smaller, more specific places where the substation could actually be built.

We are showing two possible siting zones – one for each option:

Option A has a siting zone and also a smaller siting area within it.

Option B has just a siting zone at this stage.

Graduated swathe

The graduated swathe presents shaded areas within the emerging preferred corridor and siting zone/siting area within which infrastructure (such as overhead lines or a substations) is considered more or less likely to be located. This is illustrated by the darker or lighter areas of shading.

The darker shading in the graduated swathe indicates the areas that are likely to be more suitable for new infrastructure, while lighter shading indicates areas we believe are less appropriate.

It is important to note that the graduated swathe is both initial and indicative and will be reviewed and refined following further detailed assessment work and stakeholder and community feedback. The map keys show how the footprint of proposed infrastructure is relative to the scale of the maps.

Overhead lines

For the English section of the project, we are proposing a new 400 kV electricity overhead line running between the England-Scotland border (near Kershopefoot) and a new substation near Carlisle.

There are two corridor options which share an initial route from Kershopefoot on the England-Scotland border to near the settlement of Longtown. These are referred to as our **Core Route Options**.

The route for Option A would end at a new substation in an area north of Carlisle, near the existing Harker substation. The overhead line route corridor would not reach as far as the Hadrian's Wall WHS.

Option B would end at a new substation in an area south of Carlisle with a route corridor that crosses the Hadrian's Wall WHS. We recognise the importance of the site and its cultural heritage and have considered it carefully to develop this option – please see pages 38 and 40 for more information.

These represent separate options that we want to gather your views on to help us identify our preferred option.

We are still considering the exact location of the proposed overhead line and individual pylons within both corridors and would welcome your feedback.

Option A and Option B are shown below:

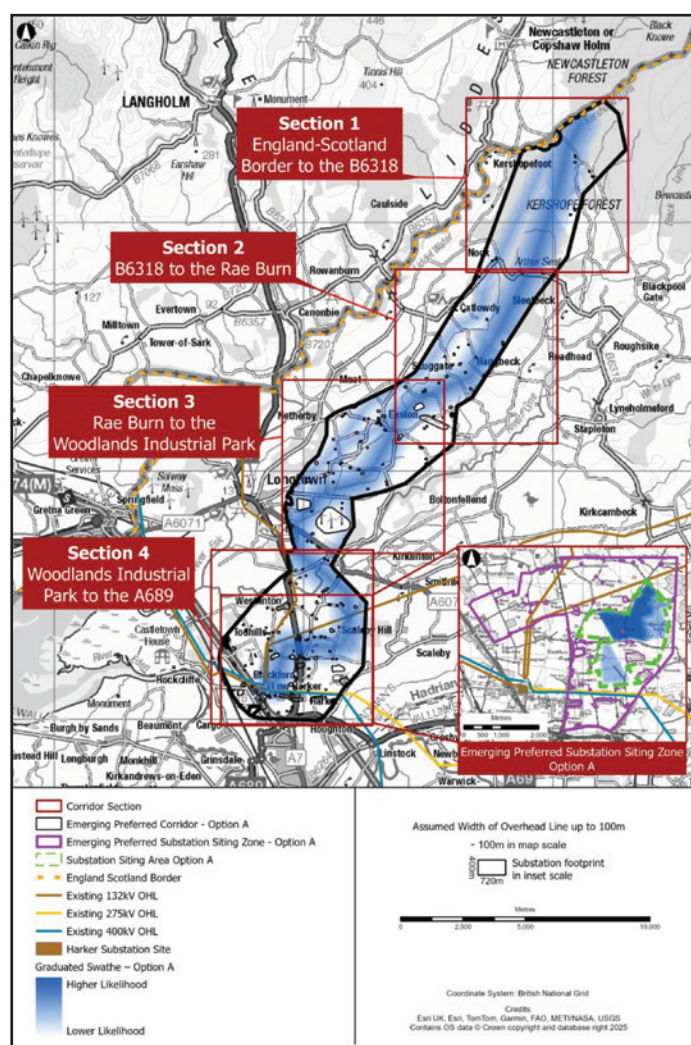


Figure 6 – Option A – North of Hadrian's Wall WHS

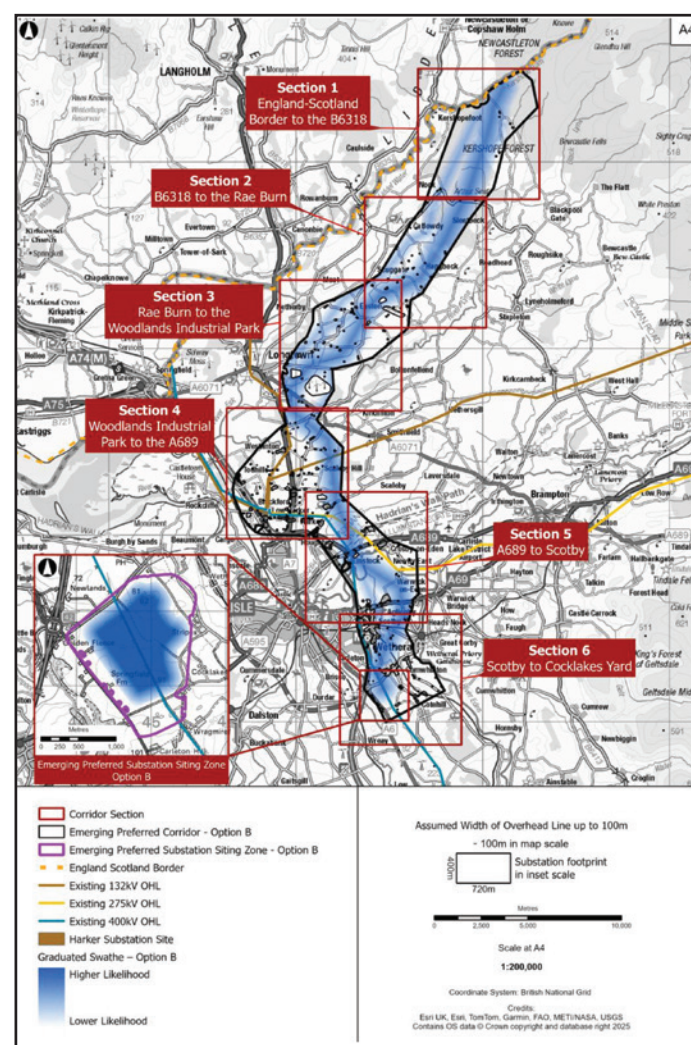


Figure 7 – Option B – Extending from north to south of Hadrian's Wall WHS



See pages 22 – 45 for locations of the proposed overhead lines.

Pylon design

We will be carrying out assessments – visual impact as well as environmental and ecological considerations, along with construction and lifetime maintenance effects – to help determine the most appropriate pylon design.

At this early stage, we are considering the use of traditional 400 kV steel lattice pylons, which can be up to approximately 50 metres (m) high.

A typical span distance between pylons is approximately 350 m, which results in around three pylons for every kilometre of overhead line.

Where the route of the overhead line changes direction, the use of larger angle pylons is required to accommodate the additional sideways strains.

The use of other pylon designs, such as low height steel lattice and T-pylon, remain under consideration. Consultation feedback, along with information from our assessments will help to determine the type of pylons that will be included in our DCO application.

More information about pylon types is available in our Corridor Preliminary Routeing and Siting Study (CPRSS).



Figure 8 – Example of 400 kV overhead line and traditional steel lattice pylon – for illustrative purposes only

Substations

Electricity substations are a vital link in the energy network, acting as the heart of our electrical infrastructure. They connect power sources like wind farms and power stations to the grid, efficiently managing the flow of electricity to homes and businesses.

The role of substations

Substations are crucial for maintaining a healthy and reliable energy network. Without them, it would be impossible to deliver electricity from where it's generated to where it's needed. They play a key role in ensuring that we all have access to the power that runs our daily lives.

Safety is our priority

We take safety extremely seriously. Our top priority is protecting the public, our employees, and our contractors. All of our substations are securely fenced with clear warning signs to prevent unauthorized access.

We design our substations to limit electric and magnetic fields (EMFs), adhering to strict, independent safety guidelines. After decades of research, the weight of evidence is against there being any health risks of EMFs below the guideline limits.

The new Carlisle substation

The new Carlisle substation would be a connection point for Cross Border Connection and other future regional reinforcement projects.

Substation dimensions

We expect that the proposed 400 kV substation would have a footprint of approximately 720 m by 400 m (approximately 28.8 hectares). We expect that the tallest elements of the substation would be gantries which facilitate overhead line connection to the substation. The height of such gantries is typically up to approximately 18 m with all other parts within the substation being substantially lower.



You can read more about substations at nationalgrid.com/stories/energy-explained/what-is-a-substation



Figure 9 – Example of a 400 kV substation – for illustrative purposes only

Route proposals by location

We have divided the proposals into sections to make it easier to review and provide feedback. The first three sections are the same for both options (referred to as our Core Route Options) with the route then diverging for Option A and Option B.

Core Route Options

- **Route section 1:** England-Scotland border to B6318
- **Route section 2:** B6318 to Rae Burn
- **Route section 3:** Rae Burn to Woodlands Industrial Park

Option A – North of Carlisle

- **Route section 4:** Woodlands Industrial Park to A689
- **Including the North of Carlisle substation**

Option B – South of Carlisle

- **Route section 4:** Woodlands Industrial Park to A689
- **Route section 5:** A689 to Scotby
- **Route section 6:** Scotby to Cocklakes Yard
- **Including the South of Carlisle substation**

Figures 6 and 7 on page 17 show each section of the Core Route Options, Option A and Option B overhead line, as well as substation siting zones/areas (see inset maps).

Summaries of the proposals for the sections of the routes, including maps, key issues and constraints, are included on the following pages.

An interactive map is also available on our website at nationalgrid.com/cbc



Core Route Options

(Route sections 1 – 3)

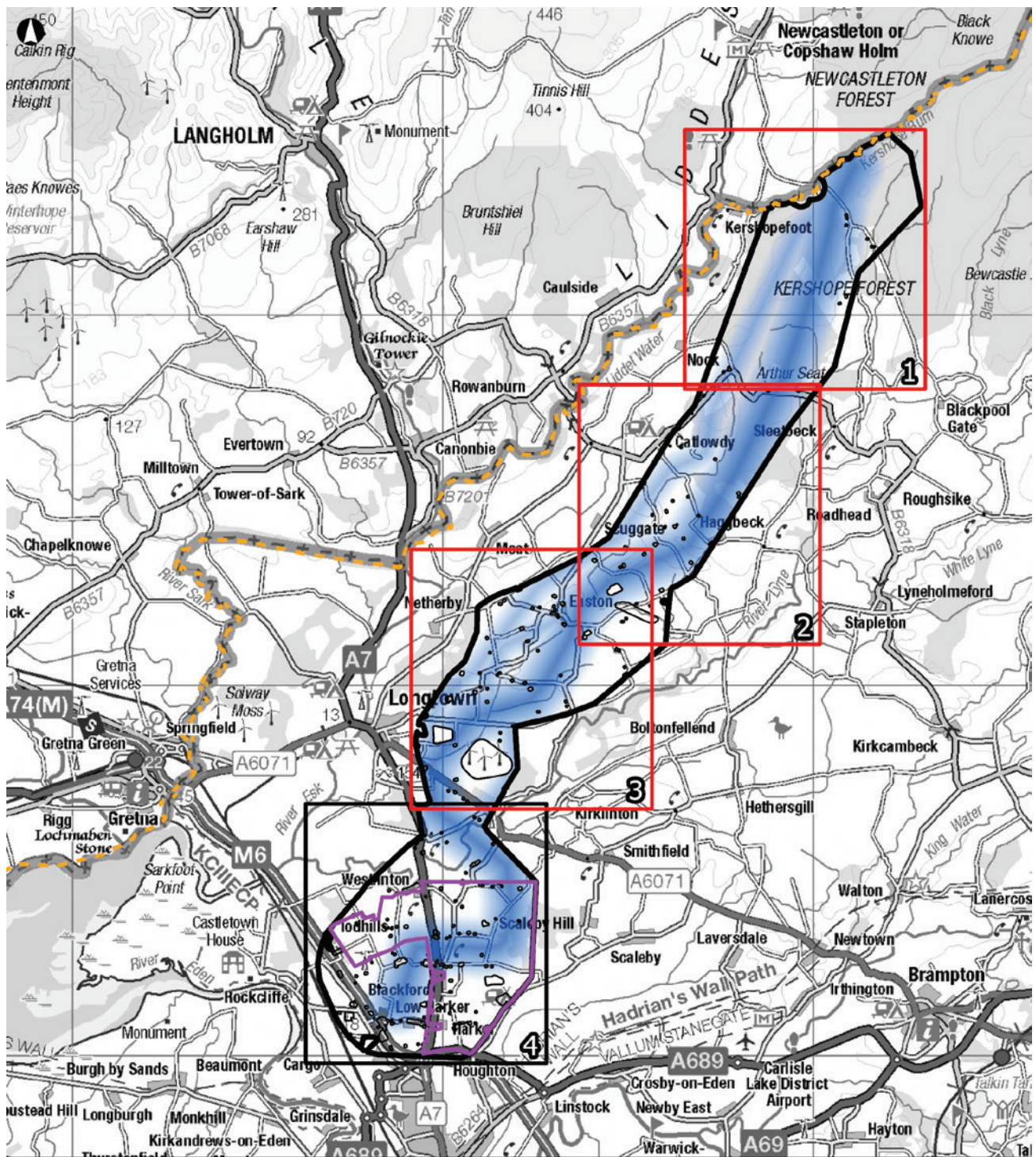
The Core Route Options are the same for Option A and Option B, with the route then diverging. These options are based on areas of the emerging preferred corridor and nearby geographical locations.

Core Route Options:

- **Route section 1:** England-Scotland border to B6318
- **Route section 2:** B6318 to Rae Burn
- **Route section 3:** Rae Burn to Woodlands Industrial Park



Sections 1 – 3 of the overhead line route for Options A and B are identical. These are referred to as our **Core Route Options**.

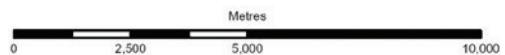


- Core Route Section 1-3
- Corridor Section
- Emerging Preferred Corridor - Option A
- Emerging Preferred Substation Siting Zone - Option A
- England Scotland Border
- Graduated Swathe – Option A
- Higher Likelihood
- Lower Likelihood

Assumed Width of Overhead Line up to 100m

~ 100m in map scale

Substation footprint
in inset scale



Coordinate System: British National Grid

Credits:
Esri UK, Esri, TomTom, Garmin, FAO, METI/NASA, USGS
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Figure 10 – Route corridor Graduated Swathe, Option A – North of Carlisle with Route Sections 1 – 3 highlighted

Route section 1: England-Scotland Border to B6318

Proposed infrastructure in this section:

- overhead line.

This section of the emerging preferred corridor would commence at the England-Scotland border. Our graduated swathe for this section is around 250 m from the boundary of the Kershope Bridge Site of Special Scientific Interest (SSSI), which is located in Scotland.

This route section is largely occupied by the Kershope Forest, and our emerging route corridor would route south-west through the commercial forestry. As part of our graduated swathe, we have proposed two potential overhead line route options in order to avoid areas of Priority Habitat. Both route options would be screened by the forestry.

The edge of the graduated swathe is at least 25 m away from isolated residential properties.

This section would end close to the B6318 which crosses this section of the corridor from east-west.

To provide feedback on on route section 1, please see question 2 of our Feedback Form.



Sections 1 – 3 of the overhead line route for Options A and B are identical. These are referred to as our **Core Route Options**.

Scan this QR code to visit our project website, where you will be able to view more detailed section maps and an interactive map.



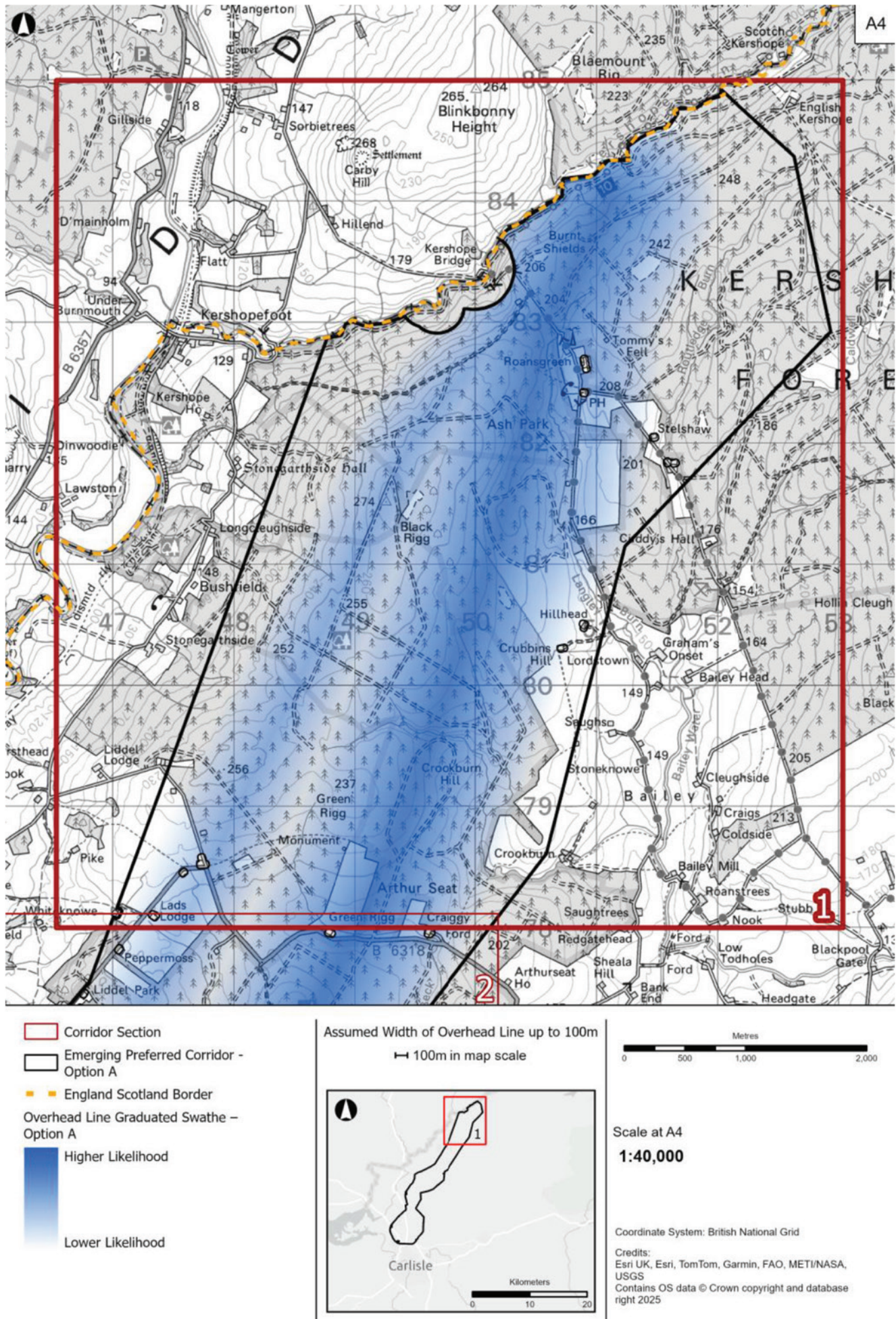


Figure 11 – overhead line emerging preferred corridor and graduated swathe in route section 1 – England–Scotland Border to B6318

Route section 2: B6318 to Rae Burn

Proposed infrastructure in this section:

- overhead line.

Commencing near the B6318, we have identified two potential overhead line routes for this section of the emerging preferred corridor. Both options would be routed north-east to south-west.

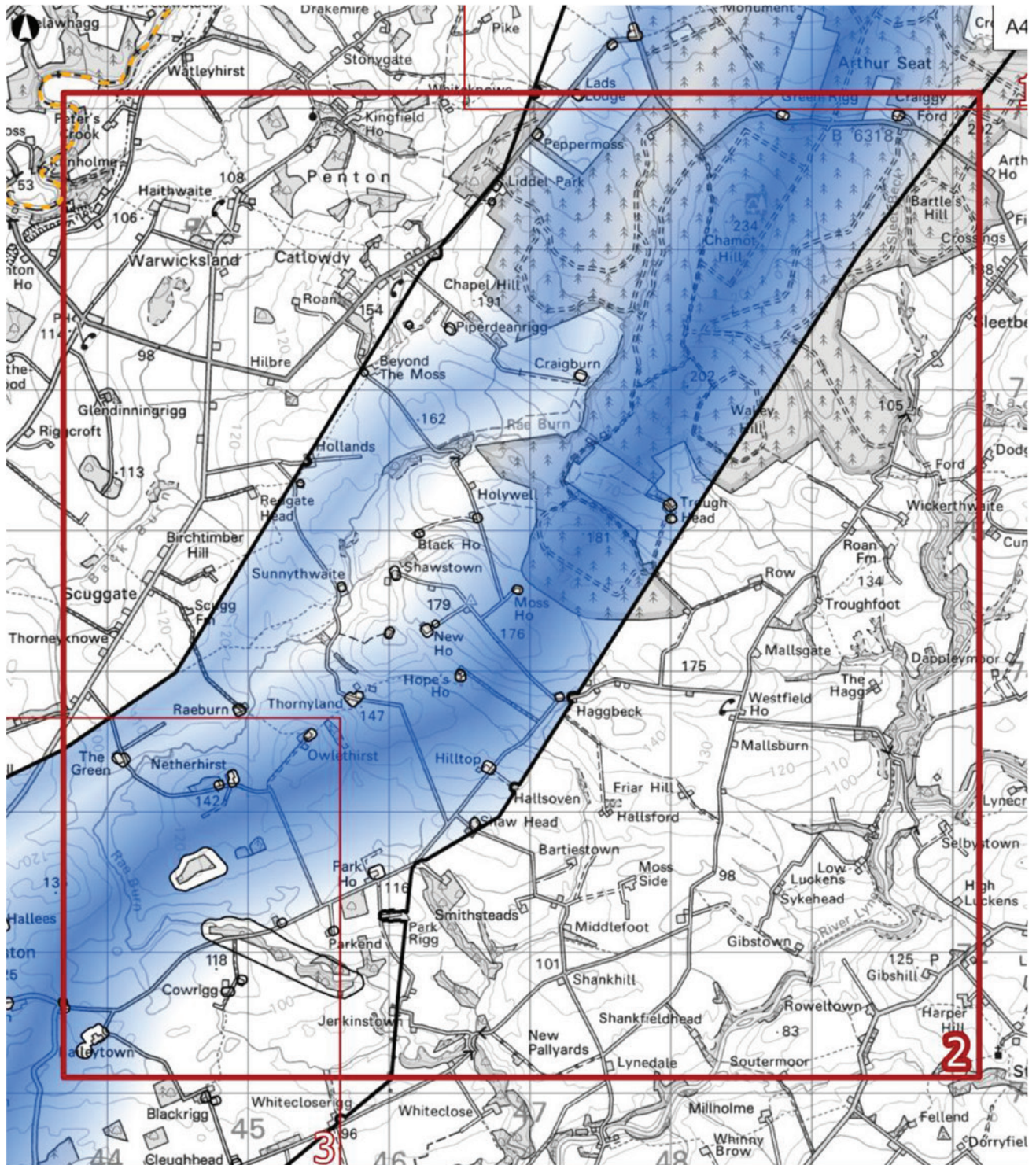
The edge of the graduated swathe is at least 25 m away from isolated residential properties. We have also identified areas of Priority Habitat woodland, and both options for the overhead line in this section would seek to avoid or limit incursion within these areas.

It is also at least 50 m from the edge of ancient woodland near to the Rae Burn, at the end of section 2.

To provide feedback on route section 2, please see question 3 of our Feedback Form.

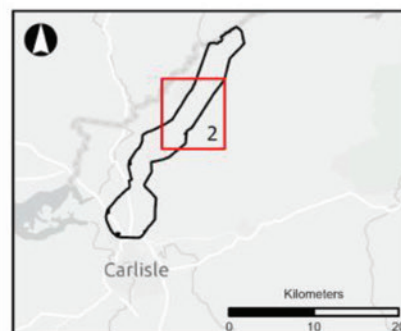


Sections 1 – 3 of the overhead line route for Options A and B are identical. These are referred to as our **Core Route Options**.



- Corridor Section
- Emerging Preferred Corridor - Option A
- England Scotland Border
- Overhead Line Graduated Swathe - Option A
- Higher Likelihood
- Lower Likelihood

Assumed Width of Overhead Line up to 100m
 ⇨ 100m in map scale



Metres
 0 500 1,000 2,000

Scale at A4
1:40,000

Coordinate System: British National Grid

Credits:
 Esri UK, Esri, TomTom, Garmin, FAO, METI/NASA,
 USGS
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Figure 12 – overhead line emerging preferred corridor and graduated swathe in route section 2: B6318 to Rae Burn

Route section 3: Rae Burn to Woodlands Industrial Park

Proposed infrastructure in this section:

- overhead line.

Section 3 of the emerging preferred corridor would start close to the Rae Burn, and would initially follow a north-east to south-west orientation. The line would then turn to follow a north-south alignment, avoiding the Raeburn Wood and Corrylees Wood ancient woodland, the Hallburn Wind Farm, and Woodland Industrial Park.

The presence of residential properties as well as Priority Habitat woodland means that we have identified three potential overhead line routes. The edge of the graduated swathe is at least 25 m away from isolated residential properties, and at least 50 m to avoid or limit incursion into the woodland.

In order to avoid the Hallburn Wind Farm, we have identified two route corridors to the east and west of the wind farm respectively, both of which maintain a distance equivalent to three times the diameter of the turbine rotor. The edge of the graduated swathe is at least 50 m away from an area of ancient woodland to the north west of the wind farm.

This section of the route would end immediately south of the Woodlands Industrial Park, near the A6071.

To provide feedback on route section 3, please see question 4 of our Feedback Form.



Sections 1 – 3 of the overhead line route for Options A and B are identical. These are referred to as our **Core Route Options**.

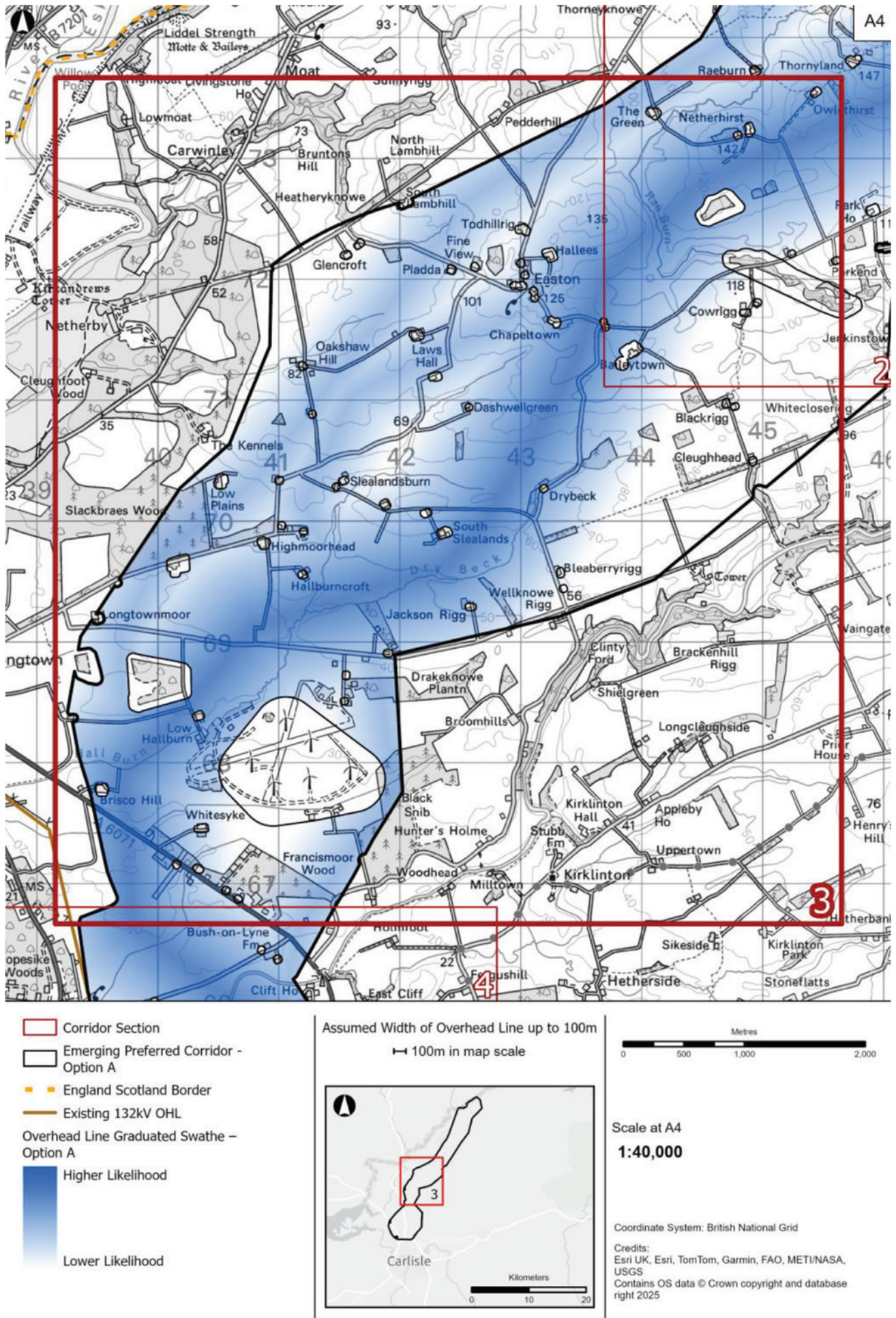


Figure 13 – overhead line emerging preferred corridor and graduated swathe in route section 3: Rae Burn to Woodlands Industrial Park

Option A – North of Carlisle

This proposal for the new overhead line is divided into four route sections. These are based on areas of the emerging preferred corridor and nearby geographical locations. These route options would follow the Core Route Options. The total length of this overhead line route option would be approximately 28 km.

Option A is a distinct option that would follow on from Route Section 3 of the Core Route Options.

- Route section 4: Woodlands Industrial Park to A689
- North of Carlisle substation



Section 4 of the overhead line route for Option A is routed differently to section 4 of Option B.

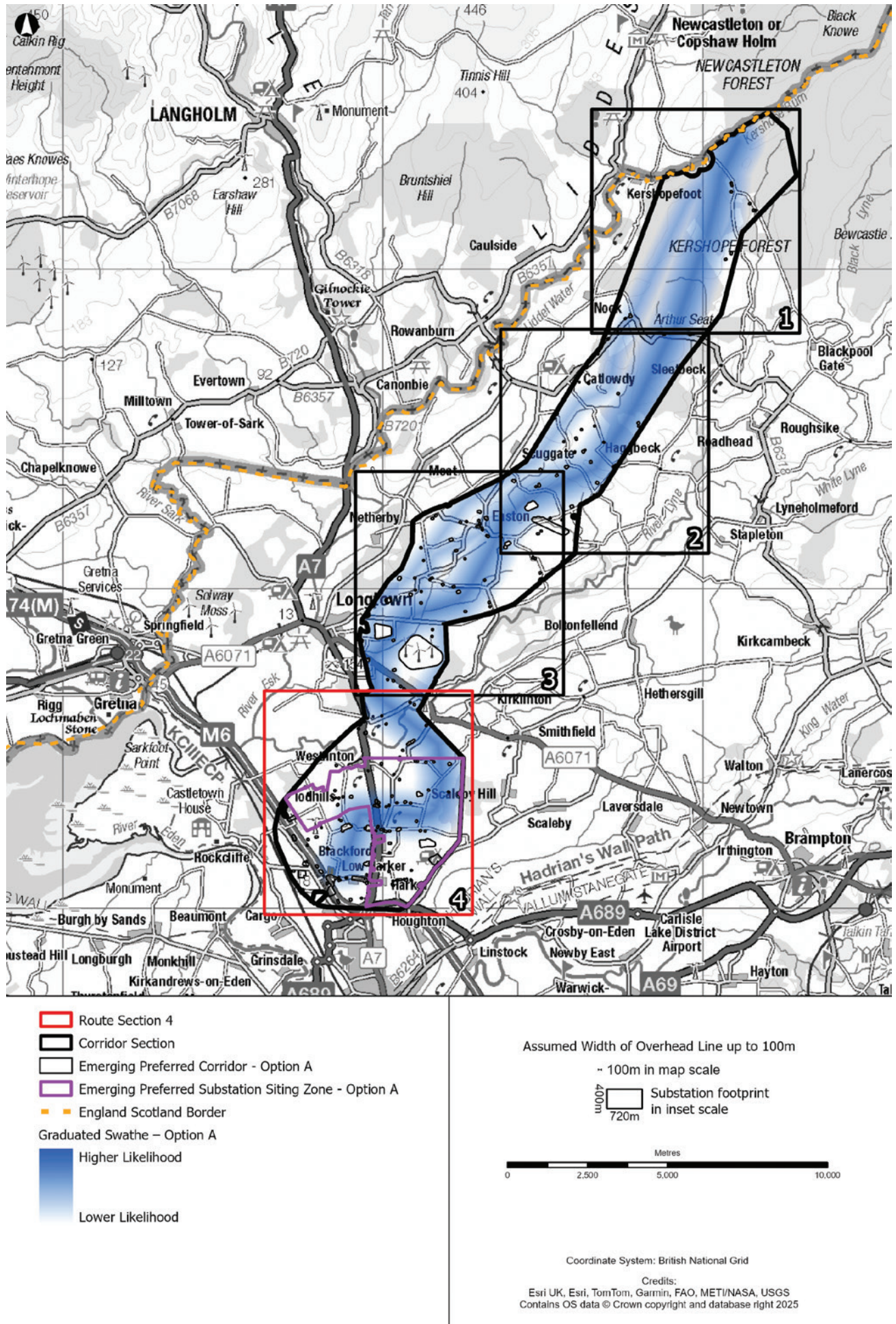


Figure 14 – Route corridor Graduated Swathe, Option A – North of Carlisle with Route Section 4 and substation location highlighted

Route section 4 (Option A): Woodlands Industrial Park to A689

Proposed infrastructure in this section:

- overhead line
- one substation (see page 34 for information)

The fourth route section of Option A would commence to the south of Woodlands Industrial Park, where it would then cross the River Lyne.

The route would then travel along a north-east to south-east alignment, before turning south and crossing the existing 132 kV overhead line towards the preferred siting area for a new substation North of Carlisle.

Consideration has been given to the Mampus Wood ancient woodland in proximity to the siting area for the North of Carlisle substation and the edge of the graduated swathe is at least 50 m away from the edge of the woodland.

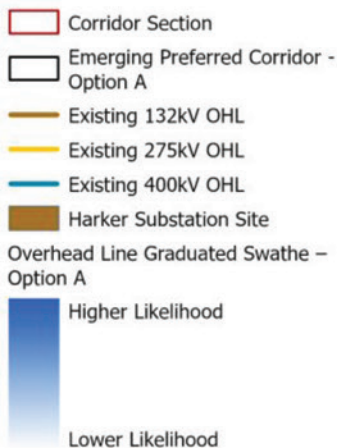
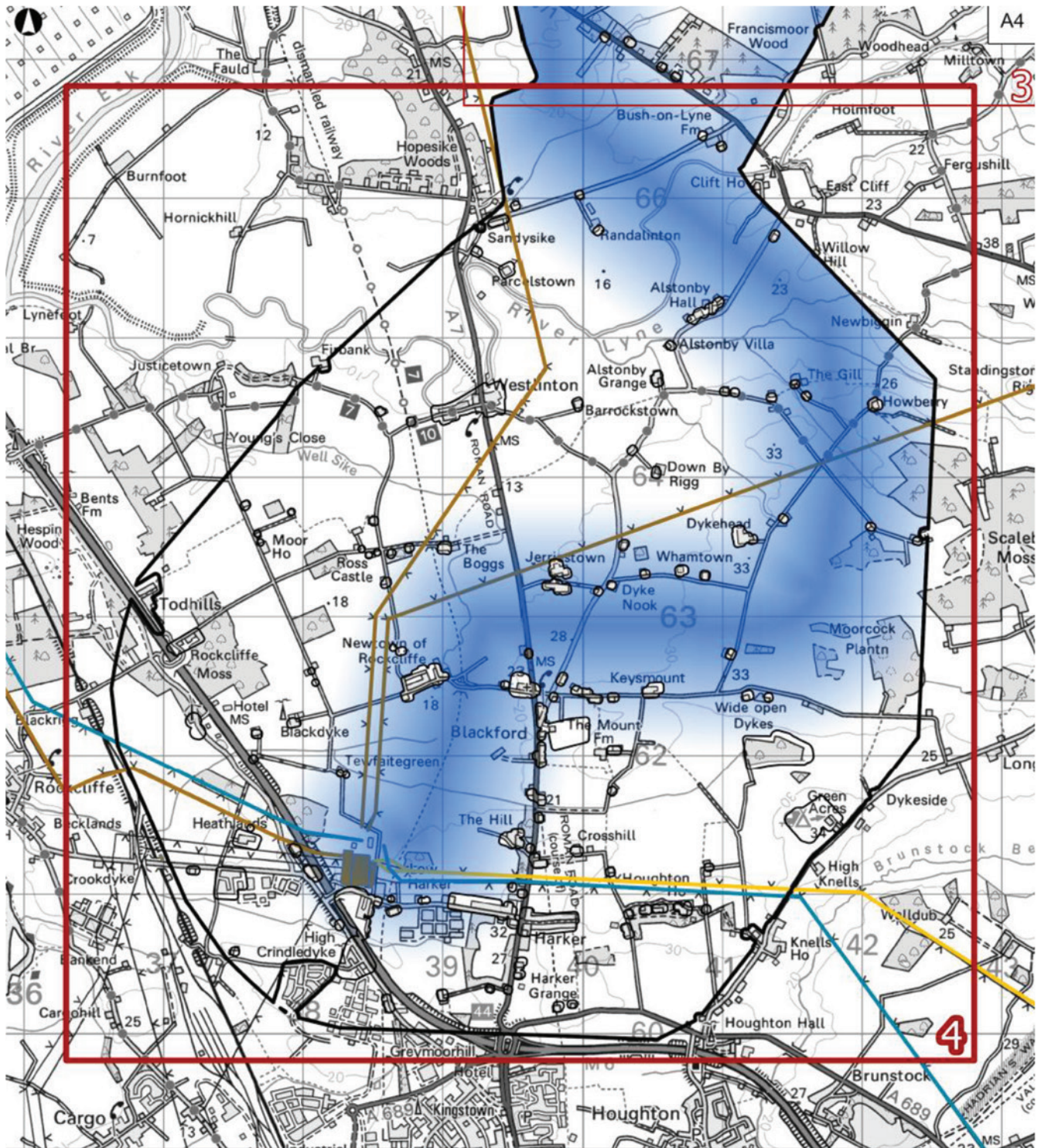
In order to connect the new substation to the existing Harker substation, an additional overhead line connection would be required between the two substations. This route would commence at the new substation siting area and follow an east-west alignment to cross the A7, before turning to a north-south alignment towards Harker.

Within this area, the overhead line would be routed to avoid existing utility infrastructure. The overhead line would then turn to follow a north to south alignment. Section 4 terminates in proximity to the A689.

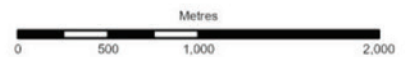
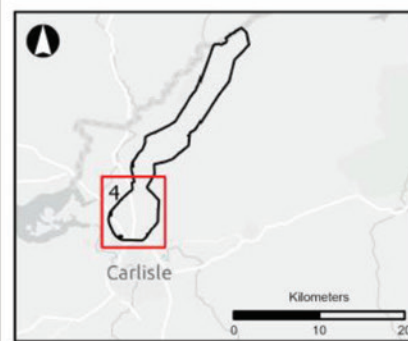
To provide feedback on the overhead line in route section 4 (Option A), please see question 5 of our Feedback Form.



Section 4 of the overhead line route for Option A is routed differently to section 4 of Option B.



Assumed Width of Overhead Line up to 100m
 100m in map scale



Scale at A4
1:40,000

Coordinate System: British National Grid

Credits:
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Figure 15 – overhead line emerging preferred corridor and graduated swathe in route section 4: Woodlands Industrial Park to A689

North of Carlisle substation

If Option A is selected, the North of Carlisle substation would be located approximately 1.7 km east of the existing Harker substation and approximately 200 m to the east of the A7.

This siting area avoids major environmental and technical considerations, such as protected woodlands, which have been avoided as part of the design.

However, existing utility infrastructure running through the site must be carefully considered during design.

The northern part of the site is screened by trees and hedgerows, and construction in this area would allow for new trees and hedgerows to be planted. It is also close to the A7 and existing energy infrastructure.

Based on this, the northern part of the site is the current preferred location for the substation associated with Option A.

To provide feedback on the North of Carlisle substation in route section 4, please see question 6 of our Feedback Form.

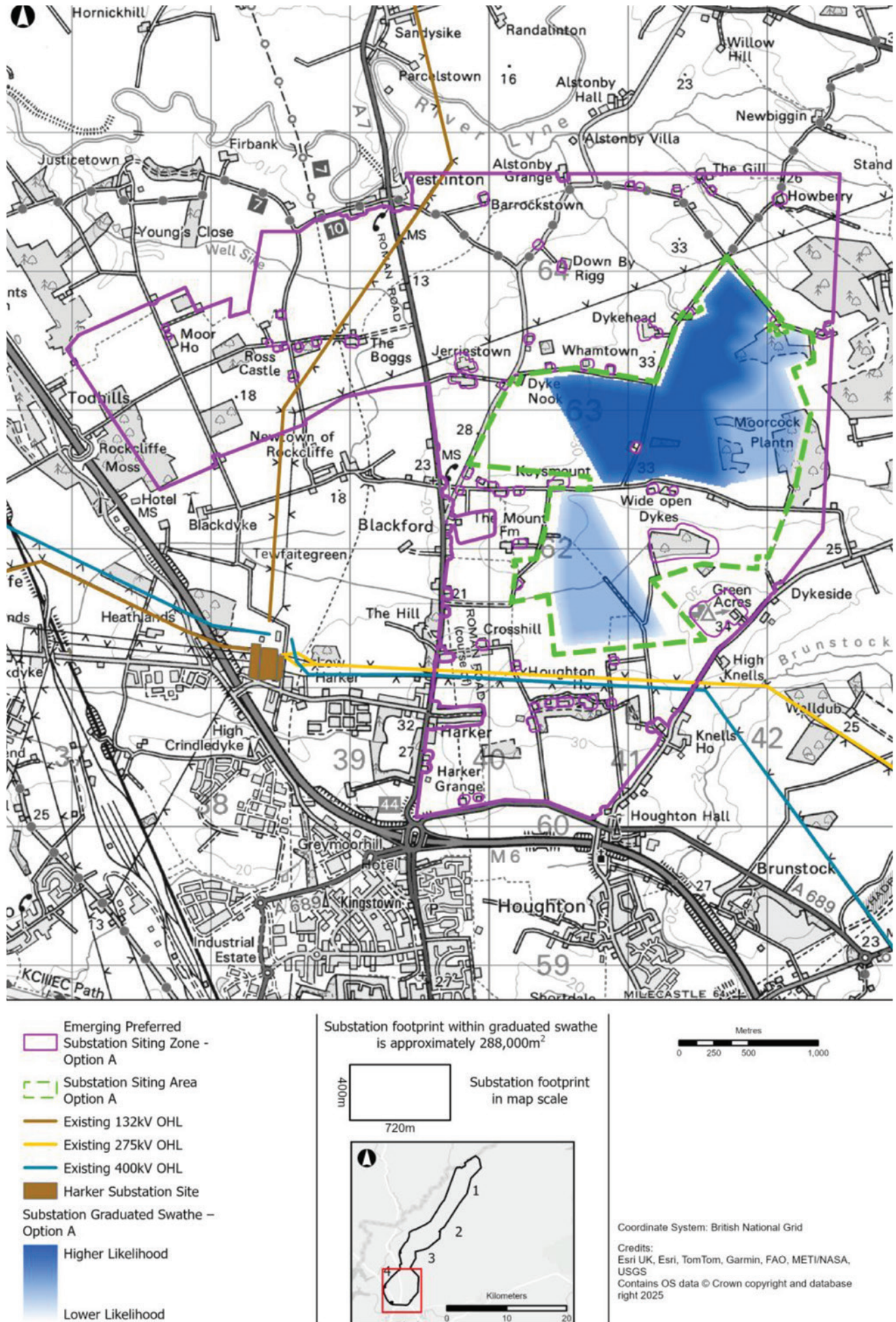


Figure 16 – New Carlisle substation – North of Carlisle siting zone and siting area

Option B – South of Carlisle

This proposal for the new overhead line is divided into six route sections. These are based on areas of the emerging preferred corridor and nearby geographical locations. These route options would follow the Core Route Options. The total length of this overhead line route option is approximately 47 km.

Option B is a distinct option that would follow on from Route Section 3 of the Core Route Options.

- **Route section 4:** Woodlands Industrial Park to A689
- **Route section 5:** A689 to Scotby
- **Route section 6:** Scotby to Cocklakes Yard
- **South of Carlisle substation**



Sections 1 – 3 of the overhead line route for Options A and B are identical.

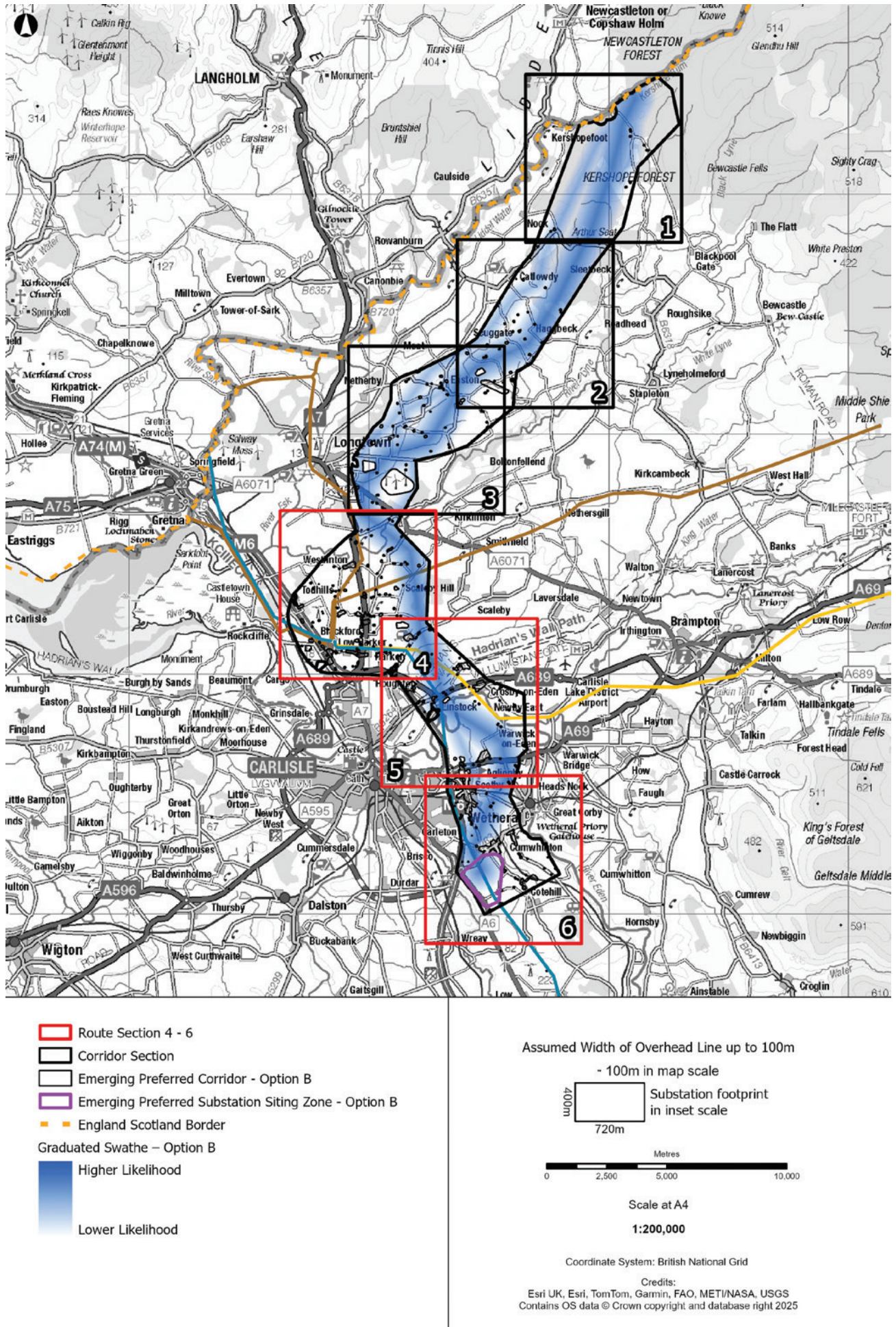


Figure 17 – Route corridor Graduated Swathe, Option B – South of Carlisle with Route Sections 4-6 highlighted

Route section 4 (Option B): Woodlands Industrial Park to A689

Proposed infrastructure in this section:

- overhead line.

The fourth route section of Option B would commence to the south of Woodlands Industrial Park, where it would then cross the River Lyne and require careful consideration to minimise impact to surrounding habitats as well as areas of Priority Habitat woodland scattered through this section.

The route would then travel along a north-east to south-east alignment, before turning south and crossing the existing 132 kV overhead line.

Consideration has been given to the Mampus Wood ancient woodland within this route section, and the edge of the graduated swathe is at least 50 m away from the edge of the woodland.

The edge of the graduated swathe is at least 25 m away from isolated residential properties.

The overhead line would then route through the Hadrian's Wall WHS setting. Within the setting, the corridor would cross an existing 275 kV overhead line. This section ends near to the A689.

To provide feedback on route section 4 (Option B), please see question 7 of our Feedback Form.

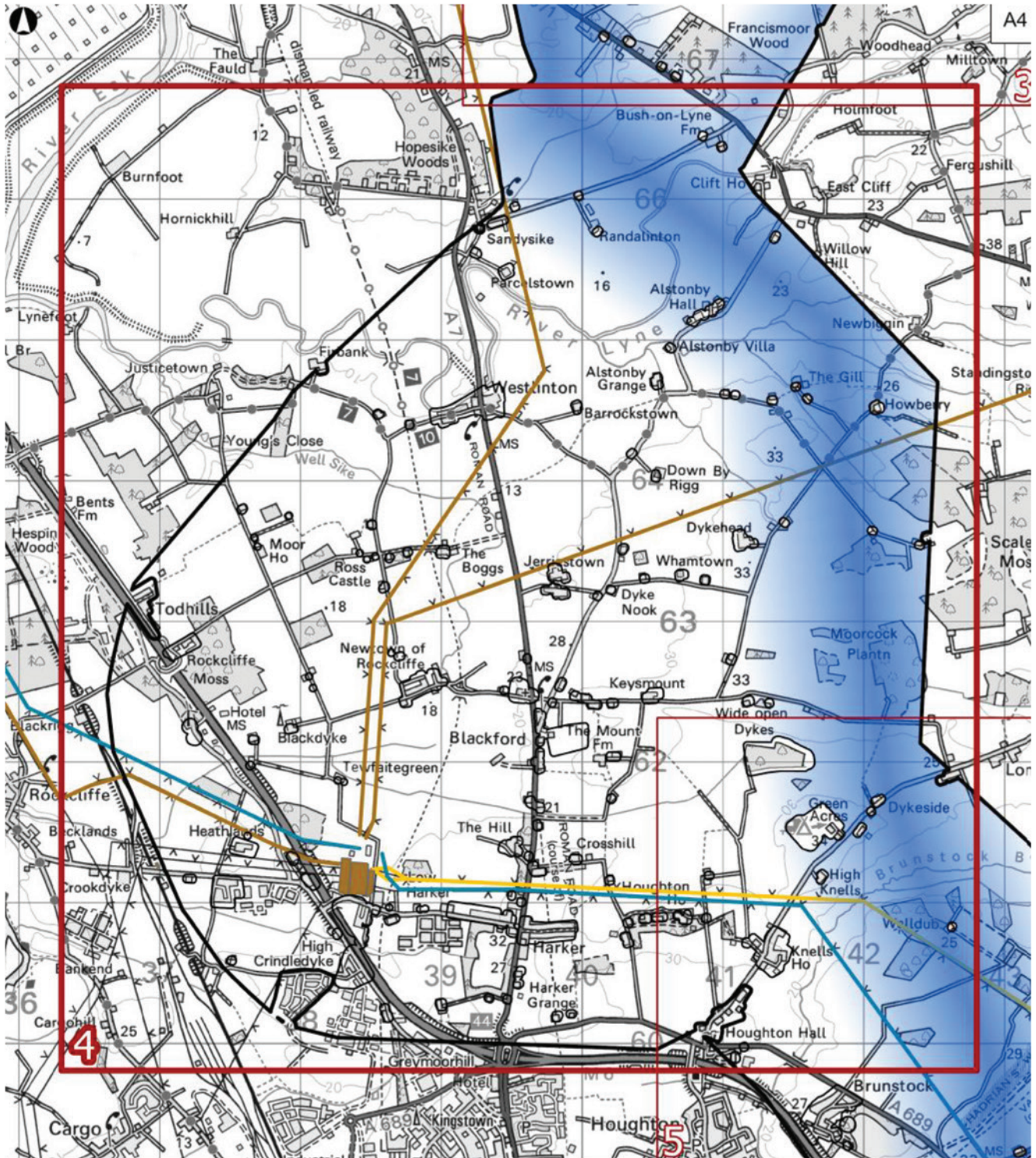
Hadrian's Wall World Heritage Site (WHS)

We fully understand the status and significance of the Hadrian's Wall WHS and are working closely with key stakeholders to minimise potential impacts wherever we can.

The location and extent of the Hadrian's Wall WHS is such that we need to consider options for crossing it to meet the need for reinforcement of the electricity transmission network.

In recognition of the site's importance, we have undertaken an assessment to understand more about its characteristics and sensitivities, which has been used to inform our proposals.

More detail on the World Heritage Site Capacity Assessment, is available in the Corridor Preliminary Routeing and Siting Study (CPRSS).



Assumed Width of Overhead Line up to 100m
 100m in map scale



Metres
 0 500 1,000 2,000

Scale at A4
 1:40,000

Coordinate System: British National Grid

Credits:
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Figure 18 – overhead line emerging preferred corridor and graduated swathe in route section 4: Woodlands Industrial Park to A689

Route section 5: A689 to Scotby

Proposed infrastructure in this section:

- overhead line.

This section of the emerging preferred corridor would begin near to the A689 within Hadrian's Wall WHS setting, and route between settlements before crossing the River Eden, which is designated as a Special Area of Conservation (SAC).

Within this route section, the overhead line would cross Hadrian's Wall (WHS).

South of the River Eden, two potential overhead line routes have been identified. The eastern route option would cross an area of woodland to the east of Aglionby and Carlisle Golf Club, and the western route option would cross a narrow strip of land between the villages of Scotby and Aglionby.

Within this area, the overhead line would be routed to avoid existing utility infrastructure. Further assessment would be required to establish detailed clearance requirements around this infrastructure.

This section would end near the settlement of Scotby.

To provide feedback on route section 5, please see question 8 of our Feedback Form.

Hadrian's Wall World Heritage Site (WHS)

We fully understand the status and significance of the Hadrian's Wall WHS and are working closely with key stakeholders to minimise potential impacts wherever we can.

The location and extent of the Hadrian's Wall WHS is such that we need to consider options for crossing it to meet the need for reinforcement of the electricity transmission network.

In recognition of the site's importance, we have undertaken an assessment to understand more about its characteristics and sensitivities, which has been used to inform our proposals.

More detail on the World Heritage Site Capacity Assessment, is available in the Corridor Preliminary Routeing and Siting Study (CPRSS).

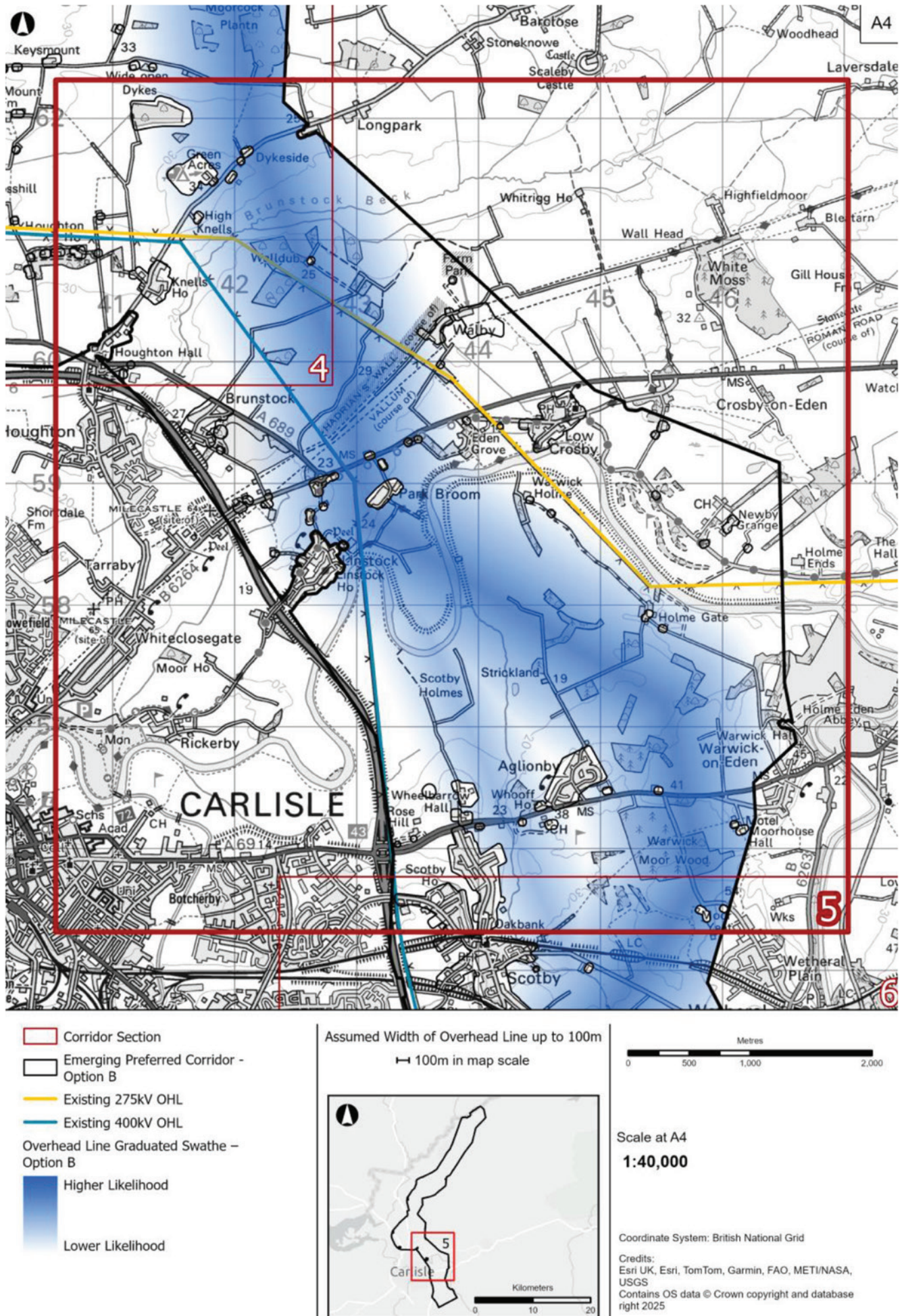


Figure 19 – overhead line emerging preferred corridor and graduated swathe in route section 5: A689 to Scotby

Route section 6: Scotby to Cocklakes Yard

Proposed infrastructure in this section:

- overhead line
- one substation (see page 44 for information).

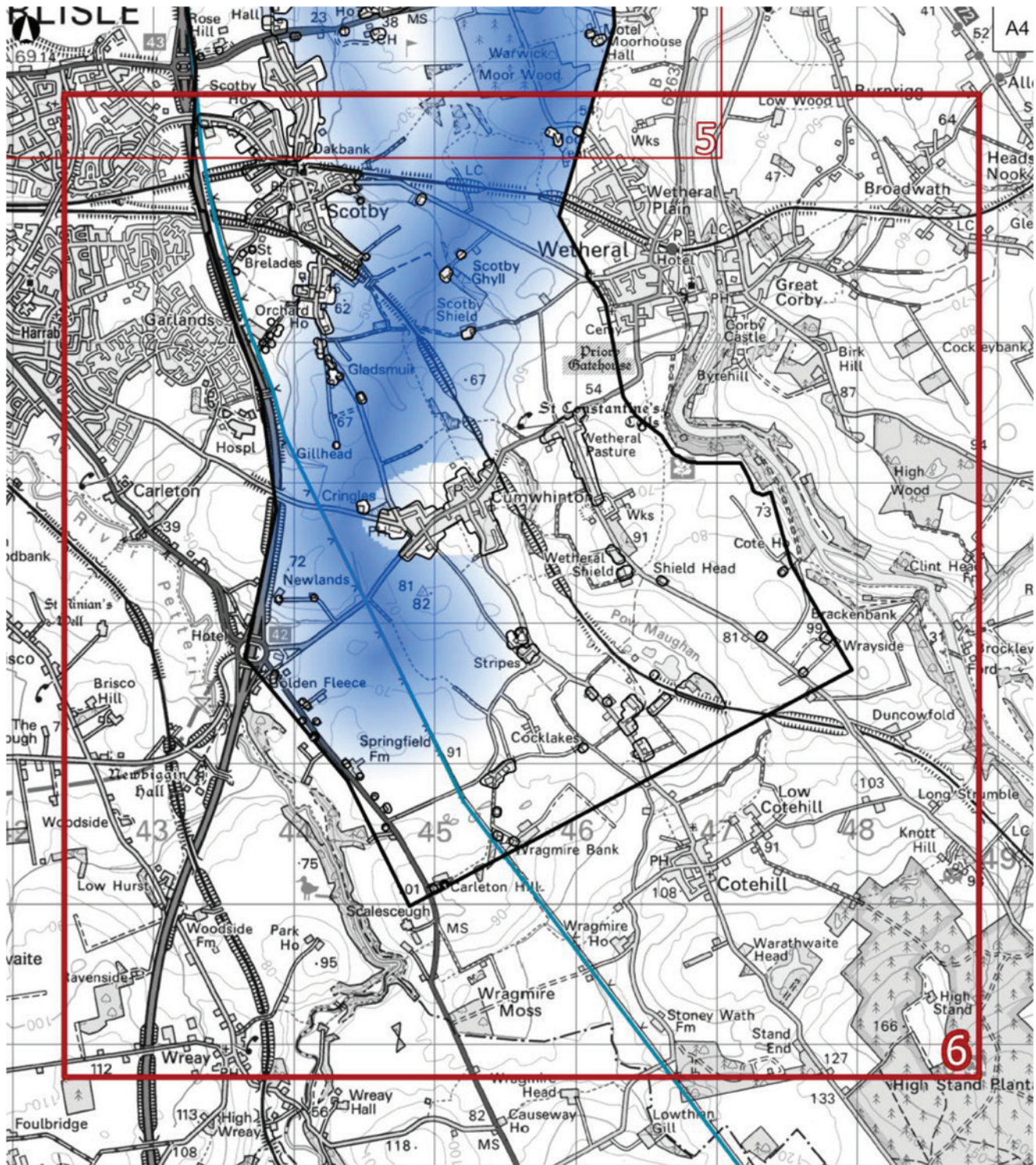
Section 6 would begin south of Scotby and follow a north-south alignment parallel to the existing 400 kV Harker-Hutton overhead line.

In proximity to Scotby, the overhead line would cross two existing railway lines, including a small section of the Carlisle-Settle Railway conservation area.

This section would then route west of the village of Cumwhinton. Here, the overhead line would cross Brammleaton Road, Cumwhinton Road and the B6263, and would also avoid the emerging St Cuthbert's Garden Village Local Plan.

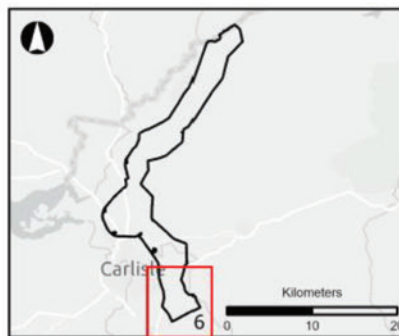
This overhead line section would then end at the emerging preferred siting area for the new Carlisle substation.

To provide feedback on the overhead line in route section 6, please see question 9 of our Feedback Form.



- Corridor Section
- Emerging Preferred Corridor – Option B
- Existing 400kV OHL
- Overhead Line Graduated Swathe – Option B
- Higher Likelihood
- Lower Likelihood

Assumed Width of Overhead Line up to 100m
 ⇨ 100m in map scale



Metres
 0 500 1,000 2,000

Scale at A4
 1:40,000

Coordinate System: British National Grid

Credits:
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Figure 20 – overhead line emerging preferred corridor and graduated swathe in route section 6: Scotby to Cocklakes Yard

South of Carlisle Substation

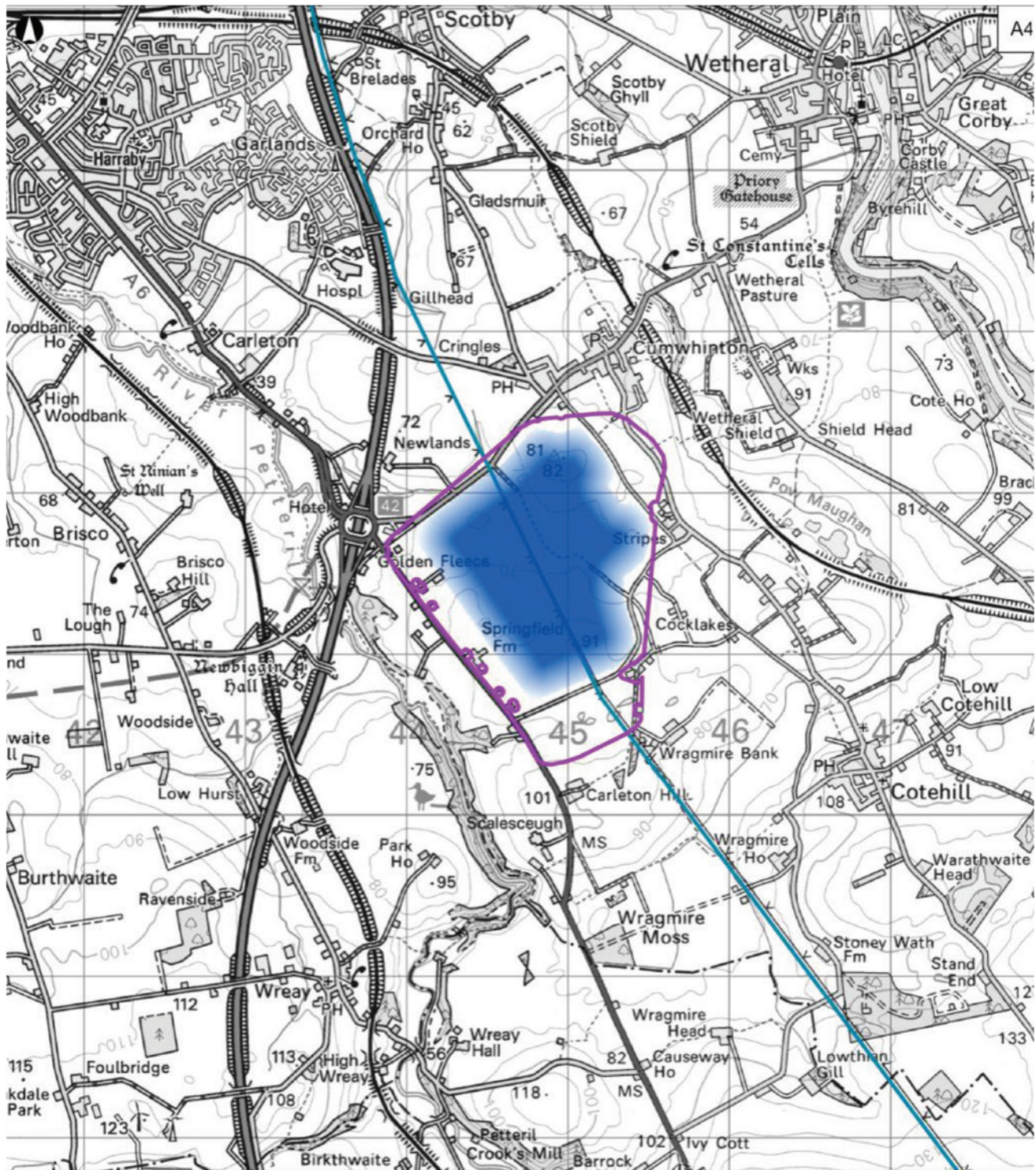
If Option B is selected, a new substation south of Carlisle would be located to the south of the village of Cumwhinton.





This location was identified as it largely avoids environmental constraints. In addition, its proximity to the M6 and A6 as well as the existing 400 kV Harker-Hutton overhead line were considered to be features of the local area with less sensitivity to change. The siting area comprises predominantly agricultural land.

This location contains technical constraints that will be considered in the developing design and layout of the substation. These include the existing 400 kV Harker-Hutton line which runs through the siting area, which depending on the substation position and orientation, could lead to a direct interface with the existing overhead line infrastructure. This would be managed through construction sequencing and outage, however a diversion of the overhead line may be required.

The area identified as the most likely location for the infrastructure provides a degree of separation from the properties along the A6 to the west and avoids the smaller scale field patterns and properties to the north-east.

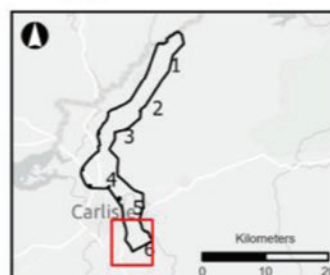
To provide feedback on the south of Carlisle substation in route section 6, please see question 10 of our Feedback Form.



-  Emerging Preferred Substation Siting Zone - Option B
-  Existing 400kV OHL
- Substation Graduated Swathe – Option B
-  Higher Likelihood
-  Lower Likelihood

Substation footprint within graduated swathe is approximately 288,000m²

400m
720m
Substation footprint in map scale



Metres
0 250 500 1,000

Scale at A4
1:35,000

Coordinate System: British National Grid

Credits:
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USGS
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Figure 21 – New Carlisle substation – South of Carlisle siting zone

Cross Border Connection in Scotland

National Grid is responsible for developing and delivering the section of Cross Border Connection in England. SP Energy Networks is developing and delivering the section in Scotland.

Overview of the Scottish section

SP Energy Networks is proposing to construct a new 400 kV overhead line between the proposed new Gala North Substation near Lauder, and a point at the Scotland-England border, south of Newcastleton.

The Scottish section is essential to enable the transmission of clean, renewable energy generated in Scotland to the wider UK electricity network. It would help alleviate existing network constraints and support the UK's renewable and energy security goals.

Coordination between SP Energy Networks and National Grid

SP Energy Networks and National Grid are working closely to ensure that the two sections of Cross Border Connection align seamlessly at the border.

Whilst the proposed route sections in England and Scotland have been developed independently, we have and will continue to work closely with SP Energy Networks throughout the project.

Consultation in Scotland

SP Energy Networks held its first round of public consultation on its preferred route in autumn 2024. Based on feedback received, SP Energy Networks made modifications to sections of the route and held further consultation events in spring 2025.

Further information about SP Energy Networks's proposals, including detailed maps and consultation materials, are available on their project website: spenergynetworks.co.uk/pages/cross_border_connection.aspx



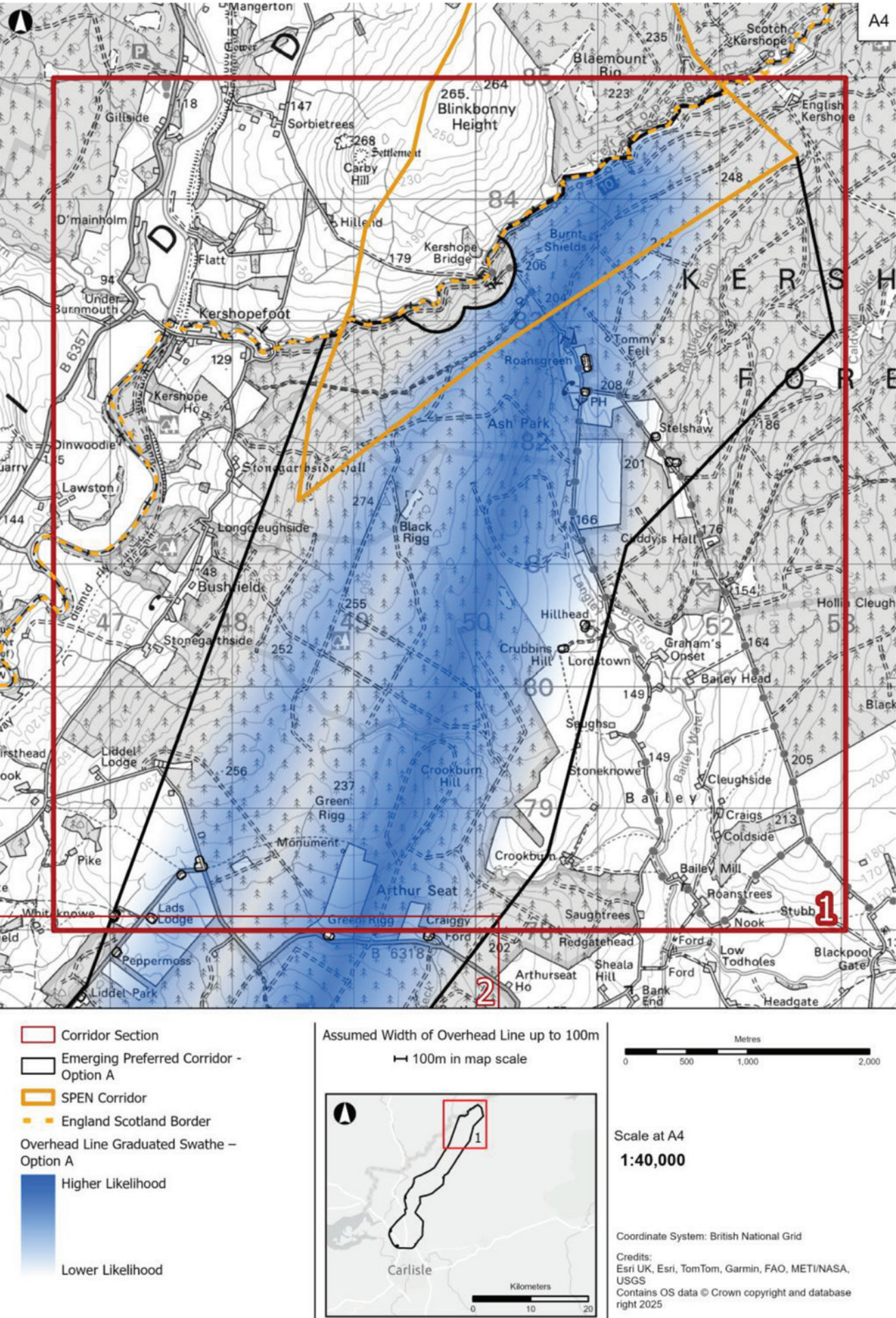


Figure 22 – Emerging alignment of the English and Scottish sections of Cross Border Connection

Construction

If Cross Border Connection is granted development consent, we expect to commence construction in 2030, with the project fully operational in 2033.

Building overhead lines

Following surveys and land preparation, an initial step in building overhead lines is to set up a working area where each new pylon would be built. Our construction teams lay foundations, then assemble the pylons in sections on the ground which are then craned into position. The number of sections for each pylon would vary according to the size and type of pylon.

Once the pylons are built, we hang the electrical wires that carry the electricity. This is known as ‘stringing’. We string a section of approximately ten pylons at a time. The electrical wires are pulled from one end to the other using large machinery.

The size, height and spacing of pylons is determined by safety, topographical, operational and environmental considerations.

Temporary construction compounds

We would need to set up temporary construction compounds to support construction activities. These compounds house temporary offices, staff welfare facilities, and store equipment. They have a hard-standing surface, are secured by perimeter fencing, and would be removed at the end of the construction phase of the project.

Constructing a substation

Constructing a substation involves several important steps to ensure it works properly and fits into the local environment. First, the site is prepared by clearing and levelling the area. Excavation is done to create space for the foundations, and the removed earth may be used to reshape the surrounding landscape. Foundations are built to support heavy equipment like transformers and circuit breakers.

Next, the construction of buildings and structures begins. These are designed to meet the specific needs of the substation. The installation of high voltage equipment is a crucial part of the process. Large components are delivered and installed, such as transformers, switchgear and circuit breakers. Busbars, which are metal bars that conduct electricity, are set up to connect the equipment. Ensuring these connections are secure is vital for the substation’s operation.

An electrical connection is established between the substation and the National Grid network, which can be done using overhead lines. Once all the equipment is in place, thorough testing is conducted to ensure everything works correctly and safely. This includes checking transformers, circuit breakers and other systems to make sure they perform as expected.

Finally, the substation is officially brought into service, ensuring it meets all operational standards. Additional landscaping and aesthetic enhancements are added to integrate the substation into its surroundings.



Find out more

We have produced a ‘Best Practice’ guide to show how we construct overhead lines. You can view this guide at: nationalgrid.com/document/561446/download

While we intend to adopt best practice as set out in these documents wherever possible, there will be some instances where we will be unable to do this.

Managing and mitigating effects

Alongside technical assessments and environmental surveys, feedback from this consultation will help develop and refine our proposals for Cross Border Connection in England.

We use best practice environmental impact assessment techniques to assess possible effects of our works and identify opportunities for mitigation measures and for delivering biodiversity net gain.

Protecting the environment

We are required to follow a set procedure for all Nationally Significant Infrastructure Projects to assess the likely significant environmental effects of our proposals.

Our detailed technical assessments and environmental surveys will help us understand potential effects and how they can be avoided, reduced or mitigated during construction and operation.

Where avoidance and mitigation are not possible, we would seek to offset – or compensate for – effects by planting or enhancing the environment near to the area of works.

We will work closely with local authorities and relevant stakeholders to identify what kind of enhancement is most suitable and where to locate it.

Biodiversity Net Gain (BNG)

Biodiversity Net Gain (BNG) is a way to ensure that the environment is left in a better state after construction than it was before the work started.

From mid 2026, it is due to be made mandatory for Nationally Significant Infrastructure Projects in England, like the English section of Cross Border Connection, to achieve 10% BNG – this means the project would result in more or better-quality natural habitat than there was before development. This may be achieved through habitat creation and/or enhancement.



Protecting soil and agricultural land

We understand the significance of the agricultural land affected by our proposals, and would put measures in place to reduce our impact, including:

- the careful removal of top soil to be stored adjacent to the working area, meaning top soil of the same texture, organic matter content and nutrient status can be reinstated in the same area it was removed from and to match the existing top soil profile as far as possible
- implementing a soil management plan to ensure there is no drop in soil quality as a result of construction works. As part of the plan, soil will be tested before and after construction
- protection of livestock by erecting suitable fencing
- soil handling works will be supervised by appropriately qualified and experienced individuals, and an appropriate aftercare period and plan will be set out.

Our aim is to reinstate land to its original condition and land grade by implementing these mitigation measures.



Information for landowners

When developing our proposals, we need to understand who has a legal interest in the land in and around the areas being considered as part of the project.

In the Development Consent Order (DCO) process, anyone with a legal interest in land is known as a person with an interest in land (PIL). If you are identified as having a land interest, we will contact you directly.

Whilst much of the information we need is available on public registers, we have appointed a land referencing firm, Dalcour Maclaren, to contact individual landowners to verify the publicly available information and ensure that we have made best efforts to identify any potentially impacted parties.

They will also assist with contacting landowners and occupiers to arrange access for non-intrusive and intrusive surveys which we plan to carry out whilst we develop the proposals and prepare the application for a DCO.

Contact our dedicated Lands Team



Call our freephone **0333 188 5375**
between 9am and 5pm



Email us:
crossborderconnection@dalcourmaclaren.com

Next steps

The feedback we received from this Stage 1 consultation, along with outputs from technical assessments and environmental surveys, will shape the development of our proposals for Cross Border Connection in England.

Following this consultation, we will:

- consider all consultation feedback as we refine our proposals before the next stage of consultation, which will also include preliminary environmental information
- continue our discussions with landowners and PILs
- continue briefing local elected representatives
- continue working with communities, local authorities and other stakeholders
- continue to refine our proposals in response to feedback and findings from technical studies and surveys
- continue carrying out environmental impact assessment work and undertaking surveys along the proposed route
- provide updates to those who have asked to be kept updated on our proposals
- post updates on Cross Border Connection website nationalgrid.com/cbc

You can register for updates on our website nationalgrid.com/cbc

We will present updated proposals for Cross Border Connection during our next stage of consultation, planned for 2026.

Following further development and finalisation of detailed proposals, we will submit our DCO application to the Planning Inspectorate. The application will include a consultation report showing how we have taken account of all feedback received.

The Planning Inspectorate will examine our proposals and make a recommendation on the application to the Secretary of State for the Department of Energy Security and Net Zero (DESNZ), who will make the final decision on whether to grant consent.

If granted consent, we expect construction work to start in 2030, with Cross Border Connection becoming operational by 2033.

Contact us

Please get in touch if you have any questions about our proposals for Cross Border Connection, or for any assistance you may need accessing or responding to the information provided.



Phone: 0800 358 1781 (lines are open Monday to Friday, 9am – 5pm, with an answerphone taking messages outside these times)



Email: crossborderconnection@nationalgrid.com



Write to us at: FREEPOST NATIONAL GRID CBC
(no stamp or further address details are required)









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