The Great Grid Upgrade

Cross Border Connection

nationalgrid

National Grid owns and maintains the high voltage electricity network in England and Wales. We are introducing proposals for Cross Border Connection, a new overhead line connection between the England-Scotland Border and Carlisle area.

This new connection will help strengthen the electricity network between England and Scotland, carrying more clean, home-grown energy to homes and businesses across northern England and beyond.

We are working in partnership with SP Energy Networks, who are responsible for the Scottish part of the project. National Grid is responsible for the English section.

Indicative project timeline

- **2025** Stage 1 consultation **We are at this stage**
- **2026** Stage 2 consultation
- **2028** DCO application submission
- **2030** Construction starts
- **2033** Fully operational

Contact us:

nationalgrid.com/cbc
crossborderconnection@nationalgrid.com
0800 358 1781
Freepost National Grid CBC

Call us to request paper copies of the materials or materials in a different format.

Scan the QR code here to view our consultation documents on our website and see our webinar details

Who are we?

nationalgrid Group PLC

National Grid Electricity Transmission

Owns and manages the high voltage electricity transmission system in England and Wales.

National Grid Strategic Infrastructure

Delivers major strategic United Kingdom electricity transmission projects, focussed on connecting more clean, low-carbon power to England and Wales.

National Grid Electricity Distribution

Owns and operates the electricity distribution networks for the Midlands, the South West of England and South Wales, with 8m customer connections serving a population of over 18m people.

National Grid Ventures

Operates a mix of energy assets and businesses to help accelerate the development of our clean energy future (such as undersea interconnectorsthat allow the United Kingdom to share energy with other European countries).

What is The Great Grid Upgrade?

The Great Grid Upgrade is the largest overhaul of the electricity grid in generations. Our infrastructure projects across England and Wales are helping to connect more secure, home-grown electricity to homes and businesses.

A grid that's fit for the future

Investment close to home

More clean energy for all

Energy security

Supporting local communities

We believe local communities hosting new transmission infrastructure should receive benefits for doing so. In line with Government guidance published in March 2025, we will deliver programmes that provide social, economic and environmental benefits to the local community and wider region. We want to hear your views to ensure we identify community benefits that work for you.

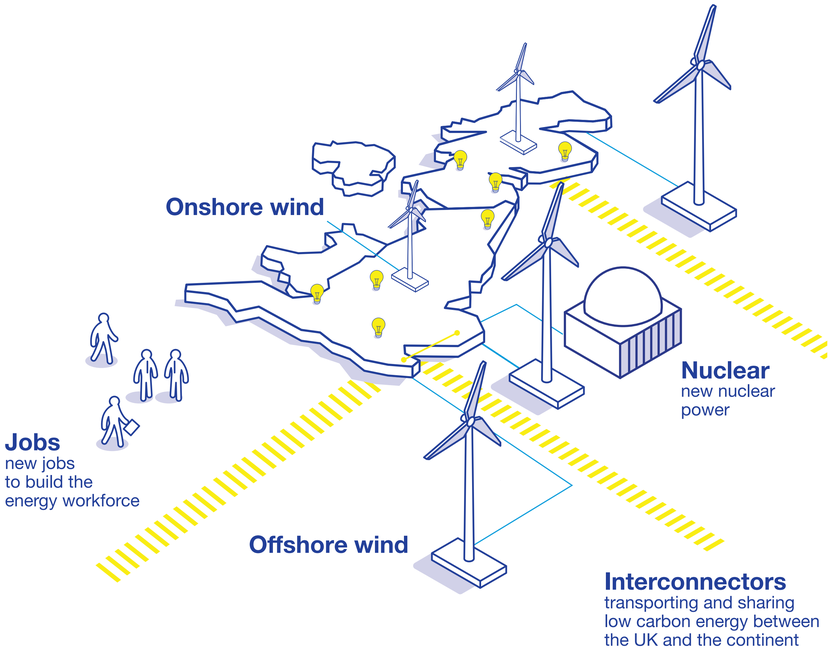
The need for Cross Border Connection

Increasing energy security and resilience in the UK

The way electricity is generated is changing, with more renewable energy being generated in the UK.

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. By transporting enough home-grown electricity to power up to six million homes, Cross Border Connection would play an important role in building a more secure and resilient energy system.

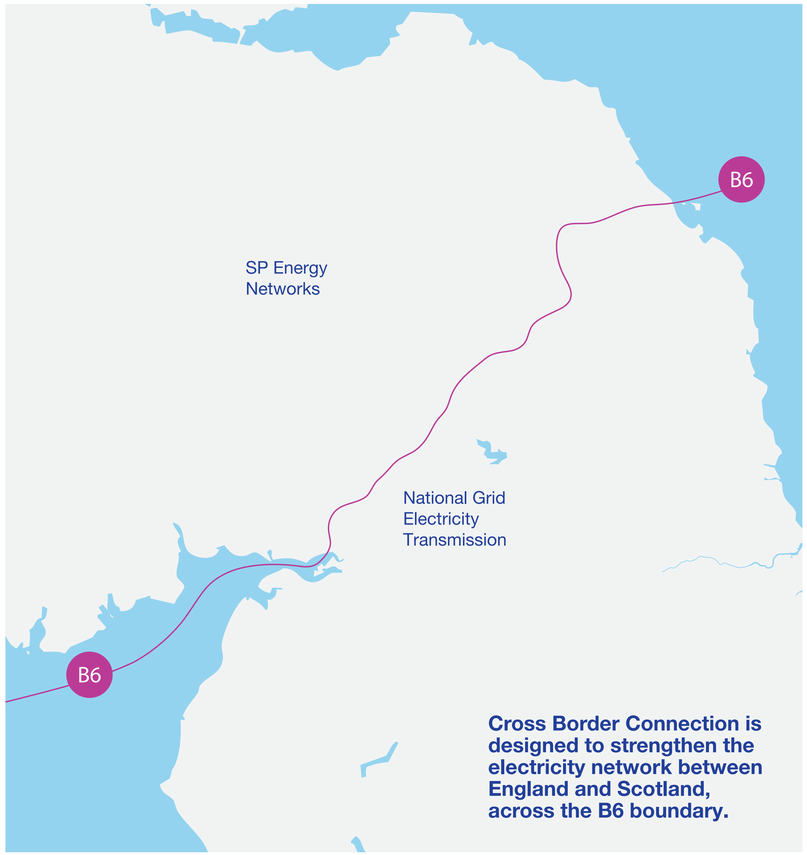


The National Energy System Operator (NESO) is responsible for identifying the areas of the electricity transmission network that require upgrades to support greater energy security and resilience.

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 (which runs alongside the England-Scotland border). This will connect the network to new proposed onshore wind farms in the Scottish Borders.

An assessment of our options for the English section of Cross Border Connection concluded that a new 400 kilovolt (kV) overhead line between the Scottish Borders and a new substation in the Carlisle area represented the most appropriate and therefore preferred solution.

For more detail on the need case for Cross Border Connection, please see our Stage 1 Consultation Document and Strategic Options Report (SOR).



Cross Border Connection is designed to strengthen the electricity network between England and Scotland, across the B6 boundary.

Overview of Cross Border Connection

The Scottish section of Cross Border Connection

SP Energy Networks is developing and delivering the section of Cross Border Connection in Scotland. Further information about SP Energy Networks' proposals are available on their website:
www.spenergynetworks.co.uk/pages/cross_border_connection.aspx

Overview of Cross Border Connection in England and Scotland

Key

- Option A for proposed new 400 kV overhead line
- Option B for proposed new 400 kV overhead line
- Indicative proposed route in Scotland
- Option A for proposed new 400 kV Carlisle substation
- Option B for proposed new 400 kV Carlisle substation
- Proposed Gala North substation
- England-Scotland border
- Main road

Only one option, A or B, would be taken forward as part of the project in England.
Indicative map for reference only. Not to scale.

What we are 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.

We are consulting on two options

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.

We 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 consultation feedback we receive, along with other technical and environmental assessments. As our plans evolve, we will come back to consult you again.

The two options

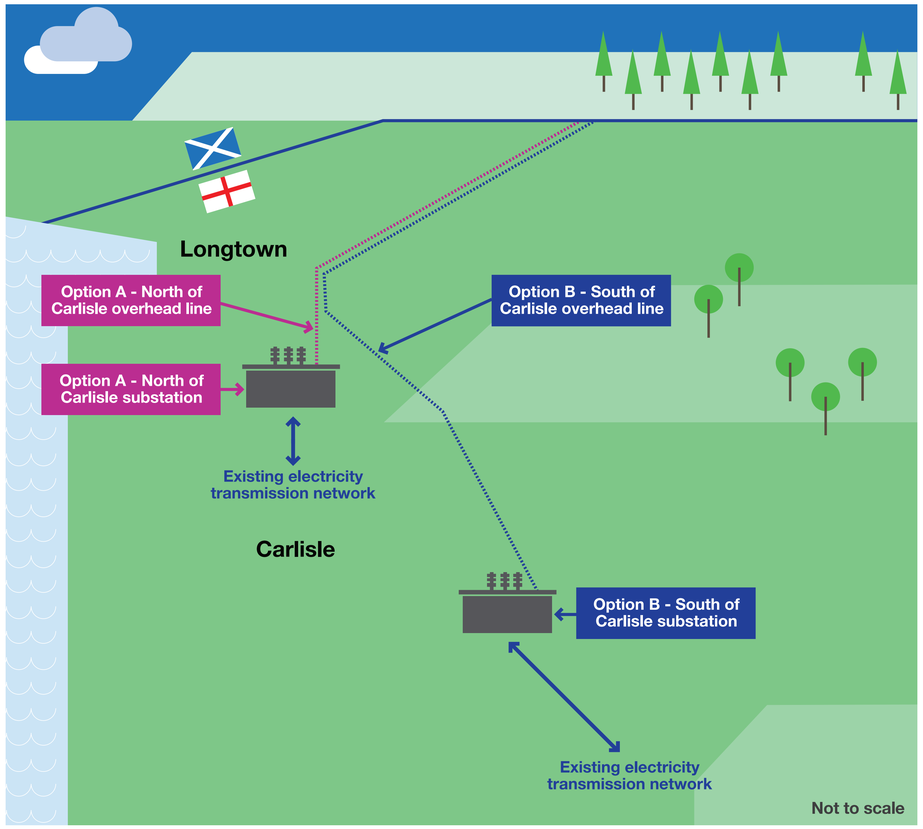
Option A - a substation located in an area north of Carlisle.

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

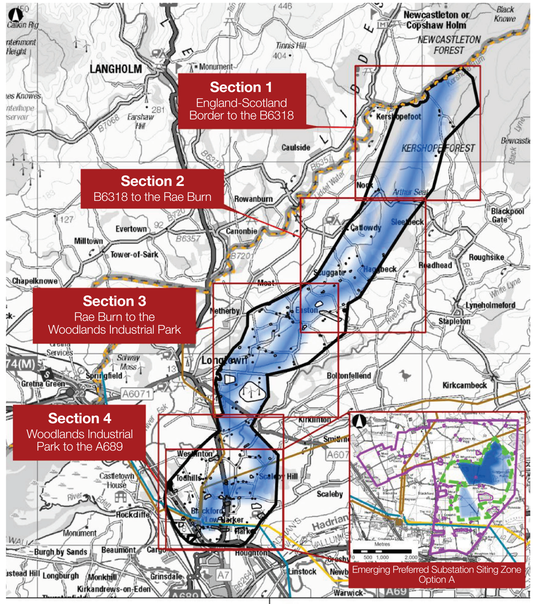
Cross Border Connection in England



Our proposed infrastructure

If you would like to see detailed maps of Cross Border Connection's proposed infrastructure, please view our individual section maps or the interactive map available at this public information event or on our project website.

Overview of our proposals in England



Corridor Section
Emerging Preferred Corridor - Option A
Emerging Preferred Substation Siting Zone - Option A
Substation Siting Area Option A
England Scotland Border
Existing 132kV OHL
Existing 275kV OHL
Existing 400kV OHL
Harker Substation Site
Graduated Swathe – Option A
Higher Likelihood
Lower Likelihood

Assumed Width of Overhead Line up to 100m
- 100m in map scale
100m 720m Substation footprint in inset scale
Metres
0 2,500 5,000 10,000

Coordinate System: British National Grid

Credits:
Esri UK, Esri, TomTom, Garmin, FAO, METI/NASA, USGS
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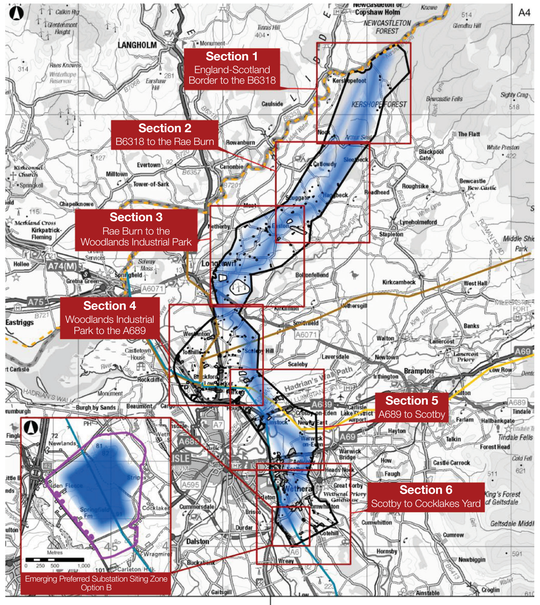
Option A – north of Carlisle



Corridor Section
Emerging Preferred Corridor - Option B
Emerging Preferred Substation Siting Zone - Option B
England Scotland Border
Existing 132kV OHL
Existing 275kV OHL
Existing 400kV OHL
Harker Substation Site
Graduated Swathe – Option B
Higher Likelihood
Lower Likelihood

Assumed Width of Overhead Line up to 100m
- 100m in map scale
100m 720m Substation footprint in inset scale
Metres
0 2,500 5,000 10,000

Scale at A4
1:200,000

Coordinate System: British National Grid

Credits:
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Option B – south of Carlisle

Overhead line and pylons

We are proposing a new 400 kV overhead line, supported by pylons, that would carry enough energy to power up to six million homes.

We are considering the use of traditional 400 kV steel lattice pylons, which can be up to approximately 50 metres (m) high. A typical distance between pylons is approximately 350 m, 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.

Substation

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.

We expect that the proposed 400 kV substation would have a footprint of approximately 720 m by 400 m (approximately 28.8 hectares). The tallest elements of the substation would be approximately 18 m, with all other parts within the substation being substantially lower.

We are currently considering two options, A and B, for the location of the substation. Only one option would be developed.

Example of 400 kV overhead line and traditional steel lattice pylon - for illustrative purposes only

Example of a 400 kV substation (under construction) - for illustrative purposes only

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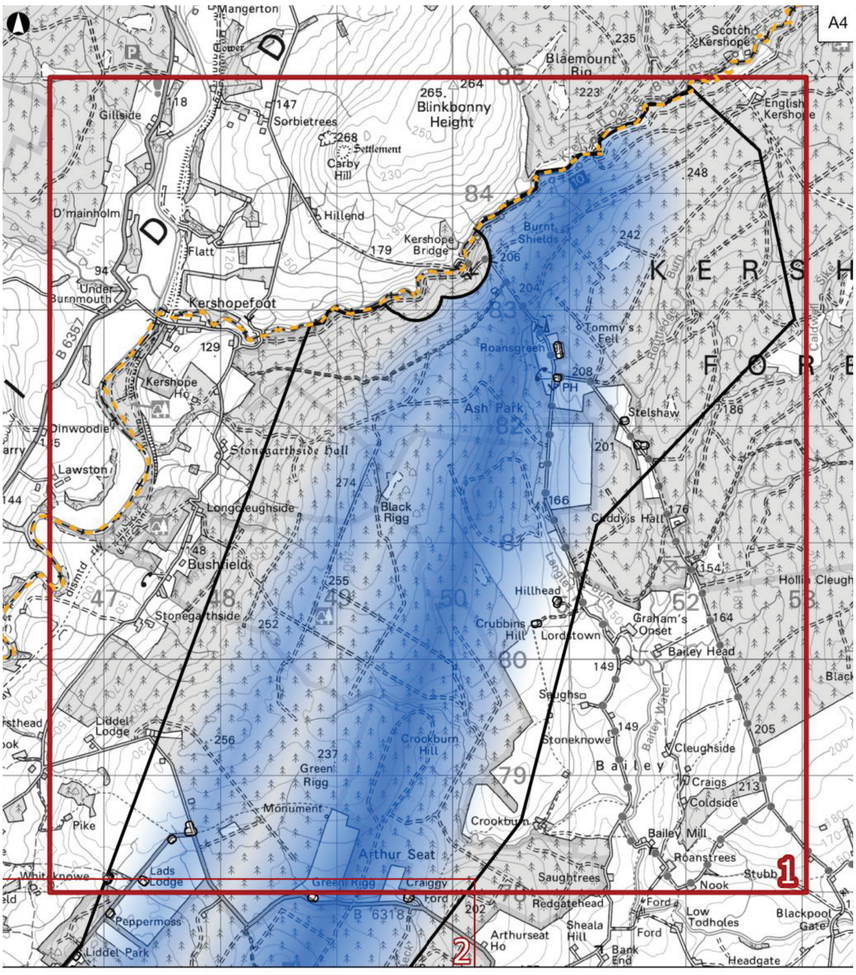
Core route options

Route section 1: England-Scotland Border to B6318

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



Corridor Section

Emerging Preferred Corridor - Option A

England Scotland Border

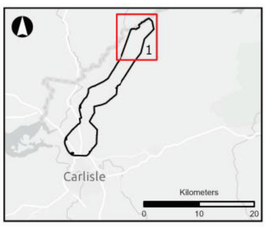
Overhead Line Graduated Swathe – Option A

Higher Likelihood

Lower Likelihood

Assumed Width of Overhead Line up to 100m

100m in map scale



Metres

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Scale at A4

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Coordinate System: British National Grid

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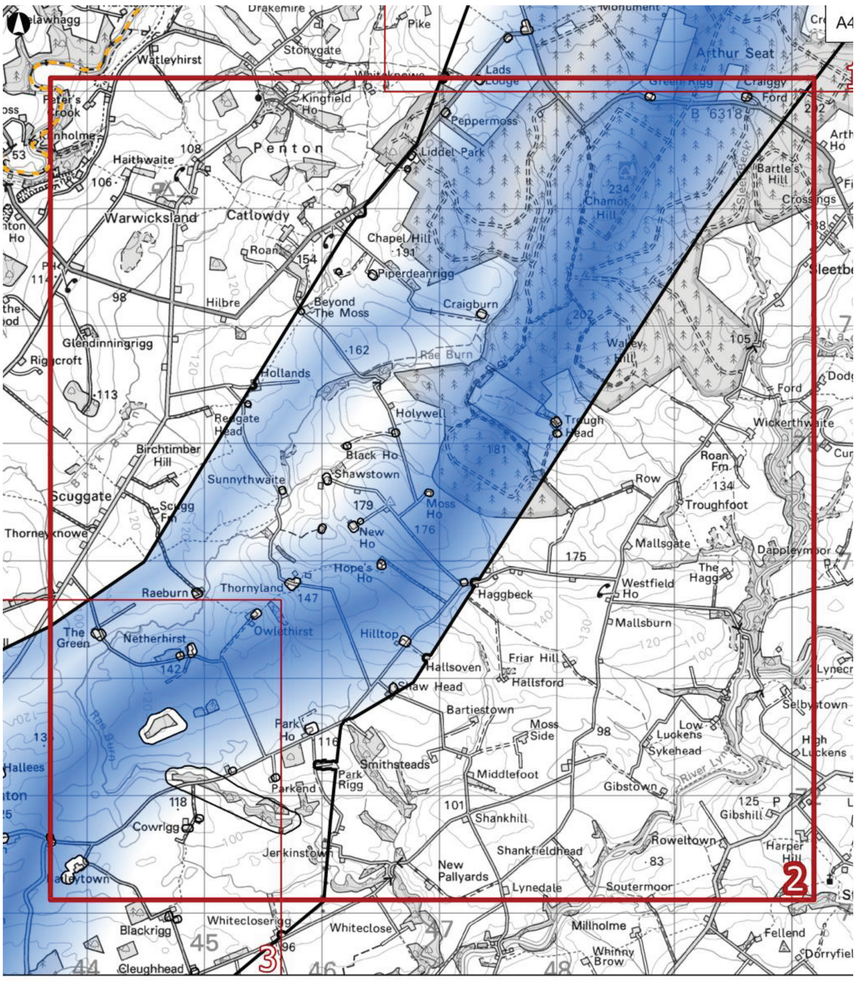
Core route options

Route section 2: B6318 to Rae Burn

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



Corridor Section

Emerging Preferred Corridor - Option A

England Scotland Border

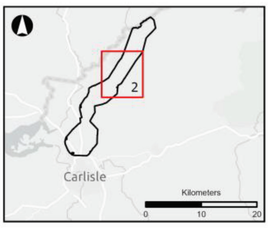
Overhead Line Graduated Swathe – Option A

Higher Likelihood

Lower Likelihood

Assumed Width of Overhead Line up to 100m

100m in map scale



Metres

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Scale at A4

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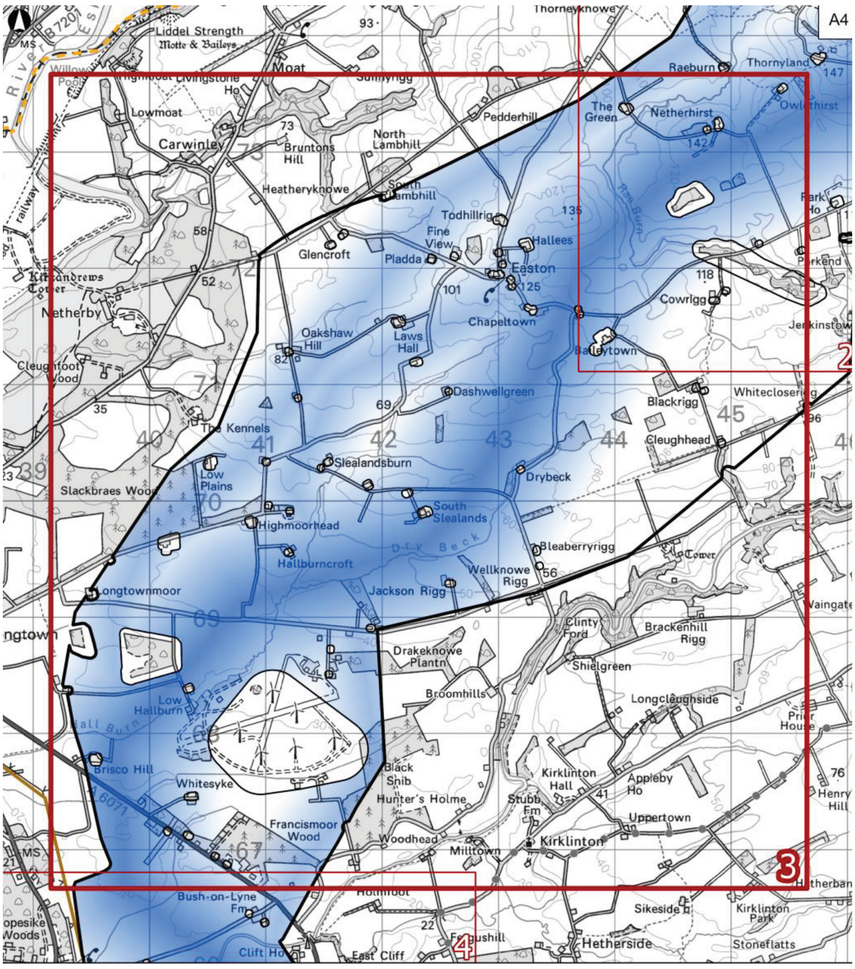
Core route options

Route section 3:
Rae Burn to Woodlands Industrial Park

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



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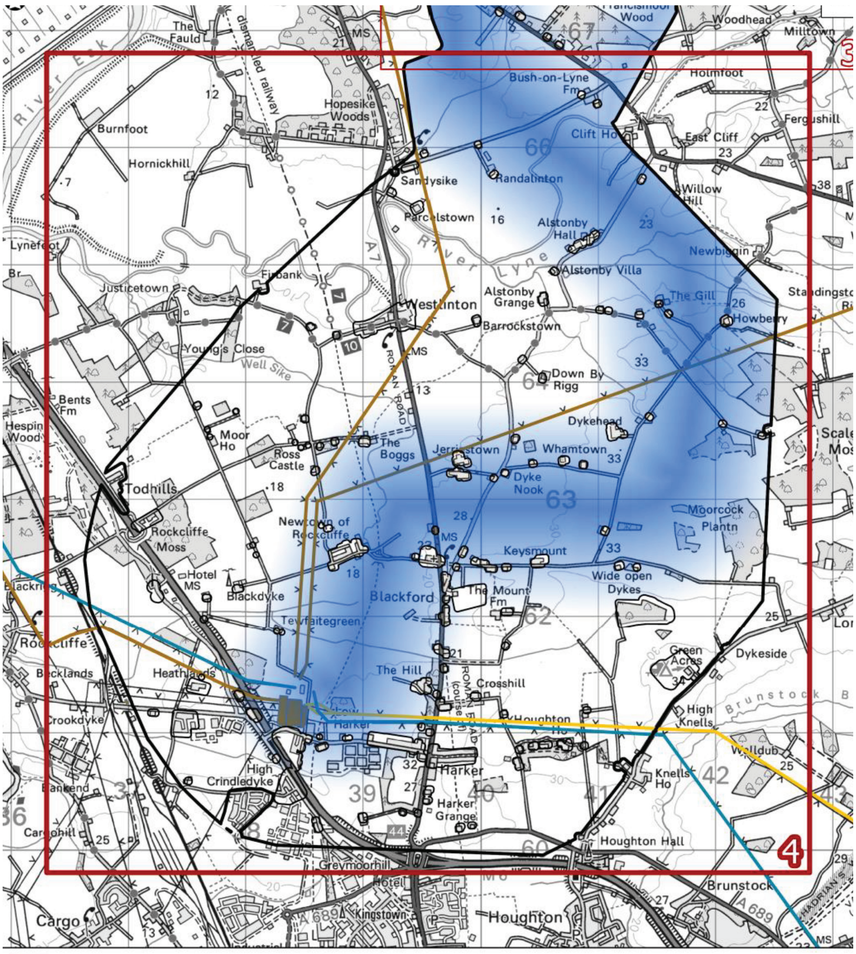
Option A – North of Carlisle

Route section 4: Woodlands Industrial Park to A689

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



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Option A – North of Carlisle

North of Carlisle substation

Emerging Preferred Substation Siting Zone - Option A

Substation Siting Area Option A

Existing 132kV OHL

Existing 275kV OHL

Existing 400kV OHL

Harker Substation Site

Substation Graduated Swathe – Option A

Higher Likelihood

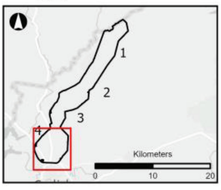
Lower Likelihood

Substation footprint within graduated swathe is approximately 288,000m²

400m

720m

Substation footprint in map scale



Metres

0 250 500 1,000

Coordinate System: British National Grid

Credits:
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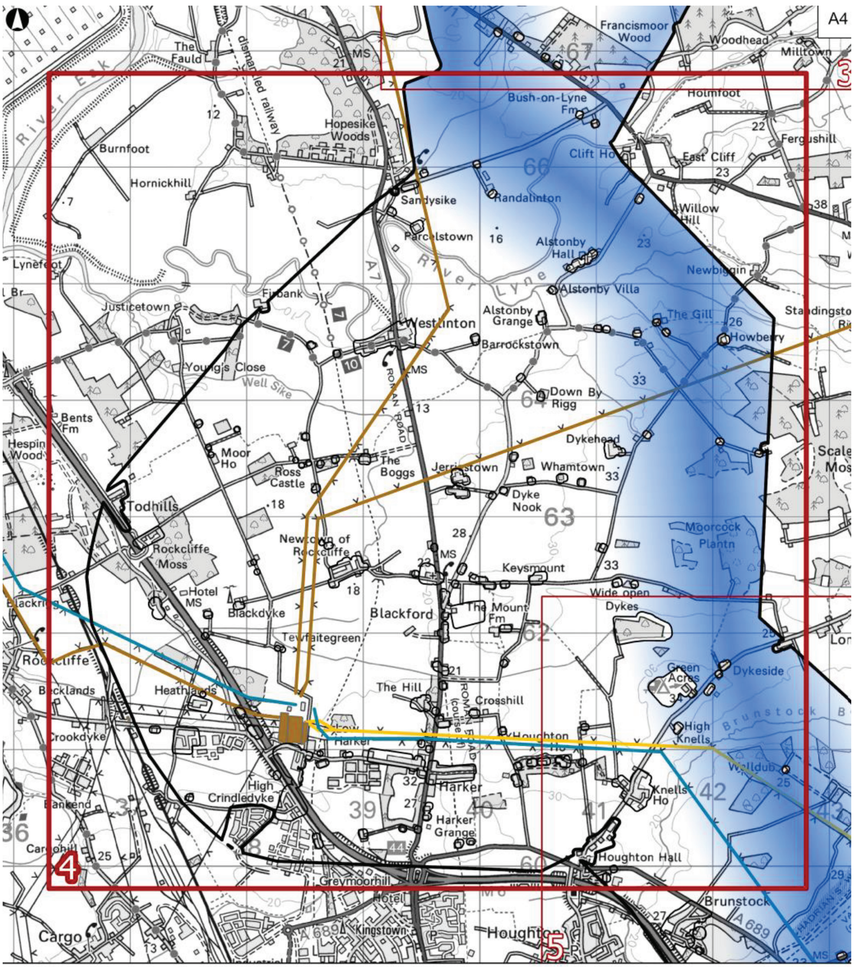
Option B – South of Carlisle

Route section 4: Woodlands Industrial Park to A689



Corridor Section

Emerging Preferred Corridor - Option B

Existing 132kV OHL

Existing 275kV OHL

Existing 400kV OHL

Harker Substation Site

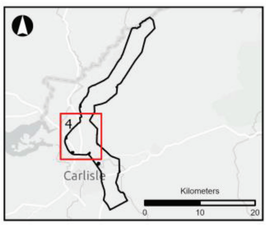
Overhead Line Graduated Swathe – Option B

Higher Likelihood

Lower Likelihood

Assumed Width of Overhead Line up to 100m

100m in map scale



Metres

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Coordinate System: British National Grid

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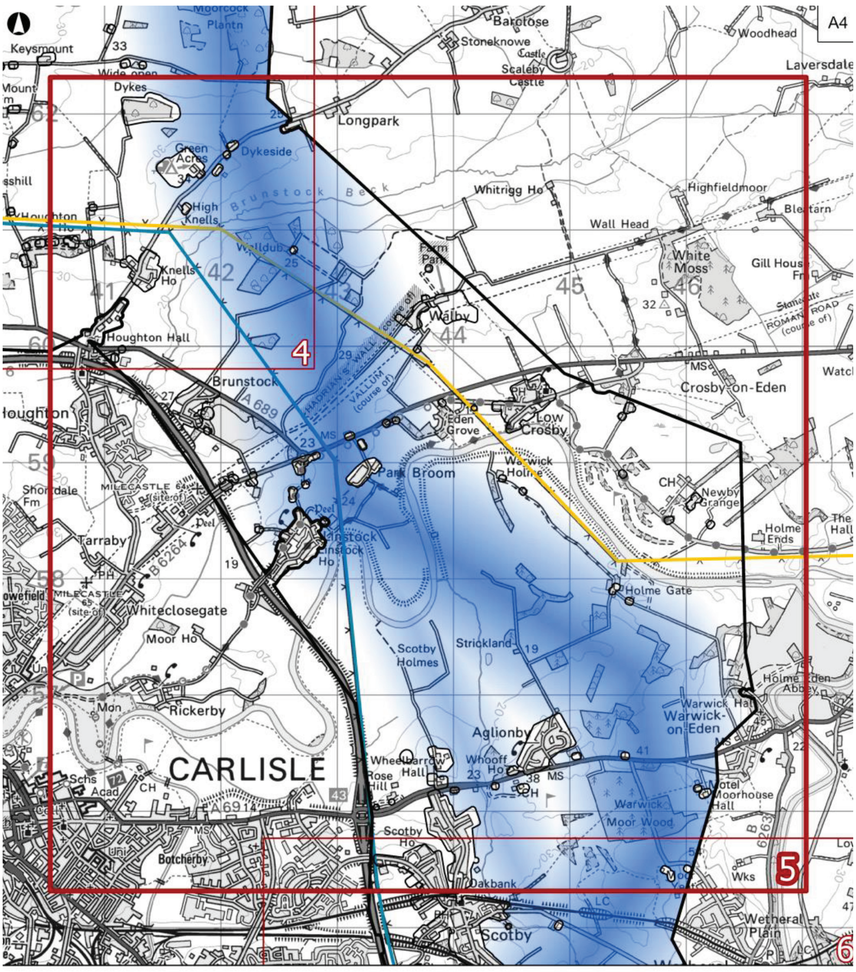
Option B – South of Carlisle

Route section 5: A689 to Scotby



Corridor Section

Emerging Preferred Corridor - Option B

Existing 275kV OHL

Existing 400kV OHL

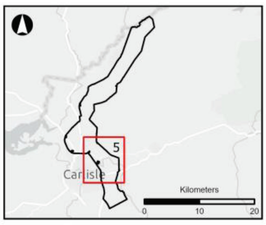
Overhead Line Graduated Swathe – Option B

Higher Likelihood

Lower Likelihood

Assumed Width of Overhead Line up to 100m

100m in map scale



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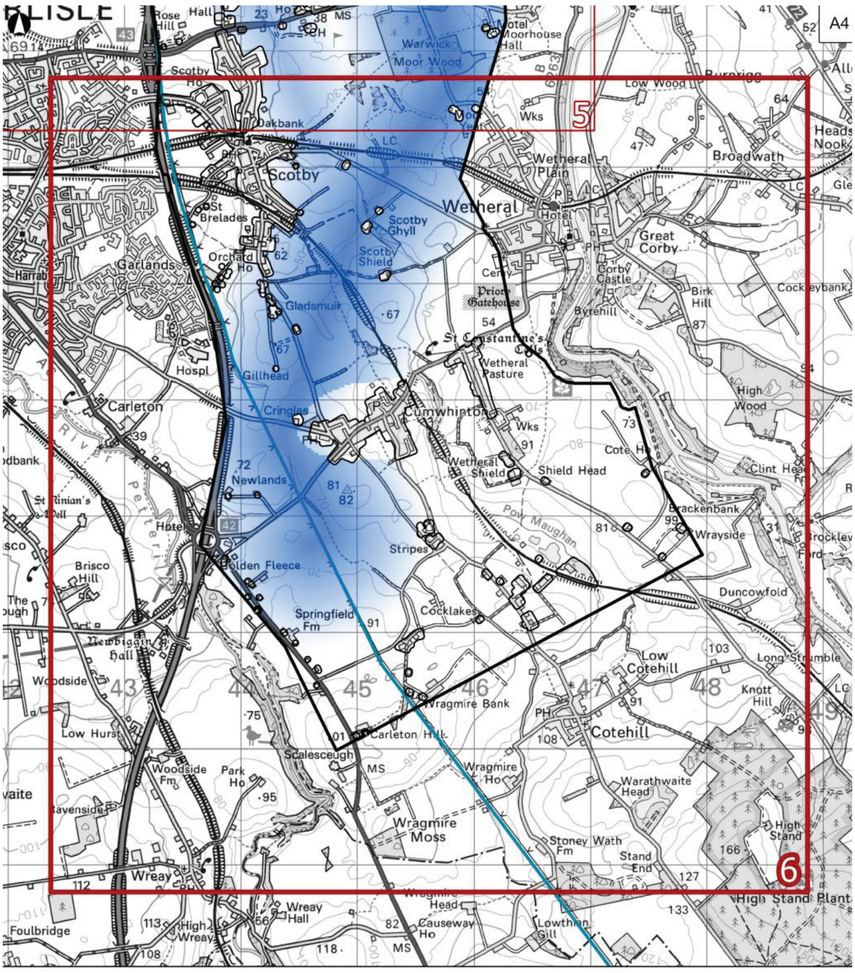
Option B – South of Carlisle

Route section 6: Scotby to Cocklakes Yard



Corridor Section

Emerging Preferred Corridor - Option B

Existing 400kV OHL

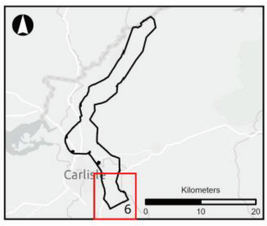
Overhead Line Graduated Swathe – Option B

Higher Likelihood

Lower Likelihood

Assumed Width of Overhead Line up to 100m

100m in map scale



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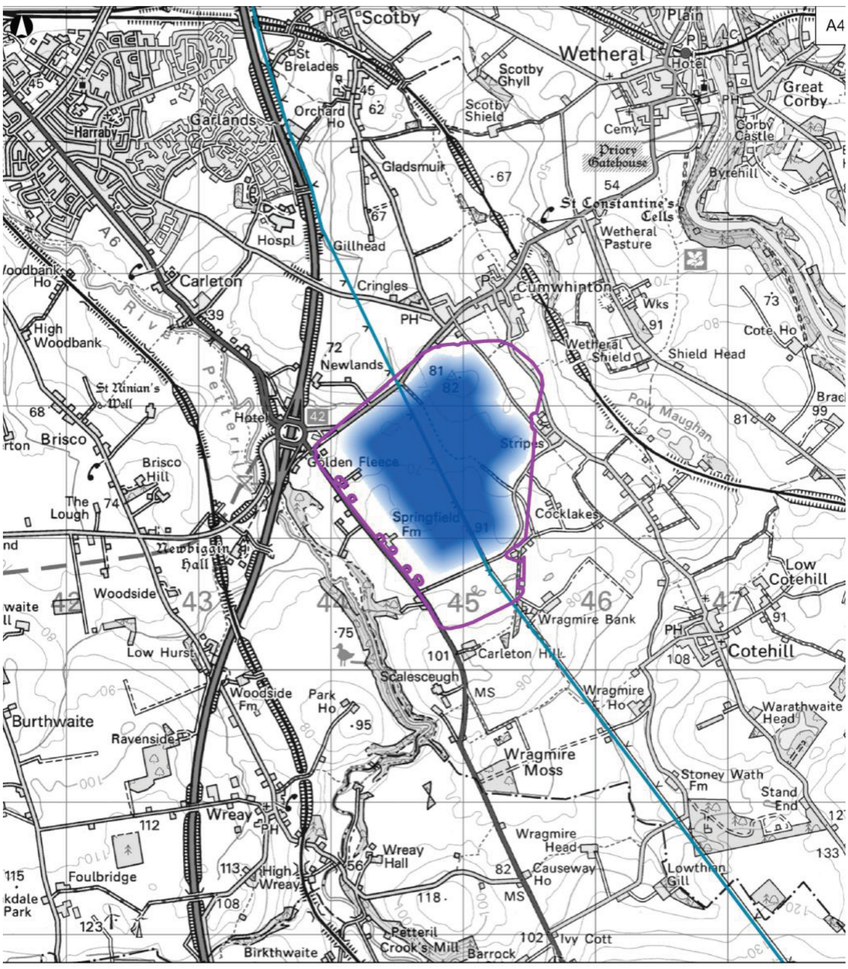
Option B – South of Carlisle

South of Carlisle substation



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