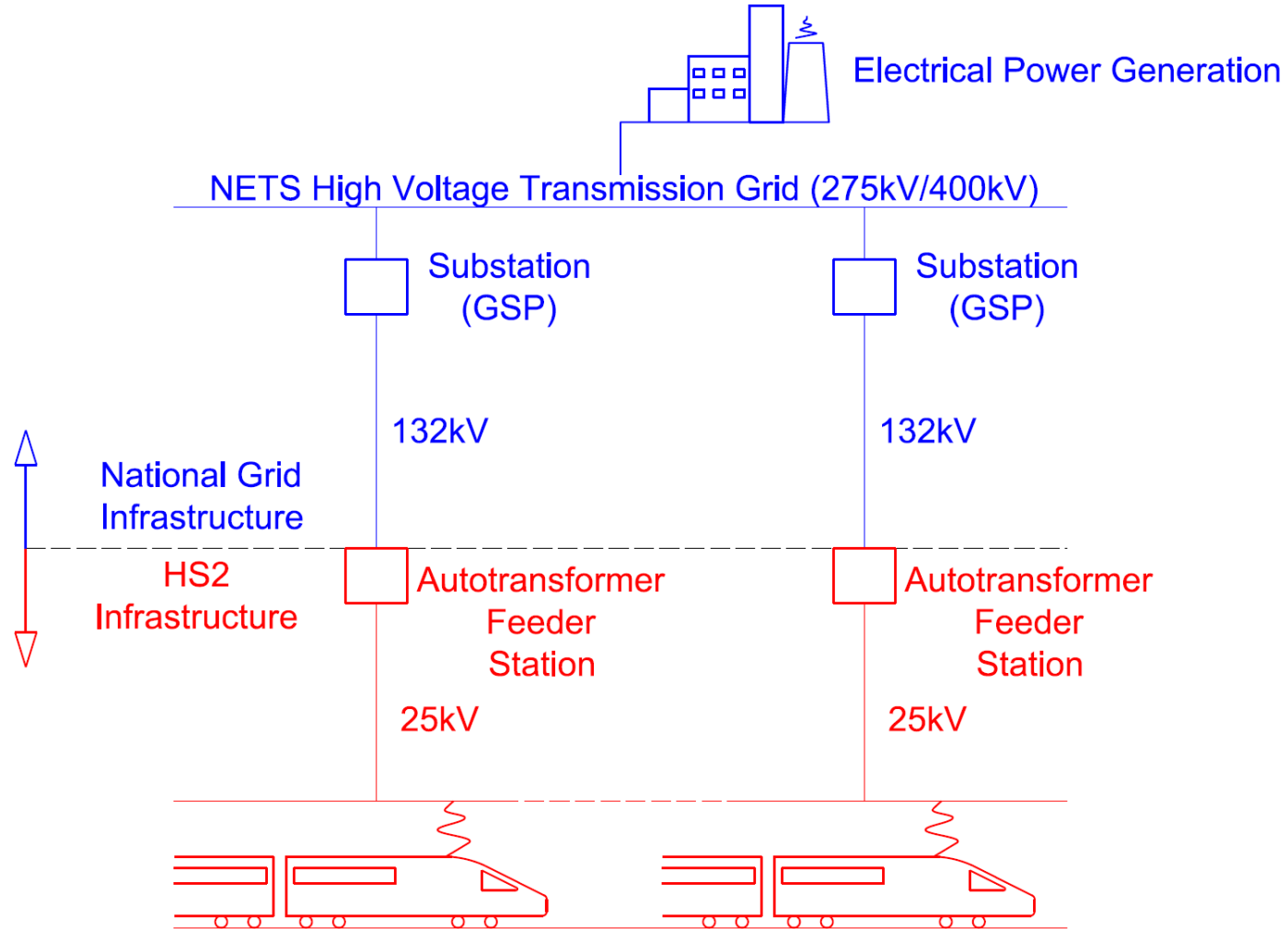


# **HS2 Phase 2a: Grid Supply Point Connection at Parkgate**

# Executive Summary

- A connection to the National Electricity Transmission System is required for the Phase 2a route.
- An auto-transformer feeder station (ATFS) is required in the vicinity of Newlands Lane to provide power to the trains, due to the need to provide power as far north as Crewe. The traction power requirements for HS2 prevent the ATFS being located further south (e.g. at Kings Bromley).
- The hybrid Bill included a connection at Rugeley substation. Development work with National Grid, post deposit of the Bill, showed that this connection could not meet both HS2's requirements and National Grid's wider obligations to provide electricity. It was also subject to petitions by National Grid, Rugeley Power Limited and two local authorities (Lichfield DC and Staffordshire CC) regarding redevelopment of the Rugeley site, and other affected landowners.
- Viable options for an alternative connection have been considered. The overhead line from Parkgate has been identified as the best solution. All other alternatives are longer in length, more costly and more disruptive.
- An overhead line from Parkgate represents the closest and most appropriate connection to the National Electricity Transmission System while balancing environmental impact, engineering and cost.
- Undergrounding the Parkgate connection would cost an additional c.£65million and this additional cost is not considered proportionate or justified in light of national policy and the temporary and permanent effects.

# Traction power connection



# Requirements for HS2 power supply

- The HS2 connection to the National Electricity Transmission System must consist of three circuits to provide the necessary resilience of electricity supply to run the trains.
- A circuit consists of three conductors (power lines)
- A pylon carries a maximum of two circuits (six power lines)
- The HS2 connection therefore requires a substation and two rows of pylons to connect to the auto-transformer feeder station.

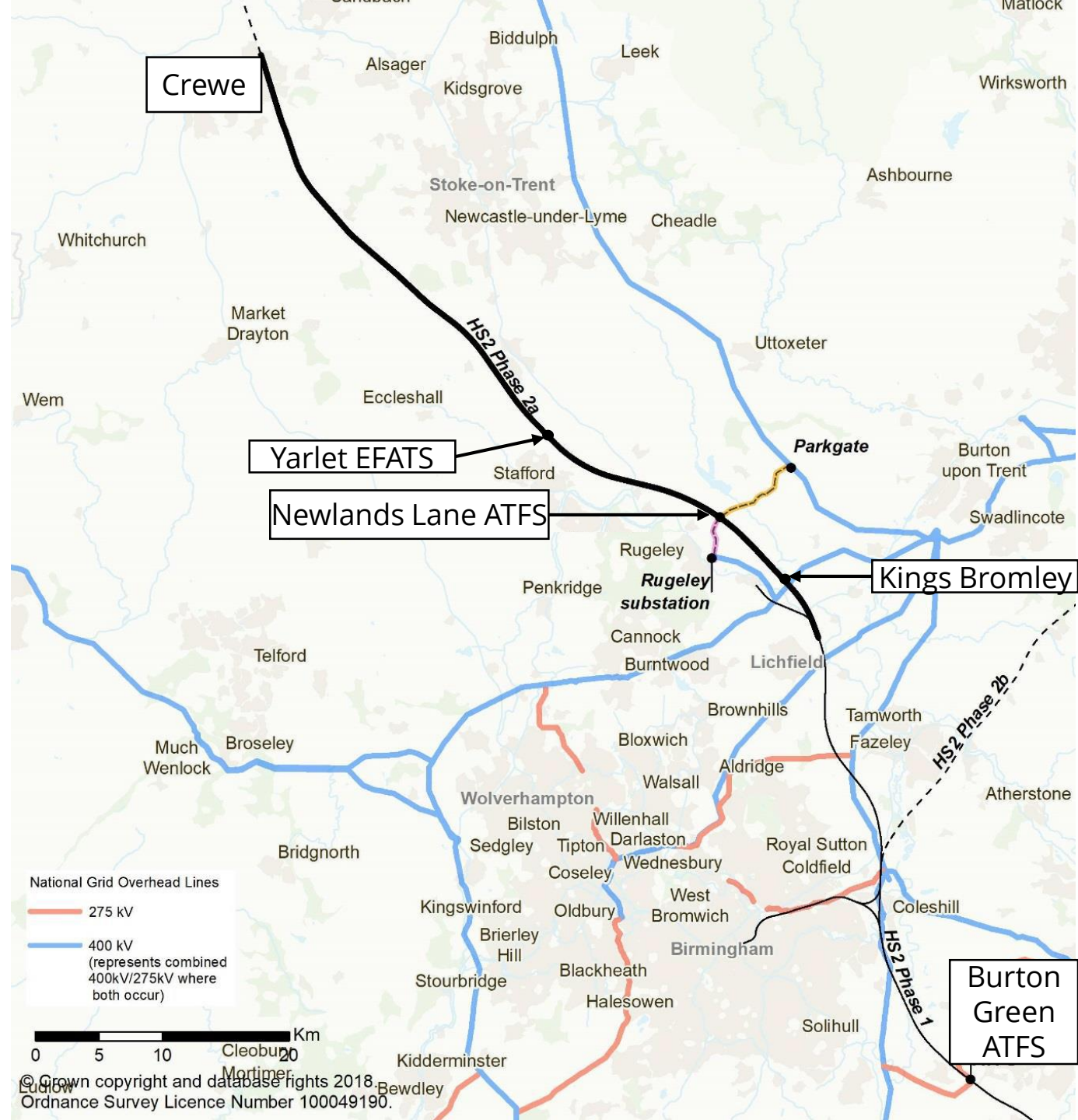


**Image showing a double pylon run near Lichfield**

# ATFS location at Newlands Lane

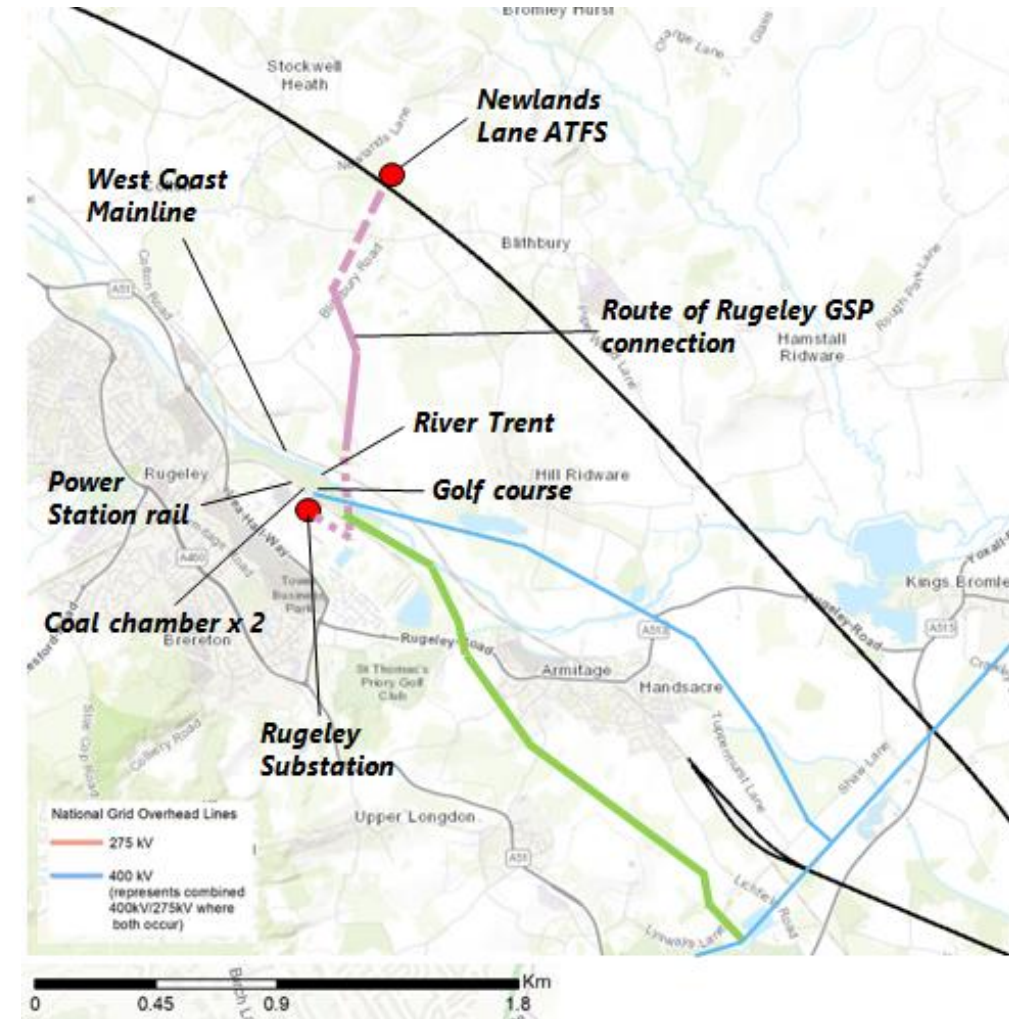
- The traction power requirements for HS2 depend upon the service requirements, length of trains, and topography of the sections of the track served.
- In general, the traction power requirements are normally met by having an auto-transformer feeder station approximately every 50km along the track. The ATFS is able to serve approximately 25km of track in each direction. There is a degree of tolerance but it is desirable for many reasons to keep close to these distances. The Newlands Lane ATFS is located approximately 52km from Burton Green to the south and would have been 48km from a proposed ATFS at Crewe South. Due to grid connection difficulties however no ATFS at Crewe South is being proposed for Phase 2a.
- To address this, Newlands Lane ATFS provides an 'express feed' connection by two cables running alongside the trace to an express feeder auto-transformer station at Yarlet. The 'express feed' cable is already at its desirable maximum length to serve HS2 to Crewe (18km cable feed and 29km of track to Crewe from Yarlet).
- This arrangement precludes relocating Newlands Lane ATFS further south at Kings Bromley (8km further south) because it would not provide sufficient power to serve the section to Crewe for the intended service pattern, for Phase 2a and in due course Phase 2b. It was also create a sub-optimal distance from Burton Green ATFS.

# ATFS Location at Newlands Lane



# Hybrid Bill scheme

- The hybrid Bill scheme proposed a connection from Newlands Lane to the existing Rugeley substation.
- Since Bill deposit, it has been established that this connection would require:
  - a new additional circuit, 7.7km long, between Rugeley substation and the National Electricity Transmission System to the south; and
  - the use of pylons rather than poles between Rugeley substation and Newlands Lane.
- In addition to the above, there are a number of construction challenges associated with the connection at Rugeley including:
  - crossing the West Coast Main Line and River Trent;
  - the presence of an underground coal chamber;
  - potential for contaminated ground at Rugeley Power Station, and;
  - installation below the multiple existing high voltage power lines (Western Power Distribution and National Grid).



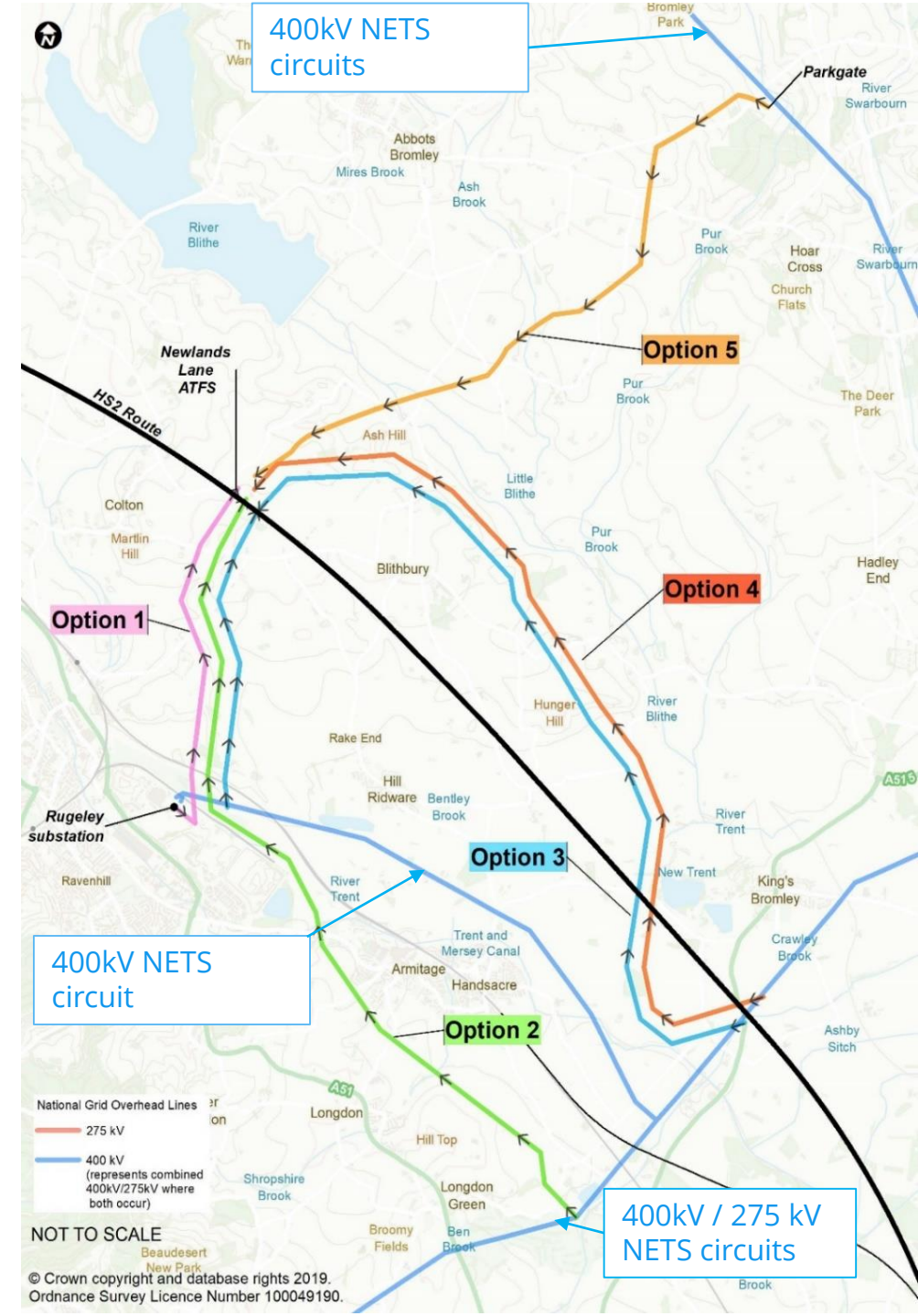
# Hybrid Bill scheme

- Staffordshire County Council and Lichfield District Council petitioned against the Bill proposals, concerned about their impact on the redevelopment proposals for the disused power station site, which are supported by the two Councils, Cannock Chase District Council and other partners.
- Rugeley Power Station Ltd, owners of the power station site, petitioned against the proposals because of the conflicts with their plans for development of the site.
- National Grid Electricity Transmission (who would own and operate the proposed grid supply point and connection) petitioned against the proposals and put forward an alternative at Parkgate as their preferred solution.
- Some land owners affected by the connection petitioned against the Bill proposals.
- Neither Staffordshire County Council, East Staffordshire Borough Council nor National Grid have petitioned against the Parkgate proposals in Additional Provision 2.
- The Promoter would expect those that petitioned against the hybrid Bill scheme to also oppose any option using Rugeley.



# Main options

- **Option 1** - the hybrid Bill scheme, which does not work on its own.
- **Option 2 (incorporating Option 1)** - an 11.8km-long connection, comprising the 4km hybrid Bill connection from Rugeley substation to Newlands Lane, along with a 7.8km-long 275kV electrical circuit from the national electricity transmission system, near Handsacre, to Rugeley substation.
- **Option 3 (incorporating Option 1)** - a 4km connection from Rugeley substation to Newlands Lane (similar to the hybrid Bill), along with a 9.7km-long connection from the national electricity transmission system, near Kings Bromley.
- **Option 4** - a 9.7km connection, taken from the national electricity transmission system near Kings Bromley. The route to Newlands Lane is roughly parallel with HS2 but seeks to avoid properties, villages and other construction conflicts.
- **Option 5** - a 7.7km connection, taken from the national electricity transmission system at Parkgate.



# Options 2 and 3

## Option 2 (incorporating Option 1)

- Option 2 would include all the construction challenges and impacts associated with Option 1 (hybrid Bill scheme).
- Option 2 would introduce new environmental impacts, including on the local communities of Longdon and Armitage, due to the additional 7.8km pylon line carrying a 275kV circuit.
- This would introduce significant extra cost.

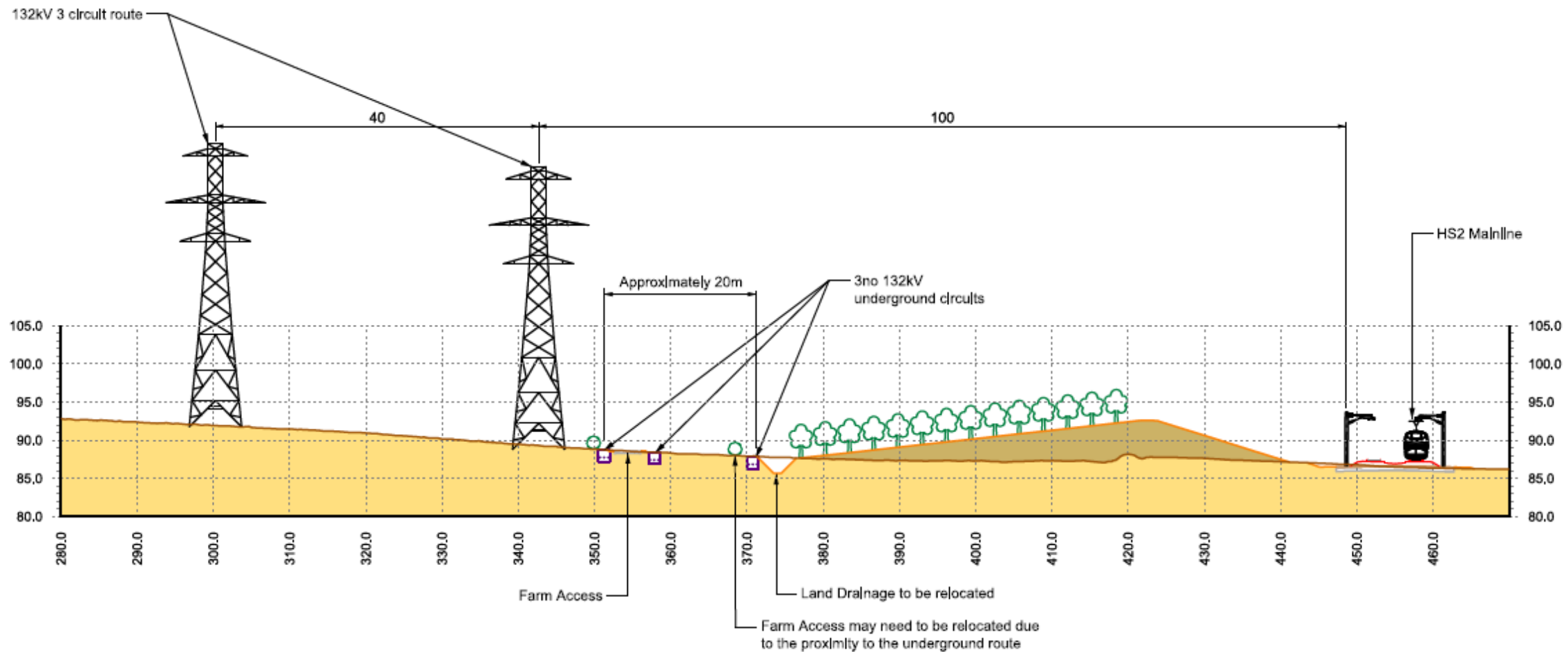
## Option 3 (incorporating Option 1)

- Option 3 would also include all the construction challenges impacts associated with Option 1 (hybrid Bill scheme).
- Option 3 would introduce new environmental impacts on the local communities in and around Kings Bromley, due to the additional 9.7km pylon line carrying a 132kV circuit.
- This would introduce significant extra cost.

# Option 4 – why not directly along the railway?

- An alignment along the railway has been considered both overhead and underground – neither is considered a reasonable alternative.
- Overhead lines need separation of up to 100m from the railway to avoid electromagnetic interference. If underground, the closest electrical circuit would need to be at least 20m from the railway, with a 65m construction corridor parallel to the trace.
- The electrical circuits need to be outside the railway boundary to separate HS2 and National Grid assets.
- The electrical circuits generally need to avoid environmental mitigation for the railway. They also cannot be placed under bunds or woodland planting.
- Either overhead or underground circuits would therefore require substantial new additional land outside Bill limits.
- Both would present conflicts between the working areas for National Grid and HS2, which would affect the construction complexity and programme, and associated costs.

# Kings Bromley Substation - Pylon Option, or Underground Cable Option, to Newlands Lane ATFS - Cross Section

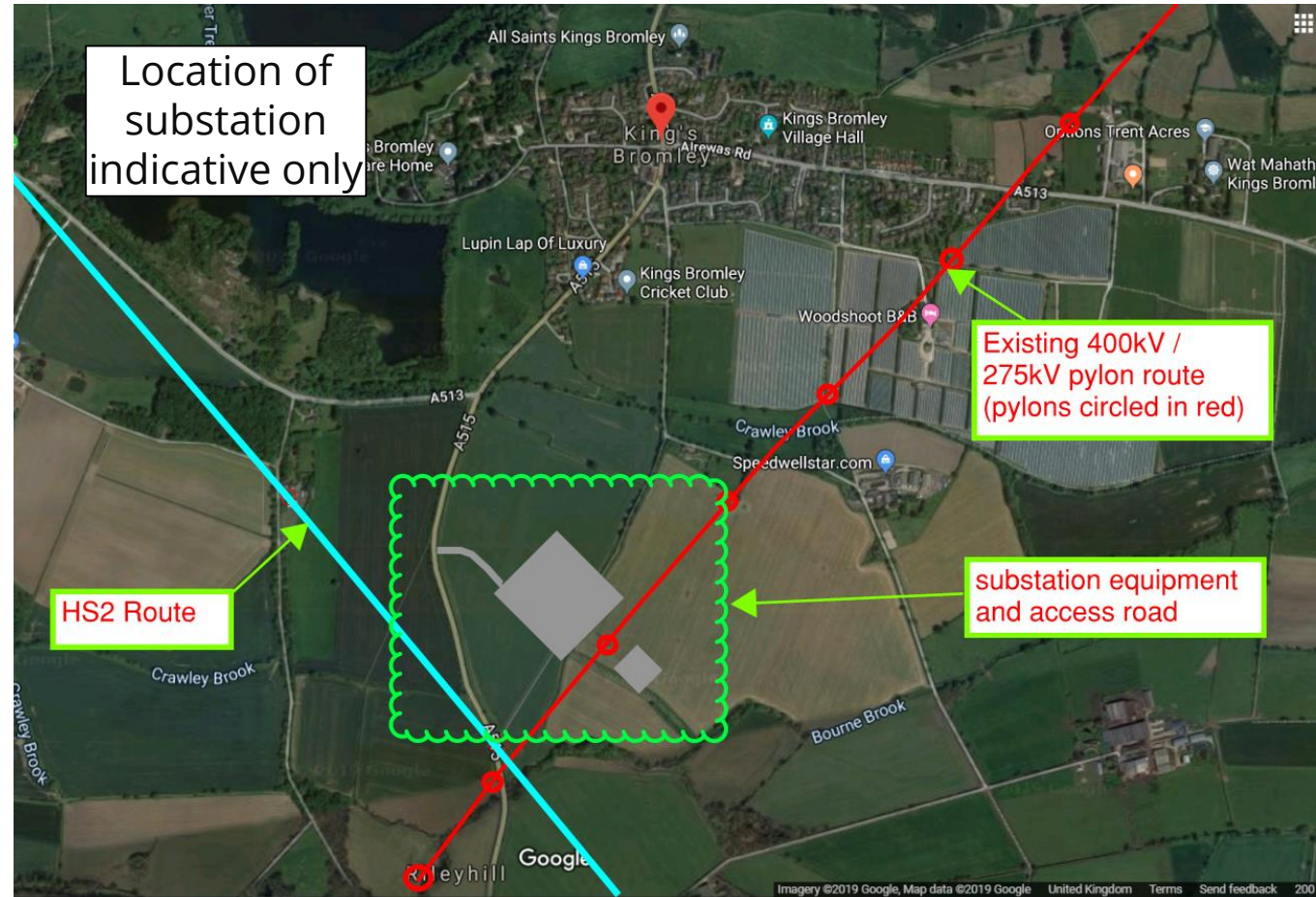


# Option 4

- In order to try and avoid the above conflicts, a refined version of a route along the railway was developed, which sought to avoid properties and environmental constraints and which seeks to comply with the Holford Rules.
- This option 4 would introduce new environmental impacts on the local communities in and around Kings Bromley, due to the two additional 9.7km pylon lines carrying 132kV circuits.
- When factoring in the extra connection length, impacts and cost, this option is considered to be significantly inferior to Option 5 (Parkgate).

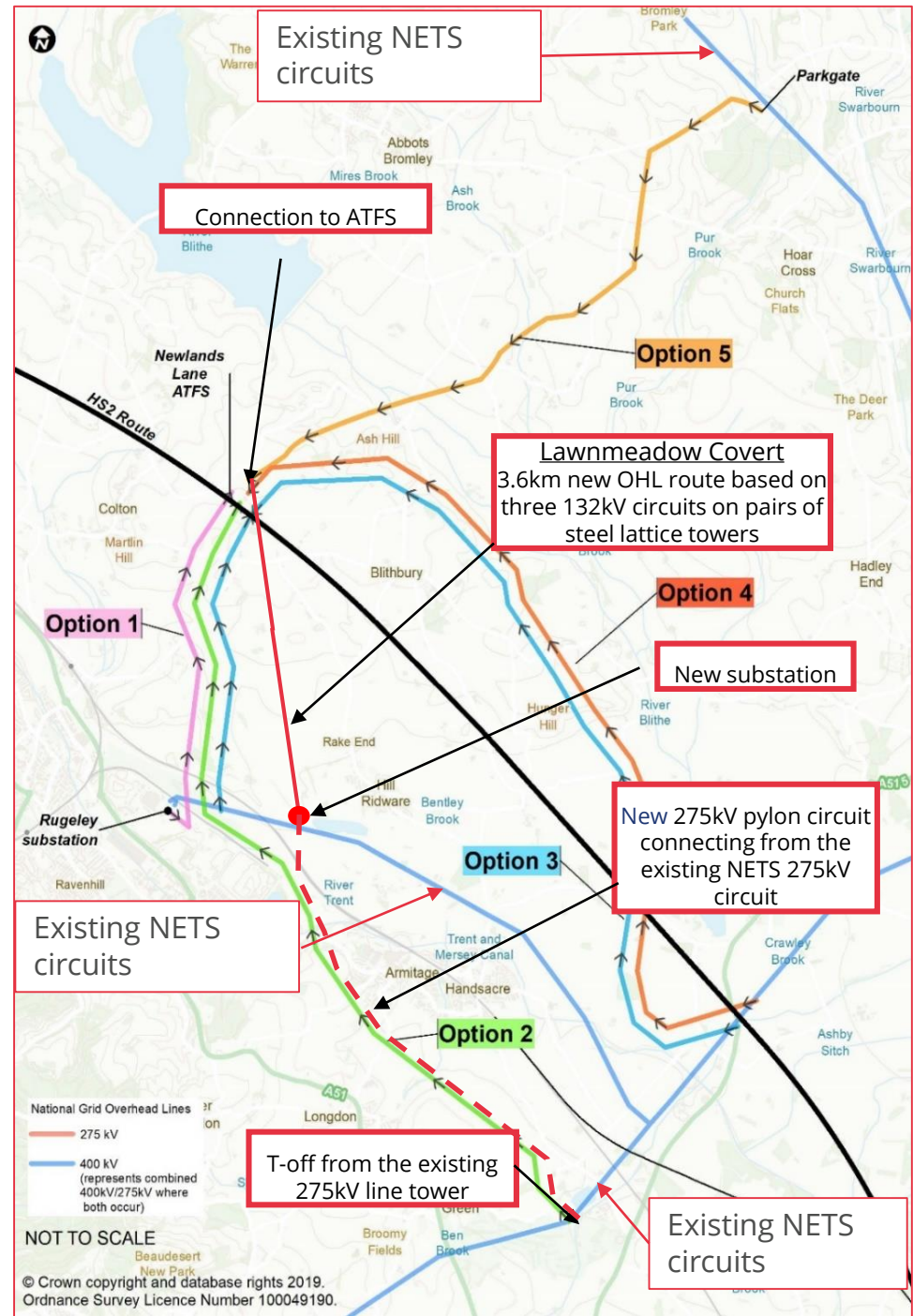
# Option 4 - substation

- Option 4, or any variant, would require a substation at Kings Bromley (possible indicative location shown on the right).
- The substation would be an addition to the HS2 works at this location (borrow pit, viaduct, road re-alignment).
- The area is subject to flooding. The level of the substation equipment would therefore have to be set above all foreseeable flood levels on an elevated platform.
- The terrain is flat and it may be more difficult to screen from Kings Bromley in the short term (until extensive landscape tree planting had matured).



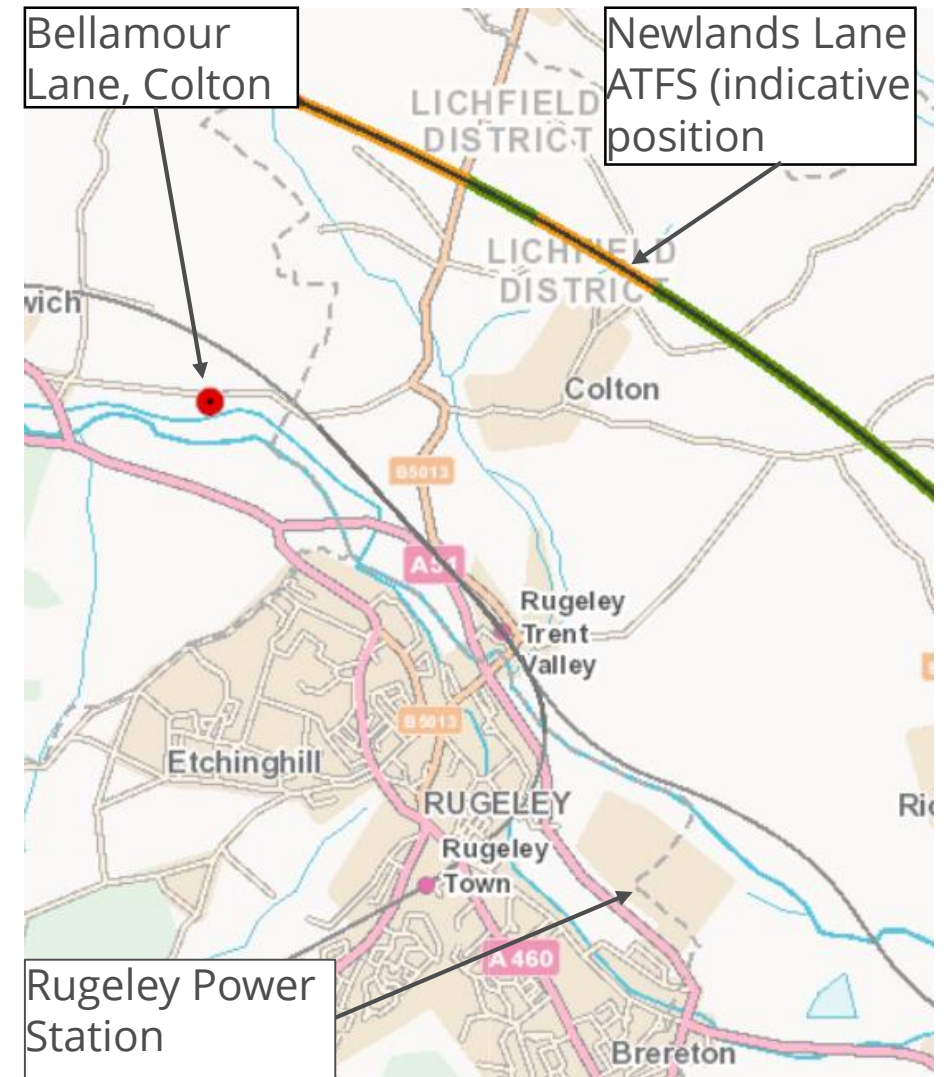
# Lawnmeadow Covert

- Parkgate Steering Group has requested reconsideration of a connection at Lawnmeadow Covert. This was considered and rejected as a viable option before deposit of the hybrid Bill.
- This option would require the construction of a new substation close to Rugeley. This option would also require a new incoming 275kV electrical circuit from the south (red dashed), resulting in a connection totalling approximately 9km.
- Other potential construction difficulties include:
  - flooding adjacent to River Trent;
  - limited public highway access, and;
  - proximity of existing 132kV overhead lines.
- This proposal is still not considered to be a reasonable alternative for reasons similar to Option 2.



# Stratera Energy

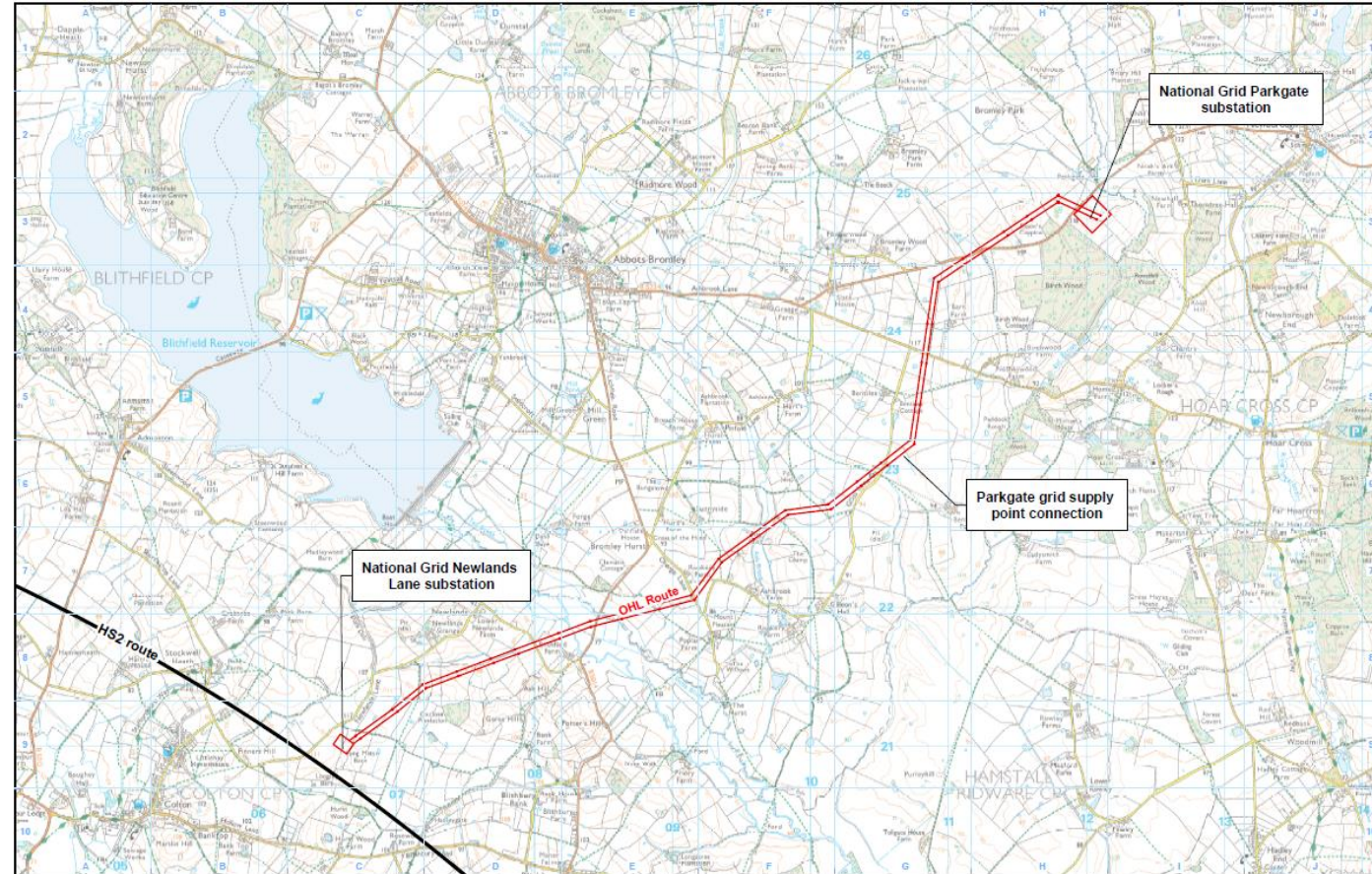
- Parkgate Steering Group has raised potential use of a proposed 49.99 megawatt gas-fired electricity generating facility in the parish of Colton. This facility is a proposal to provide backup to the local electricity distribution network, not for providing power to HS2.
- The facility, if permitted, is unable to deliver HS2's power requirements at this location (expected to be approximately 80 megawatts).
- The facility is unable to provide the resilience of supply required by HS2 that comes from use of the national electricity transmission system.
- In any event, this facility does not have planning permission, has no guarantee that it will be built, and even if combined with the hybrid Bill scheme, does not overcome the connection problems to Rugeley, dealt with previously.





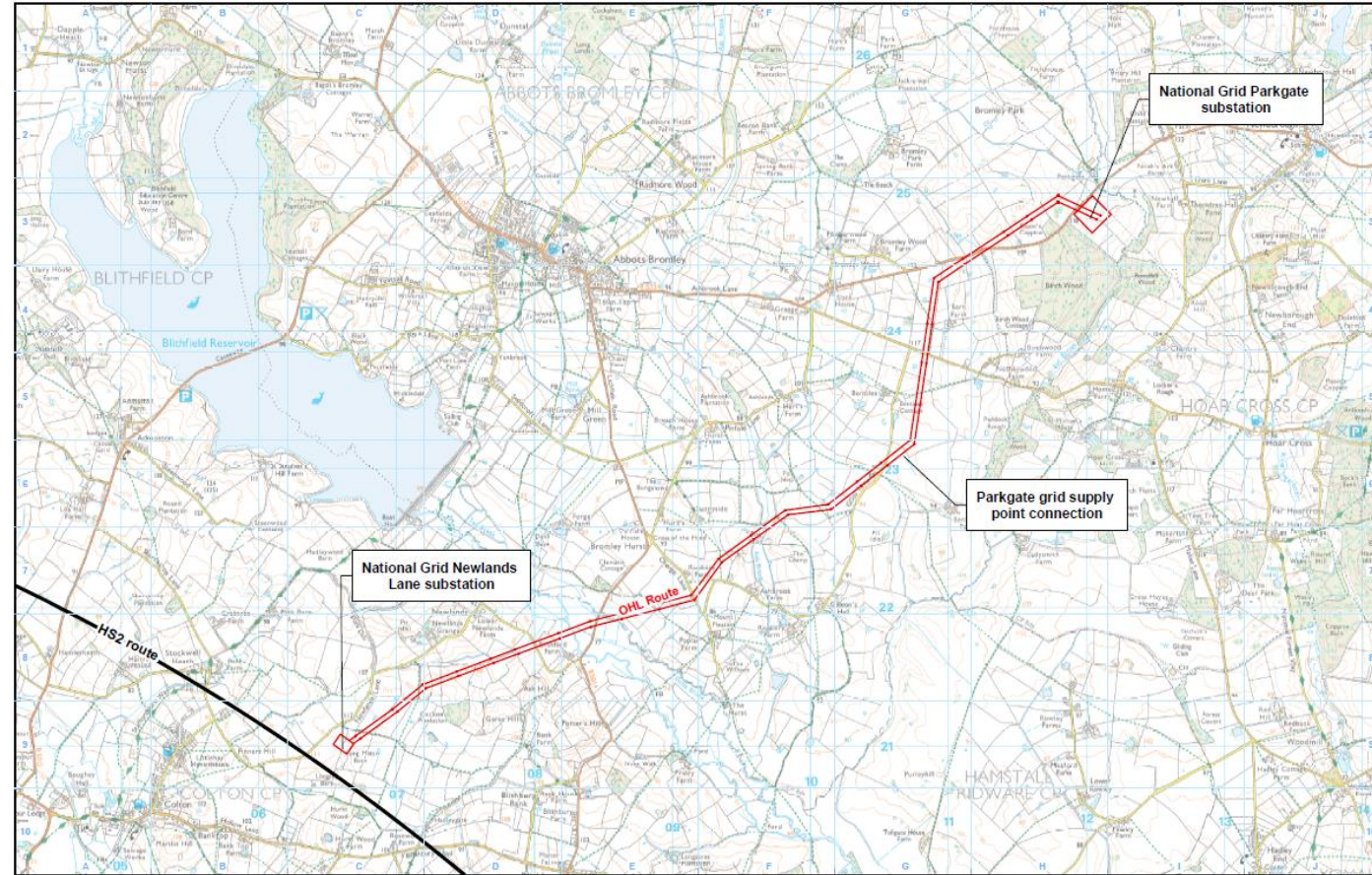
# AP2 revised scheme – Parkgate (Option 5)

- Parkgate overhead line connection provides the best solution when balancing engineering, environmental impact and cost.
- It includes a new substation, adjacent to the B5234 Bromley Road, connecting to the National Electricity Transmission System.
- Two parallel lines of pylons will be provided on a 7.7km route from Parkgate substation to a new substation adjacent to Newlands Lane auto-transformer feeder station.
- The Parkgate connection provides the shortest connection route, affecting the least number of properties, when compared to any of the other options.



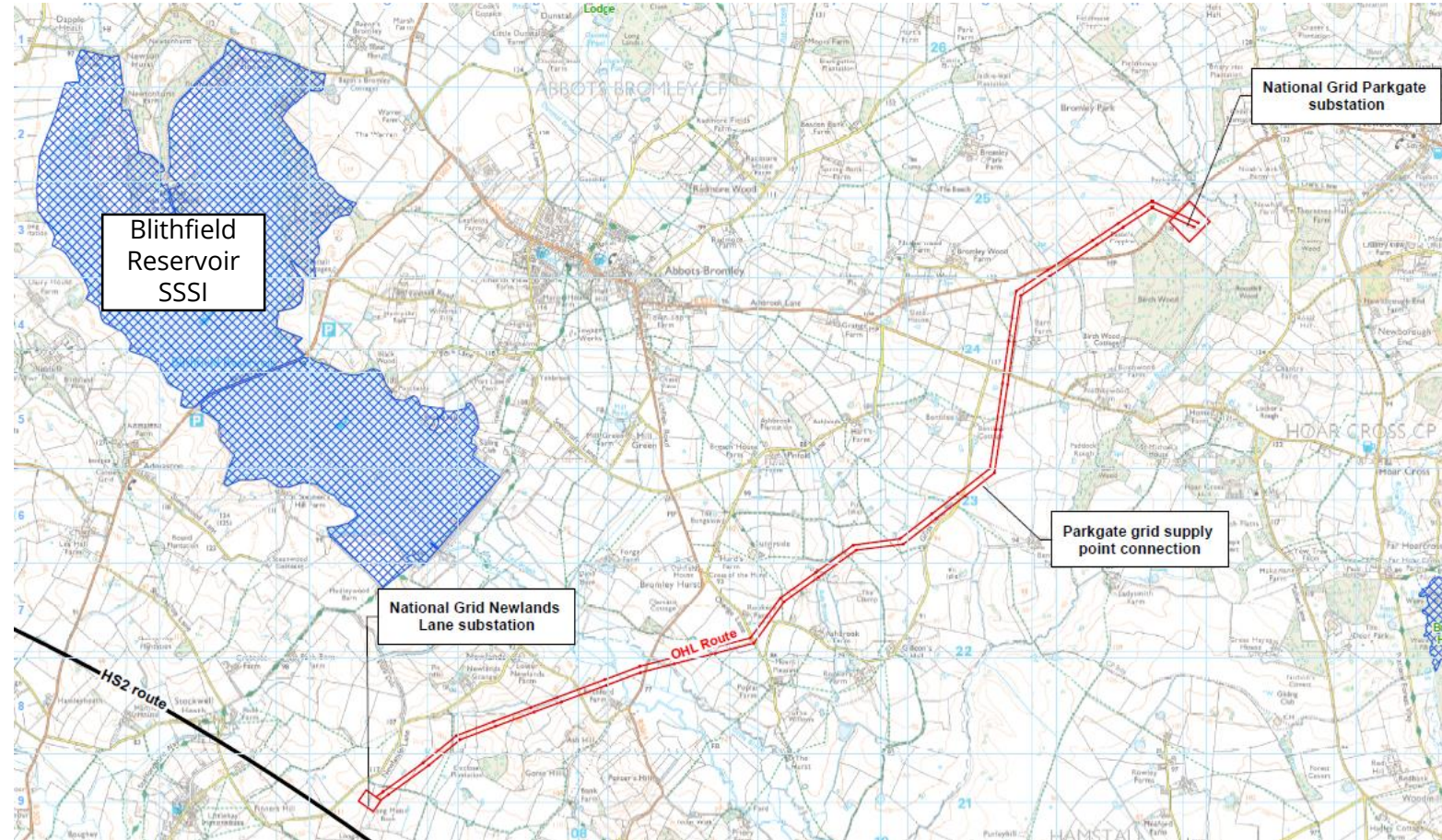
# AP2 revised scheme – Parkgate (Option 5)

- The pylons will be between 23m and 38m in height, separated by approximately 30m. The route has been selected to minimise the visual impacts, in line with the Holford Rules.
- There are no protected landscapes (AONB etc.) within the route.
- A 200m construction corridor has been allowed for flexibility during detailed design. The impacts on the route and ecological habitats in the final detailed design are very likely to be reduced from those reported in the SES2 and AP2 ES on this precautionary basis.
- With the exception of the pylon locations, agricultural land is assumed to be returned to its existing use following construction.



# Blithfield Reservoir Site of Special Scientific Interest (SSSI)

- The Parkgate grid supply point connection passes through the Blithfield Reservoir SSSI impact risk zone, along River Blithe. The SSSI is located approximately 1.1km west of the proposed Parkgate grid supply point connection.
- Bird collision risk assessments will be carried out and any appropriate mitigation required (e.g. bird diverters and habitat creation) will be provided to address the risk to birds appropriately.
- The Parkgate GSP connection is downstream of Blithfield Reservoir dam, but the risk of dam failure is negligible.



# Assurances offered on Blithfield Reservoir

The following assurances have been offered to the West Midlands Bird Club:

## **Bird Electrocutation/Collision Risk**

1. The Secretary of State will require the nominated undertaker prior to the construction of the Parkgate Grid Supply Point Connection, to develop a species-specific assessment of bird collision risk from the siting of the overhead lines in the vicinity of Blithfield Reservoir SSSI. This assessment will include consideration of the following measures:
  - a. appropriate surveys for all bird species that are relevant to the designation of Blithfield Reservoir SSSI; and
  - b. recommendations for the installation of bird diverters where detailed survey work shows installation will be required in accordance with National Policy Statement for Electricity Networks EN-5 2011.

## **Bird forage impact - Floodplain grazing marsh alongside River Blithe**

2. The Secretary of State will require the nominated undertaker during the detailed design and construction of the Parkgate Grid Supply Point Connection to limit the loss of floodplain grazing marsh and associated habitats alongside the River Blithe in the vicinity of Little Blithe habitat (as described in Supplementary Environmental Statement 2) to no more than that reasonably required to implement the Proposed Scheme. Where this habitat is lost as a result of construction of the Parkgate Grid Supply Point Connection, the nominated undertaker will be required to implement habitat creation and reinstatement measures to compensate for the loss of floodplain grazing marsh habitat so far as doing so can be done:
  - a. within the existing powers of the Bill and without the need for any additional land from that identified on the deposited plans as within the limits of land to be acquired or used for the purposes of the Proposed Scheme;
  - b. without introducing any new or different significant environmental effects; and
  - c. without prejudicing the safe, timely and economic delivery of the Proposed Scheme.

# Parkgate – undergrounding

- The estimated additional cost of undergrounding the Parkgate connection is £65million.
- There is no national policy requirement (see National Policy Statement EN-1 and EN-5), for undergrounding in this location because, amongst other things:
  - it is not a densely populated area; or
  - the proposed route alignment is not within a protected landscape (e.g. Area of Outstanding Natural Beauty).
- Undergrounding the connection would be likely to require an Additional Provision.
- Undergrounding the Parkgate connection would result in:
  - more complex construction and added disruption to existing roads and utility connections;
  - during construction, a moderate environmental worsening compared to overhead lines due to the greater scale of construction and land clearance; and
  - during operation, a moderate environmental improvement compared to overhead lines due to the limited extent of visible above ground equipment.
- In summary, undergrounding this connection would result in a significant cost increase, with no significant engineering or environmental benefit.



**Image showing construction of two underground circuits (Parkgate requires three circuits)**

# Indicative cost estimates of options

Option	Cost
Option 1 (hybrid Bill scheme)	Estimated at £89million. This option is no longer viable on its own as it does not deliver HS2 or National Grid requirements.
Option 2 (incorporating Option 1)	£173million
Option 3 (incorporating Option 1)	No cost estimated as it does not deliver HS2 or National Grid requirements but is expected to be more expensive than Option 2.
Option 4	No cost estimated due to unacceptable level of interaction with HS2 construction work but, on a pro-rata basis, is expected to be at least 20% higher than Option 5.
Option 5 (AP2 revised scheme – Parkgate)	£105million
Option 5 - underground	£170million
Lawnmeadow Covert option	Expected to be similar to Option 2.

# Construction traffic at Newborough

## Use of Large Goods Vehicles

1.1 The Secretary of State will require the nominated undertaker to avoid the use of the B5234 as it passes through Newborough as a Large Goods Vehicle route in connection with the Overhead Line Works during the weekday hours of 08:15 and 09:30 and 15:00 and 16:30 during school term time where reasonably practicable, except:

1.1.1 in circumstances where it is required to do so by the relevant planning authority under the powers conferred on it by paragraph 6 of Schedule 17 to the Bill;

1.1.2 in circumstances where it would not be reasonably practicable to use other access routes, for example (but not limited to) in respect of any utilities works proposed within Newborough as part of the Proposed Scheme; and

1.1.3 in the case of an emergency or if directed to do so by the police or emergency services.

# Engagement (1 of 3)

- **4 September 2018** – HS2 Hybrid Bill Team meeting with Councillors of Abbots Bromley and Hoar Cross Parish Councils (combined Parish Councils).
  - Discussed proposed change to traction power supply for the railway
  - Provided overview of Hybrid Bill and Petitioning process
  - *NB - Councillors from Newborough Parish Council had confirmed attendance but did not attend the meeting.*
- **19 October 2018** – Public information event, Abbots Bromely
  - Attended by 238 members of the communities, including landowners
  - Provided information on proposed grid supply point (GSP) connection through parishes of Abbots Bromley, Hoar Cross and Newborough
  - Technical specialists and National Grid representatives had discussions with attendees on specific questions and concerns



# Engagement (2 of 3)

- **19 October 2018** – HS2 meeting with Councillors and representatives of combined Parish Councils.
  - Discussed progress in the detail of the GSP connection since last meeting
  - HS2 technical specialists and National Grid representatives were in attendance
- **November 2018 – March 2019** – HS2 engagement with directly affected landowners
  - Individual meetings with over 25 land owners directly affected by the Parkgate GSP connection
  - All meetings attended by HS2 technical specialists
- **6 February 2019** – Parkgate GSP connection residents' surgery
  - 14 meetings held with individuals not directly affected by the proposed GSP connection
  - HS2 technical specialists provided detail of the grid supply connection in advance of AP2 deposit
  - Discussed specific concerns
  - National Grid representatives were in attendance

# Engagement (3 of 3)

- **6 February 2019** – HS2 meeting with Councillors of combined Parish Council
  - Provided and discussed detail of the GSP connection in advance of AP2 deposit
  - National Grid representatives also present
- **8 – 11 February 2019** – Additional Provision 2 deposit and Parkgate Report
  - Informed the lead representative of combined Parish Councils, representative land agents, and recently engaged individuals on the deposit of Additional Provision 2, publication of accompanying Environmental Statement documentation, and publication of Parkgate report.
- **2 April 2019** – Parkgate Report addendum
  - Informed Parkgate Steering group and all others who have petitioned against the Parkgate GSP connection of publication of addendum, providing further detail on the environmental and cost comparison between the Parkgate OHL and underground options.
- **September 2018 – April 2019** - Ongoing dialogue, by email and telephone, between HS2 Petition Management and lead representative of the combined Parish Councils.