04.

The Study Area

4. The Study Area

4.1 Introduction

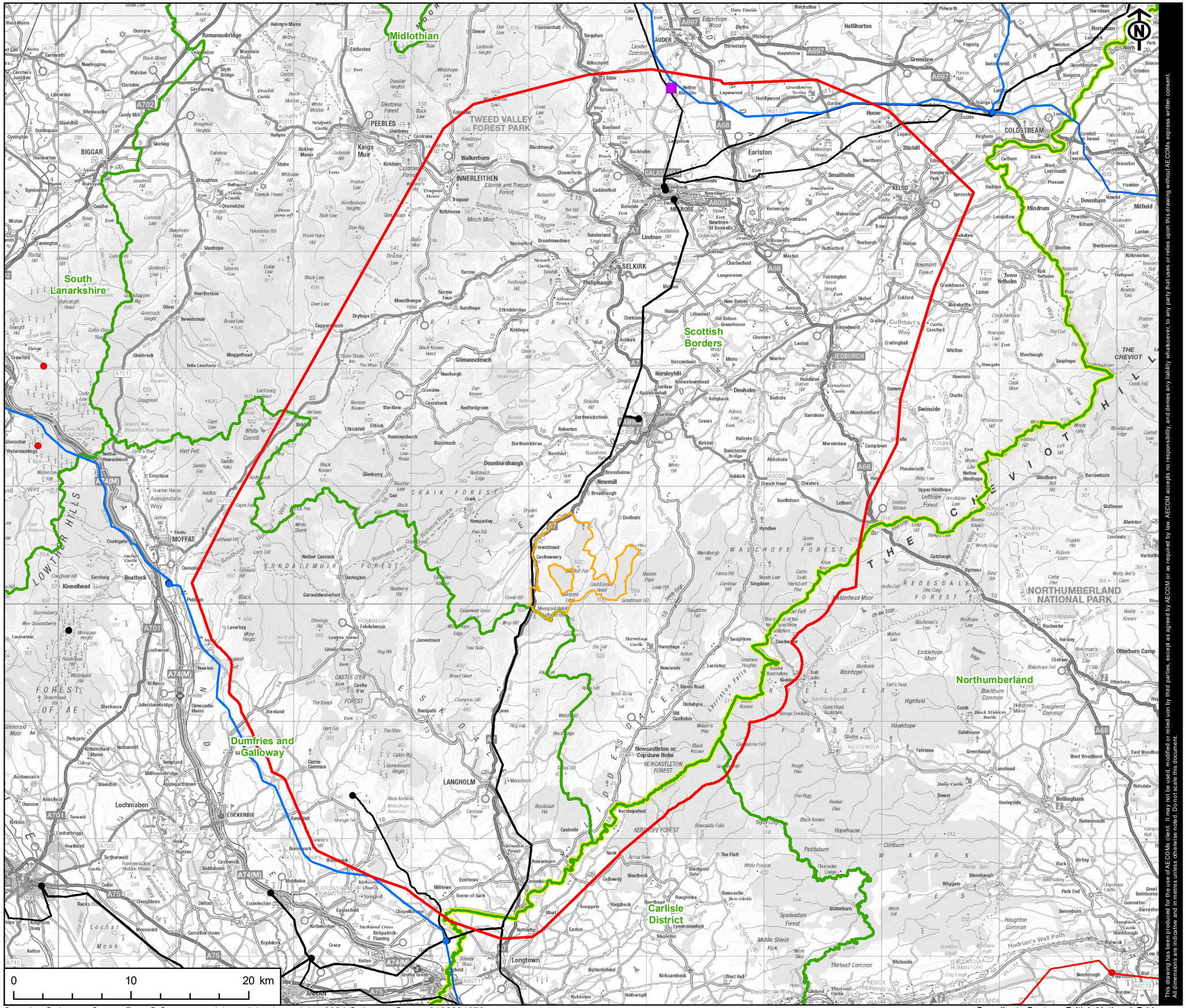
This section describes the Study Area and the key environmental and technical constraints within it. These form the basis of routeing and siting considerations which inform the identification and assessment of alternative route options and substation sites. The SP Energy Networks Project has a fixed 'start' point at the proposed Gala North Substation west of Lauder in the Scottish Borders, however, the 'end' point' (where it crosses the Scotland-England border into NGET's licence area) is dependent on the connection point in the northwest of England to which wider Project is routed to. For the purposes of this routeing and siting study the 'end' has been taken to be a section of the Scotland-England border extending from west to east from the River Sark to Kielder.

4.2 Description of the Study Area

The extents of the Study Area, illustrated in Figure 7, have been informed by the location of the 'start' and 'end' points as well as the requirement to connect proposed wind generation to the electricity network via a new substation in the south of Scotland. The northern extent of the Study Area has been defined by the proposed Gala North Substation and the southern extent by the Scotland-England border which coincides with the boundary between SP Transmission and NGET's licence areas. NGET will be responsible for identifying and assessing alternative routes within its licence area from south of the Scotland-England border to the Carlisle area. The western and eastern extents of the Study Area have largely been established taking account of SP Transmission's statutory duties and in particular the directness of route options which they would enable. Extending the Study Area too far east or west would only serve to increase the length of potential route options without any benefit. The western extent of the Study Area has largely been defined by the Tweedsmuir Hills and Moffat Hills while the eastern extent of the Study Area has been defined by the Cheviot Hills and Kielder Forest. This establishes a large Study Area which enables the identification and consideration of a range of route and site options while also seeking to balance potential adverse environmental effects with technical feasibility and economic viability.

As illustrated in Figure 7 the majority of the Study Area is within the Scottish Borders Council area with a small part to the south/southwest within the Dumfries and Galloway Council area. The southern extent of the Study Area extends over the Scotland-England border into Cumberland Council and Northumberland County Council to the east for completeness and to ensure that an appropriate level of consideration is given to routeing considerations that might influence or constrain route options in the border area including those which could affect onward routeing within NGET's licence area. As noted previously the identification and assessment of alternative route options within NGET's licence area is outside of the scope of this study.

Project Management Initials: DR Designer: LC Checked: DF Approved: DR



Scale @ A3 1:300,000

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Coordinate System: British National Grid

AECOM

PROJECT
Cross Border Connection -
Gala North Substation to Border

CLIENT
SP Energy Networks

KEY
- 🟥 Study Area
- 🟪 Proposed Gala North Substation Location
- 🟧 Proposed Teviot Wind Farm Boundary
- 🟩 Local Authority Boundary
- ━ Scotland / England Border

Existing Transmission System
- ● 132 kV Substation
- ● 275 kV Substation
- ● 400 kV Substation
- ━ 132kV OHL
- ━ 275kV OHL
- ━ 400kV OHL

TITLE
Figure 7
The Study Area

REFERENCE
GH_20240827_RS_7_v2

SHEET NUMBER 1 of 1

DATE 27/08/24

4.3 Areas of the Highest or High Environmental Value

The following sub-sections identify areas or sites of the highest or high environmental value within the Study Area taking account of Holford Rule 1 and supplementary notes and clarifications. The following sections should be read with reference to Figure 8 and the plans contained in Appendix C.

Landscape Designations

Landscape designations of the highest or high environmental value comprise National Parks, National Scenic Areas (NSA) and Wild Land in Scotland and National Parks and National Landscapes (formerly Areas of Outstanding Natural Beauty (AONBs)) in England.

There is one designation of the highest environmental value wholly within the Study Area; the Eildon and Leaderfoot NSA located to the east of Melrose where the Leader Water drains into the River Tweed. The Wildland Area: 02. Talla- Hart Fell extends very slightly into the Study Area on its western edge. The Study Area does not encompass any nationally designated landscapes in England, although the Northumberland National Park lies immediately to the east at Carter Bar on the edge of the Cheviot Hills.

Ecology and Ornithology Designations

Ecological and ornithological sites of the highest or high environmental value comprise Special Areas of Conservation (SACs), Special Protection Areas (SPAs) and Sites of Special Scientific Interest (SSSIs) as well as Ramsar sites.

Special Areas of Conservation

There are seven SACs located wholly or partly within the Study Area and summarised in Table 4 below. Route options should be developed to avoid SACs in order to prevent directly impacting them. The location and/or scale of SACs within the Study Area is such that they are considered to be avoidable with careful routeing, however the River Tweed SAC is an exception. It comprises of the River Tweed and its tributaries many of which flow across the Study Area. Within the north of the Study Area (north of the River Tweed) tributaries flow in a southern or southeastern direction draining into the River Tweed while to the south tributaries typically flow northeast across the Study Area draining into the River Tweed. The number of tributaries, particularly to the south of the River Tweed, means that the designation cannot be avoided, and route options will be required to cross the SAC. However, where the River Tweed SAC requires to be crossed by route options, impacts can be avoided through design of the route alignment and careful consideration of tower locations.

Table 4 Special Areas of Conservation within the Study Area

Designated Site	SAC Qualifying Interests	Location
Moorfoot Hills (also SSSI)	Habitats comprising blanket bogs and dry heaths	Large-scale site located to northwest of the Study Area partly extending into it

Designated Site	SAC Qualifying Interests	Location
River Tweed	Habitats (floating vegetation dominated by crowfoot) and protected species (fish and mammals)	Linear site extending throughout the Study Area comprising multiple watercourses including the River Tweed and its tributaries
Threepwood Moss (also SSSI)	Habitats comprising active and degraded raised bogs	Small-scale site located entirely within the Study Area south of the proposed Gala North Substation
Borders Woods (also overlaps a number of different SSSIs)	Habitats comprising mixed woodland on base-rich soils associated with rocky slopes	Comprises a number of small-scale sites all located within the Study Area (south of Hawick, east of Newton St Boswells and south of Cleuch Head
Whitlaw and Branxholme (also overlaps a number of different SSSIs)	Habitats comprising fens, slender green feather moss and very wet mires	Small-scale site comprised of two discrete components located entirely within the Study Area to the southwest of Hawick, west of the A7
Moffat Hills (also SSSI)	Habitats including heaths, blanket bog and montane acidic grasslands	Relatively large-scale site located to west of the Study Area partly extending into it
Border Mires, Kielder-Butterburn	Habitats including blanket bogs, dry heaths, west heaths and transition mires	Large-scale comprising multiple components extending along the Scotland-England border
Moorfoot Hills (also SSSI)	Habitats comprising blanket bogs and dry heaths	Large-scale site located to northwest of the Study Area partly extending into it
River Tweed	Habitats (floating vegetation dominated by crowfoot) and protected species (fish and mammals)	Linear site extending throughout the Study Area comprising multiple watercourses including the River Tweed and its tributaries
Threepwood Moss (also SSSI)	Habitats comprising active and degraded raised bogs	Small-scale site located entirely within the Study Area south of the proposed Gala North Substation

Designated Site	SAC Qualifying Interests	Location
Borders Woods (also overlaps a number of different SSSIs)	Habitats comprising mixed woodland on base-rich soils associated with rocky slopes	Comprises a number of small-scale sites all located within the Study Area (south of Hawick, east of Newton St Boswells and south of Cleuch Head

Special Protection Areas

There is one SPA located wholly within the Study Area; the Langholm-Newcastleton Hills SPA described in Table 5. It occupies a large area (over 7,000ha) to the southeast of the Study Area straddling the boundary between Dumfries and Galloway and the Scottish Borders. Route options should be developed to avoid the SPA as well as take account of potentially functionally linked land in its vicinity in order to prevent directly impacting its qualifying interests.

Table 5 Special Areas of Conservation within the Study Area

Designated Site	SPA Qualifying Interests	Location
Langholm-Newcastleton Hills SPA (also SSSI)	Supports a breeding population of hen harrier	Large-scale site located to the southeast of the Study Area south of the proposed Teviot Wind Farm

Sites of Special Scientific Interest

There are more than 60 SSSIs located throughout the Study Area ranging in size and basis of designation (i.e. designated for biological and/or geological reasons). A number of the sites coincide with the SACs and SPA summarised above albeit the reasons for their designation may differ. Table 6 identifies the SSSIs designated for biological and geological reasons which are wholly or partly present within the Study Area (note those sites designated only for geological reasons are identified in Table 8). Route options should be developed to avoid SSSIs in order to prevent directly impacting them. There is a large number of SSSIs within the Study Area, however, a combination of their size and distribution is such that they are generally considered to be avoidable with careful routeing. As described in section 3 some smaller sites of high environmental value may be more appropriately addressed in developing a detailed route alignment. There are some localised areas where a small number of SSSIs are more closely clustered together such as east of Selkirk and south Hawick which are considered to be slightly more constrained and likely to have a greater influence on routeing.

Table 6 Sites of Special Scientific Interest (biological) within the Study Area

Designated Site	SSSI Qualifying Interests	Location
Long Moss-Drinkstone Hill	Habitats including fens and lowland grasslands	Small-scale site located wholly within the Study Area to the northwest of Hawick
Longnewton Cutting	Habitat comprising lowland grassland	Small-scale site located wholly within the Study Area to the southeast of Melrose
Avenel Hill and Gorge	Habitat comprising upland oak woodland as well as invertebrates	Small-scale site located wholly within the north of the Study Area to the north of Tweedbank
Lurgie Loch	Habitat comprising basin fen and invertebrates	Small-scale site located wholly within the northeast of the Study Area
Lynnwood-Whitlaw Wood, Slitrig	Habitat comprising upland mixed ash woodland	Small-scale site located south of Hawick coinciding with part of the Borders Wood SAC.
Minto Craigs	Habitat comprising upland mixed ash woodland as well as plants, lichens and invertebrates	Small-scale site located wholly within the Study Area to the northeast of Hawick
Moffat Hills	Geological and biological with the latter comprising upland habitats and plants	Relatively large-scale site located to west of the Study Area coinciding with the Moffat Hills SAC
Newtown St Boswells Woods	Habitat comprising upland mixed ash woodland	Small-scale site located east of Newton St Boswell coinciding with part of the Borders Wood SAC
Plora Wood	Habitat comprising upland oak woodland	Small-scale site located to the west of the Study Area south of Innerleithen
Selkirk Racecourse Moss	Habitat comprising basin fen as well as its plant assemblage	Small-scale site located towards the north of the Study Area east of Selkirk

Designated Site	SSSI Qualifying Interests	Location
St Mary's Loch	Freshwater habitat comprising oligo-mesotrophic loch	Small-scale site located on the western margins of the Study Area coinciding with the River Tweed SAC
Threepwood Moss	Habitat comprising raised bog	Small-scale site located entirely within the Study Area south of the proposed Gala North Substation coinciding with Threepwood Moss SAC
Tweedwood-Gateheugh	Habitat comprising upland oak woodland as well as invertebrates	Small-scale site located on the banks of the River Tweed to the east of Melrose
Whitlaw Mosses	Habitat comprising basin fen as well as invertebrates and plants	Small-scale site located entirely within the Study Area to the southwest of Hawick, west of the A7 coinciding with Whitlaw and Branxholme SAC
Whitlaw Rig	Habitat comprising lowland grassland	Small-scale site located entirely within the Study Area to the east of Selkirk
Whitmuirhall Loch	Habitat comprising fens including basin fen	Small-scale site located entirely within the Study Area to the east of Selkirk
Williamhope	Habitats including lowland grassland and heathland as well as fens	Moderate sized site located entirely within the Study Area to the east of Traquair Forest
Woodhead Moss	Habitats comprising basin fen and wet woodland	Small-scale site located entirely within the Study Area to the north of Ancrum
Whitlaw Bank to Hardies Hill	Habitat comprising lowland grassland as well as butterflies and invertebrates	Small-scale site located entirely within the Study Area to the south of Hawick
Adderstonlee Moss	Habitat comprising basin fen	Small-scale site located entirely within the Study Area to the southeast of Hawick

Designated Site	SSSI Qualifying Interests	Location
Bell's Flow	Habitat comprising intermediate bog	Small-scale site located to the south of the Study Area south of Langholm
Bemersyde Moss	Habitat comprising open water transition fen as well as breeding bird species	Small-scale site located to the north of the Study Area east of Newton St Boswells
Lindean Reservoir	Freshwater habitat comprising base-rich loch as well as invertebrates	Small-scale site located entirely within the Study Area to the east of Selkirk
Langholm-Newcastleton Hills	Geological and biological with the latter comprising upland habitats and breeding bird assemblages including moorland birds, wader and raptor species	Large-scale site located to the southeast of the Study Area south of the proposed Teviot Wind Farm coinciding with the Langholm-Newcastleton Hills SPA
Ashkirk Loch	Habitat comprising basin fen	Small-scale site located entirely within the Study Area to the northwest of Hawick
Kielderhead Moors: Carter Fell to Peel Fell	Habitat comprising blanket bog and heathland well as breeding bird assemblages	Moderate sized site located entirely within the Study Area on its eastern margin on the Scotland-England border
Kingside Loch	Habitats comprising basin fen and oligotrophic loch	Small-scale site located entirely within the Study Area to the north of Craik Forest
Kirkton Burn Meadow	Habitat comprising lowland grassland	Small-scale site located entirely within the Study Area to the east of Hawick
Kirkhope Linns	Habitat comprising upland mixed ash woodland	Small-scale site located entirely within the Study Area to the south of Ettrickbridge
Kippilaw Moss	Habitat comprising basin fen	Small-scale site located entirely within the Study Area to the west of Hawick

Designated Site	SSSI Qualifying Interests	Location
Slaidhills Moss	Plants comprising bryophyte assemblage	Small-scale site located entirely within the Study Area to the southwest of Hawick coinciding with Whitlaw and Branxholme SAC
Herman Law and Muchra Cleuchs	Habitat comprising upland birch woodland	Small-scale site comprising three closely located components on the western margins of the Study Area
Faldonside Loch	Freshwater habitat comprising base-rich loch	Small-scale site located entirely within the Study Area to the south of Galashiels
Gordon Moss	Habitat comprising wet woodland	Small-scale site located to the north of the Study Area to the east of the proposed Gala North Substation
Glenkinnon Burn	Habitats comprising upland mixed ash woodland and upland birchwood as well as lichen assemblage	Small-scale site comprising two components located entirely within the Study Area to the east of Traquair Forest adjacent to Williamhope SSSI
Dryfe Water	Habitats comprising upland mixed ash woodland	Small-scale site located on the southwestern margins of the Study Area
Akermoor Loch	Freshwater habitat comprising mesotrophic loch	Small-scale site located entirely within the Study Area to the south of Ettrickbridge
Clarilaw Grasslands	Habitats comprising lowland calcareous grassland and invertebrates	Small-scale site comprised of two components located entirely within the Study Area to the south of Melrose
Dunhog Moss	Habitat comprising basin fen and invertebrates	Small-scale site located entirely within the Study Area to the south of Selkirk

Designated Site	SSSI Qualifying Interests	Location
Gattonside Moss	Habitat comprising basin fen and invertebrates	Small-scale site located entirely within the Study Area to the north of Gattonside
Colmsliehill Junipers	Woodland comprising juniper scrub	Small-scale site located entirely within the Study Area south of the proposed Gala North Substation
Allan Water, Hillhead	Habitats comprising lowland calcareous grassland	Small-scale site located entirely within the Study Area to the southwest of Hawick east of the A7
Catshawhill	Habitat comprising lowland neutral grassland and basin fen	Small-scale site located entirely within the Study Area to the west of Jedburgh
Cragbank and Wolfehopelee	Habitat comprising upland mixed ash woodland and invertebrates	Small-scale site located entirely within the Study Area to the south of Cleuch Head
Buckstruther Moss	Habitat comprising basin fen and invertebrates	Small-scale site located entirely within the Study Area to the west of Bonchester Bridge
Makerstoun - Corbie Craigs to Trows' Craigs	Habitat comprising lowland neutral grassland	Small-scale site located entirely within the Study Area to the southwest of Kelso adjacent to the River Tweed SAC and SSSI
Branxholme Wester Loch	Freshwater habitats comprising oligotrophic loch and open water transition fen	Small-scale site located entirely within the Study Area to the southwest of Hawick, west of the A7 overlapping with part of Whitlaw and Branxholme SAC
Branxholme Easter Loch	Freshwater habitats comprising base-rich loch	Small-scale site located entirely within the Study Area to the southwest of Hawick, west of the A7
Jedwater Woodlands	Habitat comprising upland oak woodland and invertebrates	Small-scale site comprising three components located south of

Designated Site	SSSI Qualifying Interests	Location
		Jedburgh along the Jed Water Valley
Blind Moss	Habitat comprising basin fen and invertebrates	Small-scale site located entirely within the Study Area to the northwest of Hawick
Henderland Bank	Habitat comprising upland mixed ash woodland	Small-scale site located on the western margins of the Study Area west of St Mary's Loch SSSI
Moorfoot Hills	Habitats comprising blanket bog, upland habitats and upland birch woodland as well as breeding bird assemblages	Large-scale site located to northwest of the Study Area partly extending into it coinciding with the Moorfoot Hills SAC
River Tweed	Freshwater habitats as well as freshwater and estuarine fish species, otters and invertebrates	Linear site extending throughout the Study Area comprising multiple watercourses including the River Tweed, Whiteadder Water, Blackadder Water, Yarrow Water, Ettrick Water, River Teviot and Bowmont Water
Alemoor West Loch and Meadow	Habitat comprising flood plain fen and plant assemblage.	Small-scale site located entirely within the Study Area to the west of Hawick south of the B711
Riskinhope	Habitat comprising flood plain fen	Small-scale site located on the western margins of the Study Area adjacent to St Mary's Loch SSSI and part of the River Tweed SAC and SSSI
Hummelknowes Moss	Habitat comprising basin fen	Small-scale site located entirely within the Study Area to the south of Hawick
Kielder Mires	Habitat comprising a range of mire types including blanket mire, valley mires and intermediate mires	Large scale site comprising multiple components along the Scotland-England border

Designated Site	SSSI Qualifying Interests	Location
Jockie's Syke	Fossil assemblage	Small scale site located to the south of the Scotland-England border
Kielderhead and Emblehope Moors	Habitat comprising blanket bog, dry heathland, grassland complexes and wet heath	Large-scale located to the east of the Study Area on the Scotland-England border

Cultural Heritage and Archaeology

Cultural heritage and archaeological sites of the highest or high environmental value within the Study Area comprise scheduled monuments, inventory battlefields and listed buildings as well as Gardens and Designed Landscapes.

Scheduled Monuments

There are almost 400 scheduled monuments located within the Study Area (seven of which are located south of the Scotland-England border). These are present throughout the Study Area ranging in size from discrete small-scale sites such as the remains of hillforts or settlement to relatively larger sites such as Newstead Roman Military Complex north of Newtown St Boswells or Stobs Camp south of Hawick to linear features such as the Faldonside to Kippielaw linear earthwork or the Catrail. There are a number of locations where the distribution of scheduled monuments means that they are closely clustered together and assets may also be interrelated. These areas are generally considered to be slightly more constrained and likely to have a greater influence on routeing. The identification of route options in proximity to scheduled monuments considers their location as well as their setting as far as possible.

Inventory Battlefields

There are three inventory battlefields present within the Study Area, listed below. The boundaries of inventory battlefields define the area in which the main events of the battle are considered to have taken place and where associated physical remains and archaeological evidence occur or may be expected.

- Battle of Darnick located at the village of Darnick to the west of Melrose. The inventory battlefield site occupies an area of approximately 110ha extending south and west from the River Tweed over the village to west of the A6091.
- Battle of Ancrum Moor located to the north of the village of Ancrum. The inventory battlefield site occupies a large area of countryside (approximately 1,300ha) with some development most notably the A68 which bisects it in south-easterly direction.
- Battle of Philiphaugh located within and to the west of the town of Selkirk. The inventory battlefield site occupies an area of just over 500ha extending from within the town of Selkirk over the village of Philiphaugh to the A708 and the Ettrick Water.

Listed Buildings

There are nearly 2,000 listed buildings present within the Study Area (Category A: 133, Category B: 822 and Category C: 964). The majority of listed buildings are located within settlements where they coincide with conservations areas. Some listed buildings are present in more rural open areas, however, they are much less prevalent particularly within the central part of the Study Area moving south of Hawick where terrain and landform are more elevated.

Gardens and Designed Landscapes

There are 16 Gardens and Designed Landscapes located within the Study Area. These are predominantly located within the northern part of the Study Area with a number of Gardens and Designed Landscapes extending west to east along the River Tweed Valley from Innerleithen to Kelso. A number of the Gardens and Designed Landscapes coincide with other sites or features of cultural heritage interest including scheduled monuments and listed buildings.

Table 7 Gardens and Designed Landscapes within the Study Area

Garden and Designed Landscape	Location
The Glen	Located on the western margins of the Study Area and within which there are a number of listed buildings
Traquair House	Located to the west of the Study Area south of Innerleithen and within which there are a number of listed buildings
Bowland	Located to the north of the Study Area southwest of the proposed Gala North Substation and within which there are listed buildings
Fairnilee	Located to the north of the Study Area south/southwest of Galashiels on the River Tweed and within which there are listed buildings
Abbotsford	Located in the northern part of the Study Area south of Galashiels and within which there are listed buildings as well as a scheduled monument
Bowhill	Located in the northern part of the Study Area west/southwest of Selkirk and within which there are listed buildings and a scheduled monument
The Haining	Located in the northern part of the Study Area south of Selkirk and within which there are listed buildings and a scheduled monument

Garden and Designed Landscape	Location
Carolside And Leadervale	Located to the north of the Study Area southeast of the proposed Gala North Substation and within which there are listed building
Bemersyde	Located to the east of Melrose between the River Tweed to its west and the B6356 to its east within which there are listed buildings
Dryburgh Abbey	Located to the east of Newton St Boswells within which there is Dryburgh Abbey scheduled monument as well as a number of listed buildings
Mertoun	Located to the east of St Boswells which is bisected by the River Tweed and within which there are a number of listed buildings
Monteviot	Located to the north of Jedburgh which is bisected by the River Tweed and the A68 and within which there are a number of listed buildings
Mellerstain	Located to the east of Earlston in the northeast of the Study Area adjacent to the A6809 and within which there are number of listed buildings
Newton Don	Located to the north of Kelso the northeast of the Study Area adjacent to the A6809 and within which there are number of listed buildings
Floors Castle	Located on the western margins of the Study Area and within which there are a number of listed buildings
Hendersyde	Located to the west of the Study Area south of Innerleithen and within which there are a number of listed buildings

Other Designations

Other sites of the highest or high environmental value within the Study Area include designations relating to geology and woodland.

Geological Designations

There are a number of Geological Conservation Review (GCR) sites present within the Study Area containing geological and/or geomorphological features of national or international importance. While GCR sites are not identified in the Holford Rules and supplementary notes or clarifications as being of the highest or high environmental value, the majority of GCR sites are also designated as SSSIs for their geological interests. As a result, such sites

are considered to be sites of high environmental value for the purposes of this study. Table 8 identifies the SSSIs/GCRs are present within the Study Area.

Table 8 Sites of Special Scientific Interest (geological) within the Study Area

Designated Site	SSSI Qualifying Interests	Location
Palmers Hill Railway Cutting	Geological	Small-scale site located to the east of the Study Area east of Hermitage Castle
River Esk, Glencartholm	Geological	Small-scale site located east of the Study Area south of Langholm
Thornylee Quarry	Geological	Small-scale site located to the north of the Study Area adjacent to the A72
Bigholms Burn	Geological	Small-scale site located to the south of the Study Area south of Langholm
Hareheugh Craigs	Geological	Small-scale site located on the northeastern margins of the Study Area
Kershope Bridge	Geological	Small-scale site located on the southeastern margins of the Study Area straddling the Scotland-England border
Grieston Quarry	Geological	Small-scale site located on the northwestern margins of the Study Area
Penton Linns	Geological	Small-scale site located on the Liddel Water to the north and south of the Scotland-England border

Woodland designations

The Ancient Woodland Inventory (AWI) identifies three main categories of woodland which are considered likely to be of value for biodiversity and/or cultural reasons: ancient woodland of semi-natural origin (category 1a and 2a), long-established woodland of plantation origin (category 1b and 2b) or other woodlands (category 3). While ancient woodland is not identified in the Holford Rules as an area or site of highest or high environmental value, the notes advise that such areas should be identified on a project-by-project basis having regard to factors including policy. National Planning Framework 4 (NPF4) highlights the importance irreplaceable habitats and while this does not include specific reference to ancient woodland such sites may be considered to be irreplaceable. Adopting a precautionary approach,

noting NatureScot's guidance on AWI which highlights the provisional nature of the inventory, AWI sites are considered to be sites of high environmental value and should be avoided as much as possible.

There are more than 500 sites on the AWI present within the Study Area (comprising 1a: 202 sites, 1b: 20 sites, 2a: 126 sites, 2b: 130 sites and 3: 31 sites). Sites are scattered throughout the Study Area and include sites on periphery of larger scale plantation forestry, sites within Gardens and Designed Landscapes as well as more isolated woodlands in open countryside. Towards the south of the Study Area, to the north and south of Langholm following the A7 as well as extending south of Kershope Foot there are a larger number of AWI sites more closely located together which may increase the level of constraint in these areas.

Settlement

As described in section 3 the Holford Rules do not address settlements or residential properties, however, the guidance set out in supplementary notes and clarifications advise "avoid routeing close to residential areas as far as possible on grounds of general amenity" and "in rural areas avoid as far as possible dominating isolated house, farms or other small-scale settlements". For the purposes of this routeing and siting study, settlements and properties have been defined as areas of the highest amenity or environmental value. Smaller clusters of properties or individual properties are considered to be of similar importance to settlements, however, their relative small-scale is such that they may be appropriately addressed through the identification of a detailed route alignment.

Larger towns and villages tend to be present to the north of the Study Area, for example along the River Tweed Valley including Innerleithen, Galashiels, Melrose and Kelso. Moving southwards in the Study Area larger settlements coalesce along the road network including Selkirk, Hawick and Langholm on the A7 and Jedburgh on the A68. Smaller villages are scattered in the wider areas surrounding these towns, however, south of Hawick, large parts of the Study Area are relatively unsettled due to the upland terrain and topography. Smaller villages and scattered properties are present along the A6068 which connects the A7 and the A68 as well as along the Liddesdale valley on the eastern boundary of the Study Area. This includes Bonchester Bridge on the A6068 and Newcastleton in the Liddesdale Valley.

4.4 Areas of Moderate or Low Environmental Value

The following sub-sections identify areas or sites of moderate or low environmental value within the Study Area. The Holford Rules do not refer to areas of moderate or low environmental value, however, the supplementary notes do highlight that consideration should be given to designations of regional and local importance. The following sections should be read with reference to Figure 8 and the plans contained in Appendix C.

Landscape Designations

There are a number of local landscape designations present within the Study Area that have been designated by Scottish Borders (Special Landscape Areas (SLAs)) or Dumfries and Galloway Councils (Regional Scenic Areas (RSAs)). These include:

- Tweedsmuir Uplands SLA1 – Located on the western margins of the Study Area in the Scottish Borders and extending northeast to southwest along the Tweedsmuir Hills.

- Tweed Valley SLA 2 – Located to the northwest of the Study Area in the Scottish Borders and extending west to east along the Tweed Valley to the east of Innerleithen.
- Tweed, Ettrick and Yarrow Confluences SLA 3 – Located adjacent to SLA1 and 2 in the and extending along the Tweed Valley and south towards Ettrickbridge.
- Tweed Lowlands SLA 4 – located to the east of the Study Area in the Scottish Borders extending eastwards from Newtown St Boswells along the Tweed Valley towards Kelso.
- Teviot Valleys SLA 5 – located to the east of the Study Area in the Scottish Borders extending southwest from Jedburgh to Hawick following the A698 and River Teviot.
- Cheviot Foothills SLA 8 – slightly extends into the Study Area on its eastern margin close to the Scotland-England border at Carter Bar.
- Moffat Hills RSA – Located on the western margins of the Study Area in Dumfries and Galloway where it follows the route of the A708.
- Langholm Hills RSA – Located to the south of the Study Area in Dumfries and Galloway straddling the A7 and extending over the hills to the west and east of the road.

Ecology and Ornithology Designations

Ecological sites or areas of moderate or low environmental value comprise Local Biological Sites (LBS) in the Scottish Borders and Local Nature Conservation Sites (LNCS) in Dumfries and Galloway as well as Scottish Wildlife Trust (SWT) Reserves:

- There are a number of LBS identified from Technical Note 4 which forms part of the proposed Scottish Borders Local Development Plan (LDP). These are typically small-scale sites which are scattered throughout the Study Area.
- No LNCS have been identified within the Study Area from a review of Technical Paper which forms part of the adopted Dumfries and Galloway LDP.
- There are a small number of SWT Reserves present within the Study Area (Gordon Moss, Bemersyde Moss, Hare and Dunhog Mosses and Whitlaw Wood) all of which are small-scale sites and, in some instances coincide with statutory designations.
- The Tarras Valley Nature Reserve is a community owned initiative occupying a large area extending north/northeast from Langholm along the Tarras Valley. Much of the Reserve coincides with the Langholm-Newcastleton SPA and SSSI.

Cultural Heritage and Archaeology

There are no cultural heritage or archaeological sites of moderate or low environmental designated within the Scottish Borders LDP, however, the Dumfries and Galloway LDP identifies Archaeologically Sensitive Areas and non-inventory Gardens and Designed Landscapes. Other non-designated assets, for example Historic Environment Record (HER) data is not considered as part of this study but would be taken into account as the detailed route alignment is developed.

Within the southwest of the Study Area there are:

- Four Archaeologically Sensitive Areas (17. Raeburfoot, 18. Tanlawhill, 19. Boyken Burn and 20. Dryfe Water) which also coincide with clusters of scheduled monuments.

- Six non-inventory Gardens and Designed Landscapes (Gillesbie House, Castle O'er, Grange, Westerhall, Langholm Lodge/Holmhead and Broomholm).

Tourism and Recreational Interests

There are a diverse range of tourism and recreational interests present within the Study Area ranging from visitor attractions such as historic homes or monuments to recreational walking and cycling routes or outdoor activities such as mountain biking as well as tourism-related businesses such as hotels, bed and breakfasts and camping sites. While the Holford Rules do not make reference to such interests, the supplementary notes and clarifications highlight that consideration should be given to potential effects on users of tourist and recreational routes. For the purposes of this study, this has included consideration of potential effects on key visitor attractions as well as tourist and recreational routes.

Tourism and recreational interests within the Study Area include:

- Long distance routes and trails that are within the Study Area including the Southern Upland Way, Borders Abbey Way, St Cuthberts Way, Roman and Reivers Route and Cross Borders Drove Road.
- A number of Foresty and Land Scotland (FLS) sites within the Study Area which provide outdoor recreational activities including Innerleithen, Yair, Craik Forest, Wauchope, Newcastleton and Castle O'er.
- A range of notable visitor attractions (a number of which are also designated for cultural heritage interests) including Traquair House, Abbotsford, Floors Castle and Hermitage Castle as well as Melrose Abbey.

Carbon-rich Soils and Peatland

The Carbon and Peatland 2016 Map identifies where areas of carbon-rich soils and peatlands are likely to occur. It shows the distribution of carbon and peatland classes (class 1 which is representative of nationally important carbon rich soils and deep peat to class 5 which is representative of peat soils). This is an important consideration in the identification of route options taking account of NPF4 which aims to guide development away from carbon-rich soils and peatland.

Class 1, 3 and 5 soils are present throughout the Study Area with particularly extensive areas on the western and eastern margins of the Study Area as well as south of the proposed Teviot Wind Farm. Small areas of Class 1 soils are present on the western margins of the Study Area with larger areas of Class 3 soils and in particular Class 5 soils present moving eastward across Craik Forest and towards the A7. Slightly larger areas of Class 1 soils are present to the east of the Study Area, firstly south of the proposed Teviot Wind Farm and coinciding with the Langholm-Newcastleton SPA and SSSI and on the eastern margins of the Study Area coinciding with Kielderhead Moors: Carter Fell to Peel Fell SSSI. Class 3 and 5 soils are present on much of the eastern part of the Study Area extending southwards from the A6088 to Kershope Foot.

Other Land Use Considerations

Forestry

There are large areas of forestry present throughout the Study Area. These include Traquair Forest, Craik Forest, Eskdalemuir Forest and Castle O'er Forest all of which lie to the west of the Study Area as well as Wauchope and Newcastleton Forests which are located to the southeast of the Study Area. The extent of forestry present within the Study Area means that it is an important consideration in the identification of route options taking account of NPF4 and the Scottish Government's Control of Woodland Removal Policy. These only support woodland removal where it would achieve significant and clearly defined public benefits. In most cases, compensatory planting may form part of this balance.

Land Capability for Agriculture

The Land Capability Map for Agriculture provides information on the types of crops that may be grown in different areas dependent on environmental and soil characteristics. Land is classed from 1-7 depending on its capability to support agriculture (with 1 indicating capability to support a wide range of crops and 7 indicating land of limited agricultural value). Much of the land within the Study Area falls within classes 4,5 and 6 and is therefore of lower agricultural capability. Some smaller area of class 3 are present in lower lying river valleys including along the River Tweed and Ettrick Water while a larger area of class 3 with some class 2 land is present to the northeast of the Study Area largely coinciding with lower lying land.

4.5 Landscape Character and Sensitivity

The following sub-sections provide an overview of landscape character within the Study Area and should be read with reference to Appendix D.

Landscape Baseline

The landscape character within the Study Area is defined by the use of Landscape Character Types (LCTs), which are areas of a type of landscape which may be replicated across different parts of the country and are not geographically defined as a unique area.

There are 26 LCTs within the Study Area, largely based on land use and topographical characteristics and defined by Nature Scot. No single LCT is prevalent but in general terms most are uplands/upland plateau or upland fringe/foothills with lowland areas and valley landscapes being less common. The LCTs are identified below in Table 9.

Table 9 Landscape Character Types within the Study Area

Landscape Character Types within the Study Area	
115: Upland Valley with Mixed Farmland	172: Upland Fringe- Dumfries and Galloway
103: Undulating Upland Fringe	171: Flow Plateau
91: Plateau Grassland-Borders	175: Foothills- Dumfries and Galloway,

Landscape Character Types within the Study Area	
114: Pastoral Upland Valley	90: Dissected Plateau Moorland,
116: Upland Valley with Woodland	119: Wooded Upland Fringe Valley
93: Southern Uplands with Scattered Forest- Borders	160: Narrow Wooded River Valley- Dumfries and Galloway
113: Upland Valley with Pastoral Floor	117: Pastoral Upland Fringe Valley
96: Southern Uplands with Forest- Border	177: Southern Uplands- Dumfries and Galloway
178: Southern Uplands with Forest- Dumfries and Galloway	176: Foothills with Forest- Dumfries and Galloway
94: Rolling Moorland	120: Lowland Valley with Farmland
101: Rocky Upland Fringe.	98: Rolling Foothills
99: Rolling Farmland – Borders	109: Lowland Margin with Hills
158: Coastal Flats- Dumfries and Galloway	102: Upland Fringe with Prominent Hills

A summary of the key characteristics of each LCT is provided in Appendix D of this report with the LCTs shown on Figure C.2. A summary of the landscape context across the study area is provided below.

The northeast portion of the study area largely comprises the Tweed lowlands which are characteristic of a typical Borders landscape of rolling mixed farmland with extensive estate landscapes with rich cultural heritage. Much of this landscape provides the foreground to the view of the Eildon Hills. The upland landscape to the west comprises large tracts of steep rolling landform and open plateau moorland with deep valleys and rounded peaks. Locally prominent areas of forestry are present along with pockets of shelterbelt planting within the undulating upland fringe. Between Teviot and the Tweed lowlands to the north, there are a varied mix of landscape elements with forestry, woodland, open hillsides and pastoral farmland which contrast with the well settled valleys.

From Teviot south the landscape is largely characterised by the southern uplands, a larger scale, rolling, upland landscape with large areas of forestry, open moorland and wind farms. This landscape transitions to the south to a generally undulating landscape with semi-improved pasture and many scattered farmsteads and small settlement. The southern most part of the study area is characterised by the flow plateau, an area of largely flat and gently rolling topography with an incline towards the Solway with large fields and pockets of riparian woodland.

Landscape Sensitivity

Landscape sensitivity studies can identify areas of relative sensitivity to particular development scenarios (An approach to landscape sensitivity assessment – to inform spatial planning and land management, Natural England, June 2019).

Landscape sensitivity can be defined as a measure of the resilience, or robustness, of a landscape to withstand specified change arising from development types or landscape management practices, without undue negative effects on the landscape and visual baseline and their value.

When considering the ability of the landscape of the study area to accommodate high voltage OHLs or substation infrastructure, factors which influence the sensitivity of a landscape to overhead lines needs to be considered. Factors which increase or reduce landscape elements' susceptibility to an OHL within the Study Area are set out in Appendix D.

Initial assessment of the sensitivity of the landscape baseline has been undertaken based on desktop analysis and focused site survey of landscape designations and their special qualities within the Study Area and the LCTs and their key characteristics. In determining landscape sensitivity professional judgement has been applied along with an understanding of how a high voltage OHL or substation would affect or fit in with the landscape. These findings are set out in Appendix D.

4.6 Other Routeing Considerations

Physical Environment

Physical environmental considerations, in particular altitude and slope angle influence the identification of route options. At higher altitudes OHLs would be exposed to higher wind and ice loading which would influence OHL design, for example potentially requiring tower steelwork to be strengthened, as well as potentially affecting the lifetime of OHL assets through increased risk of damage. Similarly steeper slopes can adversely affect the identification of OHL routes requiring more extensive groundworks to enable construction.

The majority of the Study Area is located between 200 and 500 metres Above Ordnance Datum (mAOD). Localised high points in excess of 500mAOD are locate on the western margins of the Study Area associated with the Tweedsmuir and Moffat Hills, south of the proposed Teviot Wind Farm where a number of hills are in excess of 500mAOD. Areas of lower altitudes, less than 200mAOD, are confined to the northeast and south of the Study Area as well as along river valleys including the River Tweed, Ettrick Water, Yarrow Water, River Teviot and Ale Water.

Steep slopes (greater than 22%) are present throughout the Study Area, however, they are most prevalent to the west of the Study Area on hillslopes on Tweedsmuir and Moffat Hills as well as along the A7 from Castleweary to south of Langholm. More localised steep slopes are present along some of the river valleys within the Study Area.

Other Electricity Transmission Infrastructure

There is a limited amount of existing electricity transmission infrastructure within the Study Area. Existing and proposed infrastructure which may influence the development of route options includes:

- Existing ZA Route: To the north of the Study Area, located to the north and east of the proposed Gala North Substation is an existing 400kV OHL route (referred to as the 'ZA route'). It is routed from Smeaton Substation outside of Edinburgh to Eccles Substation in the east of the Scottish Borders. The ZA route will also be turned into (i.e. connected to) the proposed Gala North Substation.
- Proposed Gala North Substation: the 'start' point for the SP Energy Networks Project, a proposed 400/132kV Substation located approximately 3-4km southwest of Lauder.
- Existing U and AT Routes: To the north of the Study Area to the north of Galashiels are two existing 132kV OHL routes referred (referred to as 'U' and 'AT' routes). These are routed from Galashiels to Eccles. It should be noted that these routes are to be consolidated and replaced by a new 132kV OHL from Galashiels to Eccles.
- Existing V Route: extending south through the centre of the Study is an existing 132kV route from Galashiels to Hawick and onwards across the Scotland-England border towards the Harker area (referred to as V route). For a large part of its length from just south of Hawick to just south of Langholm, the V route largely parallels the A7.
- Planned Dun Law Wind Farm Grid Connection: a new 132kV OHL from the existing Dun Law Wind Farm north of the Study Area to the proposed Gala North Substation and then southwards terminating to the north of Langlee, Galashiels where the existing U and AT routes converge.

Wind Farms

There is extensive wind farm development particularly within the south of the Study Area coinciding with higher elevations and more sparsely populated areas. Wind turbines create a physical obstacle to the routeing of OHLs and subject to proximity to them, their downwind wake effect may impact on conductors ('wires') causing increased levels of movement, or in more extreme cases causing conductor clashing where the conductors come into contact with each other. These effects could shorten the lifetime of OHL assets through increased risk of damage.

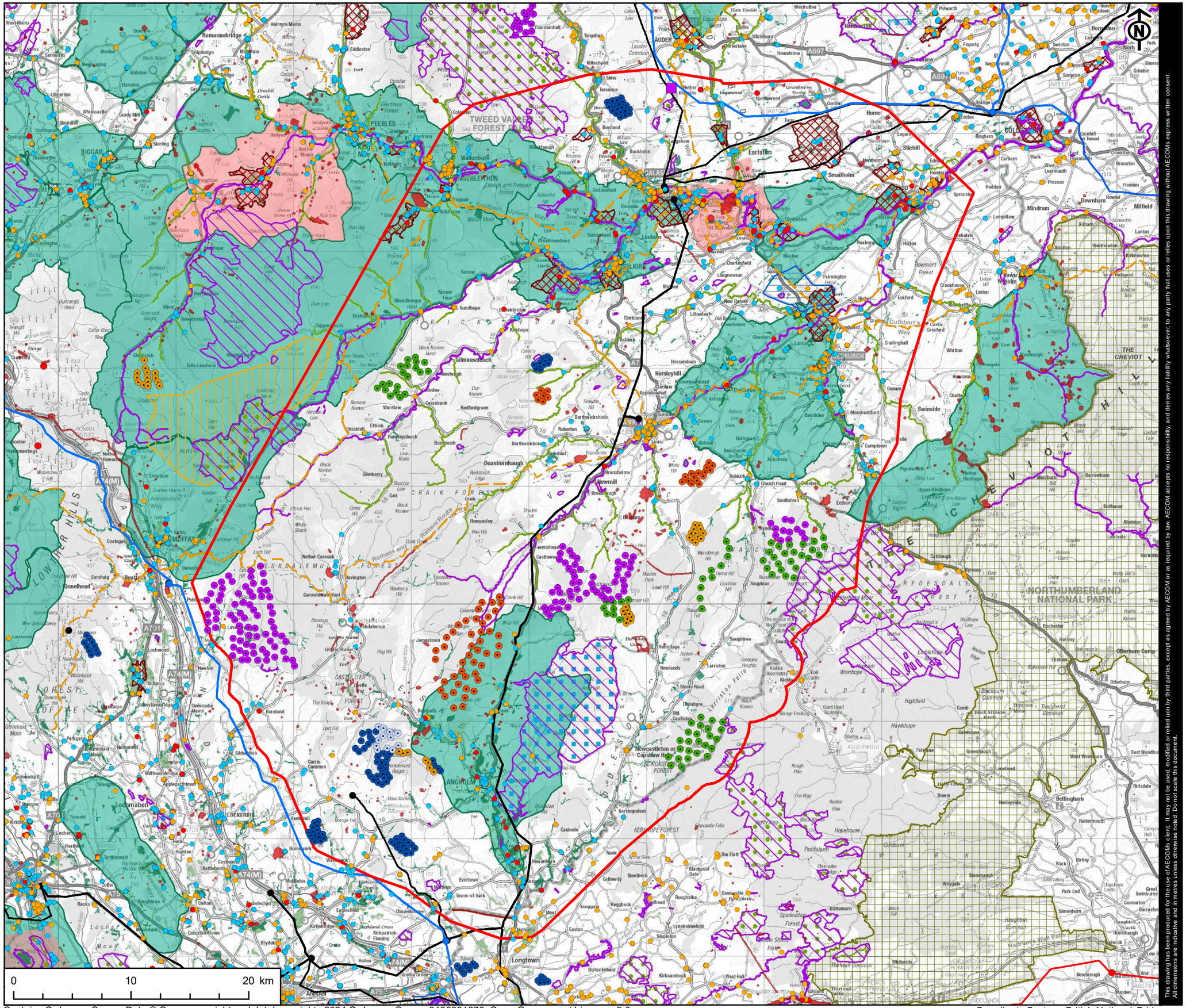
Existing and proposed wind farms have been identified from publicly available information held by Scottish Borders Council, Dumfries and Galloway Council and the Scottish Government Energy and Consents Unit (ECU) at the time of the routeing and siting study. Wind farms have been categorised according to their current status; for example operational, in construction or in planning. Wind farms are considered to be a significant engineering constraint which should be avoided taking account of good practice developed by the Electricity Networks Association (ENA).

Military Activity

Much of the Study Area coincides with a Ministry of Defence (MOD) Tactical Training Area (TTA). Area 20T extends west to east across the Study Area and southwards from Selkirk

across the Scotland-England border. The TTA is used to practice low-flying to 100 feet above ground level (i.e. approximately 30m above ground level).

Project Management Initials: DR Designer: LC Checked: DF Approved: DR



Coordinate System: British National Grid

AECOM

PROJECT
Cross Border Connection -
Gala North Substation to Border

CLIENT
SP Energy Networks

KEY

- Study Area
- Proposed Gala North Substation Location
- Category A / Grade I Listed Building
- Category B / Grade II* Listed Building
- Category C / Grade II Listed Building
- Scheduled Monument
- Garden and Designed Landscape
- Inventory Battlefield
- Special Protection Area (SPA)
- Special Area of Conservation (SAC)
- Site of Special Scientific Interest (SSSI)
- Ancient Woodland Inventory Site
- Woodland identified in the Native Woodland Survey of Scotland
- National Park
- National Scenic Area
- Locally Designated Landscape
- Wild Land Area
- Long Distance Trail

Wind Turbine Location (Status)

- Operational
- Consented
- Appeal/Public Inquiry
- Application Submitted
- Design/Scoping; Scoping
- Refused

Existing Transmission System

- 132 kV Substation
- 275 kV Substation
- 400 kV Substation
- 132kV OHL
- 400kV OHL

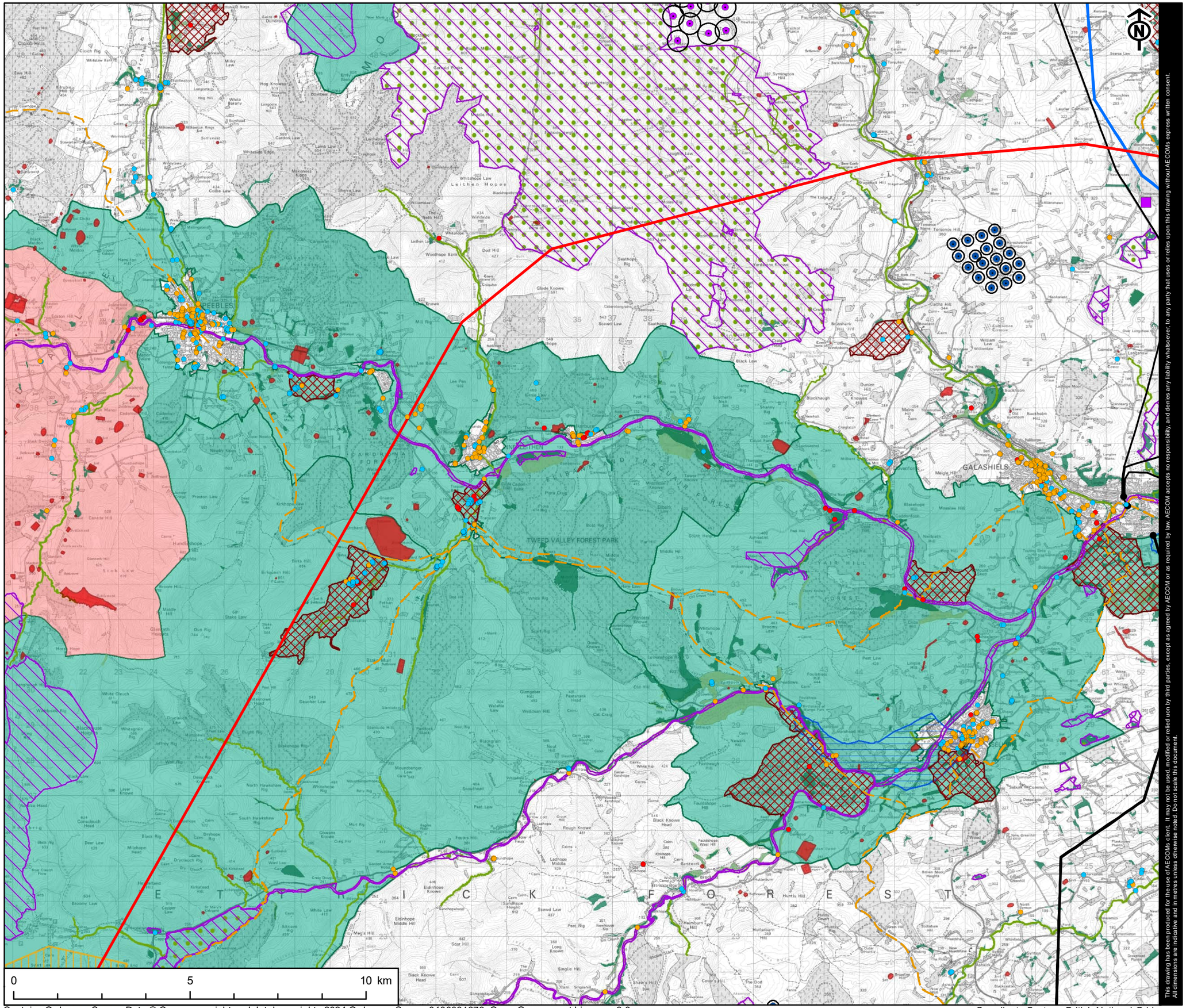
TITLE
Figure 8
Study Area - Key Routeing and Siting Constraints

REFERENCE
GH_20240827_RS_8_v2

SHEET NUMBER
1 of 7

DATE
27/08/24

Project Management Initials: DR Designer: LC Checked: DF Approved: DR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Eddleston
Longcote Hill
Hog Knowes
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Kirkhope Law
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Stob Law
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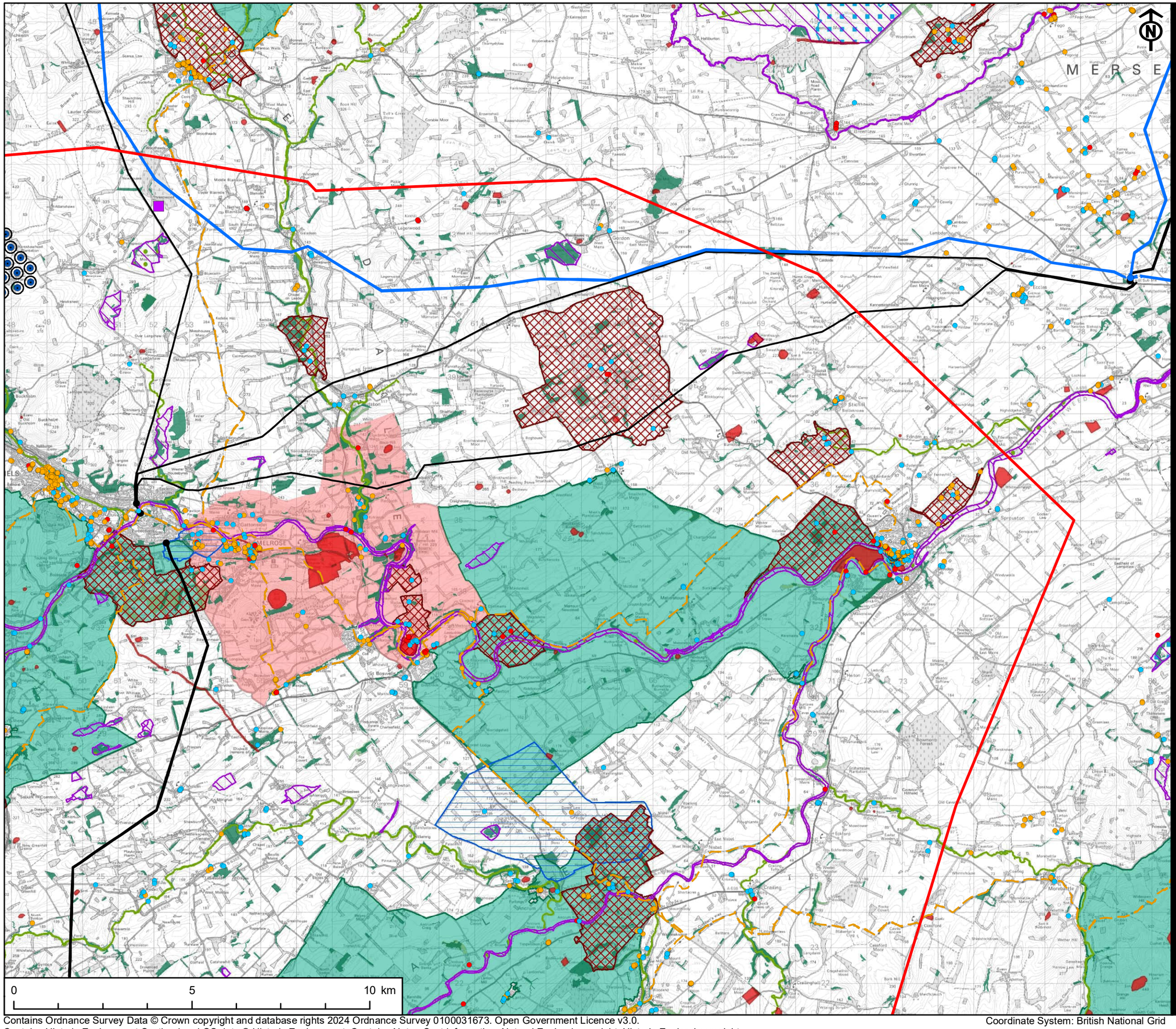


AECOM

PROJECT
Cross Border Connection -
Gala North Substation to Border

CLIENT
SP Energy Networks

KEY

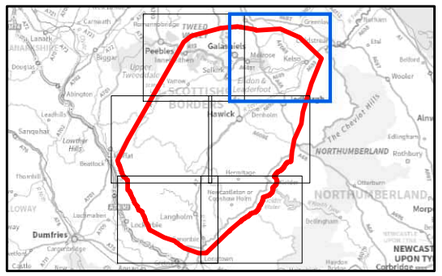
- Study Area
- Proposed Gala North Substation Location
- Category A / Grade I Listed Building
- Category B / Grade II* Listed Building
- Category C / Grade II Listed Building
- Scheduled Monument
- Garden and Designed Landscape
- Inventory Battlefield
- Special Protection Area (SPA)
- Special Area of Conservation (SAC)
- Site of Special Scientific Interest (SSSI)
- Ancient Woodland Inventory Site
- Woodland identified in the Native Woodland Survey of Scotland
- National Scenic Area
- Locally Designated Landscape
- Long Distance Trail

Wind Turbine Location (Status)

- Operational
- Wind Turbine Location - 2x Rotor Diameter

Existing Transmission System

- 132 kV Substation
- 400 kV Substation
- 132kV OHL
- 400kV OHL



TITLE
Figure 8
Study Area - Key Routeing and Siting Constraints

REFERENCE
GH_20240827_RS_8_v2

SHEET NUMBER
3 of 7

DATE
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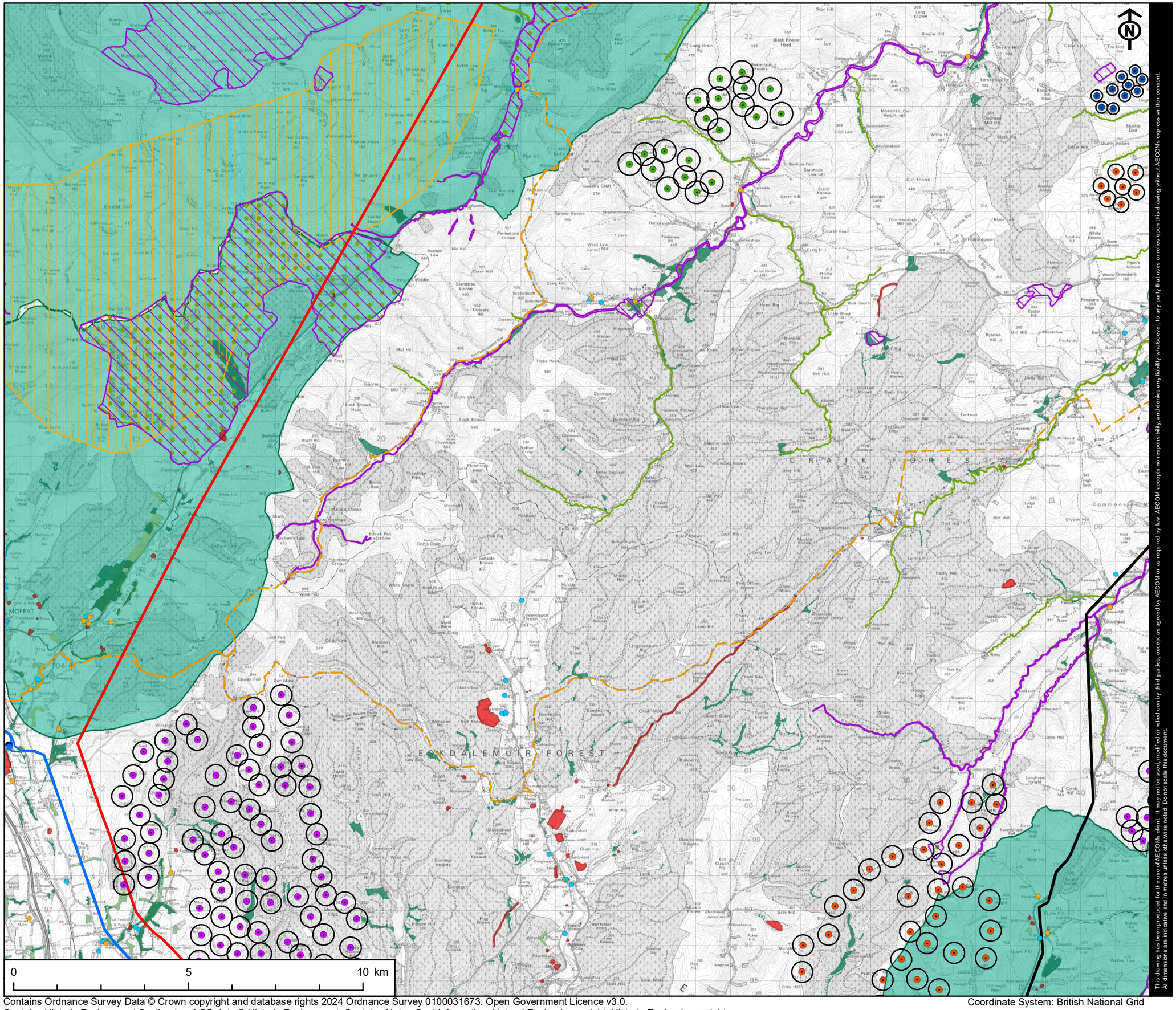
Coordinate System: British National Grid

Project Management Initials: DR Designer: LC Checked: DF Approved: DR



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Coordinate System: British National Grid

AECOM

PROJECT
Cross Border Connection -
Gala North Substation to Border

CLIENT
SP Energy Networks

KEY

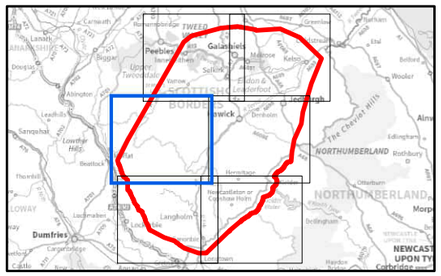
- Study Area
- Category A / Grade I Listed Building
- Category B / Grade II* Listed Building
- Category C / Grade II Listed Building
- Scheduled Monument
- Special Protection Area (SPA)
- Special Area of Conservation (SAC)
- Site of Special Scientific Interest (SSSI)
- Ancient Woodland Inventory Site
- Woodland identified in the Native Woodland Survey of Scotland
- Locally Designated Landscape
- Wild Land Area
- Long Distance Trail

Wind Turbine Location (Status)

- Operational
- Application Submitted
- Design/Scoping; Scoping
- Refused
- Wind Turbine Location - 2x Rotor Diameter

Existing Transmission System

- 132 kV Substation
- 400 kV Substation
- 132kV OHL
- 400kV OHL



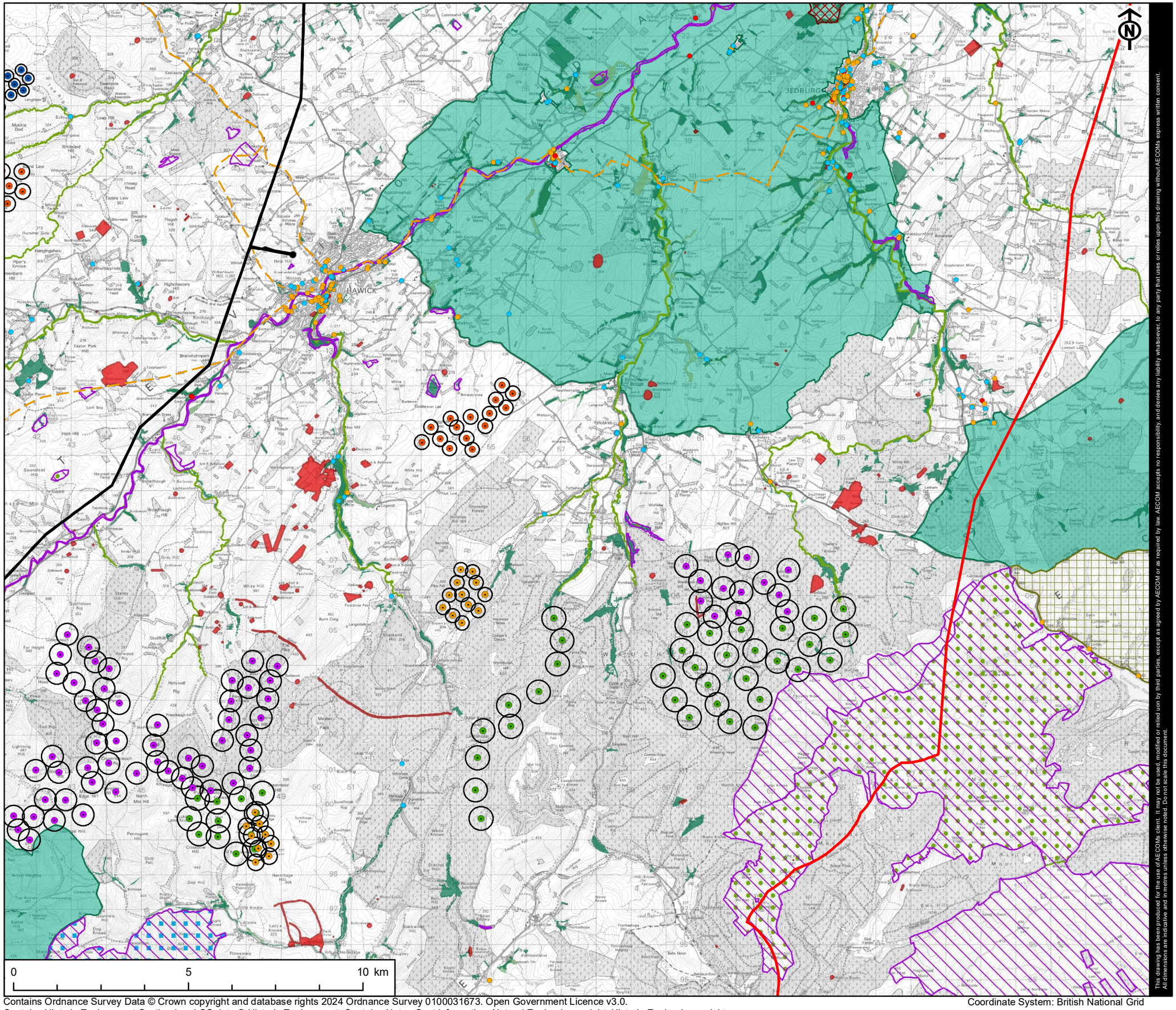
TITLE
Figure 8
Study Area - Key Routeing and Siting Constraints

REFERENCE
GH_20240827_RS_8_v2

SHEET NUMBER
4 of 7

DATE
27/08/24

Project Management Initials: DR Designer: LC Checked: DF Approved: DR



AECOM

PROJECT
Cross Border Connection -
Gala North Substation to Border

CLIENT
SP Energy Networks

KEY

- Study Area
- Category A / Grade I Listed Building
- Category B / Grade II* Listed Building
- Category C / Grade II Listed Building
- Scheduled Monument
- Garden and Designed Landscape
- Special Protection Area (SPA)
- Special Area of Conservation (SAC)
- Site of Special Scientific Interest (SSSI)
- Ancient Woodland Inventory Site
- Woodland identified in the Native Woodland Survey of Scotland
- National Park
- Locally Designated Landscape
- Long Distance Trail

Wind Turbine Location (Status)

- Operational
- Consented
- Application Submitted
- Design/Scoping; Scoping
- Refused
- Wind Turbine Location - 2x Rotor Diameter

Existing Transmission System

- 132 kV Substation
- 132kV OHL

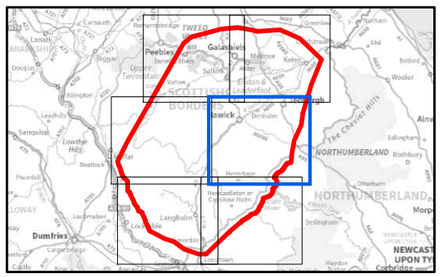


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Figure 8
Study Area - Key Routeing and Siting Constraints

REFERENCE
GH_20240827_RS_8_v2

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DATE
27/08/24

Coordinate System: British National Grid

Project Management Initials: DR Designer: LC Checked: DF Approved: DR

AECOM

PROJECT
Cross Border Connection -
Gala North Substation to Border

CLIENT
SP Energy Networks

KEY

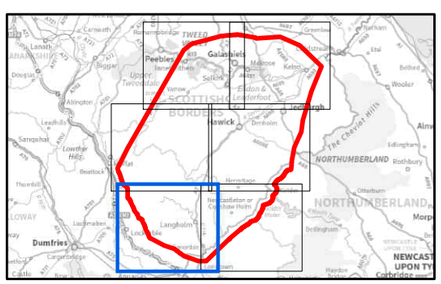
- Study Area
- Category A / Grade I Listed Building
- Category B / Grade II* Listed Building
- Category C / Grade II Listed Building
- Scheduled Monument
- Garden and Designed Landscape
- Special Protection Area (SPA)
- Special Area of Conservation (SAC)
- Site of Special Scientific Interest (SSSI)
- Ancient Woodland Inventory Site
- Woodland identified in the Native Woodland Survey of Scotland
- Locally Designated Landscape

Wind Turbine Location (Status)

- Operational
- Consented
- Appeal/Public Inquiry
- Application Submitted
- Refused
- Wind Turbine Location - 2x Rotor Diameter

Existing Transmission System

- 132 kV Substation
- 400 kV Substation
- 132kV OHL
- 400kV OHL



TITLE
Figure 8
Study Area - Key Routeing and Siting Constraints

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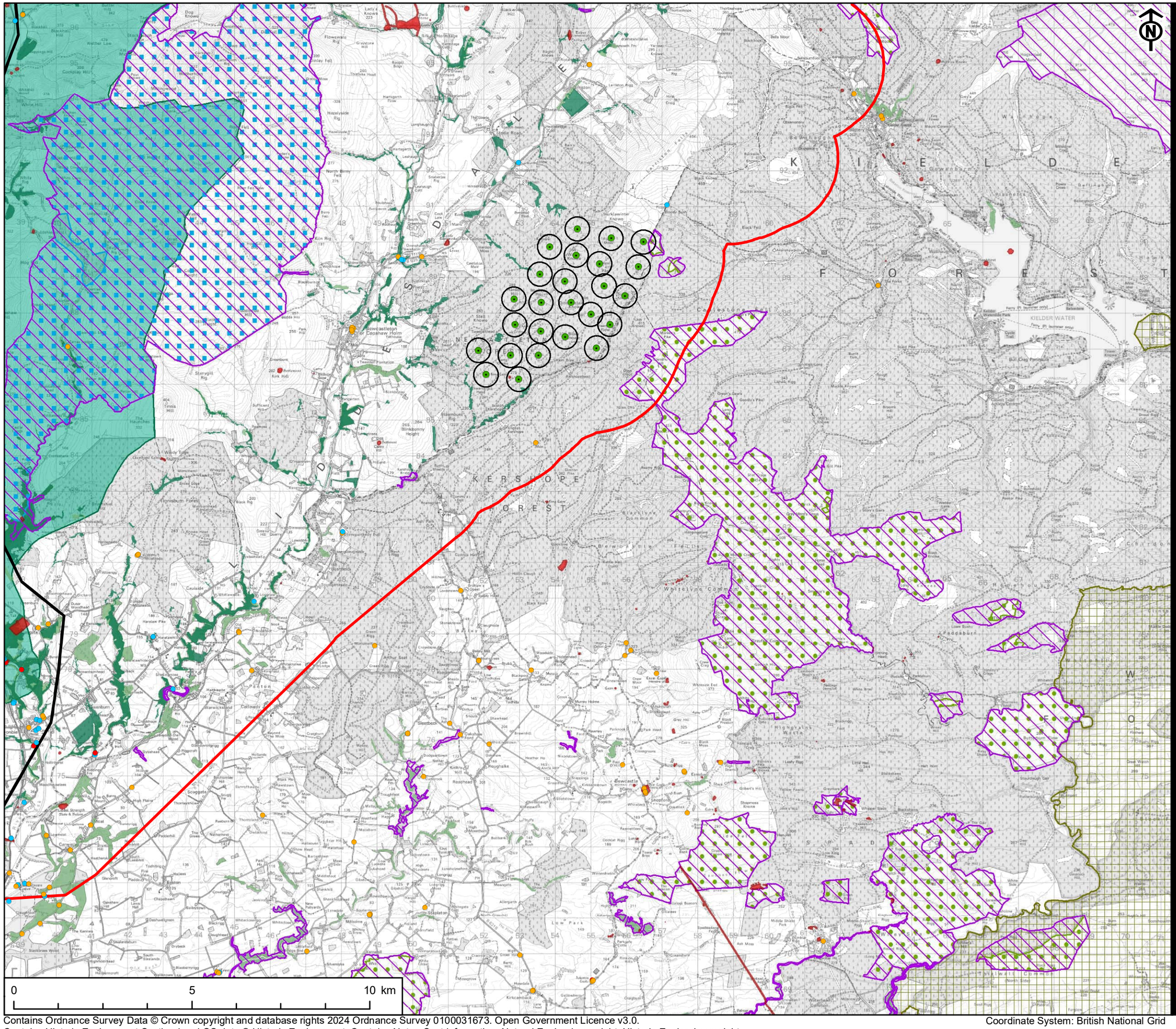
Scale @ A3 1:2,000,000

0 5 10 km

Coordinate System: British National Grid

Project Management Initials: DR Designer: LC Checked: DF Approved: DR



Scale @ A3 1:2,000,000

Coordinate System: British National Grid

AECOM

PROJECT
Cross Border Connection -
Gala North Substation to Border

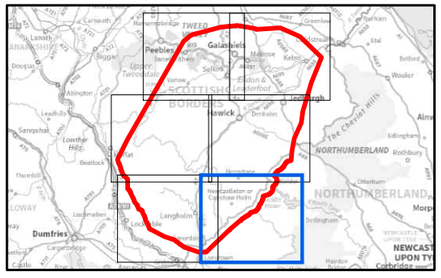
CLIENT
SP Energy Networks

KEY

- Study Area
- Category A / Grade I Listed Building
- Category B / Grade II* Listed Building
- Category C / Grade II Listed Building
- Scheduled Monument
- Special Protection Area (SPA)
- Site of Special Scientific Interest (SSSI)
- Ancient Woodland Inventory Site
- Woodland identified in the Native Woodland Survey of Scotland
- National Park
- Locally Designated Landscape

Wind Turbine Location (Status)

- Operational
- Design/Scoping; Scoping
- Wind Turbine Location - 2x Rotor Diameter
- 132kV OHL



TITLE
Figure 8
Study Area - Key Routeing and Siting Constraints

REFERENCE
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05.
Routeing Strategy

5. Routeing and Siting Strategy

5.1 Routeing and Siting Considerations

Routeing and siting considerations are set out in detail in Appendix D but are briefly summarised in this section in Table 10. These have been developed specific to the SP Energy Networks Project based on the constraints present within the Study Area while drawing on the guidance contained in the Holford and Horlock Rules.

Table 10 Project Routeing and Siting Considerations

Appraisal Topic	Routeing and Siting Considerations
Landscape	The Eildon and Leaderfoot NSA is the only statutory landscape designation or area of the highest environmental value within the Study Area and therefore must be avoided by route and site options. There are other nationally designated landscapes present in the immediate vicinity of the Study Area including the Upper Tweeddale NSA to the west and the Northumberland National Park to the east. While effects on these areas should be avoided consideration of potential landscape setting effects may be required if route options are located on the margins of the Study Area. There are a number of local landscape designations in the Study Area including multiple SLAs in the Scottish Borders and one RSA in Dumfries and Galloway. These areas are considered to be of moderate environmental value. While it is preferable to avoid these areas as much as possible, the scale and distribution of SLAs within the Scottish Borders means that some routeing within them will be unavoidable. Where routeing through local landscape designations regard should be had for the key features and attributes of the local designations and sensitivity to OHLs.
Visual Amenity	Settlements within the Study Area comprise a number of towns and larger villages which should be avoided as much as possible to prevent or reduce views from residential areas. The rural nature of large parts of the Study Area means that there are scattered individual properties or small clusters of properties present throughout. These should be avoided as much as possible in order to reduce potential adverse effects on views from residential receptors, however, this may require to be balanced against other routeing and siting considerations.
Ecology and Biodiversity	There are a number of internationally and nationally designated sites (i.e. sites of the highest or high environmental value) present within

Appraisal Topic	Routeing and Siting Considerations
	the Study Area as well as locally designated sites (i.e. sites of moderate or low environmental value), however, they vary in terms of the basis of the designation as well as in scale from small discrete sites to larger scale or linear sites. Route and site options should avoid designated sites as much as possible in order to prevent or reduce potential adverse effects on them. Where sites cannot be avoided due to the extent of designation or because of other constraints, consideration should be given to the designations qualifying interests, the location of substation sites or where they are crossed by overhead line routes in order to provide opportunities to develop a detailed design which reduces the potential for adverse effects on them.
Cultural Heritage and Archaeology	There are a number of cultural heritage and archaeological designations which are of the highest or high environmental value. These vary in geographic scale (from small discrete sites to larger areas) and well as in distribution (from individual areas or sites to clusters of sites which are closely located and in some cases may be interrelated). Route and site options should avoid designated sites as much as possible in order to prevent or reduce potential adverse effects on them including effects on their setting. This may include using existing landscape features such as landform or woodland to avoid or reduce effects.
Forestry and Woodland	There are a range of forestry and woodland resources present within the Study Area ranging from Ancient Woodland Inventory sites which are considered to be areas of high environmental value to large-scale commercial forestry which support land use and recreational functions and are of moderate or low environmental value. Route and site options should avoid forestry and woodland as much as possible, in particular Ancient Woodland Inventory sites, in order to prevent tree loss. Where route or site options cannot avoid woodland due to other constraints, effects should be reduced as far as possible with routes or sites identified having regard to forestry design as well as planting/restocking plans.
Water Resources	There are a number of waterbodies and watercourses present within the Study Area, however, in general they are not considered to significantly constrain the development of route or site options. Route options should maintain a minimum separation distance of 50m in order to ensure watercourses could be spanned by OHL routes where they require to be crossed. Site options for the new substation

Appraisal Topic	Routeing and Siting Considerations
	should be sited away from watercourses as much as possible in order to reduce the potential for pollution of watercourses.
Ground Conditions	There are a small number of sites designated only for geological conservation purposes within the Study Area. These are typically small discrete sites which should be avoided by route and site options as much as possible. Where sites cannot be avoided due to the extent of designation or because of other constraints, consideration should be given the location of substation sites or where they are crossed by overhead line routes in order to provide opportunities to develop a detailed design which reduces the potential for adverse effects on them. Priority and other peatland habitats and other carbon rich soils are present throughout the Study Area. Route and site options should avoid peatland habitats as much as possible in order to reduce the loss of peat. Where peatland areas cannot be avoided losses should be minimised as far as possible, for example by routeing across peatland as directly as possible in order to minimise the length of routes within peat.
Tourism and Recreation	There is a range of tourism and recreational interests present within the Study Area. Route and site options should avoid tourism and recreational interests as much as possible in order to reduce potential adverse effects on the amenity of users of or visitors to routes, trails or other visitor attractions. Where routeing or siting cannot avoid tourism or recreational interests, regard should be had for the landscape setting of the attraction and visual amenity of visitors/users for example using existing landscape features such as landform or woodland to avoid or reduce effects.
Land Use	The majority of the land within the Study Area is not suitable for arable farming based on the National Land Capability Map for Agriculture. Route and site options should avoid or reduce impacts on agricultural land as much as possible. Large areas of commercial forestry are present throughout the Study Area. Route and site options should avoid commercial forestry as much as possible but where it cannot be avoided, effects should be reduced as far as possible with routes or sites for example having regard to forestry design and felling/restocking plans.
Engineering Constraints	Route options between the proposed Gala North Substation and new Teviot Substation as well as new Teviot Substation and the Scotland-England border should be as direct as possible subject to other routeing constraints considerations in order to reduce overall OHL

Appraisal Topic	Routeing and Siting Considerations
	route lengths. Consideration should be given to the impact of siting Teviot Substation on the overall directness and length of route options. Altitudes and slope angle have been derived from digital terrain data and reviewed as part of technical reviews of route options. Altitudes within the Study Area are highly variable from less 100mAOD in some river valleys to more than 500mAOD in upland areas. Subject to other routeing constraints and considerations, route options should take account of altitudes in order to reduce potential exposure to increased ice and wind loads as much as possible (<200mAOD/low risk, 200-500mAOD/medium risk and >500mAOD/high risk). While routeing at higher altitudes is feasible it can require tower strengthening works as well as shorter spans (i.e. more towers) in order to mitigate exposure to wind and ice loads. The variable altitudes also influence the steepness of slopes within the Study Area with steep slopes often present within narrow V-shaped river valleys. Route options should take account of slopes which require to be routed over and/or along avoiding steep slopes where possible in order to reduce construction access risks. Sites for the new Teviot Substation should also take account of slopes seeking to avoid areas where significant earthworks may be required to establish a level platform for the substation where possible. There is a range of existing and proposed energy infrastructure within the Study Area including transmission assets as well as wind farms at various stages of development (pre-application, application, construction, operation). Existing infrastructure has been identified and should be taken account of in the identification of route and site options. This includes consideration of proximity to and/or requirements to cross other transmission infrastructure such as the existing 132kV OHL route (V route) which is routed north to south through the Study Area as well as application of appropriate separation distances to wind farms in line with industry guidance.

5.2 The Routeing and Siting Strategy

The Routeing and Siting Strategy has been developed taking into account the routeing and siting objective identified in section 3 and the routeing considerations outlined above and detailed in Appendix E. The purpose of the Routeing and Siting Strategy is to ensure a consistent approach to identifying and assessing route and site options leading to the identification of a preferred option which best meets the objective while also balancing routeing and siting considerations. Addressing this balance often requires careful professional judgement taking account of different constraints as well as seeking to integrate an OHL into the landscape.

The Routeing and Siting Strategy developed for the SP Energy Networks Project is as follows:

"Route options for continuous overhead line routes will avoid areas of the highest or high environmental value and settlement where possible while responding to and making best use of landscape character and features including topography and woodland to screen or backcloth routes. Where conflicting environmental and technical considerations are identified, these will be carefully balanced using professional judgement when assessing route options."

"Site options for a new substation will avoid areas of the highest or high environmental value and settlement where possible while taking account of landscape character and making best use of existing landform and woodland to integrate the substation into its surroundings. Where conflicting environmental and technical considerations are identified, these will be carefully balanced using professional judgement when assessing site options."