T ROUTE REBUILD PROJECT

ROUTEING AND CONSULTATION DOCUMENT

VOLUME 2: TECHNICAL APPENDICES AND FIGURES

SP ENERGY NETWORKS

JUNE 2022

T Route Rebuild Project

Routeing and Consultation Document

Volume 2: Technical Appendices and Figures

GILLESPIES	T Route Rebuild Project	T Route Rebuild Project: **Routeing & Consultation Document** **Volume 2 Technical Appendices and Figures** P11571-00-000-700			SP Energy Networks
Rev.	**Date**	**Detail**	**Made By**	**Checked By**	**Approved By**
00	10.9.21	DRAFT	LR	SG	SG
01	17.9.21	DRAFT – updated appendices	LR	SG	SG
02	12.11.21	ISSUE– updated appendices	LR	SG	SG
03	11.02.22	Updated consultees	LR	SG	SG
04	16.6.22	Updated Consultees	LR	SG	SG

CONTENTS

LIST OF FIGURES (APPENDIX G)

APPENDIX A – List of consultees

Statutory Consultees

- Allerdale Borough Council
- Carlisle City Council
- Cumbria County Council
- Dumfries and Galloway Council
- Eden District Council
- Environment Agency
- Historic England
- Historic Environment Scotland
- Natural England
- Nature Scot
- Scottish Environment Protection Agency (SEPA)
- Scottish Government ECU

Internal Scottish Government Advisors

- Transport Scotland
- Marine Scotland
- Scottish Forestry

Non statutory Consultees

- Arthuret Parish Council
- Association for the Protection of Rural Scotland
- BAA Aerodrome Safeguarding (Aberdeen)
- BAA Aerodrome Safeguarding (Edinburgh)
- Bowness-on-Solway Parish Council
- British Horse Society
- BT
- Canonbie and District Community Council
- Civil Aviation Authority – Airspace
- Crown Estate Scotland
- Cummertrees and Cummertrees West Community Council
- Defense Infrastructure Organisation (MoD)
- Dumfries & Galloway Archaeological Services
- Edinburgh Airport
- Fisheries- Local District Salmon Fisheries
- Fisheries Management Scotland
- Forestry Land Scotland

- Galloway and Southern Ayrshire Biosphere
- Glasgow Airport
- Glasgow Prestwick Airport
- Gretna and Rigg Community Council
- Hoddom and Ecclefechan Community Council
- John Muir Trust
- Joint Radio Company
- Kirkandrews-on-Esk Parish Council
- Kirkpatrick Fleming and District Community Council
- Kirtle and Eaglesfield Community Council
- Maritime and Coastguard Agency
- Mountaineering Scotland
- National Air Traffic Services
- National Grid
- National Trust (England)
- National Trust for Scotland
- NATS Safeguarding
- Network Rail
- Nuclear Safety Directorate
- RAF
- Rockcliffe Parish Council
- Royal Burgh of Annan Community Council
- RSPB Scotland
- Scottish Canoe Association
- Scottish Fisheries
- Scottish Rights of Way (ScotWays)
- Scottish Water
- Scottish Wildlife Trust
- Solway Coast AONB
- Springfield and Gretna Green Community Council
- Sustrans Scotland
- The Coal Authority
- Visit Scotland
- West of Scotland Archaeology Service
- Westlinton Parish Council

APPENDIX B – THE HOLFORD RULES

The Holford Rules: Guidelines for the Routeing of New High Voltage Overhead Transmission Lines with NGC 1992 and SHETL 2003 Notes

In 1959, Lord Holford, then advisor to the Central Electricity Generating Board (CEGB), developed a series of planning guidelines in relation to amenity issues, which have subsequently become known as the "Holford Rules". A subsequent review of the Holford Rules (and NGC clarification notes) was undertaken by Scottish Hydro Electric Transmission Limited (SHETL) and SP Transmission Ltd (SPT) in 2003. This review concluded that the Holford Rules should be used as originally formulated but with the NGC's notes of clarification modified and expanded to meet Scottish circumstances. Given the similarities between the Scottish and Welsh landscapes, the SHETL and SPT approach is considered relevant as the basis for this routeing study and are set out below.

Rule 1: Avoid altogether, if possible, the major areas of high amenity value, by so planning the general route of the line in the first place, even if the total mileage is somewhat increased in consequence.

Note on Rule 1:

a) Investigate the possibility of alternative routes, avoiding altogether, if possible major areas of highest amenity value. The consideration of alternative routes must be an integral feature of environmental statements. If there is an existing transmission line through a major area of highest amenity value and the surrounding land use has to some extent adjusted to its presence, particularly in the case of commercial forestry, then the effect of remaining on this route must be considered in terms of the effect of a new route avoiding the area.

b) Areas of highest amenity value require to be established on a project-by-project basis considering Schedule 9 to The Electricity Act 1989, Scottish Planning Policies, National Planning Policy Guidelines, Circulars and Planning Advice Notes and the spatial extent of areas identified

Examples of areas of highest amenity value which should be considered are:

- Special Area of Conservation
- Special Protection Area
- Ramsar Site
- National Scenic Areas
- National Parks
- National Nature Reserves
- Protected Coastal Zone Designations
- Sites of Special Scientific Interest (SSSI)
- Schedule of Ancient Monuments
- Listed Buildings
- Conservation Areas
- World Heritage Sites (a non-statutory designation)
- Historic Gardens and Designed Landscapes (a non-statutory designation)

Rule 2: Avoid smaller areas of high amenity value, or scientific interest by deviation; provided that this can be done without using too many angle towers, i.e. the more massive structures that are used when lines change direction.

Note on Rule 2:

a) Small areas of highest amenity value not included in Rule 1 as a result of their spatial extent should be identified along with other areas of regional or local high amenity value identified from development plans.

b) Effects on the setting of historic buildings and other cultural heritage features should be minimised.

c) If there is an existing transmission line through an area of high amenity value and the surrounding land uses have to some extent adjusted to its presence, particularly in the case of commercial forestry, then the effect of remaining on this line must be considered in terms of the effect of a new route deviating around the area.

Rule 3: Other things being equal, choose the most direct line, with no sharp changes of direction and thus with few angle towers.

Note on Rule 3:

a) Where possible choose inconspicuous locations for angle towers, terminal towers and sealing end compounds.

b) Too few angles on flat landscape can also lead to visual intrusion through very long straight lines of towers, particularly when seen nearly along the line. The fewer more massive structures used to support the transmission lines, the less impact upon the amenity of the area. However, it is also suggested that in flat or open landscapes, support poles or towers should not be erected in a straight line, as this increases the visual intrusion due to an artificially linear feature being introduced into the landscape.

Rule 4: Choose tree and hill backgrounds in preference to sky backgrounds, wherever possible; and when the line has to cross a ridge, secure this opaque background as long as possible and cross obliquely when a dip in the ridge provides an opportunity. Where it does not, cross directly, preferably between belts of trees.

Rule 5: Prefer moderately open valleys with woods where the apparent height of the towers will be reduced, and views of the line will be broken by trees.

Notes on Rules 4 and 5:

a) Utilise background and foreground features to reduce the apparent height and domination of towers from main viewpoints.

b) Minimise the exposure of numbers of towers on prominent ridges and skylines.

c) Where possible follow open space and run alongside, not through woodland or commercial forestry, and consider opportunities for skirting edges of copses and woods. Where there is no reasonable alternative to cutting through woodland or commercial forestry, the Forestry Commission Guidelines should be followed (Forest Landscape Design Guidelines, second edition, The Forestry Commission 1994 and Forest Design Planning – A Guide to Good Practice, Simon Bell/The Forest Authority 1998).

d) Protect existing vegetation, including woodland and hedgerows, and safeguard visual and ecological links with the surrounding landscape.

Rule 6: In country which is flat and sparsely planted, keep the high voltage lines as far as possible independent of smaller lines, converging routes, distribution poles and other masts, wires and cables, so as to avoid a concatenation or 'wirescape'.

Note on Rule 6:

a) In all locations minimise confusing appearance.

b) Arrange wherever practicable that parallel or closely related routes are planned with tower types, spans and conductors forming a coherent appearance. Where routes need to diverge allow. where practicable, sufficient separation to limit the effects on properties and features between lines.

Rule 7: Approach urban areas through industrial zones, where they exist; and when pleasant residential and recreational land intervenes between the approach line and the substation, go carefully into the comparative costs of undergrounding, for lines other than those of the highest voltage.

Note on Rule 7:

a) When a line needs to pass through a development area, route it so as to minimise as far as possible the effect on development.

b) Alignments should be chosen after consideration of effects on the amenity of existing development and on proposals for new development.

c) When siting substations take account of the effects of the terminal towers and line connections that will need to be made and take advantage of screening features such as ground form and vegetation.

Explanatory Note on Rule 7:

The assumption made in Rule 7 is that the highest voltage line is overhead.

Supplementary Notes:

a) Residential Areas

Avoid routeing close to residential areas as far as possible on grounds of general amenity.

b) Designations of County, District and Local Value

Where possible choose routes which minimise the effect on Special Landscape Areas, areas of Great Landscape Value and other similar designations of County, District or Local value.

c) Alternative Steel Lattice Tower Designs

In addition to adopting appropriate routeing, evaluate where appropriate the use of alternative steel lattice tower designs available where these would be advantageous visually, and where the extra cost can be justified [Note : SHETL have reviewed the visual and landscape arguments for the use of steel lattice towers in Scotland and summarised these in a document titled Overhead Transmission Line Tower Study 2004].

Further Notes on Clarification to the Holford Rules

Line Routeing and People

The Holford Rules focused on landscape amenity issues for the most part. However, line routeing practice has given greater importance to people, residential areas etc. The following notes are intended to reflect this.

a) Avoid routeing close to residential areas as far as possible on grounds of general amenity.

b) In rural areas avoid as far as possible dominating isolated houses, farms or other small-scale

settlements.

c) Minimise the visual effect perceived by users of roads and public rights of way, paying particular attention to the effects of recreational, tourist and other well-used routes.

APPENDIX A

INTERPRETATION OF THE HOLFORD RULES 1 AND 2 AND THE NOTES TO RULE 2 REGARDING THE SETTING OF A SCHEDULED ANCIENT MONUMENT OR A LISTED BUILDING

Interpretation of The Holford Rules 1 and 2

1.1 Introduction

Rules 1 refers to avoiding major areas of highest amenity value, Rule 2 refers to avoiding smaller areas of high amenity value. These rules therefore require identification of areas of amenity value in terms of highest and high, implying a hierarchy, and the extent of their size(s) or area(s) in terms of major and smaller areas.

The NGC Notes to these Rules identify at Rule 1(b) areas of highest amenity value and at Rule 2(a) and (b) of high amenity value that existed in England circa 1992.

1.2 Designations

Since 1949 a framework of statutory measures has been developed to safeguard areas of high landscape value and nature conservation interest. In addition to national designations, European Community Directives on nature conservation, most notably through Special Areas of Conservation under the Habitats and Species Directive (92/43/EC) and Special Protection Areas under the Conservation of Wild Birds Directive (79/409/EEC) have been implemented. Governments have also designated a number of Ramsar sites under the Ramsar Convention on Wetlands of International Importance (CM6464). Scottish Office circulars 13/1991 and 6/1995 are relevant sources of information and guidance. In addition, a wide range of non-statutory landscape and nature conservation designations affect Scotland.

1.3 Amenity

The term 'Amenity' is not defined in The Holford Rules but has generally been interpreted as designated areas of scenic, landscape, nature conservation, scientific, architectural or historical interest.

This interpretation is supported by paragraph 3 of the Schedule 9 to the Electricity Act 1989 (The Act). Paragraph 3 (1)(a) requires that in formulating any relevant proposals the licence holder must have regard to the desirability of preserving natural beauty, of conserving flora, fauna and geological or physiological features of special interest and of protecting sites, buildings including structures and objects of architectural, historic or archaeological interest. Paragraph 3 (1)(b) requires the licence holder to do what he reasonably can do to mitigate any effect which the proposals would have on the natural beauty of the countryside or on any flora, fauna, features, sites, buildings or objects.

1.4 Hierarchy of Amenity Value

Rules 1 and 2 imply a hierarchy of amenity value from highest to high.

Schedule 9 to the Act gives no indication of hierarchy of value and there is no suggestion of a hierarchy of value in either NPPG 5 : Archaeology and Planning, NPPG 13: Coastal Planning, NPPG 14 : Natural

Heritage or NPPG 18 : Planning and the Historic Environment. Nevertheless, designations give an indication of the level of importance of the interest to be safeguarded.

1.5 Major and Smaller Areas

Rules 1 and 2 imply consideration of the spatial extent of the area of amenity in the application of Rules 1 and 2.

1.6 Conclusion

Given that both the spatial extent in terms of major and smaller and the amenity value in terms of highest and high that must be considered in applying Rules 1 and 2, that no value in these terms is provided by either Schedule 9 to the Act, relevant Scottish Planning Policies or National Planning Policy Guidelines, then these must be established on a project-by-project basis. Designations can be useful in giving an indication of the level of importance and thus value of the interest safeguarded. The note to The Holford Rules can thus only give examples of the designations which may be considered to be of the highest amenity value.

2 The setting of a Scheduled Ancient Monument or a Listed Building

The NGC note to Rule 2 refers to the setting of historic buildings and other cultural heritage features. NPPG 5: Archeology and Planning refers to the setting of scheduled ancient monuments and NPPG 18: Planning and the Historic Environment refers to the setting of Listed Buildings. None of these documents define setting.

APPENDIX B

ENVIRONMENTAL AND PLANNING DESIGNATIONS – EXAMPLES OF DESIGNATIONS TO BE TAKEN INTO ACCOUNT IN THE ROUTEING OF NEW HIGH VOLTAGE TRANSMISSION LINES

Major Areas of Highest Amenity Value

In Scotland relevant national or international designations for major areas of highest amenity value include the following identified from Scottish Planning Policies and National Planning Policy Guidelines :

- Special Areas of Conservation (NPPG 14)
- Special Protection Areas (NPPG 14)
- Ramsar Sites (NPPG 14)
- National Scenic Areas (NPPG 14)
- National Parks (NPPG 14)
- National Nature Reserves (NPPG 14)
- Protected Coastal Zone Designations (NPPG 13)
- Sites of Special Scientific Interest (NPPG 14)
- Scheduled Ancient Monuments (NPPG 5)
- Listed Buildings (NPPG 18)
- Conservation Areas (NPPG 18)

- World Heritage Sites (NPGG 18)
- Historic Gardens and Designed Landscapes (NPPG 18)

Other Smaller Areas of High Amenity Value

There are other designations identified in development plans of local planning authorities which include areas of high amenity value:-

- Areas of Great Landscape Value
- Regional Scenic Areas
- Regional Parks
- Country Parks

The nature of the landscape in these areas is such that some parts may also be sensitive to intrusion by high voltage overhead transmission lines but it is likely that less weight would be given to these areas than to National Scenic Areas and National Parks.

Flora and Fauna

Legislation sets out the procedure for designation of areas relating to flora, fauna and to geographical and physiogeographical features. Designations relevant to the routeing of transmission lines will include Special Area of Conservation, Special Protection Area, Sites of Special Scientific Interest, National Nature Reserves, Ramsar Sites and may also include local designations such as Local Nature Reserve.

Area of Historic, Archaeological or Architectural Value

Certain designations covering more limited areas are of relevance to the protection of views and the settings of towns, villages, buildings of historic, archaeological or architectural value. These designations include features which may be of exceptional interest. Of particular importance in this connection are:-

Schedule of Ancient Monuments

Listed Buildings, especially Grade A and Grade B Conservation Areas

Gardens and Designed Landscapes included in the Inventory of Gardens and Designed Landscapes of Scotland

Green Belts

Generally the purposes of Green Belts are not directly concerned with the quality of the landscape.

GILLESPIES

T ROUTE REBUILD PROJECT

ROUTEING AND CONSULTATION DOCUMENT

APPENDIX C: LANDSCAPE SENSITIVITY APPRAISAL

SEPTEMBER 2021

SP ENERGY NETWORKS

T Route Rebuild

Routeing and Consultation Document

Appendix C: Landscape Sensitivity Appraisal

September 2021

GILLESPIES	Project Title	Document Title		Client
	T Route Rebuild	T Route Rebuild: **Appendix C: Landscape Sensitivity Appraisal** P11571-00-000-703		SP Energy Networks

Rev.	Date	Detail	Made By	Checked By	Approved By
00	10.9.21	DRAFT 00	LR	SG	SG
01	17.9.21	Amendments to references	LR	SG	SG

Purpose and Introduction

1.1. To comply with the obligations of its transmission licence, SP Transmission plc (SPT), on behalf of SP Energy Networks needs to rebuild approximately 13.5km of the existing 132kV overhead line (T Route), which currently extends between tower AK008 on the AK Route north of Annan to the shared license boundary with National Grid Energy Transmission (NGET) in the Solway Firth, south of Gretna. T137A is currently the last tower on this connection before the license boundary. The span of electric line crossing the license boundaries will be retained at its existing location and angle.

1.2. The existing steel lattice tower line forming T Route will be rebuilt as a wood pole overhead line between a point close to tower AK007 and T137A. Additionally, a new terminal steel lattice tower will be needed adjacent to the AK Route near Annan and two new towers at the NGET boundary south of Gretna on the same angle as the existing electric line. Tower AK008 will be removed and land restored to a similar condition as its surroundings.

1.3. The existing 132kV steel lattice towers along the redundant section of the route will be dismantled, removed and the ground restored following construction of the replacement overhead line.

1.4. The upgrading is referred to as the 'T Route Rebuild' (the Project). The location of the existing AK and T Routes and the section to be dismantled to allow for the rebuild are shown in **Figure 1**.

1.5. As part of the routeing process, a landscape sensitivity appraisal was carried out in order to establish the sensitivity of the landscape within the broad study area to the proposed development.

Methodology

1.6. Landscape sensitivity, in the context of spatial planning for built development and land management, can be defined as a measure of the resilience, or robustness, of a landscape to accommodate change arising from specified development types or land management practices. Landscape sensitivity assessment provides an indication of this resilience in a manner which is robust, repeatable and capable of standing up to scrutiny. The process assesses the resilience of landscape character, and what we value about that landscape, to a specified potential change. It also provides an understanding of the nature of change should a particular scenario be implemented.

1.7. The assessment utilises existing landscape character assessments and focuses on the key characteristics/ elements and features which are likely to be affected by a new overhead line. this includes physical attributes such as landform, land cover, land use (including settlement), historic or cultural heritage features historic features and cultural heritage features, perceptual attributes such as naturalness, beauty and tranquillity and visual characteristics such as skylines or presence of iconic views or landmarks. The assessment also looks at characteristics, which add value to the landscape such as designations (local, national or international), landscape character and sense of place, attributes, such as topography, perceptual qualities,

cultural and historic features and associations, biodiversity, special qualities and recreational value.

1.8. The sensitivity assessment is based on the assessment units defined within the existing landscape character assessments, which in this case are the Landscape Character Types within the Scottish Landscape Character Types Map and associated LCT descriptions produced by Nature Scot in 2019[1] and the within the Cumbria Landscape Character Assessment Guidance and Toolkit produced by Cumbria County Council in 20112.[2]

1.9. Landscape Character Types (LCTs) are distinct types of landscape that are relatively homogeneous in character. They are generic in nature in that they may occur in different areas in different parts of the country, but wherever they occur they share broadly similar combinations of geology, topography, drainage patterns, vegetation, and historical land use and settlement pattern, and perceptual and aesthetic attributes.

Scottish Landscape Character Type Map and Descriptions

1.10. For the part of the study area which falls within Scotland, landscape sensitivity was assessed with reference to the existing landscape characteristics and attributes of the landscape as set out in the Scottish Landscape Character Types Map and associated LCT descriptions produced by Nature Scot in 2019.

1.11. Six of the LCTs defined by NatureScot in 2019 cover the broad study area as shown in **Figure 8a**. Of these, LCT 158 Coastal Flats, encompasses the largest geographic area. These LCTs are listed below and described in more detail within Table 3. The LCT boundaries have been used as they and their corresponding descriptions are the most detailed in terms of assessing sensitivity of the landscape to the type of development proposed:

- LCT 158: Coastal Flats (Dumfries and Galloway);
- LCT 160: Narrow Wooded Valley (Dumfries and Galloway);
- LCT 162: Lower Dale (Dumfries and Galloway);
- LCT 170: Coastal Plateau (Dumfries and Galloway);
- LCT 171: Flow Plateau; and
- LCT 172: Upland Fringe (Dumfries and Galloway).

Cumbria Landscape Character Assessment Guidance and Toolkit

1.12. For the part of the broad study area which falls within England, information within the Cumbria Landscape Character Assessment Guidance and Toolkit

[1] NatureScot (2019). Scottish Landscape Character Type Map and Descriptions. Available online at https://www.nature.scot/professional-advice/landscape/landscape-character-assessment/landscape-character-assessment-scotland

[2] Cumbria County Council (2011). Cumbria Landscape Character Guidance and Toolkit

produced by Cumbria County Council 2011 was used to inform the sensitivity assessment. This report maps and describes the LCTs across the area and provides guidance on how to maintain or enhance the character and distinctiveness of the landscape within each LCT.

1.1. The purpose of the guidance is that it *'…seeks to describe and map the elements and features that make up distinctively different types of landscape throughout the county. The vision, landscape changes and guidelines provide a framework to help protect, manage, enhance and restore landscapes in the future and keep their distinctiveness*.'

1.2. Five LCT fall within the broad study area but only a very small part of LCT 5b falls within it, being located to the far north east. It has therefore been scoped out of this study. The following four LCTs have therefore been considered:

- LCT 1a: Intertidal Flats;
- LCT 1b: Coastal Marsh;
- LCT 2b: Coastal Mosses;
- LCT 2c: Coastal Plain; and

1.3. Natural England has also produced National Character Areas (NCA)[3], which divide England into broad character areas. While these are helpful to understand landscape character on a regional scale, the Cumbria Landscape Character Assessment has been used to consider landscape sensitivity within this appraisal in view of its local scale.

1.4. In addition to the regional landscape character assessments described above, the following report also provided useful information on the landscape sensitivity and capacity of the landscape to accommodate vertical infrastructure.

Dumfries and Galloway Wind Farm Landscape Capacity Study

1.5. The LCTs which are defined and assessed as part of the Dumfries and Galloway Wind Farm Landscape Capacity Study[4] are shown in **Figure 8b**. This study focuses on the capacity for the landscape to accommodate onshore windfarm development, but also considers the sensitivity of the landscape to vertical infrastructure associated with such development including overhead lines. Six LCTs fall within the broad study area. Of these, only a very small part of the LCT 2: Coastal Flats is contained within the broad study area and this LCT has therefore been scoped out of the study. The remaining five are listed below:

- LCT 4: Narrow Wooded River Valley;

[3] Natural England. National Character Areas Profiles. Available to view online at https://www.gov.uk/government/publications/national-character-area-profiles-data-for-local-decision-making/national-character-area-profiles

[4] Dumfries and Galloway Council (2017) Part 1 Wind Energy Development: Development Management Considerations. Appendix C Dumfries and Galloway Wind Farm Landscape Capacity Study

- LCT 7a: Middle Dale with Hills;
- LCT 14: Coastal Plateau;
- LCT 15: Flow Plateau; and
- LCT 16: Upland Fringe.

1.6. The following published assessments also consider the landscape sensitivity or capacity of the landscape to accommodate vertical infrastructure:

- The Solway Coast Area of Outstanding Natural Beauty (AONB) Landscape and Seascape Character Assessment[5],
- Cumbria Wind Energy Supplementary Planning Document, Part 2 Landscape and Visual Considerations[6]; and
- Cumbria County Council Cumulative Impacts of Vertical Infrastructure (Cumbria County Council, 2014)[7].

1.7. Consideration of the information in these different studies combined with field verification, enabled an overall assessment to be made of the landscape within the broad study area in terms of its sensitivity to an overhead line on wood pole support structures.

1.8. In undertaking the assessment, consideration was given to the presence of existing overhead line infrastructure, which potentially reduces the sensitivity of the landscape to further overhead line development, but conversely may also give rise to cumulative effects arising from multiple lines in closer proximity.

1.9. This approach draws on the principles set out in the Holford Rules and allows a more detailed consideration of how a route option would affect, or fit within, the landscape, and the degree to which potentially adverse effects could be avoided or reduced.

1.10. Indicators of the relative levels of landscape sensitivity to development (described as high, medium or low) are provided in the table below:

[5] The Solway Coast Area of Outstanding Natural Beauty (AONB) Landscape and Seascape Character Assessment (LUC for the Solway Coast AONB Partnership, 2010)
[6] Cumbria Wind Energy Supplementary Planning Document, Part 2 Landscape and Visual Considerations (Coats Associates, 2006)
[7] Cumbria County Council Cumulative Impacts of Vertical Infrastructure (Cumbria County Council, 2014)

Table 1: Indicators of landscape sensitivity

Sensitivity	Definition
High	Landscape and/ or visual characteristics of the assessment unit are very susceptible to change and/ or its values are high or high/ medium and it is unable to accommodate the relevant type of development without significant character change or adverse effects. Thresholds for significant change are very low.
High/ medium	Landscape and/or visual characteristics of the assessment unit are susceptible to change and/ or its values are medium through to high. It may be able to accommodate the relevant type of development but only in limited situations without significant character change or adverse effects if defined in the relevant land parcel summary. Thresholds for significant change are low.
Medium	Landscape and/ or visual characteristics of the assessment unit are susceptible to change and/ or its values are medium/ low through to high/ medium and/ or it may have some potential to accommodate the relevant type of development in some defined situations without significant character change or adverse effects. Thresholds for significant change are intermediate.
Medium/ low	Landscape and/ or visual characteristics of the assessment unit are resilient and of low susceptibility to change and/ or its values are medium/ low or low and it can accommodate the relevant type of development in many situations without significant character change or adverse effects. Thresholds for significant change are high.
Low	Landscape and/ or visual characteristics of the assessment unit are robust or degraded and are not susceptible to change and/ or its values are low and it can accommodate the relevant type of development without significant character change or adverse effects. Thresholds for significant change are very high.

1.11. For each LCT, the key characteristics are analysed to inform an overall judgement on its ability to accommodate high voltage overhead lines. The following table outlines the rationale for determining landscape capacity in relation to key landscape characteristics:

Table 2: Characteristics influencing Landscape Sensitivity

Characteristic	Characteristics indicating a lower sensitivity to overhead lines	Characteristics indicating a higher sensitivity to overhead lines
Landform and scale	• Flatter or gently undulating landscapes • Broad valley landscapes • Larger scale landscapes	• Steep, complex landscapes • Complex topography • Intimate scale landscapes
Landcover and pattern	• Arable, pasture, rough grassland • Moorland • Simple patterns • Landcover which can recover quickly/ does not require complex engineering solutions	• Continuous woodland • Bog, peat, wetlands • Complex patterns • Landcover which recovers slowly/ requires complex engineering solutions
Manmade influence	• Industry, arable farming, presence of large built structures, disturbed areas • Landscapes which have experienced a higher level of human influence • More developed/ managed landscapes	• Remote landscapes • Areas with natural characteristics • Landscapes with little evidence of human influence
Visual experience	• Interrupted horizons • Simple skylines	• Uninterrupted horizons • Distinctive/ complex skylines
Settlements	• Industrial • Sparsely settled arable	• Residential • Dense patterns of isolated farmsteads/ small scale settlements
Time depth	• Landscapes which, through human influence, have experienced greater change at a faster pace of evolution (and which look likely to continue in this way)	• Landscapes which are more static, evolving at a slower pace (and which look likely to continue in this way)

1.12. In determining landscape sensitivity, professional judgement was applied alongside an understanding of how the proposed development would affect, or fit in with the landscape, and the degree to which potentially adverse effects could be reduced. This enabled a judgement to be made on the landscape sensitivity of each LCT to the proposed development. The results of this assessment are presented in **Table 3**.

Findings

1.13. The following table presents the findings of the landscape sensitivity appraisal of the landscapes sensitivity to accommodate the proposed development with reference to the Landscape Character Types contained within the broad study area. The part of the broad study area within Scotland is covered first.

1.14. The following documents are referenced within the table below:

i. NatureScot (2019). Scottish Landscape Character Type Map and Descriptions. Available online at https://www.nature.scot/professional-advice/landscape/landscape-character-assessment/landscape-character-assessment-scotland.

ii. Dumfries and Galloway Wind Farm Landscape Capacity Study. Main Report (Carol Anderson in association with Alison Grant, Landscape Architects, 2011);

iii. Cumbria Landscape Character Guidance and Toolkit (Cumbria County Council, 2011);

iv. The Solway Coast Area of Outstanding Natural Beauty (AONB) Landscape and Seascape Character Assessment (LUC for the Solway Coast AONB Partnership, 2010);

v. Cumbria Wind Energy Supplementary Planning Document, Part 2 Landscape and Visual Considerations (Coats Associates, 2006); and

vi. Cumbria County Council Cumulative Impacts of Vertical Infrastructure (Cumbria County Council, 2014).

Table 3: Sensitivity of the Landscape to the Proposed Development

LCT	Landscape sensitivity findings (relevant to overhead lines) taken from NatureScot (formerly SNH) Landscape Character Assessment 2019 (i)	Dumfries and Galloway Wind Farm Landscape Capacity Study (2017) (ii) (focuses on wind turbines which are similar vertical structures)	Appraisal: Landscape Sensitivity to the proposed development
Scottish Landscape Character Type (LCT) (NatureScot, 2019)			
LCT 158 Coastal Flats (Dumfries and Galloway)	Key characteristics based on LCT description and of relevance to the broad study area are: Generally extremely flat and low lying, although the coastal plain have some gentle undulations. Exposed with long views over the flats, as they merge with the Solway waters out to sea and distant views of opposite coastline. A more intimate feel to the minor road network and where there are abundant trees and a more well-managed appearance. Large to medium sized fields of improved pasture, with some arable cultivation. Fields enclosed by hedgerows or fences, or a combination of both, although sheep grazed salt marsh is traditionally unenclosed. Predominantly rural character with isolated properties scattered throughout the LCT. Small settlements and occasional caravan/ camping parks,	LCT 158 corresponds with Type 14: Coastal Plateau '*The well-settled nature of these landscapes increases sensitivity to larger typologies in general while additional sensitivities are also associated with the more natural mosses, coastal edge and woodlands and also the presence of existing wind farm development in the nearby 'Annandale' Foothills (Type 18)…there is an overall medium sensitivity to the small-medium typology (20–50m) and medium-low for the small typology turbines.*' (Page 83)	Simple skylines, flat/ gently rolling topography and simple landscape pattern (predominantly improved pasture) indicate a lower sensitivity to overhead line development. However, this has to be balanced against the openness of the landscape, long views and evenly dispersed pattern of properties, and areas of open salt marsh, which increases the sensitivity. **Overall LCT 158: Coastal Flats is considered to be of high/ medium sensitivity to a new wood pole overhead line.**

	contrasting with occasionally larger towns such as Annan and Gretna. Varied tree cover, with generally few woodlands or shelterbelts. Wet vegetation in areas of coastal moss Telegraph poles, power lines and farm structures are very evident as they break the flat horizon in flat estuarine areas. Major communication routes for road, rail and power lines on coastal plain. Man-made drainage features on coastal parkland. Open network of small burns dissecting merse areas.		
LCT 160 Narrow Wooded River Valleys (Dumfries and Galloway)	Key characteristics of relevance to the broad study area are: Narrow incised valleys with wooded slopes enclosing pasture floors. Small pastures and arable fields enclosed by hedges/ fences in lower reaches and drystone dykes in upper reaches. Dominant broadleaf (semi-natural) woodland character with conifers on higher slopes. Lush trough-shaped river valleys with pasture/arable floors enclosed by deciduous wooded slopes.	LCT 160 corresponds with Type 4: Narrow Wooded River Valleys: '*There would be a high-medium sensitivity to the small/ medium typology (20–50m) but a low sensitivity to small wind turbines.'* (Page 46)	Narrow incised valley, intimate unspoilt nature and dominant broadleaf woodland cover increases sensitivity but also provide scope to accommodate a sensitively routed wood pole overhead line. The presence of motorway and other human influences lowers the sensitivity. **Overall, LCT 160: Narrow Wooded River Valleys is considered to be of medium sensitivity to a new wood pole overhead line.**

	Riparian trees and woodlands following meandering river courses in lower reaches. Narrow lanes following valleys and linking isolated houses, occasional settlements and providing access to higher moorland. Clusters of prehistoric landscapes and settlement up some valleys. Numerous arched stone bridges over the rivers. Intimate unspoilt landscape focussing on river views with some adjacent policy landscape.		
LCT 162 Lower Dale (Dumfries and Galloway)	Key characteristics of relevance to the broad study area are: Wide, flat or gently undulating section of the major valleys. Improved pastures and arable fields of medium to large size. Hedgerow field boundaries (beech and hawthorn) with occasional walls. Hedgerow tree lines and tree avenues predominantly beech and sycamore. Beech trees are an essential feature of Lower Annandale. Broadleaf shelterbelts.	LCT 162 corresponds with Type 7a: Middle Dale with Hills and Type 16 Upland Fringe. '*The sensitivity of the landscape of the Middle Dale with Hills is High for large and medium typologies, High-medium for the small-medium typology (turbines 20-50m) and Medium for small wind turbines <20m high, as there could be opportunities to site the latter where they are less visible due to tree cover and landform.*' (Page 57) *In the landscape of the Upland Fringe, there is High-medium sensitivity to the medium typology but would generally be less sensitive to the small-medium typology(turbines 20-50m) with an overall Medium sensitivity assessed for this smaller typology of <20m*	Broad valley with undulating landform, with broadleaf shelterbelts and simple land cover pattern suggest lower sensitivity with scope to accommodate a sensitively routed wood pole overhead line. However, there are many dispersed settlements and isolated farmsteads, which increases the sensitivity. **Overall, LCT 162: Lower Dale is considered to be of medium sensitivity to a new wood pole overhead line.**

	Open character, medium to long views determined by tree lines and shelterbelts. Wide meandering river channels. Network of communication lines: minor and major roads and railway lines. Many settlements including main towns at river bridging points, isolated developments and suburban expansion. Archaeological features, particularly Roman and medieval forts and castles.	*high turbines. There would be a Medium-low sensitivity to the small typology.* (Page 89)	
LCT 170 Coastal Plateau (Dumfries and Galloway)	Key characteristics of relevance to the broad study area are: Mostly flat and gently rolling topography with an incline towards the coast. Elevated long views over the Solway Firth. Improved pastures with large rectilinear fields. Small geometric forests and shelterbelts forming dark visual horizons. Hedgerow field enclosures with some hedgerow trees. Straight roads. Farmsteads at the end of straight access lanes This LCT is flat with a gentle incline towards the Solway Firth, with gentle undulations. There are long views	LCT 170 corresponds with Type 14: Coastal Plateau: *'The well-settled nature of these landscapes increases sensitivity to larger typologies in general while additional sensitivities are also associated with the more natural mosses, coastal edge and woodlands and also the presence of existing wind farm development in the nearby 'Annandale' Foothills (Type 18)…there is an overall medium sensitivity to the small-medium typology (20–50m) and medium-low for the small typology turbines.'* (Page 83)	Simple skylines, flat/ gently rolling topography and simple landscape pattern (predominantly improved pasture) indicate a lower sensitivity to overhead line development. However, the openness of the landscape, dispersed settlement and long views increases the sensitivity. **Overall LCT 170: Coastal Plateau is considered to be of high/ medium sensitivity to a new wood pole overhead line.**

	towards the Cumbrian Mountains across the Solway Firth due to the open, elevated plateau landscape. Improved pastures comprise the majority of the LCT, with some arable fields and areas of rougher pasture on higher landform. Fields are large and rectilinear, bounded by fences. This LCT contains Chapelcross Power Station.		
LCT 171: Flow Plateau	Key characteristics of relevance to the broad study area are: Mostly flat and gently rolling topography with an incline towards the Solway. Occasional long views over the Solway. Waterlogged rush infested pastures, ochre green and brown. Large fields with hedgerows in poor condition and fences. Cattle grazing. Shelterbelts and small informally shaped forests. Riparian woodlands. Scattered farmsteads	LCT 171 corresponds with Type 15: Flow Plateau. It is the higher ground, inland and to the west of the LCT which fall within the broad study area. *'These gently undulating landscapes fall gradually to the Solway coast and the broad floodplain of the Esk. Farmland is interspersed with low-lying mosses which are often encircled by broadleaved woodland and scrub... The field enclosure pattern becomes less distinct and settlement sparser in the north-east of the Flow Plateau at the transition with the Upland Fringe (16)… The field enclosure pattern becomes less distinct and settlement sparser in the north-east of the Flow Plateau'* *Sensitivity would be high-medium for the small-medium typology (turbines 20-50m) and medium-low for the small typology (turbines <20m) (page 83).*	Characteristics very similar to LCT 170: Coastal Plateau however, the inland areas to the north west which fall within the broad study area are also characterised by areas of bracken, scrub and rough grassland. The A74(M) runs along the LCT's south-western boundary with LCT 160. Areas of marsh close to the low-lying mosses are a valued landscape characteristic. **Overall LCT 171: Flow Plateau is considered to be of high/ medium sensitivity to a new wood pole overhead line.**

LCT 172: Upland Fringe (Dumfries and Galloway)	Key characteristics of relevance to the broad study area are: Elevated rolling pastures. Improved and rough grassland in close proximity. Hedgerow banks and treelines along roads in some lower areas. Dry stone dykes. Squared areas of forestry. Contrast between wide open areas and more intimate landform. Panoramic views over valley and coastal lowlands. Small bridges over incised burns. Notable landmark features, including Iron Age fortifications, designed landscapes and grand houses.	LCT 172 corresponds with Type 16: Upland Fringe and 7a Middle Dale with Hills. *In the landscape of the Upland Fringe, there is High-medium sensitivity to the medium typology but would generally be less sensitive to the small-medium typology(turbines 20-50m) with an overall Medium sensitivity assessed for this smaller typology of <20m high turbines. There would be a Medium-low sensitivity to the small typology.* (Page 89) *'The sensitivity of the landscape of the Middle Dale with Hills is High for large and medium typologies, High-medium for the small-medium typology (turbines 20-50m) and Medium for small wind turbines <20m high, as there could be opportunities to site the latter where they are less visible due to tree cover and landform.'* (Page 57)	The rolling pastures and woodland/ hedgerow cover offer some opportunities for backclothing and utilising woodland cover for screening exist. However, this is a transitional landscape which is highly visible from the surrounding settled lowlands. **Overall, LCT: Upland Fringe is considered to be of medium sensitivity to a new wood pole overhead line.**
LCT	Landscape Sensitivity findings (in relation to tall structures, wind farms etc.) from Landscape Character Assessment (2011) (iii) and Landscape and Seascape Character Assessment (2010) (iv)	Landscape Capacity findings (in relation to wind farms) from Landscape Capacity Study (2006)vii (v) and Cumulative Impacts of Vertical Infrastructure Study (2014) (vi)	Appraisal: Landscape Sensitivity to the proposed development
LCTs within Cumbria			
LCT 1a: Intertidal Flats	This dynamic landscape changes with daily tides and includes mudflats, sands, shingle and pebble beaches beside the	Low capacity '*Any type of turbine development would have the potential to impinge on the natural character and strong*	The open seascape character, important coastal features and processes, and the highly visible and undeveloped nature of

	open water of the Solway Firth. The landform is flat and open with significant ecological interest and historic routes and artefacts. This is an unspoilt character area with largely undeveloped horizons and a sense of naturalness and tranquillity. 'Development pressures include major infrastructure and energy infrastructure proposals, which can be highly intrusive particularly as the waters-edge naturally attracts attention and is a focal point.' 'Encourage the deep burial of cables to reduce the need for vertical structures both in this and adjacent seascapes that form the backdrop to this type, especially the Solway Coast and Arnside and Silverdale AONBs, and the Hadrian's Wall buffer zone.'	*sense of remoteness, tranquillity and wildness for which this landscape is valued.' (v) (*page 42*) 'The largely undeveloped horizons, naturalness and tranquillity of the wide open seas and mudflats contribute to its sensitivity; Energy infrastructure proposals could have significant effects on natural coastal processes, habitats and the open seascape character. Overall sensitivity is considered moderate/high*' (vi) (page Cumbria -3)	this LCT increase the sensitivity of the landscape to overhead line development. **Overall, LCT 1a: Intertidal Flats is considered to be of high sensitivity to a new wood pole overhead line.**
LCT 1b: Coastal Marsh	This character area comprises salt marshes, hedge topped sea dykes and closely grazed fine sward. There are creeks, channels, erosion cliffs and river channels which constantly cut new courses. These marshes lie above average daily tides and the higher marshes are dissected by streams. This LCA is of a transitional seascape character and is of international ecological importance.	Low capacity '*Any type of turbine development would have the potential to impinge on the natural character and strong sense of remoteness, tranquillity and wildness for which this landscape is valued.'* (v) (page 42*)* *'The open and undeveloped nature makes them sensitive to development and significant changes to the largely undeveloped horizon; Expansive backdrop of the seas and Lakeland and Scottish fells could be sensitive to significant*	The open seascape character, highly visible nature and undeveloped nature of the landscape increase the sensitivity of the landscape to overhead line development. **Overall, LCT 1b: Coastal Marsh is considered to be of high sensitivity to a new wood pole overhead line.**

	'Energy infrastructure including tidal, large scale wind and pylons could be considered in the adjacent estuary and bay areas. These could have significant effects on natural coastal processes, habitats and the open seascape character.'	*infrastructure development. Overall sensitivity is considered moderate/high*' (vi) (page Cumbria - 3)	
LCT 2b: Coastal Mosses	This LCA comprises lowland raised mosses with a mosaic of heath, scrub, woodland and pasture of high ecological value. Field shapes vary, from small irregular fields in undulating areas to large rectangular fields on the flat open mosses. Lowland bogs are of international and national importance and have a rich cultural heritage. '*The introduction of energy infrastructure and associated tall and vertical structures such as pylons and large scale wind turbines can impact greatly on the character of these expansive open areas. The introduction of pylons with regard to the grid upgrade could act as an incentive to developers looking to site tall structures which could obscure important views.'*	Low/ moderate capacity '*Potential is limited by the overall moderate/ high sensitivity of its variable landscape character, moderate/ high to high landscape value of parts recognised by LoCI and Solway Coast AONB designation, rarity of dunes and mosses and strong ecological and historical interests.*' (v) (page 45). '*The introduction of energy infrastructure and associated tall and vertical structures such as pylons and large scale wind turbines can impact greatly on the character of these expansive open areas. The introduction of pylons with regard to the grid upgrade could act as an incentive to developers looking to site tall structures which could obscure important views. The Solway Coast AONB, with sense of wilderness and remoteness is likely to be compromised by any scale of wind energy development. Overall sensitivity is considered moderate/high.'* (vi) (Cumbria - page 7)	The open character, sense of remoteness and tranquillity and rich diversity of landcover increase the sensitivity of the landscape to overhead line development. **Overall, LCT 2b: Coastal Mosses is considered to be of high sensitivity to a new wood pole overhead line.**

LCT 2c: Coastal Plain	This LCA is predominantly pasture with some arable farming, along a flat and slightly undulating coastal plain. There are historic fields patterns linked to settlements, fields are long and narrow in undulating areas and larger in flat areas. Rivers and watercourses cross through this LCA and vegetation cover is sparse, limited to gorse and hedgerows. Telecommunication masts and pylons are prominent in some areas, along with 20th century military sites. Minimise the impact of major developments such as large scale wind energy, roads, pylons, masts and infrastructure linked to offshore developments by careful siting to maximise screening from public view and high standards of design and landscape treatment. Open and exposed sites and those that affect key views should be avoided, especially where development would become the dominant feature. *'Pressures for renewable energy development including onshore and offshore wind farms, tidal energy schemes, electricity grid infrastructure and other large scale development which may change the views from the coastal plains, particularly extension of*	Low/ moderate capacity. '*Potential is limited by the overall moderate/ high sensitivity of its variable landscape character, moderate/ high to high landscape value of parts recognised by LoCI and Solway Coast AONB designation, rarity of dunes and mosses and strong ecological and historical interests.*' (v) (page 45). '*The open views across adjacent marshes and flats out to sea and inland to the Lakeland Fells are sensitive to large scale infrastructure development. This area could be affected by an upgrade to the national grid resulting in new pylons… New, larger pylons could affect the open character of the landscape. Overall sensitivity is considered moderate/high.*' (vi) (page Cumbria-9).	This is a large scale landscape of predominantly pastoral land cover on a gently undulating coastal plain. The landscape has been altered by major developments such as roads and pylons, which reduces its sensitivity in parts although care will have to be taken to avoid cumulative effects. Much of the LCT falls within the Solway Firth AONB where the open character, sense of remoteness and tranquillity increase the sensitivity of the landscape to overhead line development **Overall, LCT 2c: Coastal Plain is considered to be of high sensitivity to a new wood pole overhead line.**

	developed skylines along open and undeveloped land or sea horizons.'		

CCHK19

APPENDIX D:
T ROUTE REBUILD

Routeing Study: Cultural Heritage Appraisal

for Gillespies & SP Energy Networks

September 2021

HEADLAND ARCHAEOLOGY

T ROUTE REBUILD

Routeing Study: Cultural Heritage Appraisal

for Gillespies & SP Energy Networks

September 2021

HA Job no.:	CCHK19
Council:	Dumfries & Galloway
Project Manager:	Tom Janes
Author:	Tom Janes

CONTENTS

HEADLAND ARCHAEOLOGY
SCOTLAND
13 Jane Street
Edinburgh EH6 5HE
0131 467 7705
www.headlandarchaeology.com

KEY

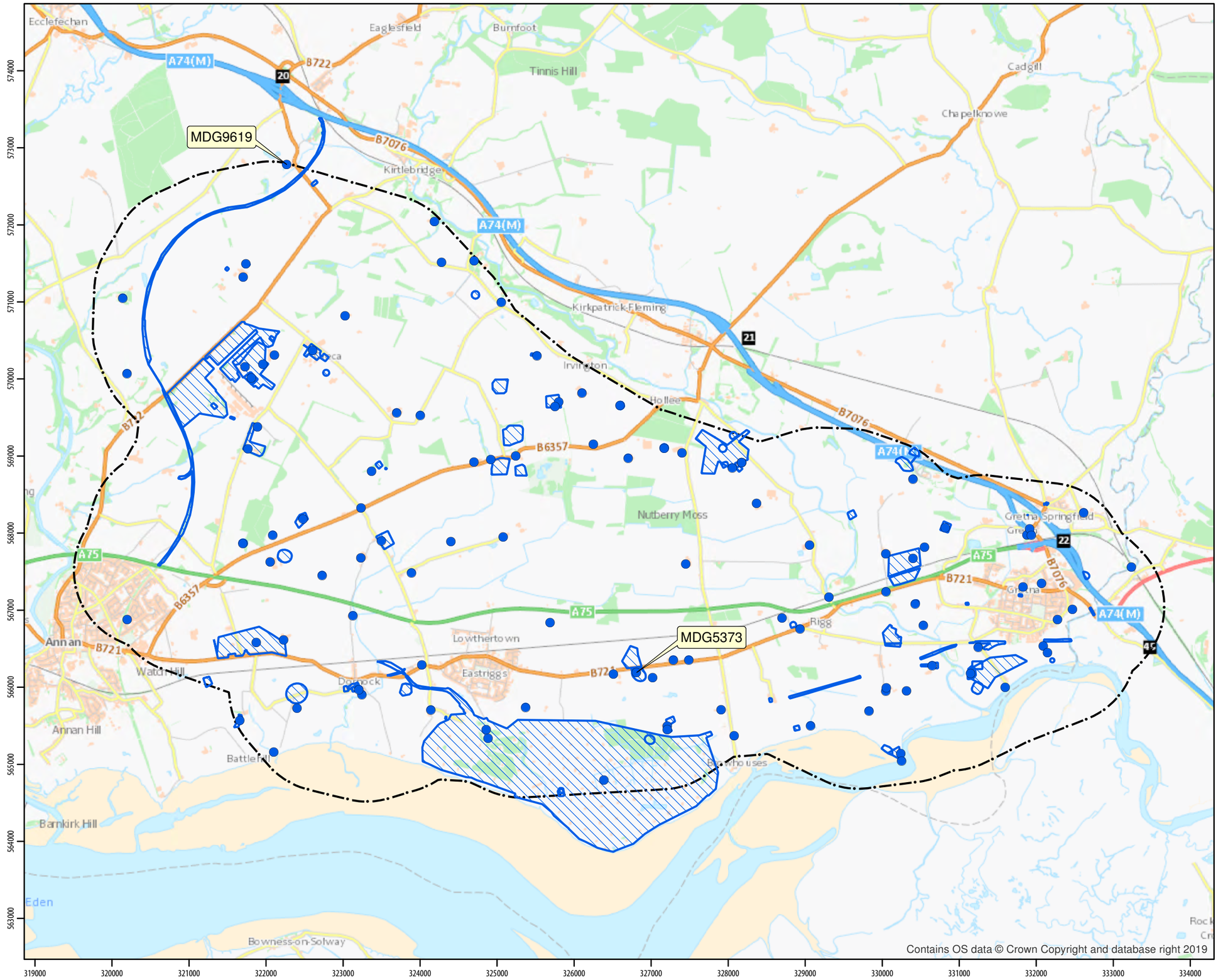
- Scheduled Monument
- Category A Listed Building
- Category B Listed Building
- Category C Listed Building
- Grade II Listed Building
- Inventory Historic Battlefield
- World Heritage Site Buffer Zone
- IRSA

1:50,000 @ A3

0 1,180m

Figure 1
Designated Heritage Assets within the IRSA

HEADLAND ARCHAEOLOGY
SCOTLAND
13 Jane Street
Edinburgh EH6 5HE
0131 467 7705
www.headlandarchaeology.com



KEY

- HER Entry
- Extent of HER Entry

1:50,000 @ A3

0 1,180m

Figure 2
Undesignated Heritage Assets within the IRSA

T ROUTE REBUILD

ROUTEING STUDY: CULTURAL HERITAGE APPRAISAL

This report presents the findings of a cultural heritage appraisal for a proposed replacement/upgrade of an existing overhead line (OHL) from tower AK008 on the AK Route north of Annan to tower T137A to the south of Gretna, south-east of Gretna, Dumfries and Galloway. The purpose of this study is to identify the principal heritage constraints on development, based on a consideration of national and local authority archaeological databases. The report provides high-level advice on known and potential cultural heritage constraints within the initial route study area, and on the scope of any further work likely to be required to allow the planning authority to determine a planning application. This is not intended to serve as a detailed impact assessment of any particular route option.

There are 62 designated heritage assets within the IRSA; these comprise the Buffer Zone of the Frontiers of the Roman Empire (Hadrian's Wall) World Heritage Site, 46 Listed Buildings, 14 Scheduled Monuments, and one Inventory Historic Battlefield (IHB). There are also over 100 undesignated heritage assets recorded on Historic Environment Records within the IRSA. The IRSA is considered to be of medium archaeological potential.

The main issue is with the need for the OHL to cross part of the Battle of Sark IHB. There is a risk of direct impacts within the IHB, but these can be minimised with appropriate route selection and design solutions. Further investigation, in the form of a desk-based assessment and walkover of the route, will be required in order to establish a baseline for further assessment, and to inform design iterations.

It is also recommended that statutory consultees should be engaged at an early stage in order to determine the baseline, and to discuss and agree impact mitigation proposals and/or inform design solutions.

1 INTRODUCTION

1.1 Planning Background

Gillespies, on behalf of SP Energy Networks, are undertaking a routeing study of the proposed rebuild of the 132kV overhead line (OHL) between tower AK008 and the existing tower T137A at Harker on the edge of Gretna in Dumfries and Galloway, located roughly 17.5km distant.

They have instructed Headland Archaeology to carry out a cultural heritage appraisal to inform the study. The aim of this appraisal is to identify any significant cultural heritage constraints to inform the initial route selection.

1.2 Site Description & Study Area

The initial routeing study area (IRSA) is approximately 73.5 km^2 and comprises a 1km buffer around the outermost of the initial route options (Figure 1 and 2). The IRSA takes in the towns of Eastriggs and Gretna, as well as the north-east of Annan and much of the land between the Solway Coast and the A74(M). The IRSA is bounded by the A74(M) along its northern edge, and the Solway Firth to the south.

The receiving landscape is typical for the Solway coastal plain; low lying and flat, with regular fields of improved farmland given over to a mixture of arable and pasture. Occasional areas of unimproved land comprise the partially drained and exploited peatlands of Nutberry Moss and White Moss to the north of Eastriggs. Farms, small settlements and towns are dotted throughout the area, linked by the A75 and a network of minor roads.

2 AIMS AND OBJECTIVES

The assessment has been carried out according to the *Standard and guidance for historic environment desk-based assessment* published by the Chartered Institute for Archaeologists (CIfA 2014) and aims to provide a high-level overview of the archaeology of the area, outlining the type and range of known assets, together with commentary on key constraints – including designated assets and any undesignated sites of national importance.

3 METHODOLOGY

3.1 Content

This appraisal includes:

- A review of relevant legislation, national and local planning policy and guidance;
- A description of the study areas, data sources and methodology used in the appraisal;
- A description of the known heritage assets that could act as constraints on the development, with an assessment of the potential for further, as yet unknown, constraints;
- A preliminary assessment of the potential impact of the proposed development on the historic environment, highlighting any effects that may be significant and that could lead the planning authority to refuse consent, or impose conditions on consent;
- Recommendations for addressing any such potential effects; and
- Maps showing all relevant heritage assets in relation to the proposed development.

A heritage asset (or historic asset) is any element of the historic environment which has cultural significance. Both discrete features, and extensive landscapes defined by a specific historic event, process or theme, can be defined as heritage assets; and assets may overlap or be nested within one another.

Designated assets include Scheduled Monuments, Listed Buildings, World Heritage Sites, Conservation Areas, Inventory Gardens and Designed Landscapes, Inventory Historic Battlefields and Historic Marine Protected Areas. Other assets may also be locally designated through policies in the Local Plan.

The majority of heritage assets are not designated. Some undesignated assets are recorded in Historic Environment Records or Sites and Monuments Records (HERs/SMRs) maintained by local authorities and other agencies. However, many heritage assets are currently unrecorded, and the information contained in HERs and SMRs is not definitive, since they may include features which, for instance, have been entirely removed, or are of uncertain location, dubious identification, or negligible importance. The identification of undesignated heritage assets is therefore to some extent a matter of professional judgement.

The appraisal is based on an assessment of known heritage assets recorded in national and local authority databases. It does not constitute a desk-based assessment or baseline study, as may be required in support of a planning application but is intended to inform the design of the proposed development at a pre-planning stage. Further investigation (such as a desk-based assessment or on-site investigation) would be necessary to provide sufficient information to allow the local authority to determine a planning application. The scope of further works likely to be required is described in the final section of the report.

No consultation has been carried out in connection with the appraisal.

3.2 Data sources

The following sources of information were referred to:

- Designation data from the Historic Environment Scotland;

- The National Record of the Historic Environment (NRHE), including the Canmore database viewed via the Pastmap website;
- The Dumfries & Galloway Council Historic Environment Records (HER);

No walkover survey was undertaken at this early stage of the route selection process.

3.3 Assessment of cultural significance and importance

Heritage assets are assessed in terms of their cultural significance and importance. Cultural significance is a quality that applies to all heritage assets, and as defined by Historic Environment Scotland (Environmental Impact Assessment Handbook, SNH & HES 2018, Appendix 1 page 175[1]) relates to the ways in which a heritage asset is valued both by specialists and the general public; it may derive from factors including the asset's fabric, setting, context and associations. This use of the word 'significance', referring to the range of values we attach to an asset, should not be confused with the unrelated usage in EIA where the significance of an effect reflects the weight that should be attached to it in a planning decision.

The *importance* of a heritage asset is the overall value assigned to it based on its cultural significance, reflecting its statutory designation or, in the case of undesignated assets, the professional judgement of the assessor (Table 1). Assets of national importance and international importance are assigned a high and very high level respectively. Scheduled Monuments, Inventory Gardens and Designed Landscapes, Inventory Historic Battlefields and Historic Marine Protected Areas are, by definition, of national importance. The criterion for Listing is that a building is of 'special architectural or historic interest'; following Designation Policy and Selection Guidance (DPSG) Annex 2.19, Category A refers to 'outstanding examples of a particular period, style or building type', Category B to 'major examples of a particular period, style or building type', and Category C to 'representative examples of a particular period, style or building type' (DPSG, HES 2019). Conservation Areas are not defined as being of national importance and are therefore assigned to a medium level. Any feature which does not merit consideration in planning decisions due to its cultural significance may be said to have negligible heritage importance; in general, such features are not considered as heritage assets and are excluded from the assessment.

Table 1: Criteria for Assessing the Importance of Heritage Assets

Importance	**Criteria**
Very high	World Heritage Sites and other assets of equal international importance
High	Category A Listed Buildings, Scheduled Monuments, Inventory Gardens and Designed Landscapes, Inventory Historic Battlefields, Historic Marine Protected Areas and undesignated assets of national importance
Medium	Category B Listed Buildings, Conservation Areas, and undesignated assets of regional importance
Low	Category C Listed Buildings and undesignated assets of lesser importance

3.4 Potential for unknown heritage assets

The databases maintained by HES and the HER do not include all heritage assets, and it should not be assumed that the information they contain is a comprehensive record of the historic environment resource. The likelihood that significant undiscovered heritage assets may be present within the Study Area is referred to as *archaeological potential*. Overall levels of potential can be assigned to different landscape zones, following the

[1] Scottish Natural Heritage & Historic Environment Scotland (2018) Environmental Impact Assessment Handbook. (5th Edition)

criteria in Table 2, while recognising that the archaeological potential of any zone will relate to particular historical periods and types of evidence. The following factors are considered in assessing archaeological potential:

- The distribution and character of known archaeological remains in the vicinity, based principally on an appraisal of data in the HERs;
- The history of archaeological fieldwork and research in the surrounding area, which may give an indication of the reliability and completeness of existing records;
- Environmental factors such as geology, topography and soil quality, which would have influenced land-use in the past and can therefore be used to predict the distribution of archaeological remains;
- Land-use factors affecting the survival of archaeological remains, such as ploughing or commercial forestry planting; and
- Factors affecting the visibility of archaeological remains, which may relate to both environment and land-use, such as soils and geology (which may be more or less conducive to formation of cropmarks), arable cultivation (which has potential to show cropmarks and create surface artefact scatters), vegetation, which can conceal upstanding features, and superficial deposits such as peat and alluvium which can mask archaeological features.

Table 2: Archaeological potential

Potential	Definition
High	Undiscovered heritage assets are almost certainly present, and these are likely to include assets of high or medium importance.
Medium	Undiscovered heritage assets are likely to be present, and it is possible, though unlikely, that these may include assets of high or medium importance.
Low	The study area may contain undiscovered heritage assets, but these are unlikely to be numerous and are highly unlikely to include assets of high or medium importance.
Negligible	The study area is highly unlikely to contain undiscovered heritage assets of any level of importance.
Nil	There is no possibility of undiscovered heritage assets existing within the study area.

4 CULTURAL HERITAGE CONSTRAINTS

4.1 Previous investigations

The DGC HER does not record any previous investigations within the IRSA.

4.2 Heritage assets in the Initial Routeing Study Area

World Heritage Site

There is one World Heritage Site (WHS) within the IRSA. This is the Frontiers of the Roman Empire (Hadrian's Wall) WHS, which consists of upstanding remains and known sites associated with Hadrian's Wall. The Buffer Zone of the WHS encroaches upon the IRSA south-east of Gretna (Figure 1). The WHS encompasses the Wall and its hinterland and stretches from Maryport in Cumbria to South Shields on Tyneside – this is a total area of 450 km^2. However, less than 1 km^2 of the Buffer Zone of the WHS is within the IRSA.

No significant setting impacts are anticipated upon the WHS, and no direct impacts will occur.

Scheduled Monuments

There are 14 Scheduled Monuments (SMs) within the IRSA which comprise 12 prehistoric ritual, funerary and/or settlement features, one Roman ritual site and a nineteenth-century tile works (Figure 1). As SMs, all 14 are of High importance.

The SMs are distributed fairly evenly throughout the IRSA and tend to be discrete features. There is one small cluster of three prehistoric features (two cairns and a settlement) at Calvertsholm, along the northern edge of the IRSA (SM11947, SM11950 and SM12128, Figure 1). The remaining prehistoric SMs comprise a mixture of enclosures, settlement sites, cairns and a standing stone; all fairly typical features for a low lying, fertile landscape such as the Solway plain.

The Roman altar at Westhills farm (SM11980, Figure 1) is not in its original position and is likely to have been moved to its present location in the nineteenth century to serve as an ornamental landscape feature.

The tile works at Bonshaw (SM7554, Figure 1) appear to have sited to take advantage of the glacial clays prevalent in this area of the Solway plain.

All of the SMs derive some of their cultural significance from their settings: The enclosures and settlements take advantage of the natural fertility of the flood plain, the cairns are located with apparent ritual reference to the nearby Kirtle Water, and the Roman altar was placed to be a landscape feature, from which scenic views can be enjoyed across the Solway Firth.

However, it is not anticipated that any of the setting characteristics which contribute to these SMs' cultural significance will be subject to significant impacts from the proposed OHL. It should also be possible to route the OHL in such a way as to avoid direct impacts upon all of the SMs.

Table 3: Scheduled Monuments in the IRSA

Ref	Title	Type	Easting	Northing
SM3378	Lochmaben Stone, standing stone & stone	Prehistoric ritual and funerary: standing stone	331239	565990
SM4087	Broats, enclosure 250m N of	Prehistoric domestic and defensive: enclosure (domestic or defensive)	325229	569281
SM4090	Woodhead, enclosure 200m NE of	Prehistoric domestic and defensive: enclosure (domestic or defensive)	322227	567702
SM7554	Bonshaw Tile Works, NW of Bonshawside, Kirtlebridge	Industrial: pottery	322637	572773
SM11947	Calvertsholm Cottages, cairn 315m WNW of	Prehistoric ritual and funerary: cairn (type uncertain)	327938	569094
SM11950	Calvertsholm Cottages, cairn 320m NNW of	Prehistoric ritual and funerary: cairn (type uncertain)	328063	569264
SM11980	Westhills, altar stone 35m N of	Roman: altar	327230	565544
SM11987	Robgill Mains, cairn 320m E of	Prehistoric ritual and funerary: cairn (type uncertain)	324723	571090
SM11994	The Bracken, enclosed settlement and droveway 370m WSW of	Prehistoric domestic and defensive: settlement	330296	568888
SM12001	Gleningle, enclosure 80m NE of	Prehistoric domestic and defensive: settlement	322401	565922

Ref	Title	Type	Easting	Northing
SM12029	Woodfield, enclosure 295m NE of	Prehistoric domestic and defensive: enclosure (domestic or defensive)	326783	566319
SM12086	Redkirkmill, enclosure 50m WSW of	Prehistoric domestic and defensive: enclosure (domestic or defensive)	330142	566638
SM12128	Calvertsholm, settlement 110m N of	Prehistoric domestic and defensive: enclosure (domestic or defensive)	328170	569019
SM12189	Burnbrae, enclosure 270m W of	Prehistoric domestic and defensive: enclosure (domestic or defensive)	323820	565970

Listed Buildings

There are 46 Listed Buildings within the IRSA (Table 4, Figure 1); 45 of these are in Scotland and comprise three Category A, 29 Category B and 13 Category C listed buildings. The sole English LB within the IRSA is Grade II-listed.

Table 4: Listed Buildings in the IRSA

Ref	Title	Category	Easting	Northing	Importance
LB3489	Bonshaw Tower and House and Courtyard Walls	A	324256	572068	High
LB3782	Stapleton Tower	A	323471	568871	High
LB3792	Dornock Village, Dornock House, Old Farmhouse and Steading, Including Detached Tall West Block	A	323167	566032	High
LB3478	Outertown	B	320315	568933	Medium
LB3487	Beckfoot Farmhouse with Steading and Gatepiers	B	321721	565672	Medium
LB3490	Bonshaw Sundial	B	324236	572048	Medium
LB3778	Stapleton Tower, Lodge and Gatepiers	B	322952	568677	Medium
LB3779	Woodhall Houses and Steading	B	323913	567514	Medium
LB3780	Robgill Tower, Lodge and Gatepiers	B	324695	571389	Medium
LB3781	Stapleton Grange Farmhouse and Steading	B	323061	568255	Medium
LB3783	Stapleton Tower, Corn Drying Kiln	B	323471	568871	Medium
LB3785	Dornock Village, Millbrae, Hillridge	B	323338	566170	Medium
LB3786	Dornock Village, Dornock Parish Church and Churchyard	B	323048	565984	Medium
LB3787	Eastriggs Village, St John's Episcopal Church	B	324523	566242	Medium
LB3793	Dornock Village, Dornock Town Farmhouse	B	323202	566053	Medium
LB9793	Broats Farmhouse and Steading	B	325181	569033	Medium
LB9929	Springfield Village, Old Blacksmith's Shop and Smithy	B	332116	568368	Medium
LB9931	Gretna Green, Gretna Hall Hotel and Gatepiers	B	331933	568219	Medium
LB9932	Gretna Village, Annan Road, The Gables	B	331474	567357	Medium

Ref	Title	Category	Easting	Northing	Importance
LB9933	Gretna Village, Annan Road, Rectory to All Saints Episcopal Church	B	331754	567303	Medium
LB9934	Gretna Village, Annan Road, All Saints Episcopal Church	B	331799	567307	Medium
LB9936	Gretna Village, Annan Road, Hunters Lodge Hotel	B	332045	567287	Medium
LB9937	Gretna Village, 56a-F, 58a-C and 60a-E Annan Road, (Including Tourist Information Office)	B	331911	567254	Medium
LB9942	Kirtleside Bridge (A75 Over Kirlte Water)	B	329418	567048	Medium
LB9943	Old Toll House ("Scotland's First House")	B	332690	567066	Medium
LB9946	Sark Bridge (A75, South Bound Traffic Over River Sark)	B	332720	566989	Medium
LB9958	Gretna Green, Gretna Hall Former Stables, Including Elmwood	B	331863	568245	Medium
LB9959	Gretna Green, Gretna Parish Church and Churchyard	B	331929	568009	Medium
LB9960	Gretna Village, Loanwath Road, St Andrews Church (Church of Scotland)	B	331772	566975	Medium
LB9961	Gretna Village, 148-171 (Inclusive Nos), Central Avenue	B	331833	567350	Medium
LB9962	Gretna Village, Central Avenue, Richard Greenhow Centre	B	331873	567178	Medium
LB9963	Gretna Village, Victory Road, Anvil Hall, Former Roman Catholic Church	B	331755	567458	Medium
LB3477	Northfield Farmhouse and Steading	C	319834	568200	Low
LB3479	Preston Hall Farmhouse	C	321352	568131	Low
LB3784	Dornock Village, Dornock Town, North Range of Farm Steading (Adjoining Main Road)	C	323209	566085	Low
LB3790	Robgill Tower, Walled Garden	C	324704	571532	Low
LB9926	Gretna Village, 14-32 (Even Nos) Canberra Road	C	332135	567435	Low
LB9928	Rigg Village 1 and 2 Meikle Green	C	329244	566925	Low
LB9935	Gretna Village, Annan Road, Surrone House	C	332072	567334	Low
LB9938	Gretna Village, 23-33 (Odd Nos) Canberra Road	C	332080	567460	Low
LB9940	Gretna Village, 30-52 (Even Nos) Victory Avenue	C	331710	567366	Low
LB9945	Rigg Village, The Square, House with Shop and Houses Adjoining, The Cottage and Five Bells	C	329170	566890	Low
LB21125	Standalane, Newington House	C	319894	566932	Low

Ref	Title	Category	Easting	Northing	Importance
LB51732	Gretna Village, 121 Central Avenue, Former Gretna Cinema	C	331799	567187	Low
LB51967	Gretna Village, 50 Annan Road	C	331807	567254	Low
1335641	Milestone South of Gretna	Grade II	332950	566767	Low

The Listed Buildings comprise a mixture of churches, houses, shops, farm buildings and estate buildings typical of a rural and semi-rural farming area such as the Solway plain.

Although some of the LBs derive some cultural significance from their settings, it is not anticipated that any of these LBs will be subject to significant impacts from the proposed OHL.

It should also be possible to route the OHL in such a way as to avoid direct impacts upon all of the LBs

Inventory Historic Battlefields

The south-eastern end of the OHL route terminates within the Inventory Historic Battlefield (IHB) of Sark (Figure 1). This records the location of the fifteenth century victory of the Scots over an English army led by the Earl of Northumberland. As outlined on the HES listing entry;

"*The IHB boundary defines the area in which the main events of the battle are considered to have taken place (landscape context) and where associated physical remains and archaeological evidence occur or may be expected (specific qualities).*"

The existing OHL crosses the IHB, which is largely under arable farmland and crossed by minor roads. No significant setting or construction impacts are anticipated upon the IHB.

Other Designated Heritage Assets

There are no Inventory Gardens and Designed Landscapes, Conservation Areas or Properties in Care of Scottish Ministers within the IRSA.

Undesignated heritage assets

DGC categorise heritage assets on the basis of importance and maintain a non-statutory register (NSR). In brief the categories of importance comprise 'National' (existing designated assets and undesignated assets considered to be of schedulable/listable quality), 'Regional' (undesignated assets of regional significance and interest), 'Local' (undesignated assets of local significance and interest), 'Regional/Local' refers to heritage assets identified before 2003 that have not yet been fully categorised. 'Unknown' (undesignated assets identified from documentary sources and whose survival and/or heritage significance has not been ground-truthed). 'Other' is used for minor agricultural features, and 'None' are sites not considered significant for planning purposes.

The DGC HER records a total of 259 entries within the IRSA (Appendix 1). However, the significance of 132 of these is categorised in the HER as 'None' or 'Other'. A further 16 entries record findspots of artefacts since removed. None of these 147 entries are considered as Heritage Assets in this appraisal.

Therefore, there is a total of 112 HER entries within the IRSA. Sixty-six of these are of 'Unknown' significance, 11 are of 'Local' significance, 33 are of 'Regional/Local' significance and two (MDG5373 and MDG9619, Figure 2) are of 'National' significance.

There are several DGC HER entries within the IRSA dated to the prehistoric period; these include the settlement at Woodfield (MDG5373). The prehistoric settlement is categorised by the HER as being of 'National' significance, and therefore of schedulable quality. The remaining entries are categorised as being of 'local' importance.

Three HER entries are dated to between the Roman and medieval period, and the majority of the remaining (over 100) entries are post-medieval to modern, or undated. Among these is the Burnhead Limeworks (MDG9619), categorised as being of 'National' significance.

The majority of the post-medieval to modern features within the IRSA largely comprise structures associated with agriculture. The remainder comprise typical rural and semi-rural structures such as houses, churches, bridges, and memorials as well as several features associated with the Gretna cordite factory and other wartime establishments. Wider views and setting make a limited contribution to the cultural significance of these assets, and no significant setting impacts are anticipated upon them.

Depending upon the final route, design and construction methodology of the OHL, there is potential for a direct impact upon some undesignated heritage assets.

4.3 Archaeological potential of the Study Area

The archaeology within the IRSA, as recorded on the HER, indicates a human presence in the area dating back to the Mesolithic .

The distribution patterns of known archaeology in the IRSA suggest that the IRSA is of **medium** archaeological potential. According to the criteria in Table 2, this means there is a risk that undiscovered heritage assets are likely to be present, and it is possible, though unlikely, that these may include assets of high or medium importance.

5 POTENTIAL EFFECTS OF THE DEVELOPMENT

Effects on the historic environment can arise through direct physical impacts, impacts on setting or indirect impacts:

- Direct physical impacts describe those development activities that directly cause damage to the fabric of a heritage asset. Typically, these activities are related to construction works and will only occur within the application site.
- An impact on the setting of a heritage asset occurs when the presence of a development changes the surroundings of a heritage asset in such a way that it affects (positively or negatively) the heritage significance of that asset. Visual impacts are most commonly encountered but other environmental factors such as noise, light or air quality can be relevant in some cases. Impacts may be encountered at all stages in the life cycle of a development from construction to decommissioning but they are only likely to lead to significant effects during the prolonged operational life of the development.
- Indirect impacts describe secondary processes, triggered by the development, that lead to the degradation or preservation of heritage assets. For example, changes to hydrology may affect archaeological preservation; or changes to the setting of a building may affect the viability of its current use and thus lead to dereliction.

5.1 Direct impacts

Likely direct, construction impacts could result from topsoil stripping and excavation associated with pylon/pole footings and other infrastructure within the construction footprint. There is also a risk of accidental damage to heritage assets outside the construction footprint from uncontrolled plant movement.

The heritage assets at most risk of a direct impact is the Battle of Sark IHB at the eastern end of the IRSA. As tower T137A is within the boundary of the IHB, the proposed grid connection will have to cross the asset in order to terminate.

Other heritage assets (designated and undesignated) within route option corridors can be avoided at an early design stage, or by micrositing.

As the IRSA is considered to be of medium archaeological potential, there is some risk of direct impacts upon previously undiscovered heritage assets.

5.2 Setting impacts

The proposed grid connection will be introduced into a modern agricultural landscape already characterised by roads, farm buildings, and overhead power lines. It will not comprise dominant or imposing structures. Furthermore, although setting is of some relevance to a number of the heritage assets within the IRSA, the presence of the grid connection in views from or towards these heritage assets will not result in substantive changes to the assets' cultural significance.

No significant setting impacts are anticipated from the proposed grid connection.

5.3 Indirect impacts

No significant indirect impacts are anticipated from the proposed grid connection.

6 CONCLUSIONS

The IRSA is a characteristic estuarine landscape of grazing and arable farmland with evidence of settlement and cultivation dating back to the prehistoric period. Known heritage assets within the IRSA are typical of the region, and although there are a number of designated heritage assets, effects upon their setting are not anticipated to be significant.

The main issue is with the need for the grid connection to cross the IHB at the eastern end of the IRSA. There is a risk of direct impacts within the IHB, but these can be minimised with appropriate route selection and design solutions. Further investigation, in the form of a desk-based assessment and walkover of the route, will be required in order to establish a baseline for further assessment, and to inform design iterations.

It is also recommended that statutory consultees should be engaged at an early stage in order to determine the baseline, and to discuss and agree impact mitigation proposals and/or inform design solutions.

APPENDIX 1

Undesignated Heritage Assets in the IRSA

HER Ref	Name	Type	HER Significance	Importance	Easting	Northing
4869	'Dundronok' / 'Durnock'/ Dornock House	Tower house	Other	None	323172	565952
4871	Dornock	Village	None	None	323087	565960
4872	Calvertsholm / 'Ye Cawardsholm'	Tower house	Other	None	328131	568845
4873	Calvertsholm	Farmstead; farmhouse	Unknown	Low	328176	568917
4873	Calvertsholm	Farmstead; farmhouse	Unknown	Low	328176	568917
4874	Baurch	Farmstead; farmhouse	None	None	328549	565878
4875	Baurch / 'Blawst'	Tower house	Other	None	328549	565835
4877	Torduff / 'Torduf'	Tower house	Other	None	325800	564600
4888	Redkirk / 'Renpatrick'	Tower house	Unknown	Low	330056	565992
4894	Dornock, Cruck-Framed Cottage	Cruck house	None	None	323301	566199
4918	Torduff	Farmstead; farmhouse	Other	None	325830	564650
4995	River Sark, Gretna	Findspot	None	None	332419	566855
5373	Woodfield	Settlement; linear feature; drove road?	National	High	326810	566190
7352	Stonehouse Tower	Tower house	Other	None	329580	568240
7354	Rigmoor	Findspot	N/A	None	328300	566900
7355	Baurch, Church Yard	Cemetery	Other	None	328880	565470
7358	Rigg, Old Windmill	Windmill	Other	None	328845	566808
7363	Hillhead	Enclosure	Regional/Local	Low	327170	569100
7364	Westhills / Westhills Farm	Tower house	Regional/Local	Low	327210	565449
7365	Westhills Moss	Earthwork	Other	None	326970	565320
7367	Three Piked Stane / St Marjory's Cross	Stone circle? cross?	Regional/Local	Low	321701	567867
7369	Beckfoot	Findspot	N/A	None	321739	565633
7374	Bloomfield	Farmhouse	None	None	320653	566332
7375	Eastgill / East Ghyll	House	None	None	321310	567469
7378	Sword Well / Swordwell	Well	Regional/Local	Low	321873	566582
7379	Woodhead Cottage	Enclosure	Regional/Local	Low	322482	568185
7380	Dornock	Landing point	Unknown	Low	322102	565160
7381	Aldersyde / Swordwell/ Battlefield Farm	Battlefield	Other	None	321784	566485

HER Ref	Name	Type	HER Significance	Importance	Easting	Northing
7383	Round Bush Cottages / Dornock Wood/ Dornoch Wood	Earthwork?	Unknown	Low	323500	567900
7384	Woodhall / Dornoch	Findspot	N/A	None	323899	567498
7385	Stapleton Road, Annan	Findspot; findspot; findspot; findspot	None	None	320200	566900
7452	Blackyett Cottage	House	None	None	325033	570992
7460	Kirkpatrick-Fleming	Site	None	None	320007	570017
7471	Bonshaw	Findspot	None	None	324254	572055
7472	Johnstonlee / Johnstonelea	Findspot	N/A	None	321500	570600
7474	Dumbretton / Dunbretton	Farmstead; farmhouse	Unknown	Low	321704	571322
7475	Breconbeds School	School house; school	None	None	322592	571954
7492	Cairn of Creca	Battlefield; cairn?	Other	None	322780	570080
7751	Gretna, The Green / Gretna Green	Findspot	Other	None	331930	568054
7752	Grainhead Farm, Gretna Green	Findspot; findspot	N/A	None	331584	568303
7753	Hirst, Gretna	Findspot	N/A	None	331283	566805
7754	Redkirk Point	Findspot	None	None	330179	565068
7755	Redkirk Point / Redkirk Point 1 And 2	Findspot?	None	None	330108	565122
7756	Old Graitney	Ship burial? mound	None	None	331221	566434
7757	Gretna	Findspot	N/A	None	331301	567174
7760	Floshend	Enclosure	Regional/Local	Low	330820	568070
7762	Newhouse / Newhouse Heldings No. 1	Enclosure	Regional/Local	Low	330430	567080
7763	Redkirk Point / Redkirk Point 1	Pottery kiln? findspot	Regional/Local	Low	330200	565100
7764	Battle of Sark / Lochmaben Stone/ Old Graitney/ Stormont	Battlefield	Other	None	331400	566200
7765	Gretna Hill	Earthwork	Other	None	332640	567438
7771	Old Graitney	Findspot	Other	None	331147	566142
7772	'Solum' / Gretna Green/ Chapel Flosh/ Floshend/ Solum/ Sollome Moss/ Solane Moss	Deserted settlement	None	None	330991	568014

HER Ref	Name	Type	HER Significance	Importance	Easting	Northing
7775	Gretna, Old Church And Parish Church / Old Gretna Church; Gretna Green Church; Weild Monument	Findspot; coped gravestone; commemorative monument; cemetery; font? carved stone; church	Regional/Local	Low	331920	567999
7776	Gretna Churchyard, Sundial	Sundial	None	None	331922	567963
7777	Old Graitney / 'Auld Hoose'	Tower house	Other	None	331198	566298
7778	Sirkbrig Tower / Sarkbridge	Tower house	None	None	332592	567093
7780	Redkirk Point / Redkirk Point 2	Hearth; occupation site	Regional/Local	Low	330053	565168
7782	Redkirk / Redkirk Holdings	House; farmstead; farmhouse	Unknown	Low	330049	565949
7783	Old Graitney / Old Gretna	Farmstead; farmhouse	Unknown	Low	331248	566518
7784	Sarkfoot	Farmstead; farmhouse	Unknown	Low	332091	566536
7785	Alison's Bank	Farmstead; farmhouse	Unknown	Low	332470	567012
7786	Gretna House	House	None	None	331694	568054
7787	Floshend	Farmstead; farmhouse	None	None	331349	568125
7788	Stonehouse	Field system; enclosure	Regional/Local	Low	330400	567670
7789	Springfield	Village	None	None	332281	568315
7790	Redkirk Point	Findspot	None	None	330162	565099
7791	Stormont / Port Stormont	Landing point	Unknown	Low	331599	565999
7792	Redkirk Point	Landing point	Unknown	Low	330254	565042
7793	Redkirk, Old Parish Church / Red Kirk; Raynpatrick; Rinpatrick; Redkirk Point	Cemetery; church	None	None	330113	565036
7794	Sarkfoot	Landing point	Unknown	Low	332146	566450
7795	Gretna, Market Cross / Gretna Green	Market cross	Other	None	331909	568055
7796	Gretna	Findspot	N/A	None	331559	567128
7798	Gretna	Findspot	N/A	None	332000	567000
9374	Corsehill Quarry	Sandstone quarry	None	None	320500	570100
9392	Westhills Farm	Findspot	N/A	None	327200	565400
9619	Burnhead Limeworks	Lime works	National	High	322270	572781

HER Ref	Name	Type	HER Significance	Importance	Easting	Northing
9659	Eaglesfield Quarry / Brownmuir; Quarry Park; Burnhead; Donkins Cottages; Kirtledene; Kirtlebridge Limestone Workings	Lime kiln; lime works; limestone quarry	None	None	321750	572700
9735	Nutberry Moss / Birkhill/ Dornock Flow	Findspot	N/A	None	326150	567450
9973	Redkirk	Enclosure	Regional/Local	Low	329830	565690
9975	Redkirk	Structure	None	None	329678	565463
10201	Gretna Parish Manse / Gretna Green, Manse	Manse	Local	Low	331880	567977
10207	Stonehouse	Farmstead; farmhouse	Unknown	Low	330048	567731
10209	Gretna Junction	Railway junction	None	None	333167	567660
10210	Gretna, Sark Viaduct	Railway bridge	Local	Low	333237	567558
10236	Annan Airfield / Chapelcross Power Station	Airfield	Local	Low	321960	570194
10663	Gretna Green	Village	None	None	331931	568059
10664	Gretna	Village	None	None	331842	567269
10665	Wenruth	Farmstead; farmhouse	Unknown	Low	332279	566880
10668	Kirkpatrick Airfield	Airfield	Unknown	Low	325518	570302
10776	CHAPELCROSS, NUCLEAR POWER STATION / Annan Airfield	Power station	None	None	321670	569700
10778	Outertown Cottages	House	None	None	320390	569105
10779	Dornock Mains / Dornock House Steading	Farmstead; farmhouse	Local	Low	322404	565727
10780	Woodhead Cottage	House	Unknown	Low	322088	567973
10782	Stapelton Bar Cottage	House	Local	Low	323235	568329
10783	Stapelton Grange Cottages	House	None	None	322931	568191
10785	Scotsfield	Farmstead; farmhouse	Unknown	Low	323699	569561
10786	Christielands	Farmstead; farmhouse	Unknown	Low	324702	568920
10787	Christielands Cottages	House	None	None	324426	568868
10788	New Christielands	House	None	None	324254	568812
10789	Tulliesfield	Farmstead; farmhouse	Unknown	Low	324401	567890
10790	Eastriggs	Village	None	None	324800	566200
10791	Dornock Cottage	House	None	None	322220	565331
10792	Dornockbrow	House	None	None	323608	565143

HER Ref	Name	Type	HER Significance	Importance	Easting	Northing
10793	Dornock Fishery	House	None	None	323762	565101
10794	Swordwellrig	Farmstead; farmhouse	Unknown	Low	322230	566613
10795	Priestholm	Farmstead; farmhouse	Unknown	Low	323129	566927
10796	Round Bush	Farmstead; farmhouse	Unknown	Low	323232	567679
10797	Round Bush Cottages	House	None	None	323414	567912
10798	Howgill Tileworks	Tile works	Other	None	321220	566090
10827	Woodhead	Farmstead; farmhouse	Unknown	Low	322056	567625
10843	Broats	Farmstead; farmhouse	Unknown	Low	325244	569000
10844	Todholes	Farmstead; farmhouse	Unknown	Low	325081	567950
10845	Irvington	Farmstead; farmhouse	Unknown	Low	325689	566841
10846	Foulsyke	Farmstead; farmhouse	Unknown	Low	325370	565738
10847	Woodfield / Cloverdale	Farmstead; farmhouse	Unknown	Low	326512	566169
10848	Westhills	Farmstead; farmhouse	Unknown	Low	327211	565496
10849	Clerkston	Farmstead; farmhouse	Unknown	Low	327909	565710
10850	Green	Farmstead; farmhouse	Unknown	Low	327290	566353
10851	Newtonlea	Farmstead? house	Unknown	Low	327490	566353
10852	West Scales	Farmstead; farmhouse	Unknown	Low	327452	567599
10853	Broathill	Farmstead; farmhouse	Unknown	Low	326103	569819
10854	Flosh	Farmstead; farmhouse	unknown	Low	326251	569151
10855	Nutberry	Farmstead; farmhouse	Unknown	Low	326705	568972
10856	Nutberry Bungalow	Bungalow	None	None	326640	569192
10859	Hillhead	Farmstead; farmhouse	Unknown	Low	327403	569039
10860	Riggheads	Farmstead; farmhouse	Unknown	Low	328370	568387
10864	East Scales	Farmstead; farmhouse	Unknown	Low	329059	567846
10865	Gardrum	Farmstead; farmhouse	Unknown	Low	328078	565370
10867	Broathill / Beltenmont/ Hollies	Stone circle	Unknown	Low	326598	569656

HER Ref	Name	Type	HER Significance	Importance	Easting	Northing
11225	Bonshaw Mains	Farmstead; farmhouse	Unknown	Low	324187	572041
11228	Creca	Village	None	None	322752	570333
11230	Bonshawside / Tilekilns	Tile works	Other	None	322620	572530
11728	'Irving'	Church?	None	None	326000	570000
11753	Gretna, Gretna Green Station / Gretna Station	Railway station	None	None	332017	567913
11754	Rigg, Mansefield Hall	Village hall	Local	Low	328936	566755
11758	Suronne / 'Souron'	Farmstead	Unknown	Low	332070	567348
11759	Gretna, Glasgow Road, Villas	House	None	None	332294	567349
11760	Gretna, Glasgow Road/Annan Road, Canteen / Crossways Inn	Inn	None	None	332326	567287
11884	Gardrum Cottage	House	None	None	328008	565500
11949	Eastriggs, Annan Road, Graham Inn	Public house	None	None	324234	566223
11950	Eastriggs, 65 Pretoria Road	House	None	None	325134	566028
11951	Eastriggs, 48 Pretoria Road	House	None	None	325162	566062
11952	Eastriggs, Annan Road, Baxter Memorial Hall / Annan Road Church Of Scotland Church	Church	None	None	324750	566368
11953	Eastriggs, Annan Road, Roy Bungalow	House	None	None	324234	566266
11954	Gretna, Hm Factory, Eastriggs Explosives Factory (Site 3) / Moorside;	Munitions factory	Unknown	Low	326389	564798
12917	Dumbretton / Hilltown	Farmstead	Unknown	Low	321741	571494
12918	Dumbretton / Bank Hillhead	Farmstead	Other	None	321499	571430
13292	Bridge Of Sark - Portpatrick Military Road / Dumfries And Galloway Road	Military road	None	None	331061	567808
13293	Bridge Of Sark - Portpatrick Military Road / Dumfries And Galloway Road	Military road	None	None	327900	566379

HER Ref	Name	Type	HER Significance	Importance	Easting	Northing
13294	Bridge Of Sark - Portpatrick Military Road / Dumfries And Galloway Road	Military road	Other	None	323702	566181
13390	Gretna, Hm Factory, Eastriggs Explosives Factory	Explosives factory	Unknown	Low	324884	565338
13425	Nutberry Works / Richardson's Moss Litter Company Ltd	Peat cutting	None	None	324889	567060
13440	Annandale Distillery, Mill Dam	Pond	None	None	319987	568132
13581	Nutberry Moss	Findspot	Unknown	Low	325601	567600
13894	Gretna, Hm Factory, Eastriggs Explosives Factory (Site 3)	Pillbox	None	None	325070	564660
15093	Gretna, Callander Hamilton Bridge	Road bridge	None	None	332691	566989
17104	Windyknowe	Farmstead	Unknown	Low	320198	570069
17119	Annan / Standalane	Building	Unknown	Low	320200	566880
17125	Baurch Holdings	Building; enclosure	Unknown	Low	329070	565500
17126	Flosh	Farmstead?	None	None	326361	569090
17127	Gill Burn / Gillfoot	Building	Unknown	Low	322730	567450
17129	Stonehouse	Building	Unknown	Low	330551	567818
17161	Blackyett House	House	None	None	325053	571109
17206	Eastriggs, Melbourne Avenue, Police Station And Accomodation	Police station; farmhouse; house; farmstead	None	None	324671	565977
17264	Rigg And District War Memorial	War memorial	Regional/Local	Low	330051	567239
20970	Border - Crawford - Inveresk (?)	Road	None	None	332325	568271
20992	Old Graitney, Annan	Site	Regional/Local	Low	331150	566180
21027	Kirtlebridge, Annan And Brayton Branch Line	Railway	Other	None	321416	572185
21652	Redkirk Point	Salt works	None	None	330047	565064
21712	Broathill	Observation post	Regional/Local	Low	325800	569700
21718	Broatshill Farm	Observation post	Regional/Local	Low	325753	569641
21762	Broathill	Enclosure	Other	None	325456	570313
21772	Broat's Cottage	Ridge and furrow	Other	None	324960	568890
21773	Broats	Ridge and furrow	Other	None	325001	569900
21774	Broats	Ridge and furrow	Other	None	325300	568810
21775	Flosh	Plough marks	None	None	325800	569300

HER Ref	Name	Type	HER Significance	Importance	Easting	Northing
21776	Broathill	Ridge and furrow	Other	None	325700	569700
21844	Gretna, Munitions Works, Railway	Railway	Other	None	332130	566609
21899	Annan Airfield, Technical Site, Watch Tower	Control tower?	None	None	321675	570181
21900	Annan Airfield, Domestic Site	Hut; air raid shelter	Regional/Local	Low	323027	570820
21962	Beckfoot	Linear feature	Unknown	Low	321660	565570
21975	Auld Green	Farmstead; farmhouse	Unknown	Low	327021	566124
21986	Redkirk Point	Mineral railway	Other	None	330227	565161
21987	Old Graitney / Port Stormont	Findspot	None	None	331568	566079
22019	Redkirk Point	Salt works	Unknown	Low	330241	565138
22020	Sarkfoot	Salt works	Other	None	332208	566351
22163	Eastriggs Station	Railway station	None	None	324056	566393
22209	Gretna Green, War Memorial	War memorial	Regional/Local	Low	331917	568057
22217	Rigg, Station	Railway station	Unknown	Low	328700	566900
22247	Boghead	Field system	Unknown	Low	330400	568700
22321	Annan Airfield, Domestic Site, South Camp	Military camp; decontamination building; domestic site	Regional/Local	Low	321765	569093
22322	Annan Airfield, Technical Site	Aircraft hangar (type t); air raid shelter; technical site	Regional/Local	Low	321730	570158
22323	Annan Airfield, Creca Camp, Domestic Site	Military camp; decontamination building; domestic site; air raid shelter	Regional/Local	Low	322606	570368
22324	Annan Airfield, Domestic Site	Accommodation hut	None	None	322790	569650
22325	Annan Airfield, Domestic Site	Sewage works	None	None	321250	569190
23147	Eastriggs, Ladysmith Road, St John's Episcopal Church	Church	None	None	324523	566242
23260	Eastfield	Farmhouse; farmstead	Unknown	Low	324005	569527
23264	Dornock Burn, Bridge	Bridge	Local	Low	324919	568954
23449	Butterdale	Farmstead	Unknown	Low	324141	565706
23450	Eight Of Dornock	Farmstead	None	None	323000	566000

HER Ref	Name	Type	HER Significance	Importance	Easting	Northing
23461	Elmside	Farmstead	None	None	325825	566162
23494	Williamwood	Country house	Local	Low	320141	571049
23556	Rigg, General	Village	None	None	329182	566879
23557	Gretna Green, Prince Charlie's House	House	None	None	331906	568033
23587	Rigg, 1 - Meikle Green	Stable	None	None	329244	566925
23622	Springfield, Main Street, Springfield Farm	Farmstead	Unknown	Low	332616	568264
23640	Rigg, Railway Viaduct	Railway viaduct	Local	Low	329311	567169
23747	Ednamhill / 'Edmondhill'	Farmhouse; farmstead	Unknown	Low	322112	570312
23801	Holmhead	Farmstead	Other	None	327966	568912
23902	Broats Bridge	Footbridge	None	None	324919	568939
23908	Broadlee Of Robgill	Farmhouse; farmstead	Unknown	Low	324280	571513
23976	Primrose Cottage, Bridge	Bridge	None	None	323915	571749
23990	Springfield, Headless Cross, Lover's Leap Motel	Motel	None	None	332063	568358
24109	Robgill Mains	Farmhouse; farmstead	None	None	324401	571098
24116	Gretna, Hm Factory, Eastriggs Explosives Factory, Site 3, Gatehouse And Main Gates	Gate; gatehouse	Regional/Local	Low	324860	565450
24163	Blackyett, Steading	Farmstead	Unknown	Low	325056	570995
24164	Blackyett, Lodge	Lodge	None	None	325066	570961
24166	Beckfoot, Stables	Stable; farmstead	None	None	321736	565677
24167	Beckfoot, South Barn	Farmstead	None	None	321724	565650
24168	Beckfoot, North Barn	Farmstead	None	None	321719	565660
24169	Beckfoot, Cartshed, Western Section	Farmstead	None	None	321716	565668
24170	Beckfoot, Cartshed, Northern Section	Farmstead	None	None	321721	565672
24245	Calvertsholm, Cottages	Estate cottage	Unknown	Low	328055	568845
24319	Gretna Hall Hotel, Carved Stones	Findspot	Regional/Local	Low	331886	568235
24369	Dornock, Dornock Town Farmhouse	Farmhouse	None	None	323132	566018
24370	Dornock, Dornock Town Farmhouse, North Range Of Farm Steading	Farmstead	None	None	323200	566058
24372	Robgill Tower, Walled Garden	Walled garden	Local	Low	324704	571532

HER Ref	Name	Type	HER Significance	Importance	Easting	Northing
24385	Rigg Parish Church	Church	None	None	329057	566874
24496	Robgill Tower, Lodge	Lodge; gate pier	None	None	324695	571389
24497	Woodhall, Farmhouse	Farmhouse	None	None	323894	567489
24590	Rigg, United Presbyterian Church, Manse	Manse	None	None	329047	566873
24635	Gretna Green, Gretna Hall Hotels, Stables, North West Range	Stable	None	None	331853	568245
24639	Gretna Hall	Nidl	Regional/Local	Low		
24692	Woodhall, Farmhouse Wing	Farmhouse; farmstead	Unknown	Low	323889	567484
24693	Woodhall, Farmsteading, South East Range	Barn; farmstead	None	None	323955	567512
24694	Woodhall, Farmsteading, South West Range	Barn; farmstead	None	None	323925	567497
24695	Woodhall, Farmsteading, West Range	Cart shed; farmstead	None	None	323915	567508
24696	Woodhall, Farmsteading, North West Range	Cart shed; farmstead	None	None	323913	567514
24697	Woodhall, Farmsteading, North Range	Farmstead	None	None	323918	567524
24698	Woodhall, Farmsteading, North East Range	Farmstead	None	None	323940	567533
24833	Dornock House	Bridge	Regional/Local	Low	323246	565902
24834	Dornock House	Hollow way	Regional	Medium	323205	565971
24851	Solway Firth	Human remains	None	None	324600	564800
25342	Joinville	Farmhouse; farmstead	Unknown	Low	321890	569380
25347	1 Blake Terrace, Dornock	Findspot	N/A	None	323138	566131
25368	Hailstonemoor, 'Halstonmore'	Farmstead	Other	None	331103	567082
25495	Eastriggs, Annan Road, War Memorial	War memorial	Regional/Local	Low	324024	566289
25638	Warmanbie	Nidl	Regional/Local	Low		
25639	Mount Annan	Nidl	Regional/Local	Low		
25654	Stapleton Tower Policies	Landscape park	Regional	Medium	323372	568804
25691	Mossknowe	Nidl	Regional/Local	Low		

HER Ref	Name	Type	HER Significance	Importance	Easting	Northing
25841	Gretna, Empire Way, General	Road	None	None	331626	566741
26191	Annan Airfield, Battle H.Q.	Battle headquarters	Regional	Medium	321810	570010
26226	Gretna, Annan Road, All Saints Episcopal Church	Commemorative monument	Local	Low	331829	567304
26239	Gretna Green, Old Churchyard	Grave slab	Regional	Medium	331938	567973
26244	Old Graitney Holdings	Palisaded enclosure	Regional	Medium	330536	566802
26246	Redkirk	Rectilinear enclosure	Regional/Local	Low	330317	565953
27079	Browhouses	Workers cottage; bungalow	None	None	328068	565426
27096	Redkirk, Power Plant (Hm Factory Gretna Site 4; Rigg Power House)	Power station	Regional	Medium	330650	566280

G

GILLESPIES

T ROUTE REBUILD PROJECT

ROUTEING AND CONSULTATION DOCUMENT

APPENDIX E: EVALUATION OF ROUTE OPTIONS AND ALTERNATIVE LINKS

SEPTEMBER 2021

SP ENERGY NETWORKS

T Route Rebuild

Routeing and Consultation Document

Appendix E: Evaluation of Route Options and Alternative Links

September 2021

	Project Title	Document Title	Client
GILLESPIES	T Route Rebuild	T Route Rebuild: **Appendix E: Evaluation of Route Options & Alternative Links** P11571-00-000-704	SP Energy Networks

Rev.	Date	Detail	Made By	Checked By	Approved By
00	10.9.21	DRAFT 00	LR	SG	SG
01	17.9.21	Amendments to text	LR	SG	SG

Topic Area	1	2	3	4	5	6	Preferred Route
Landscape and Visual Note: When considering the landscape and visual criteria for each route option, consideration was given to their attributes and proximity to each route option or link. A judgement was then made as to the likelihood of the criteria (landscape sensitivity, residential visual amenity, etc.) being susceptible to change as a result of the introduction of the proposed development (the grid connection). A judgement of ***high*** indicates that a particular aspect would most likely be adversely effected by the grid connection if it were placed along this route, and a judgement of ***low*** indicates that the route option would likely avoid adverse effects on this criteria. A judgement of ***none*** means that the criteria is not of concern, e.g., if there are no residential properties within the vicinity of a route. **All measurements are approximate and measured from the centre line of the routeing corridor. It should be noted that if the route is microsited within the routeing corridor, then these measurements could increase or decrease.* *The number of properties in proximity to a route corridor are an approximate guide only, being calculated using GIS to identify the number of properties recorded on the OS AddressBase Plus® data layer within a specified distance of the centre line of the route option.*							
Length of Route	Approximately 13.7km	Approximately 13.1km	Approximately 12.9km	Approximately 12km	Approximately 11.8km	Approximately 13.4km	**Summary:** Routes 4 and 5 are the most direct. Routes 2 and 3 are comparable. Routes 1 and 6 are the longest and requires the greatest number of directional changes.
Landscape and Visual Amenity	This route heads north-east a short distance from Tower AK008, crossing Gill Wood (Ancient Woodland) and is the most northerly route option in order to avoid the peat working areas of Nutberry Moss. It turns south just east of Gretna in order to cross the A75 at a perpendicular angle. **Landscape Sensitivity –** High**/** *medium* This route runs through LCT 170 Coastal Plateau and LCT 158 Coastal Flats. See also Appendix C Landscape Sensitivity Appraisal. The route runs across a landscape which consists of a mix of arable and pastoral farmland, interspersed with small blocks and linear belts of woodland and dissected	Unlike Route 1, the route heads east upon leaving tower AK008, avoiding Gill Wood (Ancient Woodland) before then heading north east, crossing approximately 400m of class 1 peat around Nutberry Moss. It joins Route 1 and turns south just east of Gretna in order to cross the A75 at a perpendicular angle. **Landscape Sensitivity –** High**/** *medium* This route runs through LCT 158 Coastal Flats. See also Appendix C Landscape Sensitivity Appraisal. The route runs across a landscape which consists of a mix of arable and pastoral farmland, interspersed with small blocks and linear belts of woodland and dissected	This route travels further east than Route 2, broadly following the route of the A75 and the existing T Route before turning north east at Lowthertown, crossing approximately 690m of class 1 peat around Nutberry Moss. It joins Routes 1 and 2, turning south just east of Gretna in order to cross the A75 at a perpendicular angle. **Landscape Sensitivity** High**/** *medium* This route runs through LCT 158 Coastal Flats. See also Appendix C Landscape Sensitivity Appraisal. The route runs across a landscape with a mix of arable and pastoral farmland, crossed by road infrastructure and	This route travels further east again than Route 3, passing to the south of the peat digging area of Nutberry Moss (crossing approximately 920m of class 1 peat) before heading south east, to the east of Eastriggs. Like Route 3, it also follows the A75 and existing T Route and runs through a landscape more influenced by infrastructure before it turns south east towards the Solway Firth, crossing the A75 and railway line at an oblique angle. **Landscape Sensitivity** High**/** *medium* This route runs through LCT 158 Coastal Flats. See also Appendix C Landscape Sensitivity Appraisal.	This route follows that of Route 4 until just east of Eastriggs, passing to the south of the peat digging area of Nutberry Moss (crossing approximately 790m of class 1 peat) where it heads south east towards the Solway Firth. Of all of the options, this option follows the route of the existing T Route the most closely. Like Route 4, it also follows the A75 and therefore runs through a landscape more influenced by infrastructure than Route 1, 2, 3 before it turns south east, crossing the A75 and railway line at an oblique angle. **Landscape Sensitivity** High**/** *medium* This route runs through LCT 158 Coastal Flats. See also	Unlike the other options, this route heads south from tower AK008, crossing the A75 to the north east of Annan before turning south east, skirting the settlement and following the route of the existing T Route before heading south, just east of Swordwellrigg. In doing so it is able to entirely avoid areas of class 1 and 2 peat at Nutberry Moss. **Landscape Sensitivity** High**/** *medium* This route runs through LCT 158 Coastal Flats. See also Appendix C Landscape Sensitivity Appraisal. This is the most southerly option, travelling parallel to the Solway Firth for the majority of its length. The landscape is well settled and	**Summary:** All options are considered viable in terms and landscape and visual, but Route 3 is preferred. All routes are broadly comparable in terms of proximity to properties with the exception of route 6 which passes closer to a considerably greater number of properties than the other options. Routes 1 and 6 entirely avoid areas of class 1 and 2 peat at Nutberry Moss but both are considered more convoluted and route 6 has greater potential effects on residential visual amenity. Routes 2 and 3 are similar, there being one section where they diverge. Route 3 follows the A75 and existing

Topic Area	1	2	3	4	5	6	Preferred Route
	by local roads and overhead lines, including a 132kV line which it follows closely to the north and crosses twice. This is the most elevated option, with undulating landform sloping gently down to the south and the Solway Firth. Occasional long views south over the estuary. Scattered properties are located across the landscape, becoming denser on the approach to Gretna. **Residential Visual Amenity** *Medium* This is a settled landscape with scattered properties dispersed throughout. The route north east out of Tower AK008 allows the line to avoid the cluster of properties to the north east of Annan but the northern part of the route is located in proximity to an existing 132kV and crosses it twice. It would be viewed by a number of residential receptors in conjunction and cumulatively with the existing line for a distance of approximately 6km. This only applies to Option 1. Settlement pattern becomes denser on the approach to Gretna, with the route required to pass within 200m of properties. *Approximate number of properties: Within 120m - 2 Within 200m - 39 **Visual Amenity** *Medium*	by local roads and low voltage overhead lines. The undulating landform slopes gently to the south and the Solway Firth, with occasional long views over the estuary. The landscape is well settled, with properties scattered throughout, and with denser clusters located to the north east of Annan and on the approach to Gretna. **Residential Visual Amenity** *Medium* This is a well settled landscape with residential properties scattered throughout. The route east out of Tower AK008 requires the line to pass in close proximity to the dense cluster of properties located to the north east of Annan. This is the same for Routes 3, 4, and 5. As with Route 1, settlement pattern becomes denser on the approach to Gretna, with the route required to pass within 200m of properties. *Approximate number of properties: Within 120m - 5 Within 200m - 45 There are a number of low voltage OHL in the vicinity of the route but this option is further from the existing 132 kV line than Route 1 and also generally further from the existing T Route than Routes 3, 4, 5 and 6. It would therefore introduce a wood pole overhead line into an area where views are not	interspersed with small blocks and linear belts of woodland. It follows the A75 and the existing T Route for a longer length than Route 2 before turning north east to run along the edge of the peat working area of Nutberry Moss. Here the landscape is less settled and has more remote qualities. Landform is generally flatter than Route 1 and 2, sloping gently to the south and the Solway Firth. There are a number of low voltage OHL in proximity to the route. The landscape is well settled, with properties scattered throughout, and with denser clusters located to the north east of Annan and on the approach to Gretna. **Residential Visual Amenity** *Medium* Like Routes 1 and 2, this is a well settled landscape with residential properties largely scattered throughout. The route east out of Tower AK008 requires the line to pass in close proximity to the dense cluster of properties located to the north east of Annan. This is the same for Routes 2, 4, and 5. As the route turns north east to run alongside the peat working areas of Nutberry Moss, the landscape becomes less settled and there will be reduced impacts on residential visual amenity than there would be for Routes 1 and 2. As the route approaches Gretna, as with Routes 1 and 2, settlement	Landform is generally flat, becoming flatter and low lying closer to the estuary. This route includes a section which runs close to the Solway Firth on the approach to Gretna, with the final approach to T137A being from the south west. The landscape consists of arable and pastoral farmland with areas of marsh close to the Solway Firth. Existing overhead lines are common throughout the landscape surrounding this route. It requires the crossing of the A75 and railway line at oblique angles. The landscape is more influenced by infrastructure and settlement than Routes 1, 2 and 3, broadly following the route of the existing T Route and passing close to a number of small settlements. Properties are scattered throughout. **Residential Visual Amenity** *Medium* Like the other routes, this is a well settled landscape with residential properties scattered throughout. Route 4 is generally located a short distance from, or south of, the A75. This southern landscape is generally more settled than the landscape to the north of the A75 and features a number of small settlements. Like Routes 2 and 3, the route east out of Tower AK008 requires this option to pass in close proximity to	Appendix C Landscape Sensitivity Appraisal. Landform is generally flat, becoming flatter and low lying closer to the estuary. This route includes a section which runs close to the Solway Firth but is further away than Route 4, approaching T127 from the west. The landscape consists of arable and pastoral farmland with areas of marsh close to the Solway Firth. Existing overhead lines are common throughout the landscape with the existing T Route currently prominent. **Residential Visual Amenity** *Medium* Like the other routes, this is a well settled landscape with residential properties scattered throughout. Similar to Route 4, this route is generally located a short distance from, or south of, the A75. This southern landscape is generally more settled than the landscape to the north of the A75 and features a number of small settlements. This option follows more broadly the route of the existing T Route than the other options. Properties along the route will generally have views of the existing steel lattice tower line and the change to a wood pole overhead line is generally seen as beneficial under	the route passes close to a number of small settlements. Landform is generally low lying and flat, becoming increasingly so closer to the Solway Firth. The landscape consists of arable and pastoral farmland with some marsh. Existing overhead lines are common throughout the landscape, with the existing T Route being prominent on the approach to Gretna. **Residential Visual Amenity** *High* Like the other routes, this is a well settled landscape with residential properties scattered throughout. The route is located entirely to the south of the A75 and passes in close proximity to a number of settlements including Annan, Dornock, Eastrigg, Rigfoot and Redkirk. As a result, the route passes within 200m of numerous properties. *Approximate number of properties: Within 120m - 29 Within 200m - 163 Route 6 is therefore the least preferred option in terms of residential visual amenity. **Visual Amenity** *Medium* The line crosses over the Robert Bruce and Galloway Tourist Trails on the A75, north east of Annan and crosses the Robert Bruce Tourist Trail again on the B721. The route then	T Route for longer and also follows the grain of the landscape (in this case, field boundaries) as it heads north east in order to avoid the peat working area at Nutberry Moss. It Is also further away from properties at this section of the route. The route is also able to cross the A75 and railway line at a perpendicular angle which is preferable in terms of visual amenity. **Route 3 is therefore preferred in terms of landscape and visual amenity.**

Topic Area	1	2	3	4	5	6	Preferred Route
	The route crosses the Robert Bruce Tourist Trail on the B6357 near to Eastlands Country Park, crosses NCR 74 to the north of East Scales near Kirtle Water and crosses NCR 7 at Old Graitney Road. The route crosses the Galloway and Burns Heritage Tourist Trail routes as it crosses the A75 west of Gretna. To the south of Gretna, at Cherry Tree Park, the route oversails close to the convergence point of a number of core paths (Sarkfoot to Redkirk Point, Gretna to Redkirk Point and Sarkfoot to Crochmer Park). While there are several existing wood pole overhead lines and steel lattice towers lines present within views along the route, this option will introduce a new wood pole overhead line into views along the recreational routes mentioned above, some of which would view the line in conjunction with the existing 132kV line to the north. Rebuilding the T route to the north will have the benefit of removing it from long views south over the Solway Firth. The existing AK & T line is already present within views from the core paths to the south of Gretna and so its removal and replacement with a wood pole overhead line here is considered beneficial.	currently effected by large OHL infrastructure to the same extent as the other options. **Visual Amenity** *Medium* The route crosses the Robert Bruce Tourist Trail on the B6357 south of Gill Wood and runs parallel to it as it travels north east for a distance of approximately 2.6km at a distance averaging 350m. The route crosses NCR 74 to the north of East Scales near Kirtle Water and crosses NCR 7 at Old Graitney Road. The routes crosses the Galloway and Burns Heritage Tourist Trail routes as it crosses the A75 west of Gretna. To the south of Gretna, at Cherry Tree Park, the route oversails close to the convergence point of a number of core paths (Sarkfoot to Redkirk Point, Gretna to Redkirk Point and Sarkfoot to Crochmer Park). While there are several existing wood pole overhead lines and steel lattice tower lines present within views along the route, this option will introduce a new wood pole overhead line into views along the recreational routes mentioned above. Rebuilding the T route to the north will have the benefit of removing it from long views south over the Solway Firth.	pattern becomes denser, with the route required to pass within 200m of properties. *Approximate number of properties: Within 120m - 4 Within 200m - 42 This runs closer to the existing T Route for a longer length than Routes 2 and will therefore benefit from the dismantling of the existing line and its replacement with a wood pole overhead line to a greater extent. **Visual Amenity** *Medium* The route crosses the Robert Bruce Tourist Trail on the B6357 south of Gill Wood and then runs parallel to the Galloway Tourist Trail along the A75 for a distance of approximately 2.3km before heading north east. The route crosses NCR 74 to the north of East Scales near Kirtle Water and crosses NCR 7 at Old Graitney Road. The routes crosses the Galloway and Burns Heritage Tourist Trail routes as it crosses the A75 west of Gretna. To the south of Gretna, at Cherry Tree Park, the route oversails close to the convergence point of a number of core paths (Sarkfoot to Redkirk Point, Gretna to Redkirk Point and Sarkfoot to Crochmer Park).	the dense cluster of properties located to the north east of Annan. The south west approach to T137A avoids more properties on the approach to Gretna than Routes 5 and 6 but the line is still required to pass within 200m of a number of properties. *Approximate number of properties: Within 120m - 4 Within 200m - 37 This option runs closer to the existing T Route for a longer length than Routes 3 and will therefore benefit from the dismantling of the existing line and its replacement with a wood pole overhead line to a greater extent. **Visual Amenity** *Medium* The route crosses the Robert Bruce Tourist Trail on the B6357 south of Gill Wood and then runs parallel to the Galloway Tourist Trail on the A75 for a distance of approximately 5 km before heading south east, crossing it at Nutberry Moss. It also crosses NCR 7 and the Burns Heritage Tourist Trail on the B721 to the west of Rigg. The line also crosses the Core Path Browhouses to Redkirk Point to the south of Rigg. To the south of Gretna, at Cherry Tree Park, the route oversails close to the convergence point of a	Landscape and Visual criteria. The approach to T137A from the west means that the route will pass within 200m of a number of properties, to include passing between the small settlements of Redkirk and Rigfoot. *Approximate number of properties: Within 120m - 9 Within 200m - 45 **Visual Amenity** *Medium* As with Route 4, the route crosses the Robert Bruce Tourist Trail on the B6357 south of Gill Wood and then runs parallel to the Galloway Tourist Trail on the A75 for a distance of approximately 5km before heading south east, crossing it at Nutberry Moss. It also crosses NCR 7 and the Burns Heritage Tourist Trail on the B721 to the west of Rigg. To the south of Gretna, at Cherry Tree Park, the route oversails close to the convergence point of a number of core paths (Sarkfoot to Redkirk Point, Gretna to Redkirk Point and Sarkfoot to Crochmer Park). Views from the recreational routes mentioned above already have the existing T Route within views and so the removal of the old steel lattice tower line and	crosses the Burns Heritage Trail and NCR7 to the west of Dornock. The route runs parallel to the B721 and therefore the Robert Bruce Tourist Trail and NCR 7 for approximately 1.5km at Rigg, averaging a distance of approximately 275m. To the south of Gretna, at Cherry Tree Park, the route oversails close to the convergence point of a number of core paths (Sarkfoot to Redkirk Point, Gretna to Redkirk Point and Sarkfoot to Crochmer Park). The line will introduce a new wood pole overhead line into views along the recreational routes mentioned above. Views from the core paths to the south of Gretna already have the existing line T Route within views and so the removal of the old steel lattice tower line and introduction of the new wood pole overhead line will benefit views here. It would however result in the retention of the T Route in views over the Solway Firth in comparison to Routes 1, 2 and 3. **Landscape Designations** *None* This route avoids designated landscapes. It does however have effects on ecological and archaeological designations which are considered within the sections which follow.	

Topic Area	1	2	3	4	5	6	Preferred Route
	Landscape Designations *None* This route avoids designated landscapes. It does however have effects on ecological and archaeological designations which are considered within the sections which follow. **Conclusion** Whilst this is not the preferred route, it is a viable route in terms of Landscape and Visual criteria. The key landscape and visual criteria issues for this route is the introduction of a further wood pole overhead line to the north of the study area where it parallels and crosses an existing 132kV steel lattice tower line for approximately 6km. The route required to avoid areas of peat, properties, woodland and existing infrastructure means that the route is less direct and requires a number of turns and therefore more angle poles and stays. Although existing overhead lines are characteristic of the area and already feature in views, the northern part of the study area in which this route crosses is not currently affected by the existing T Route. It is also more elevated which would increase visibility. The selection of this route would mean that the T route would	The existing T Route is already present within views from the core paths to the south of Gretna and so its removal and replacement with a wood pole overhead line is considered to be beneficial. **Landscape Designations** *None* This route avoids designated landscapes. It does however have effects on ecological and archaeological designations which are considered within the sections which follow. **Conclusion** Whilst this is not the preferred route, it is a viable route in terms of Landscape and Visual criteria. Key landscape and visual criteria issues for this route is the introduction of the T Route to the north of the study area where it currently has no influence; although its removal from long views south over the Solway Firth would be beneficial. This route runs parallel and south of the Robert Burns Tourist Trail on the B6357 for a distance of approximately 2.6km. Whilst it is approximately 220m away at its closest point it is required to cut across the pattern of fields and it will be a new features in views south over the Solway Firth.	While there are several existing wood pole overhead lines and steel lattice tower lines present within views along the route, this option will introduce a new wood pole overhead line into views along the recreational routes mentioned above. Moving the T Route to the north will have the benefit of removing it from long views south over the Solway Firth. The existing T Route is already present within views from the core paths to the south of Gretna and so its removal and replacement with a wood pole overhead line is considered to be beneficial. **Landscape Designations** *None* This route avoids designated landscapes. It does however have effects on ecological and archaeological designations which are considered within the sections which follow. **Conclusion** This is the preferred route under landscape and visual criteria. While the route is very similar to Route 2, Route 3 follows the A75 and the existing T Route for longer, and therefore travels through an area already effected by infrastructure before heading north east.	number of core paths (Sarkfoot to Redkirk Point, Gretna to Redkirk Point and Sarkfoot to Crochmer Park). While there are several existing wood pole overhead lines and steel lattice tower lines present within views along the route, this option will introduce a new wood pole overhead line into views along the recreational routes mentioned above. This route more closely follows the route of the existing T Route and so its removal and replacement with a wood pole overhead line is generally considered to be beneficial. It would however result in the retention of the T Route in views over the Solway Firth. **Landscape Designations** *None* This route avoids designated landscapes. It does however have effects on ecological and archaeological designations which are considered within the sections which follow. **Conclusion** Whilst this is not the preferred route, it is a viable route in terms of Landscape and Visual criteria. Key landscape and visual criteria issues for this route is the proximity to the Solway Firth on its approach to Gretna where it will be more prominent in views.	introduction of the new wood pole overhead line will generally benefit views. It would however result in the retention of the T Route in views over the Solway Firth in comparison to Routes 1, 2 and 3. **Landscape Designations** *None* This route avoids designated landscapes. It does however have effects on ecological and archaeological designations which are considered within the sections which follow. **Conclusion** Whilst this is not the preferred route, it is a viable route in terms of Landscape and Visual criteria. An advantage of this route is that it follows the existing T Route the most closely. The dismantling of that line and its replacement with this wood pole overhead line is considered beneficial overall although it would mean that the T Route remains in views over the Solway Firth, unlike for Routes 1, 2 and 3. The landscape is generally more densely populated to the south of the A75 and has more small settlements and clusters of properties close to which the route would pass.	**Conclusion** Whilst this is a viable route in terms of Landscape and Visual criteria, it is the least preferred. The key concerns for this line is the proximity to a number of settlements and individual properties, including to the north of Annan, west of Dornock and the south of Eastriggs and Rigfoot. It is therefore the least preferred option in terms of residential visual amenity. This is also the most southerly route, running parallel to the Solway Firth in the south for the majority of its length. Whilst this route would avoid areas of class 1 and 2 peat, it would introduce a new overhead line where the T Route does not currently feature in the landscape or upon views, including views over the Solway Firth.	

Topic Area	1	2	3	4	5	6	Preferred Route
	be removed from long views over the Solway Firth but conversely would concentrate adverse effects in areas close to the existing 132kV line. Routes 1, 2 and 3 are similar in that where they converge to the north east, they turn south and cross the A75 and railway line on the perpendicular. Subsequently, they are more able to avoid routeing closely to properties. This is preferred visually.	Where this route converges with Routes 1 and 3, it is able to avoid properties to a greater extent as it turns south to cross the A75 and railway line on the perpendicular, which is preferred visually.	The central part of the route where it attempts to minimise the impact on the peat digging areas of Nutberry Moss are also less populated and more remote, reducing sensitivity in this part of the option. It is also able to follow existing field pattern and belts of vegetation. As with Route 1 and 2, where this route converges with them, it is able to avoid properties to a greater extent as it turns south to cross the A75 and railway line on the perpendicular, which is preferred visually.	To the central part of the study area, the route cuts across the field pattern and crosses the A75, the railway line and the and the B721 (NCR Route 7) at an oblique angle which is less preferred visually. An advantage of this route is that it more closely follows the existing T Route. The dismantling of that line and its replacement with this wood pole overhead line is considered beneficial overall although it would mean that the T Route remains in views over the Solway Firth, unlike for Routes 1, 2 and 3.			
Biodiversity and Geological Conservation	**Comment:** The eastern section of Route 1 enters the Upper Solway Flats and Marshes SSSI & SPA, and the Solway Firth SAC. The site is predominantly designated for its wetland habitats and waterfowl populations including Barnacle Goose (Branta leucopsis), however the SSSI designation includes it's Natterjack Toad (Epidalea calamita) population. The route travels north-east from AK008 through arable and grazed fields, with wetter Juncus sp. grassland present in lower lying sections. The route skirts some small areas of woodland and passes through Gill Wood, an area of ancient woodland of Long-Established (of	**Comment:** The eastern section of Route 2 enters the Upper Solway Flats and Marshes SSSI & SPA, and the Solway Firth SAC. The site is predominantly designated for its wetland habitats and waterfowl populations including Barnacle Goose (Branta leucopsis), however the SSSI designation includes it's Natterjack Toad (Epidalea calamita) population. Route 2 diverts from Routes 3 and 4 as they head east from AK008, before heading north east through grassland habitat. The route rejoins Route 3 and runs close to the peat digging area of Nutberry Moss and areas of woodland, before continuing east though grazed and arable fields, where it joins	**Comment:** The eastern section of Route 3 enters the Upper Solway Flats and Marshes SSSI & SPA, and the Solway Firth SAC. The site is predominantly designated for its wetland habitats and waterfowl populations including Barnacle Goose (Branta leucopsis), however the SSSI designation includes it's Natterjack Toad (Epidalea calamita) population. Route 3 diverts from Routes 2 and 4 as they head east from AK008, running north of the A75. It runs north east through grassland habitat before rejoining Route 2 and heading east close to the digging area of Nutberry Moss and areas of woodland, before continuing east though grazed and	**Comment:** The eastern section of Route 4 enters the Upper Solway Flats and Marshes SSSI & SPA, and the Solway Firth SAC. The site is predominantly designated for its wetland habitats and waterfowl populations including Barnacle Goose (Branta leucopsis), however the SSSI designation includes Natterjack Toad (Epidalea calamita) population. Route 4 diverts from Routes 2 and 3 as they head east from AK008, running north of the A75. It runs through grassland habitat before heading south-easterly through arable and grazed fields before splitting from Route 5. The route skirts the peat digging area of Nutberry Moss and areas of woodland, before continuing	**Comment:** The eastern section of Route 5 enters the Upper Solway Flats and Marshes SSSI & SPA, and the Solway Firth SAC. The site is predominantly designated for its wetland habitats and waterfowl populations including Barnacle Goose (Branta leucopsis), however the SSSI designation includes Natterjack Toad (Epidalea calamita) population. Route 5 diverts from Routes 2 and 3 as they head east from AK008, running north of the A75. It runs through grassland habitat before heading south-easterly through arable and grazed fields before splitting from Route 4. The route is the closest aligned to the existing OHL route, skirting the peat digging area of	**Comment:** The eastern section of Route 6 enters the Upper Solway Flats and Marshes SSSI & SPA, and the Solway First SAC. The site is predominantly designated for its wetland habitats and waterfowl populations including Barnacle Goose (Branta leucopsis), however the SSSI designation includes Natterjack Toad (Epidalea calamita) population. Route 6 heads south / south east from AK008, skirting the north east edge of Annan. The route largely continues east through grazed and arable fields, running south of Eastriggs before crossing the Kirtle Water west of Gretna. The route crosses through a short section of conifer plantation woodland.	**Summary:** All options are similar, but those which run closest to the peat digging areas and lower-lying areas are more likely to require micrositing (or other localised mitigation measures) to avoid sensitive habitats. The main potential constraints are the qualifying species of the various Solway Firth designations, but the land use is predominantly grazing land / grassland, and wintering bird accumulations are more likely to occur on stubble fields further west, or along the saltmarsh / mudflats of the Firth itself. A definitive assessment of the preferred route from an ecological perspective will only be possible following

Topic Area	1	2	3	4	5	6	Preferred Route
	Plantation Order) antiquity (OS tile NY26), and one further short section of an un-named ancient woodland to the north west of Nutberry Moss (OS tile NY26). It crosses the Kirtle Water north-west of Gretna, and its eastern terminus is situated in an area of saltmarsh habitat. The habitat along route 1 appears dominated by semi-improved and improved grassland, and arable fields, with some sections of wetter Juncus sp. grassland in lower lying sections. The route crosses hedgerows and through Gill Wood. The route terminates in an area of saltmarsh habitat. Ordnance Survey maps indicate the route crosses in close proximity to Nutberry Moss peat harvesting sites, indicating that there may be sensitive peatland and GWDTE habitat in the north of the route. The route crosses two narrow areas of ancient woodland. The route crosses a number of watercourses including the Kirtle Water north-west of Gretna, and a number of burns such as the Stand Burn, and numerous field drains. A search on the NBN Gateway of biological records within 10km from (NY 25960 68155) from 2009 onwards contained records	Route 1. The route crosses the Kirtle Water west of Gretna before continuing east across fields and saltmarsh to its eastern terminus. The habitat along route 2 is dominated by semi-improved and improved grassland, and arable fields, with some sections of wetter Juncus sp. grassland in lower lying sections. The route crosses hedgerows and small areas of broadleaved and coniferous woodland. The route terminates in an area of saltmarsh habitat. Survey maps indicate the route crosses in close proximity to Nutberry Moss, a peat harvesting site, indicating that there may be sensitive peatland and GWDTE habitat on the route that may be damaged by vehicle movements. The route crosses a number of watercourses including the Kirtle Water, and a number of burns such as the Gullielands and Kirtle Burns, and numerous field drains. A search on the NBN Gateway of biological records within 10km from (NY 25960 68155) from 2009 onwards contained records for the following (recorded sightings in brackets). Meles meles: Badger (1) Myotis daubentonii: Daubenton's Bat (2) Sciurus vulgaris: Red Squirrel (773)	arable fields, where it joins Route 1. The route crosses the Kirtle Water west of Gretna before continuing east across fields and saltmarsh to its eastern terminus. The habitat along route 3 is dominated by semi-improved and improved grassland, and arable fields, with some sections of wetter Juncus sp. grassland in lower lying sections. The route crosses hedgerows and small areas of broadleaved and coniferous woodland. The route terminates in an area of saltmarsh habitat. Survey maps indicate the route crosses in close proximity to Nutberry Moss, a peat harvesting site, indicating that there may be sensitive peatland and GWDTE habitat on the route that may be damaged by vehicle movements. The route crosses a number of watercourses including the Kirtle Water, and a number of burns such as the Gullielands and Kirtle Burns, and numerous field drains. A search on the NBN Gateway of biological records within 10km from (NY 25960 68155) from 2009 onwards contained records for the following (recorded sightings in brackets). Meles meles: Badger (1) Myotis daubentonii: Daubenton's Bat (2)	easterly though grazed and arable fields. The route crosses the Kirtle Water west of Gretna before continuing east across fields and saltmarsh to its eastern terminus. The habitat along route 4 is dominated by semi-improved and improved grassland, and arable fields, with some sections of wetter Juncus sp. grassland in lower lying sections. The route crosses hedgerows and small areas of broadleaved and coniferous woodland. The route terminates in an area of saltmarsh habitat. Survey maps indicate the route crosses in close proximity to the south of Nutberry Moss and Dornock Flow, a peat harvesting site, indicating that there may be sensitive peatland and GWDTE habitat on the route that may be damaged by vehicle movements. The route passes adjacent to an un-named area of Ancient Woodland of Long Established (of Plantation Order) Antiquity (OS tile NY26). The route crosses a number of watercourses including the Kirtle Water, and a number of burns such as the Gullielands and Kirtle Burns, and numerous field drains. A search on the NBN Gateway of biological records within 10km from (NY 25960 68155) from 2009	Nutberry Moss and areas of woodland, before continuing south and east though grazed and arable fields. The route crosses the Kirtle Water west of Gretna before continuing east across fields and saltmarsh to its eastern terminus. The habitat along route 5 is dominated by semi-improved and improved grassland, and arable fields, with some sections of wetter Juncus sp. grassland in lower lying sections. The route crosses hedgerows and areas of broadleaved and coniferous woodland. The route terminates in an area of saltmarsh habitat. Survey maps indicate the route crosses in close proximity to the south of Nutberry Moss and Dornock Flow, a peat harvesting site, indicating that there may be sensitive peatland and GWDTE habitat on the route that may be damaged by vehicle movements. It passes adjacent to an un-named area of Ancient Woodland of Long Established (of Plantation Order) Antiquity (OS tile NY26). The route crosses a number of watercourses including the Kirtle Water, and a number of burns such as the Gullielands and Kirtle Burns, and numerous field drains. A search on the NBN Gateway of biological records within 10km from	The habitat along Route 6 is dominated by semi-improved and improved grassland, and arable fields, with some sections of wetter Juncus sp. The route crosses hedgerows and through a short section of conifer plantation woodland. The route terminates in an area of saltmarsh habitat. Ordnance Survey maps indicate the route crosses in close proximity to Westhills Moss, indicating that there may be sensitive peatland and GWDTE habitat to the southeast of the route that may be damaged by vehicle movements. The route crosses a number of watercourses. The route crosses the Kirtle Water west of Gretna, and a number of burns such as the Bikhill and Dornock Burns, and numerous field drains. It also passes in proximity to the southwest of an area of wetland and a pond at Westhills. A search on the NBN Gateway of biological records within 10km from (NY 25960 68155) from 2009 onwards contained records for the following (recorded sightings in brackets). Meles meles: Badger (1) Myotis daubentonii: Daubenton's Bat (2) Sciurus vulgaris: Red Squirrel (773) Fringilla montifringilla: Brambling (1) Turdus iliacus: Redwing (2) Turdus pilaris: Fieldfare (1)	winter bird surveys, but early indications suggest Routes 2, 3, 4 or 5 are likely to require fewer potential mitigation measures. **Routes 2, 3, 4 or 5 are preferred in terms of biodiversity and geological conservation.**

Topic Area	1	2	3	4	5	6	Preferred Route
	for the following (recorded sightings in brackets). Meles meles: Badger (1) Myotis daubentonii: Daubenton's Bat (2) Sciurus vulgaris: Red Squirrel (773) Fringilla montifringilla: Brambling (1) Turdus iliacus: Redwing (2) Turdus pilaris: Fieldfare (1) Vanellus vanellus: Lapwing (2) This route will potentially require survey for natterjack toad, badger red squirrel, otter and water vole. Of the birds which are qualifying species of the Upper Solway Firth SPA, only a few will potentially use the surrounding fields for feeding. These include: Pink-footed Goose (Anser brachyrhynchus), Barnacle Goose, Whooper Swan (Cygnus cygnus), Oystercatcher (Haematopus ostralegus), Curlew (Numenius arquata), Golden Plover (Pluvialis apricaria), Redshank (Tringa totanus). It is unlikely that the route will impact on these species but wintering and breeding bird surveys will be undertaken to ascertain numbers of birds present. **Conclusion:** Limited potential constraints, but micrositing of towers / mitigation may be required in proximity to the peat digging areas / low-lying marshy grassland and where the route crosses	Fringilla montifringilla: Brambling (1) Turdus iliacus: Redwing (2) Turdus pilaris: Fieldfare (1) Vanellus vanellus: Lapwing (2) This route will potentially require survey for natterjack toad, red squirrel, otter and water vole. Of the birds which are qualifying species of the Upper Solway Firth SPA, only a few will potentially use the surrounding fields for feeding. These include: Pink-footed Goose (Anser brachyrhynchus), Barnacle Goose, Whooper Swan (Cygnus cygnus), Oystercatcher (Haematopus ostralegus), Curlew (Numenius arquata), Golden Plover (Pluvialis apricaria), Redshank (Tringa totanus). It is unlikely that the route will impact on these species but wintering and breeding bird surveys will be undertaken to ascertain numbers of birds present. **Conclusion:** Likely constraints in proximity to the peat digging areas / low-lying marshy grassland – possibly can be mitigated against with micrositing away from most saturated or most sensitive areas. Qualifying species of the Solway Firth designations only a possible constraint in the far eastern stretch, but winter survey data will provide confirmation. Changes in landuse may be beneficial to	Sciurus vulgaris: Red Squirrel (773) Fringilla montifringilla: Brambling (1) Turdus iliacus: Redwing (2) Turdus pilaris: Fieldfare (1) Vanellus vanellus: Lapwing (2) This route will potentially require survey for natterjack toad, red squirrel, otter and water vole. Of the birds which are qualifying species of the Upper Solway Firth SPA, only a few will potentially use the surrounding fields for feeding. These include: Pink-footed Goose (Anser brachyrhynchus), Barnacle Goose, Whooper Swan (Cygnus cygnus), Oystercatcher (Haematopus ostralegus), Curlew (Numenius arquata), Golden Plover (Pluvialis apricaria), Redshank (Tringa totanus). It is unlikely that the route will impact on these species but wintering and breeding bird surveys will be undertaken to ascertain numbers of birds present. **Conclusion:** Likely constraints in proximity to the peat digging areas / low-lying marshy grassland – possibly can be mitigated against with micrositing away from most saturated or most sensitive areas. Qualifying species of the Solway Firth designations only a possible constraint in the far eastern stretch, but winter survey data will provide	onwards contained records for the following (recorded sightings in brackets). Meles meles: Badger (1) Myotis daubentonii: Daubenton's Bat (2) Sciurus vulgaris: Red Squirrel (773) Fringilla montifringilla: Brambling (1) Turdus iliacus: Redwing (2) Turdus pilaris: Fieldfare (1) Vanellus vanellus: Lapwing (2) This route will potentially require survey for natterjack toad, red squirrel, otter and water vole. Of the birds which are qualifying species of the Upper Solway Firth SPA, only a few will potentially use the surrounding fields for feeding. These include: Pink-footed Goose (Anser brachyrhynchus), Barnacle Goose, Whooper Swan (Cygnus cygnus), Oystercatcher (Haematopus ostralegus), Curlew (Numenius arquata), Golden Plover (Pluvialis apricaria), Redshank (Tringa totanus). It is unlikely that the route will impact on these species but wintering and breeding bird surveys will be undertaken to ascertain numbers of birds present. **Conclusion:** Few potential constraints, although care must be taken in proximity to the peat-digging areas and adjacent to the ancient woodland (possible micrositing of some	(NY 25960 68155) from 2009 onwards contained records for the following (recorded sightings in brackets). Meles meles: Badger (1) Myotis daubentonii: Daubenton's Bat (2) Sciurus vulgaris: Red Squirrel (773) Fringilla montifringilla: Brambling (1) Turdus iliacus: Redwing (2) Turdus pilaris: Fieldfare (1) Vanellus vanellus: Lapwing (2) This route will potentially require survey for natterjack toad, red squirrel, otter and water vole. Of the birds which are qualifying species of the Upper Solway Firth SPA, only a few will potentially use the surrounding fields for feeding. These include: Pink-footed Goose (Anser brachyrhynchus), Barnacle Goose, Whooper Swan (Cygnus cygnus), Oystercatcher (Haematopus ostralegus), Curlew (Numenius arquata), Golden Plover (Pluvialis apricaria), Redshank (Tringa totanus). It is unlikely that the route will impact on these species but wintering and breeding bird surveys will be undertaken to ascertain numbers of birds present. **Conclusion:** Limited potential constraints, but mitigation may be required in proximity to the peat digging areas / low-lying marshy grassland	Vanellus vanellus: Lapwing (2) This route will potentially require survey for natterjack toad, red squirrel, otter and water vole. Of all the routes that cross the Kirtle Burn, Route 6 crosses it closest to the sea, thereby minimising the potential impacts on upstream spawning habitats for migratory fish. Of the birds which are qualifying species of the Upper Solway Firth SPA, only a few will potentially use the surrounding fields for feeding. These include: Pink-footed Goose (Anser brachyrhynchus), Barnacle Goose, Whooper Swan (Cygnus cygnus), Oystercatcher (Haematopus ostralegus), Curlew (Numenius arquata), Golden Plover (Pluvialis apricaria), Redshank (Tringa totanus). It is unlikely that the route will impact on these species but wintering and breeding bird surveys will be undertaken to ascertain numbers of birds present. **Conclusion:** Few potential constraints, but mitigation may be required in proximity to the peat digging areas / low-lying marshy grassland areas. Qualifying species of the Solway Firth designations are a possible constraint along much of the route, but winter survey data will provide	

Topic Area	1	2	3	4	5	6	Preferred Route
	ancient woodland. Qualifying species of the Solway Firth designations only a possible constraint in the far eastern stretch, but winter survey data will provide confirmation. Changes in landuse may be beneficial to dissuade geese from foraging in stubble fields. **Retain?** Y (with mitigation) **Adjust?** Potentially	dissuade geese from foraging in stubble fields. **Adjust?** Y	confirmation. Changes in landuse may be beneficial to dissuade geese from foraging in stubble fields. **Adjust?** Y	poles may be required to avoid any sensitive areas). Qualifying species of the Solway Firth designations are a possible constraint in the southern and eastern areas, but winter survey data will provide confirmation. Changes in landuse may be beneficial to dissuade geese from foraging in stubble fields. **Retain?** Y (with mitigation)	and where the route crosses ancient woodland. Qualifying species of the Solway Firth designations only a possible constraint in the eastern sections, but winter survey data will provide confirmation. Changes in landuse may be beneficial to dissuade geese from foraging in stubble fields. **Retain?** Y (with mitigation)	confirmation. Changes in landuse may be beneficial to dissuade geese from foraging in stubble fields. **Retain?** Y (with mitigation)	
Hydrology and Soils	**Comment:** The eastern section of Route 1 enters the Upper Solway Flats and Marshes SSSI & SPA, and the Solway Firth SAC. The site is predominantly designated for its wetland habitats. The route crosses the Stand Burn and Kirtle Water north-west of Gretna. The route also crosses field drains in the Nutberry Moss area to the west of the confluence of the Stand Burn and Kirtle Water and near the source of the Dornock Burn. The indicative SEPA flood maps indicate a high risk of coastal flooding to the south of Gretna and also where the route approaches the southern extent of the Kirtle Water where there is a combined risk from fluvial (river) and coastal flooding (near the point where the watercourse enters the River Esk). There is quite an extensive area indicated to be at high risk of fluvial (river) flooding	**Comment:** The eastern section of Route 2 enters the Upper Solway Flats and Marshes SSSI & SPA, and the Solway First SAC The site is predominantly designated for its wetland habitats. The route crosses the Stand Burn and Kirtle Water north-west of Gretna. The route also crosses field drains in the Nutberry Moss area. The route crosses the Dornock Burn further to the north-west, then crosses the Gill Burn 560m upstream of its confluence with the Dornock Burn. The SEPA flood maps indicate a high risk of fluvial flooding where the route crosses the Dornock Burn. There is also likely to be a risk of surface water flooding locally, particularly where the route crosses the areas of field drainage near Nutberry Moss. The route does not cross any designated wetland areas as	**Comment:** The eastern section of Route 3 enters the Upper Solway Flats and Marshes SSSI & SPA, and the Solway Firth SAC. The site is predominantly designated for its wetland habitats. The route crosses the Stand Burn and Kirtle Water north-west of Gretna. The route also crosses field drains in the Nutberry Moss area to the west of the confluence of the Stand Burn and Kirtle Water and near the source of the Dornock Burn. The route crosses the Dornock Burn, a short distance to the south of the confluence with the Gill Burn. The SEPA flood maps indicate a high risk of fluvial flooding where the route crosses the Dornock Burn. There is also likely to be a risk of surface water flooding locally, particularly where the route crosses the areas of field drainage near Nutberry Moss.	**Comment:** The eastern section of Route 4 enters the Upper Solway Flats and Marshes SSSI & SPA, and the Solway First SAC. The site is predominantly designated for its wetland habitats. The route crosses the Kirtle Water west of Gretna before closely following the Birkhill Burn for approximately 1km further to the west. The route traverses the Birkhill Burn at least twice in this area. The route crosses the Dornock Burn further to the north-west. The indicative SEPA flood maps indicate a high risk of coastal flooding to the south of Gretna and also where the route crosses the Kirtle Water and Birkhill Burn watercourses near their southern extents, where there is likely to be a combined fluvial and coastal flood risk. Although the catchment area of the Birkhill Burn is too small for fluvial flood risk	**Comment:** The eastern section of Route 5 enters the Upper Solway Flats and Marshes SSSI & SPA, and the Solway First SAC. The site is predominantly designated for its wetland habitats. The route crosses the Kirtle Water west of Gretna before crossing the Birkhill Burn further to the west. The route crosses the Dornock Burn, a short distance to the south of the confluence with the Gill Burn. The indicative SEPA flood maps indicate a high risk of coastal flooding to the south of Gretna and also where the route crosses the Kirtle Water and Birkhill Burn watercourses near their southern extents (where they enter the River Esk). Although the catchment area of the Birkhill Burn is too small for fluvial flood risk to be indicated on the SEPA flood maps, there is likely to be a fluvial flood risk where the route crosses the small	**Comment:** The eastern section of Route 6 enters the Upper Solway Flats and Marshes SSSI & SPA, and the Solway First SAC. The site is predominantly designated for its wetland habitats. The route crosses the Kirtle Water west of Gretna before crossing the Birkhill Burn further to the west. The route crosses the Dornock Burn, to the south of Dornock. The indicative SEPA flood maps indicate a high risk of coastal flooding to the south of Gretna and also where the route crosses the Kirtle Water near the southern extent of the watercourse (where it joins the River Esk to the south). The route may also be at risk of coastal flooding further to the west, near where it crosses the Birkhill Burn and also to the south-east of Eastriggs. Although the catchment area of the Birkhill Burn is too small for fluvial flood risk	**Summary:** All options are similar, but those which run closest to the Class 1 peat areas and greater numbers of watercourses are more likely to require micrositing (or other localised mitigation measures) to avoid sensitive receptors. Route 1 minimises the number of watercourse crossings as well as the extent of the route which is at risk from coastal flooding. This route also avoids area of Class 1 peat. **Route 1 is preferred in terms of avoiding impacts due to flood risk.**

Topic Area	1	2	3	4	5	6	Preferred Route
	where the route traverses the Stand Burn and the Kirtle Water (a short distance upstream of the confluence of these two watercourses). There is likely to be a lower risk of fluvial flooding where the route traverses the Dornock Burn near its source, due to the small catchment area in this location. There is also likely to be a risk of surface water flooding locally, particularly where the route traverses any field drains, such as those located near Nutberry Moss. The route does not cross any designated wetland areas as indicated by the Scottish Wetland Inventory. Number of watercourse crossings – 2 named watercourses **Retain (with mitigation) –** this route minimises the number of watercourse crossings as well as the extent of the route which is at risk from coastal flooding. ***Note that approximately 1.5km of the route traverses areas indicated to contain peat (Class 5),** as identified by British Geological Survey (BGS) superficial geology mapping in conjunction with the Scottish Natural Heritage (SNH) Peatland Map. This section of the route may need to be adjusted.	indicated by the Scottish Wetland Inventory. Number of watercourse crossings – 4 named watercourses **Adjust where possible** – although the only likely significant area of fluvial flood risk would occur where the route crosses the Dornock Burn, this route crosses an area of Class 1 peatland near Nutberry Moss as identified by the SNH Peatland Map. ***Note that approximately 1km of the route traverses areas indicated to contain peat (Class 5 and 1),** as identified by British Geological Survey (BGS) superficial geology mapping in conjunction with the Scottish Natural Heritage (SNH) Peatland Map.	Number of watercourse crossings – 3 named watercourses **Adjust where possible** – although the only likely significant area of fluvial flood risks would occur where the route crosses the Dornock Burn, this route cross an area of Class 1 peatland near Nutberry Moss as identified by the SNH Peatland Map. ***Note that approximately 1km of the route traverses areas indicated to contain peat (Class 5 and 1),** as identified by British Geological Survey (BGS) superficial geology mapping in conjunction with the Scottish Natural Heritage (SNH) Peatland Map.	to be indicated on the SEPA flood maps, there is likely to be a fluvial flood risk from the small watercourse along the section where the route closely follows the path of the Birkhill Burn. There is also likely to be a high risk of fluvial (watercourse) flooding where the route crosses the Dornock Burn, near the confluence with the Gill Burn. There is also likely to be a risk of surface water flooding locally, particularly where the route traverses any field drains. The route does not cross any designated wetland areas as indicated by the Scottish Wetland Inventory. Number of watercourse crossings – 4 named watercourses **Adjust where possible –** this route has a high number of watercourse crossings and closely follows the Birkhill Burn for approximately 1km and encroaches upon the 50m watercourse buffer to Birkhill Burn. This route crosses an area of Class 1 peatland near Nutberry Moss as identified by the SNH Peatland Map. ***Note that approximately 1.5km of the route traverses areas indicated to contain peat (Class 5 and 1),** as identified by British Geological Survey (BGS) superficial geology mapping in conjunction with the	watercourse. There is also likely to be a high risk of fluvial (watercourse) flooding where the route crosses the Dornock Burn. There is also likely to be a risk of surface water flooding locally, particularly where the route traverses any field drains. The route does not cross any designated wetland areas as indicated by the Scottish Wetland Inventory. Number of watercourse crossings – 3 named watercourses **Adjust where possible –** this route has a relatively high number of watercourse crossings and takes a southerly track to the south-west of Gretna crossing area where there is a risk from coastal flooding. This route crosses an area of Class 1 peatland near Nutberry Moss as identified by the SNH Peatland Map. ***Note that approximately 1.75km of the route traverses areas indicated to contain peat (Class 5 and 1),** as identified by British Geological Survey (BGS) superficial geology mapping in conjunction with the Scottish Natural Heritage (SNH) Peatland Map.	to be indicated on the SEPA flood maps, there is likely to be a fluvial flood risk where the route crosses the small watercourse. There is also likely to be a high risk of fluvial (watercourse) flooding where the route crosses the Dornock Burn. There is also likely to be a risk of surface water flooding locally, particularly where the route traverses any field drains. The route does not cross any designated wetland areas as indicated by the Scottish Wetland Inventory. Number of watercourse crossings – 3 named watercourses **Adjust where possible–** this route has a high number of watercourse crossings and takes a southerly track between Gretna and Eastriggs, close to or within areas at high risk from coastal flooding. ***Note that approximately 1.5km of the route traverses areas indicated to contain peat (Class 5 and 1),** as identified by British Geological Survey (BGS) superficial geology mapping in conjunction with the Scottish Natural Heritage (SNH) Peatland Map (see 'Peat – Map 2' and 'Peat – Map 3').	

Topic Area	1	2	3	4	5	6	Preferred Route
				Scottish Natural Heritage (SNH) Peatland Map.			
Historic Environment	**Comment:** Designated heritage assets - Crosses 1.6km of the Inventory Historic Battlefield (IHB). The effect on the setting of the IHB is not likely to be significant such to cause refusal of consent. Non-designated heritage assets – Crosses seven Archaeological Interest Regions (AIR) recorded on the HER: two medieval tower houses (site of), two areas of Iron Age field systems, two former railway lines, and the site of the Medieval Battle of Sark. Passes within 15m of a non-inventory designed landscape, Stapleton Tower. Whilst this has the potential to introduce additional setting effects in comparison with the other route options, it appears that due to existing tree screening the effects would be negligible. **Summary:** Route retained as distance crossing designated IHB has been limited. Any direct impacts to known archaeological remains could be avoided through sensitive siting of towers or preservation by record through advance archaeological excavation. **Conclusion:** **Retain? Y**	**Comment:** Designated heritage assets - Crosses 1.6km of the Inventory Historic Battlefield (IHB). The effect on the setting of the IHB is not likely to be significant such to cause refusal of consent. Non-designated heritage assets – Crosses seven Archaeological Interest Regions (AIR) recorded on the HER: two medieval tower houses (site of), two areas of Iron Age field systems, two former railway lines, and the site of the Medieval Battle of Sark. **Summary:** Route retained as distance crossing designated IHB has been limited. Any direct impacts to known archaeological remains could be avoided through sensitive siting of towers or preservation by record through advance archaeological excavation. **Conclusion:** **Retain? Y** **Adjust? N** Whilst adjustment to avoid Iron Age Enclosure MDG7762 at 3304430, 567080 would be preferred, a direct impact can probably be avoided through sensitive siting of towers. **Eliminate? N**	**Comment:** Designated heritage assets - Crosses 1.6km of the Inventory Historic Battlefield (IHB). The effect on the setting of the IHB is not likely to be significant such to cause refusal of consent. Non-designated heritage assets – Crosses seven Archaeological Interest Regions (AIR) recorded on the HER: two medieval tower houses (site of), two areas of Iron Age field systems, two former railway lines, and the site of the Medieval Battle of Sark. **Summary:** Route retained as distance crossing designated IHB has been limited. Any direct impacts to known archaeological remains could be avoided through sensitive siting of towers or preservation by record through advance archaeological excavation. **Conclusion:** **Retain? Y** **Adjust? N** Whilst adjustment to avoid Iron Age Enclosure MDG7762 at 3304430, 567080 would be preferred, a direct impact can probably be avoided through sensitive siting of towers. **Eliminate? N**	**Comment:** Designated heritage assets - Crosses 1.9km of the Inventory Historic Battlefield (IHB). Consultees may query why options minimising effects on the setting of the IHB have not been chosen. Non-designated heritage assets – Crosses four Archaeological Interest Regions (AIR) recorded on the HER: two former railway lines, a prehistoric enclosure and the site of the Medieval battle of Sark. **Summary:** Route eliminated in favour of other options limiting distance crossing designated IHB. Any direct impacts to known archaeological remains could be avoided through sensitive siting of towers or preservation by record through advance archaeological excavation. **Conclusion:** **Retain? N** **Adjust? N** **Eliminate? Y**	**Comment:** Designated heritage assets - Crosses 2.1km of the Inventory Historic Battlefield (IHB). Consultees may query why options minimising effects on the setting of the IHB have not been chosen. Also crosses the defined non-designated setting area of a scheduled monument 'Woodfield' prehistoric enclosure. Non-designated heritage assets – Crosses five Archaeological Interest Regions (AIR) recorded on the HER: the outer remains of a scheduled prehistoric enclosure, a medieval tower house (site of), a former railway line, a power station and the site of the Medieval battle of Sark. **Summary:** Route eliminated in favour of other options limiting distance crossing designated IHB. Route also eliminated due to effects on setting of Woodfield scheduled monument. **Conclusion:** **Retain? N** **Adjust? N** **Eliminate? Y**	**Comment:** Designated heritage assets - Crosses 2.1km of the Inventory Historic Battlefield (IHB). Consultees may query why options minimising effects on the setting of the IHB have not been chosen. Passes within 75m of a Scheduled Monument (standing stone). This is unlikely to cause a significant effect, but is an additional impact compared with other route options. Non-designated heritage assets – Crosses four Archaeological Interest Regions (AIR) recorded on the HER: two former railway lines, an explosives factory and the site of the Medieval battle of Sark. **Summary:** Route eliminated in favour of other options limiting distance crossing designated IHB. Route also eliminated due to effects on setting of additional scheduled standing stone. **Conclusion:** **Retain? N** **Adjust? N** **Eliminate? Y**	**Summary:** Route 1, 2 and 3 preferred as distance crossing designated IHB is less than Routes 4, 5 and 6. The effect on the setting of the IHB is not likely to be significant such to cause refusal of consent. Route 3 is routed further from two scheduled monuments as well as a non-inventory designed landscape that would potentially be affected by other Route Options. Any direct impacts to known archaeological remains could be avoided through sensitive siting of towers or preservation by record through advance archaeological excavation. **Routes 1, 2 and 3 preferred, with a marginal preference for Route 3.**

Topic Area	1	2	3	4	5	6	Preferred Route
	Adjust? N Whilst adjustment to avoid Iron Age Enclosure MDG7762 at 3304430, 567080 would be preferred, a direct impact can probably be avoided through sensitive siting of towers. **Eliminate? N**						
Technical	**Route length:** Not a risk **Altitude:** All of corridor <200m AOD Highest point of corridor 65m AOD **Topography:** 0% of corridor traverses steep slopes greater than 11 or 22 degrees. **Buildability Access Constraints:** Approximately 30% of corridor with potential access difficulties. Access mostly available via roads with some additional access areas via remote terrain – e.g. middle of fields etc **Crossings to existing OHL, transmission and distribution infrastructure** Crossing required at existing transmission 275kV tower line AL route at two separate locations. There are also numerous 11kV crossings (10) as well as a new 33kV line being proposed in the area. This route will also require a crossing of the existing T route. One existing 33kV crossing. Risk rating **high**	**Route length:** Not a risk **Altitude:** All of corridor <200m AOD Highest point of corridor 51m AOD **Topography:** 0% of corridor traverses steep slopes greater than 11 or 22 degrees. **Buildability Access Constraints:** Approximately 30% of corridor with potential access difficulties. Access mostly available via roads with some additional access areas via remote terrain – e.g. middle of fields etc **Crossings to existing OHL, transmission and distribution infrastructure** There are numerous (12) 11kV crossings as well as a new 33kV line being proposed in the area. This route will also require a crossing of the existing T route. One existing 33kV crossing. Risk rating **medium**	**Route length:** Not a risk **Altitude:** All of corridor <200m AOD Highest point of corridor 50m AOD **Topography:** 0% of corridor traverses steep slopes greater than 11 or 22 degrees. **Buildability Access Constraints:** Approximately 30% of corridor with potential access difficulties. Access mostly available via roads with some additional access areas via remote terrain – e.g. middle of fields etc **Crossings to existing OHL, transmission and distribution infrastructure** There are numerous (12) 11kV crossings as well as a new 33kV line being proposed in the area. This route will also require a crossing of the existing T route. One existing 33kV crossing. Risk rating **medium**	**Route length:** Not a risk **Altitude:** All of corridor <200m AOD Highest point of corridor 50m AOD **Topography:** 0% of corridor traverses steep slopes greater than 11 or 22 degrees. **Buildability Access Constraints:** Approximately 30% of corridor with potential access difficulties. Access mostly available via roads with some additional access areas via remote terrain – e.g. middle of fields etc **Crossings to existing OHL, transmission and distribution infrastructure** There are numerous 11kV crossings (9) as well as a new 33kV line being proposed in the area. This route will also require a crossing of the existing T route. One existing 33kV crossing. Risk rating **medium** **Proximity to existing OHL transmission and distribution infrastructure:**	**Route length:** Not a risk **Altitude:** All of corridor <200m AOD Highest point of corridor 50m AOD **Topography:** 0% of corridor traverses steep slopes greater than 11 or 22 degrees. **Buildability Access Constraints:** Approximately 30% of corridor with potential access difficulties. Access mostly available via roads with some additional access areas via remote terrain – e.g. middle of fields etc **Crossings to existing OHL, transmission and distribution infrastructure** There are numerous 11kV crossings (11) as well as a new 33kV line being proposed in the area. This route will also require a crossing of the existing T route 5 times. One existing 33kV crossing. Risk rating **high** **Proximity to existing OHL transmission and distribution infrastructure:**	**Route length:** Not a risk **Altitude:** All of corridor <200m AOD Highest point of corridor 45m AOD **Topography:** 0% of corridor traverses steep slopes greater than 11 or 22 degrees. **Buildability Access Constraints:** Approximately 30% of corridor with potential access difficulties. Access mostly available via roads with some additional access areas via remote terrain – e.g. middle of fields etc **Crossings to existing OHL, transmission and distribution infrastructure** There are numerous 11kV crossings (14) as well as a new 33kV line being proposed in the area. This route will also require a crossing of the existing T route 3 times. One existing 33kV crossing. Risk rating **high** **Proximity to existing OHL transmission and distribution infrastructure:**	**Summary:** Route Options 1, 5 and 6 are all considered to have high risk in view of the number and/ or type of crossing required to existing OHL, transmission and distribution infrastructure. **Route 2, 3 and 4 are therefore preferred.** **Mitigation**: Proposed routes have several potential crossings of the existing 11kV and 33kV overhead lines. Negating or reducing several crossings would be achievable through partial realignment or utilising route option with fewer crossings.

Topic Area	1	2	3	4	5	6	Preferred Route
	Proximity to existing OHL transmission and distribution infrastructure: Proximity to both 132kV T route at Gretna and 275kV AL route transmission lines. Risk rating **medium** **Mineworking areas (Opencast etc)** No areas of previous mining operations evident. **Ground conditions:** Potential peat in the middle section of the line North of Eastriggs. Risk rating **minor** **Public Service Utilities (crossings/ proximity)** No noted pipelines within the corridor **Watercourse / Catchment Areas Crossings e.g. River, Loch, Reservoir** Crossing of Kirtle Water, Dornock Burn and proximity to irrigation burns/ channels along the route. Road / Railway Crossings along corridor. **Road/ Railway Crossings along corridor:** Multiple country road crossings, crossing of the B6357, A75 and a railway crossing **Windfarms:** No existing windfarms **Residential/ industrial areas**	**Proximity to existing OHL transmission and distribution infrastructure:** Proximity to existing 132kV T route at Gretna. Risk rating **medium** **Mineworking areas (Opencast etc)** No areas of previous mining operations evident. **Ground conditions:** Areas of peat in the middle section of the line North of Eastriggs. Risk rating **minor** **Public Service Utilities (crossings/ proximity)** No noted pipelines within the corridor **Watercourse / Catchment Areas Crossings e.g. River, Loch, Reservoir** Crossing of Kirtle Water, Dornock Burn and proximity to irrigation burns/ channels along the route. **Road/ Railway Crossings along corridor:** Multiple country road crossings, crossing of the B6357, A75 and a railway crossing **Windfarms:** No existing windfarms **Residential/ industrial areas** Passing south of Gretna and through country side with multiple farm houses and	**Proximity to existing OHL transmission and distribution infrastructure:** Proximity to the existing T route , existing 11 kV and 33kV OHLs Risk rating **medium** **Mineworking areas (Opencast etc)** No areas of previous mining operations evident. **Ground conditions:** Potential peat in the middle section of the line North of Eastriggs. Risk rating **minor** **Public Service Utilities (crossings/ proximity)** No noted pipelines within the corridor **Watercourse / Catchment Areas Crossings e.g. River, Loch, Reservoir** Crossing of Kirtle Water, Dornock Burn and proximity to irrigation burns/ channels along the route. **Road/ Railway Crossings along corridor:** Multiple country road crossings, crossing of the B6357, A75 and a railway crossing **Windfarms:** No existing windfarms **Residential/ industrial areas** Passing south of Gretna and through country side with	Proximity to the existing T route , existing 11 kV and 33kV OHLs Risk rating **medium** **Mineworking areas (Opencast etc)** No areas of previous mining operations evident. **Ground conditions:** Potential peat in the middle section of the line North of Eastriggs. Risk rating **minor** **Public Service Utilities (crossings/ proximity)** No noted pipelines within the corridor **Watercourse / Catchment Areas Crossings e.g. River, Loch, Reservoir** Crossing of Kirtle Water, Dornock Burn and proximity to irrigation burns/ channels along the route. Road / Railway Crossings along corridor **Road/ Railway Crossings along corridor:** Multiple country road crossings, crossing of the B6357, A75 and a railway crossing **Windfarms:** No existing windfarms **Residential/ industrial areas** Passing south of Gretna and through country side with	Proximity to existing 132kV T route, 11 kV and 33kV OHLs. Risk rating **medium** **Mineworking areas (Opencast etc)** No areas of previous mining operations evident. **Ground conditions:** Potential peat in the middle section of the line North of Eastriggs. Risk rating **minor** **Public Service Utilities (crossings/ proximity)** No noted pipelines within the corridor **Watercourse / Catchment Areas Crossings e.g. River, Loch, Reservoir** Crossing of Kirtle Water, Dornock Burn and proximity to irrigation burns/ channels along the route. **Road/ Railway Crossings along corridor:** Multiple country road crossings, crossing of the B6357, A75 and a railway crossing **Windfarms:** No existing windfarms **Residential/ industrial areas** Passing south of Gretna and through country side with multiple farm houses and dwellings.	Proximity to existing 132kV T route, 11 kV and 33kV OHLs. Risk rating **medium** **Mineworking areas (Opencast etc)** No areas of previous mining operations evident. **Ground conditions:** No areas of peat. Risk rating **minor** **Public Service Utilities (crossings/ proximity)** No noted pipelines within the corridor **Watercourse / Catchment Areas Crossings e.g. River, Loch, Reservoir** Crossing of Kirtle Water, Birkhill Burn, Saugh-hope Burn and proximity to irrigation burns/ channels along the route. Risk rating **medium** **Road/ Railway Crossings along corridor:** Multiple country road crossings, crossing of the A75, B6357, B721 and a railway crossing. Risk rating **medium** **Windfarms:** No existing windfarms **Residential/ industrial areas** Passing south of Gretna and through country side with multiple farm houses and	

Topic Area	1	2	3	4	5	6	Preferred Route
	Passing south of Gretna and through country side with multiple farm houses and dwellings. Proximity to North of Westlands Country Park. **Pollution** Corridor traverses coastal rural / rural areas - corrosion rate of 1.5 **Conclusion:** **Retain? N**	dwellings. Proximity to the south of Westlands Country Park. **Pollution** Corridor traverses coastal rural / rural areas - corrosion rate of 1.5 **Conclusion:** **Retain? Y**	multiple farm houses and dwellings. Proximity to North of Westlands Country Park. **Pollution** Corridor traverses coastal rural / rural areas - corrosion rate of 1.5 **Conclusion:** **Retain? Y**	multiple farm houses and dwellings. Proximity to North of Westlands Country Park. **Pollution** Corridor traverses coastal rural / rural areas - corrosion rate of 1.5 **Conclusion:** **Retain? Y**	**Pollution** Corridor traverses coastal rural / rural areas - corrosion rate of 1.5 **Conclusion:** **Retain? N**	dwellings. Passing south of Dornock and Eastriggs residential areas. **Pollution** Corridor traverses coastal rural / rural areas - corrosion rate of 1.5 **Conclusion:** **Retain? N**	

Alternate Link Routes

Topic Area	L1	L2	L3	L4	L5
Landscape and Visual	This Link route provides an alternative route around the properties at Morningside, following the edge of woodland and crossing the B6357 to the south west of the properties at the same location of an existing 11kV line. **Landscape Sensitivity** The route runs parallel to woodland within largely flat pasture and follows the existing field pattern. Potential to utilise the crossing point of the existing 11kV line considered beneficial. **Residential Visual Amenity** The route passes closer to the properties at Morningside but would reduce the perception of a wirescape when viewed from the rear and front elevations of properties by following the route of an existing 11 kV line and utilising the same crossing point over the B6357. It would also be backclothed by woodland in views from the north east. It could also potentially simplify the wirescape seen to the front elevation of properties but this is subject to technical feasibility and further survey.	This link provides an alternative option for route 4, allowing the route to approach Gretna from the north, eventually joining with Route 1, 2 and 3. **Landscape Sensitivity** This route runs across relatively flat landform throughout. **Residential Visual Amenity** The route would avoid the densely populated area west of Rigg but would be required to pass close to other properties, including at Stonehouse and those west of Gretna. It is therefore considered similar to the main route. **Visual Amenity** The route crosses the Galloway Tourist Trail on the A75 and NCR 74 to the south of East Scales. It then recrosses the Galloway Trail and the Burns Heritage Trail. It is considered worse than the main route as it is required to cross the A75 twice, the first of which is at an oblique. **Landscape Designations**	This option provides an alternative to route 5 in order to avoid crossing the existing AK&T route at Woodfield – which Route 5 does in order to avoid a Scheduled Monument. **Landscape Sensitivity** This route runs across relatively flat landform throughout. **Residential Visual Amenity** This alternative takes Route 5 further from some properties but closer to others. Effects overall considered to be similar. **Visual Amenity** To the east of Woodfield Holdings, the route crosses the Burns Heritage Trail and NCR 7. **Landscape Designations** This route avoids designated landscapes. It does however have effects on archaeological designations which are considered within the section which follows. **Length of Corridor** The length of the alternative route is approximately the same as the main route.	This route provides an alternative route for Route 6 in order to avoid Annan, crossing the A75 further east at an oblique angle. **Landscape Sensitivity** This route runs across relatively flat landform throughout. **Residential Visual Amenity** The use of this link route would allow Route 6 to avoid Annan by running east out of tower AK8, following the route of Routes 2, 3 and 4 before turning south east to cross the A75. It would still therefore have effects on residential visual amenity at Morningside but would have less effects on residential visual amenity to the north east of Annan. **Visual Amenity** The route crosses the Galloway Tourist Trail on the A75 and is therefore similar to the main option for route 6 **Landscape Designations** This route avoids designated landscapes. **Length of Corridor** The use of this link route would reduce Route 6 by approximately 150m.	This route provides an alternative route for Route 6 which avoids Dornock. A road embankment on the B721 which crosses the railway line requires route 6 to pass either east or west of it in view of technical constraints. **Landscape Sensitivity** This route runs across relatively flat landform throughout. **Residential Visual Amenity** The use of this link would allow Route 6 to avoid properties on the western edge of Dornock. As a result of the constraints of the road embankment on the B721, this link instead takes the route closer to properties at Swordwell Rigg and would be within 200m. Therefore, whilst this option affects less properties than main Route 6, it still has effects on residential visual amenity and would still pass close to Annan, Eastriggs and Rigfoot. **Landscape Designations** This route avoids designated landscapes. It does however have effects on archaeological designations which are considered within the section which follows.

Topic Area	L1	L2	L3	L4	L5
	Visual Amenity The alternative link would still require a crossing over the Robert Bruce Tourist Trail on the B6357 and would have similar impacts on the Galloway Tourist Trail on the A75 as the main route option. The route is located further from the Archaeological Interest Area (Stone Circle) although this is not accessible by PRoW. **Landscape Designations** This route avoids designated landscapes **Length of Corridor** Would reduce the length of the routes by approximately 75m. **Conclusion:** This link is closer to properties than the main route but siting along the edge of a woodland and utilising the existing 11 kV route has the potential to reduce effects on residential visual amenity, if technically feasible and subject to further site survey.	This route avoids designated landscapes. It does however have effects on ecological and archaeological designations which are considered within the sections which follow. **Length of Corridor** This option would increase the length of Route 4 by approximately 500m **Conclusion:** This route would introduce a new overhead line in an area which is not currently affected by the AK and T route and would require the crossing of the A75 twice, one of which would be on an oblique.	**Conclusion:** Whilst this route avoids the need to cross the existing AK&T route, in terms of landscape and visual criteria is broadly similar and therefore not sufficiently beneficial to warrant the effects on the Scheduled Monument reported in the section below.	**Conclusion:** This route avoids Annan, crossing the A75 further east than the main Route 6 and avoiding more properties. It requires a crossing over the A75 at an oblique angle which is less preferred visually subject to technical feasibility.	**Length of Corridor** This alternative would reduce Route 6 by approximately 100m. **Conclusion:** This alternative link route reduces effects on residential visual amenity by avoiding properties at Dornock, but is considered similar to the main route due to its proximity to Swordwell Rigg.
Biodiversity and Geological Conservation	**Comment:** Link 1 is an alternative section for Routes 2, 3, 4 and 5 within 500m of AK008. The habitat along Link 1 is dominated by grazed and arable fields, with a short section of wetter Juncus sp. grassland in the lower lying section at its terminus. The route passes adjacent to a mixed woodland / garden environment. **Conclusion:** Due to this link's short length, proximity to dwellings and busy	**Comment:** Link 2 is an extended section running north of the A75 in the eastern half of the route corridor linking Routes 4 with Routes 1, 2 and 3. It runs east through grassland habitat, grazed and arable fields to the east of Nutberry Moss and crosses the Kirtle Water west of Gretna before its eastern terminus. North of the point it crosses the A75, there is an area of Juncus sp. Grassland. It also runs close to several areas of woodland and over several minor watercourses.	**Comment:** Link 3 is an alternative to Route 5 running south of the A75 between Eastriggs and Rigg, closely following the existing OHL. It runs through grassland habitat, arable and grazed fields, as well as skirting areas of woodland, and crossing a minor watercourse. **Conclusion:** There may be some use by birds which are qualifying species of the Upper Solway Firth SPA, including Pink-footed Goose, Barnacle Goose, and	**Comment:** Link 4 is a short section which is a continuation of Link 1, joining Routes 2, 3 and 4 with Route 6 in the west of the corridor, south of the A75. It runs through arable and grazed fields. **Conclusion:** Due to this link's short length through managed farmland and proximity to the A75, it is unlikely to pose any risk to ecology or biodiversity, and although the standard pre-construction surveys should be undertaken, it is unlikely that any additional species specific surveys will be required.	**Comment:** Link 5 is an alternative section of Route 6, which runs north – south to the west of Dornock. The habitat along Link 5 is dominated by grazed and arable fields, with the Dornock Burn present at its eastern terminus. There are riparian trees along the burn banks. This route will potentially require survey for otter. Also, due to its proximity to the Solway Firth, the landuse along its route, and its relatively quiet location away

Topic Area	L1	L2	L3	L4	L5
	roads, it is unlikely to pose any risk to ecology or biodiversity, and although the standard pre-construction surveys should be undertaken, it is unlikely that any additional species specific surveys will be required. **Retain?** Y	This link will potentially require survey for natterjack toad, otter, water vole, and it is likely that there will be a greater diversity of breeding and overwintering birds present due to the variety of habitats present along its length. This will include birds which are qualifying species of the Upper Solway Firth SPA which use the surrounding fields for feeding, including Pink-footed Goose, Barnacle Goose, and Whooper Swan. **Conclusion:** Likely ecological constraints may include the presence of protected species and bird activity throughout the year. Whilst changes in landuse may be beneficial to dissuade geese from foraging in stubble fields, on cereal crops and fresh grass, it is likely that extensive micrositing will be required to avoid the more sensitive areas of habitat and watercourses. **Adjust?** Y **Eliminate?** Possibly	Whooper Swan. However, there are limited potential constraints, although mitigation / micrositing may be required in some areas. Standard pre-construction surveys should be undertaken - it is unlikely that any additional species specific surveys will be required. **Retain?** Y (possibly with mitigation)	There may be some use by birds which are qualifying species of the Upper Solway Firth SPA, including Pink-footed Goose, Barnacle Goose, and Whooper Swan. However, there are limited potential constraints. Changes in landuse may be beneficial to dissuade geese from foraging in cereal crops, fresh grass or stubble fields. **Retain?** Y (possibly with mitigation)	from major roads and built up areas, it is likely to be used for feeding by qualifying species of the Upper Solway Firth SPA, including Pink-footed Goose, Barnacle Goose, and Whooper Swan. **Conclusion:** Few potential constraints, but mitigation may be required adjacent to the Dornock Burn. Changes in landuse may be beneficial to dissuade geese from foraging in cereal crops, fresh grass or stubble fields. **Retain?** Y (possibly with mitigation)
Hydrology & Soils	**Comment:** Link 1 is an alternative section for Routes 2, 3, 4 and 5 within 500m of AK008. This short section does not cross any watercourses or mapped field drainage. This section does not cross any mapped peat deposits. **Conclusion:** Due to this routes short length and lack of hydrological constraints potential impact on the water environment is minimised. **Retain? Y**	**Comment:** Link 2 is an extended section running north of the A75 in the eastern half of the route corridor linking Routes 4 with Routes 1, 2 and 3. This longer section crosses the Kirtle Water and field drainage associated with Nutberry Moss. This route also crosses approximately 400m of Class 1 Peatland as identified by the SNH Peatland Map. **Conclusion:** Due to this routes peat and hydrological constraints greater requirement for mitigation and micrositing is envisaged. **Eliminate?** Possibly	**Comment:** Link 3 is an alternative to Route 5 running south of the A75 between Eastriggs and Rigg, closely following the existing OHL. This route crosses the Birkhill Burn and tributary drainage and terminates within an area of Class 1 Peatland. **Conclusion:** Due to this routes peat and hydrological constraints greater requirement for mitigation and micrositing is envisaged. **Adjust?** Y **Eliminate?** Possibly	**Comment:** Link 4 is a short section which is a continuation of Link 1, joining Routes 2, 3 and 4 with Route 6 in the west of the corridor, south of the A75. This short section does not cross any watercourses or mapped field drainage. This section does not cross any mapped peat deposits. **Conclusion:** Due to this routes short length and lack of hydrological constraints potential impact on the water environment is minimised. **Retain? Y**	**Comment:** Link 5 is an alternative section of Route 6, which runs north – south to the west of Dornock. This route crosses the Dornock Burn approximately 500m south of Dornock. This short section does not cross any other watercourses or mapped field drainage. This section does not cross any mapped peat deposits. **Conclusion:** Due to this routes short length and relative lack of hydrological constraints potential impact on the water environment is minimised. **Retain? Y (with mitigation)**
Historic Environment	**Comment:** N/A direct impacts on known heritage assets.	**Comment:** <u>Non-designated heritage assets –</u> Crosses two Archaeological Interest	**Comment:**	**Comment:** N/A direct impacts on known heritage assets.	**Comment:**

Topic Area	L1	L2	L3	L4	L5
	Slightly further from a stone circle than Route 2 / Preferred Route; link is slightly preferable to these options. **Conclusion:** **Retain? Y** **Adjust? N** **Eliminate? N**	Regions (AIR) recorded on the HER: two areas of Iron Age field systems. Link is preferable to Route 4 as it connects to the shorter option (1.6km, as opposed to 1.9km) through the Inventory Historic Battlefield (IHB). **Conclusion:** **Retain? Y** **Adjust? N** Whilst adjustment to avoid Iron Age Enclosure MDG7762 at 3304430, 567080 would be preferred, a direct impact can probably be avoided through sensitive siting of towers. **Eliminate? N**	<u>Designated heritage assets -</u> Crosses one Scheduled Monument: 'Woodfield' prehistoric enclosure. <u>Non-designated heritage assets –</u> Crosses one Archaeological Interest Regions (AIR) recorded on the HER: the defined non-designated setting area of a scheduled monument 'Woodfield' prehistoric enclosure. Route 5 is preferable to the link, as it avoids the Scheduled Monument. **Conclusion:** **Retain? N** **Adjust? N** **Eliminate? Y** Route eliminated due to impact on scheduled monument 'Woodfield' prehistoric enclosure.	Viable alternative to Route 6. No preference. **Conclusion:** **Retain? Y** **Adjust? N** **Eliminate? N**	<u>Designated heritage assets –</u> Passes within 40m of one Scheduled Monument: 'Gleningles' prehistoric enclosure. <u>Non-designated heritage assets –</u> Crosses one Archaeological Interest Regions (AIR) recorded on the HER: the defined non-designated setting area of a scheduled monument 'Gleningles' prehistoric enclosure. Route 6 is preferable, as it avoids the Scheduled Monument. **Conclusion:** **Retain? N** **Adjust? N** **Eliminate? Y** Route eliminated due to impact on scheduled monument 'Gleningles' prehistoric enclosure.
Technical	Not possible to maintain a 60m wayleave between Mornigside properties and Ancient Woodland. Link Route discounted.	Main route option not taken forward – technical feedback not provided.	Main route option not taken forward – technical feedback not provided.	Main route option not taken forward – technical feedback not provided.	Main route option not taken forward – technical feedback not provided.

DESIGN VERIFICATION Level 1 ☐ Level 2 ☐ Not apply ☒

R E V I S I O N C O N T R O L

REV.	DATE	REASON	MODIFIED PAGES
A	05/02/21	First Issue	N/A
B	09/11/21	Update to Scope, UPAS conductor	4,5

INDEX

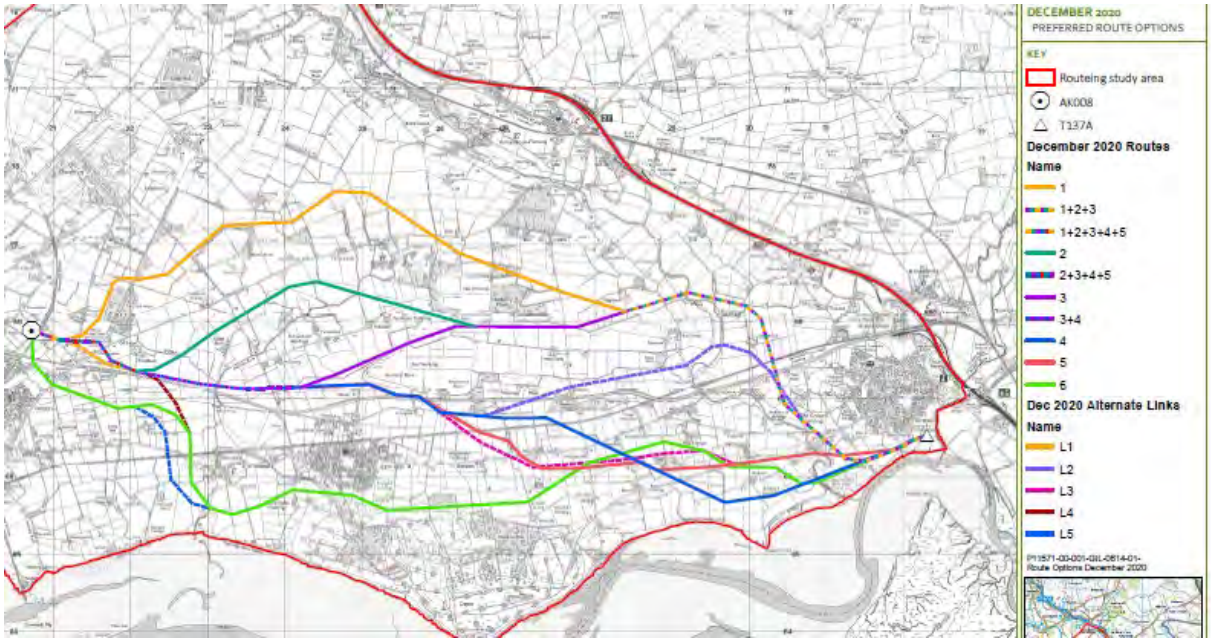
1. INTRODUCTION

Scottish Power Energy Networks (SPEN) proposes to upgrade the electricity transmission network in the Dumfries and Galloway region and Harker region to the north of Cumbria. This requirement has been necessitated through infrastructure approaching 'end of life' and inadequate capacity for future development connections. In order to accommodate the current connected and contracted generation in the Chapelcross / Gretna / Ewe Hill / Faw Side area, it is proposed to uprate AK & T Routes to provide a minimum summer rating of ~227MVA.

This circuit is owned by both SPT and NGET, with SPT owning 17.5km between Chapelcross 132kV substation to tower T137A (this includes the section known as AK Route). NGET own 8.6km from tower T137A to Harker 132kV substation.

It has been advised that the towers on AK Route (AK001 – AK008) remain in good condition and can be reused and hence it is proposed to reconductor this section only. The remaining T Route into Harker in NGET area will be rebuilt as per original scope. Additional two new towers at the Gretna end of T Route to transition to the NGET part will also be included.

An environmental planning and design study has initiated the development on a network of proposed broad route corridors for the new 132kV Overhead line to replace the current T route. SPEN Environmental has provided 6 main corridors for technical review which includes an associated high-level technical design risk appraisal carried out for each individual route to help determine if suitable for further development. Proposed routes as provided below:



Chapelcross – Harker New OHL Wood Pole Proposed Routes

2. ENGINEERING APPRAISAL CONSIDERATIONS

The technical design risk evaluation of a new 132kV overhead line route to be incorporated within the proposed corridors has been assessed through the establishment of a technical appraisal matrix comprising of a risk description, consideration, appraisal and final impact rating (low, medium, high) all reviewed as part of a desktop study including initial technical appraisal and a preliminary design hazard matrix.

A desktop study of the 6 proposed route corridors has been carried out using the following available information and software:

- Digital Terrain Maps (DTM's)
- Ordnance Surveys digital maps
- Google Earth
- Google Maps
- PLS-Cadd
- UMV

Additional engineering aspects below also considered for a new 132kV overhead line route to be incorporated within proposed route technical evaluation:

- Underground Utilities such as Transmission Cables, Gas Pipelines etc.
- Overhead Utilities and Crossings points
- Other OHL transmission route alignments
- Roads / access tracks
- Historical / Future Opencast Mining
- Ground geotechnical characteristics
- Topography / Terrain
- Access constraints (construction and maintenance)
- Flood Risk Zones
- High Altitude Areas
- Routing adjacent to proposed, planned or known Windfarms
- Pollution / Corrosion Zones

Notes:

1) The above elements have been evaluated in conjunction and within the environmental study constraints.

Proposed routing overhead line routes Technical Matrix is contained within Appendix B.

3. RESULTS OF TECHINCAL APPRAISAL

Following a review of the available information and producing the technical appraisal matrix as mentioned, the main points of note from a technical point of view are:

Route lengths:

- Route 1: ~13.7km
- Route 2: ~13.1km
- Route 3: ~12.9km
- Route 4: ~12km
- Route 5: ~11.8km
- Route 6: ~13.4km

Altitude: Within the corridors all the routes are >200m altitude with a max altitude of ~65m along route 1. In Scotland altitudes above 200m AOD are technically, by design, considered to be an extreme environment due to high wind and ice loading. Due to the geographical location it is likely that the altitude will not be a technical issue.

Conductor	Pole Type	Altitude (AOD)	Span Length (m)
UPAS with UPAS OPPC eqv.	S Pole	<200	~100m
		>200	~80m

Topography: All routes provided don't encounter any degree of steep slopes, with all slopes within the routes no greater than 6^0 showing no significant signs of technical difficulties due to steep terrain.

Buildability / Access Constraints: All route options mostly provide available access via surrounding country roads with some additional areas of remote terrain (within fields, etc) requiring access. These, accesses may provide some difficulties.

Proximity to SPEN OHL: Within each of the proposed routes, there are several OHL crossings required that will require a technical solution to overcome. (It is advised early discussion with SPD is carried out to reduce interruptions to all connections where feasible).

Route proposal	Proximity to SPEN OHL
Route 1	Crossing required at existing transmission 275kV tower line AL route at two separate locations. There is also numerous 11kV crossings as well as a new 33kV line being proposed in the area. This route will also require a crossing of the existing T route. New 33kV design currently through route alignment.
Route 2	There are numerous 11kV crossings as well as a new 33kV line being proposed in the area. This route will also require a crossing of the existing T route. New 33kV design currently through route alignment.
Route 3	There are numerous 11kV crossings as well as a new 33kV line being proposed in the area. This route will also require a

	crossing of the existing T route. New 33kV design currently through route alignment.
Route 4	There are numerous 11kV crossings as well as a new 33kV line being proposed in the area. This route will also require a crossing of the existing T route. New 33kV design currently through route alignment.
Route 5	There are numerous 11kV crossings as well as a new 33kV line being proposed in the area. This route will also require a crossing of the existing T route. New 33kV design currently through route alignment.
Route 6	There are numerous 11kV crossings as well as a new 33kV line being proposed in the area. This route will also require a crossing of the existing T route. New 33kV design currently through route alignment.

A new 33kV OHL rebuild from Chapelcross from SPD is proposed within the routing area. This route is subject to change. This route proposal current route will have a technical impact currently on all route options. Communication with SPD will be required to manage both designs to reduce crossings where possible.

Ground Conditions: Within the route proposal catchment area, an area of peat has been identified north east of Eastriggs, located in the middle sections of some routes. This may affect some middle areas of routes 2,3,4 and 5.

Watercourses: Several watercourses noted in proximity or crossing proposed corridor. All routes will require to cross the Kirtle water as well as other burns and channels along the routes.

Road / Railway Crossings: Several main roads (eg: A74), unclassified roads and access tracks lie within proposed corridors requiring to be traversed. All routes will require crossing of a railway line with both road and railway crossings taking cognisance of statutory clearance requirements.

Windfarms: No signs of existing windfarms within the area.

Public Service Utilities: No signs of major HP gas pipelines within the corridors. A utility search would be required to establish extents of all utility services present within routes.

Forestry: Minimal areas of forestry along the routes.

Flooding: Minor sections of proposed routes at the east end of the routes are within potential flood risk areas, proximity to the Channel of River Esk.

Residential / Industrial Areas: Farmstead buildings noted along proposed corridors. Cognisance of statutory clearance requirements to be considered.

Mineworking areas: No areas of previous mining operations evident. Further enquiries with relevant authority to ensure no future opencast and/or mining operations planned within proposed routes.

The main elements of all technical observations noted as having an impact on a new overhead line route have been described above, further detail for each route is listed within the technical matrix.

4. CORRIDOR ROUTE - SUMMATION

From engineering criteria employed for the evaluation of a new overhead line construction within the proposed routes in conjunction with the technical appraisal matrix would suggest that the significant engineering difficulties would likely be the proximity to existing SPEN OHLs. These will likely require a series of mitigating factors to deliver a viable overhead line engineering solution. The technical observations have highlighted key engineering concerns that should be further explored and mitigated as far as practical:

Mitigation factors

- Proposed routes have several potential crossings of the existing 11kV and 33kV overhead lines. Negating or reducing several crossings would be achievable through partial realignment or a utilising route option with fewer crossings.

5. APPENDICES

Appendix A: PREFERRED ROUTE OPTIONS DRAWING: P11571-00-001-GIL-0614-01 Route Options December 2020_ISSUED (004)

Appendix B: TECHNICAL APPRAISAL MATRIX

APPENDIX A

AK008 TO T137A
'AK & T ROUTE REBUILD'

DECEMBER 2020
PREFERRED ROUTE OPTIONS

KEY

- Routeing study area
- AK008
- T137A

December 2020 Routes

Name

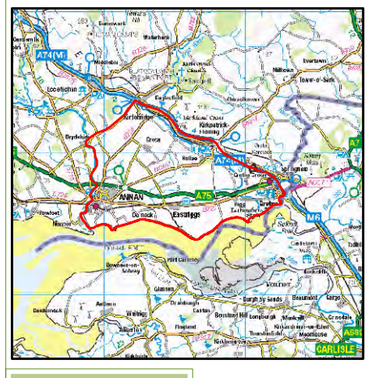
- 1
- 1+2+3
- 1+2+3+4+5
- 2
- 2+3+4+5
- 3
- 3+4
- 4
- 5
- 6

Dec 2020 Alternate Links

Name

- L1
- L2
- L3
- L4
- L5

P11571-00-001-GIL-0614-01-
Route Options December 2020



GILLESPIES

SP ENERGY NETWORKS

D:KC C:XX A:XX P11571-00-001-GIL-0614-01 Route Options December 2020 10/12/2020

APPENDIX B - TECHNICAL FEASIBILITY APPRAISAL

OHL ROUTE CORRIODR (AK & T – ROUTE 1)

RED	High Risk
AMBER	Medium Risk
GREEN	Low Risk

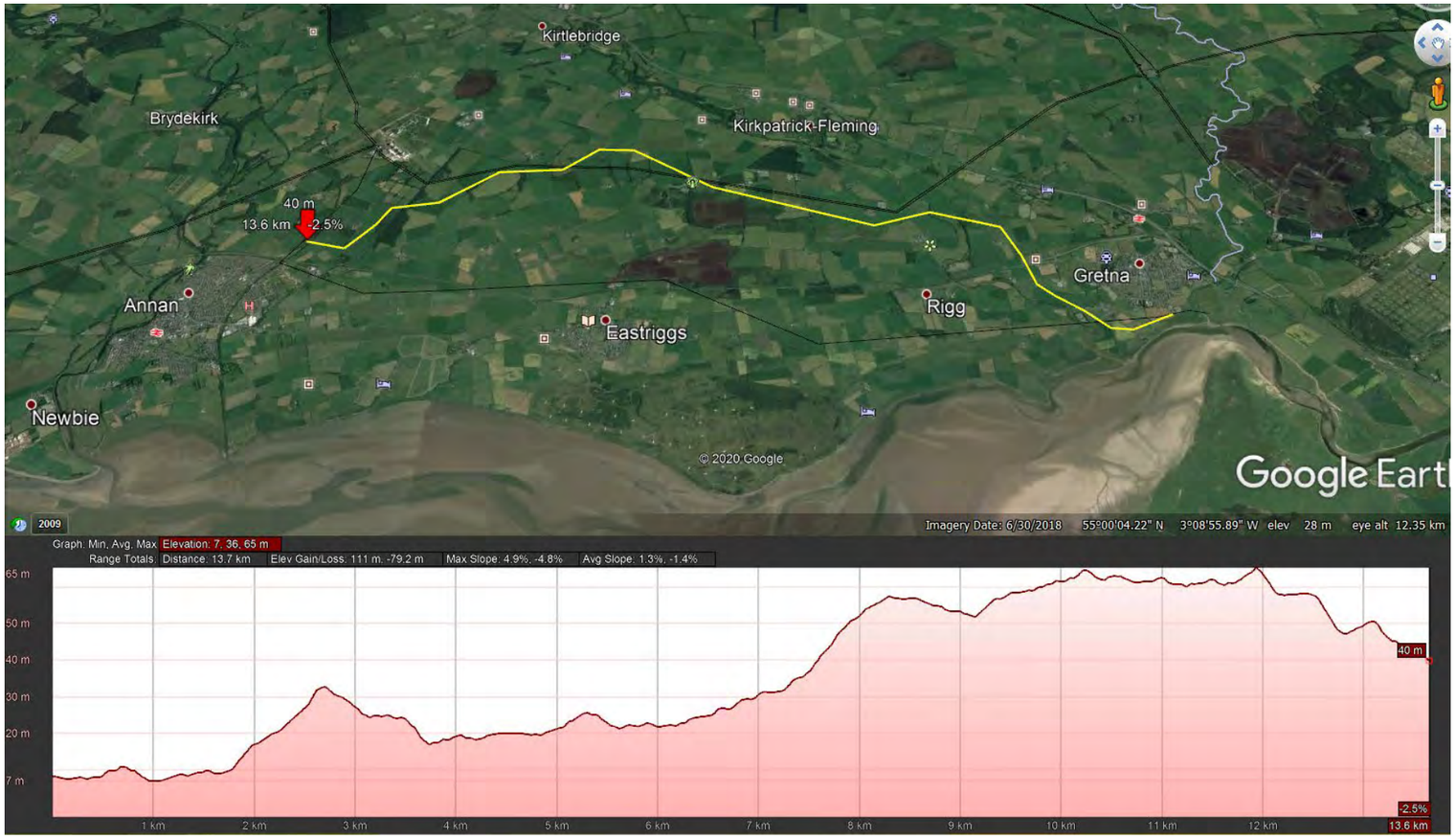
RISK DESCRIPTION	RISK APPRAISAL MEASURES	RISK - IMPACT RATING CATEGORY (R.A.G.)	CONSIDERATION COMMENTS	SOURCE OF REVIEW INFORMATION	CORRIDOR ASSESSMENT	RISK - IMPACT RATING	RISK AREA IDENTIFICATION
Route length		**AMBER**		PLS-Cadd / Google Earth / Drawings	~13.7km	**RED**	
		GREEN				**AMBER**	
		GREEN				**GREEN**	
Altitude - Above Ordnance Datum (AOD)	≥ 500m AOD	**AMBER**	very short spans	PLS-Cadd / Google Earth	all of the corridor <200m highest point of corridor ~65m	**RED**	
	≥ 200m ≤ 500m AOD.	**GREEN**	high structure loads / H poles required / reduced spans			**AMBER**	
	≤ 200m AOD.	**GREEN**	ENA 43-50 can be followed			**GREEN**	
Topography	steep ground slope Longditudinal > 11% Transversal > 22%	**RED**	extensive landscape remodeling for access / helicopter access only	TIN model of corridor using PLS-Cadd / Google Earth	approx. 100% of corridor steep ground slopes < 6º approx. 0% of corridor transversal steep slopes > 11º approx. 0% of corridor transverse steep slopes > 22	**RED**	
	ground slope Longditudinal ≥ 6% ≤ 11% Transversal < 22%	**AMBER**	highly loaded vehicular access difficulties / helicopter access / pole design constraints			**AMBER**	

	ground slope Longditudinal ≤ 6% Transversal < 22%	**GREEN**	no access or build restrictions			**GREEN**	
Buildability Access Constraints	no existing major, minor roads / forestry tracks / access tracks infrastructure / severe terrain	**RED**	challenging landscape with complex access difficulties / areas of environmental important	Google earth / OS maps / TIN model of corridor using PLS-Cadd	approx. 30% of corridor with potential access difficulties Mostly available access roads with some additional access areas of remote terrain (middle of fields etc).	**RED**	
	restrictive roads, forestry access tracks network available / severe terrain	**AMBER**	restrictive vehicular access / helicopter access / limited communications / environmental concerns			**AMBER**	
	suitable roads, forestry access tracks network available	**GREEN**	no access restrictions			**GREEN**	
Crossings to existing OHL transmission and distribution infrastructure	400kV, 275kV OHL crossings / oversails without required clearances	**RED**	diversions / undergrounding not practical	google earth / UMV / ENA 43-8 - OHL clearances	Crossing twice of the existing Transmission AL tower route ~10 11kV OHL crossings one 33kV crossing Crossing of the existing T route at the Gretna end	**RED**	
	132kV, 33kV, 11kV and LV OHL crossings	**AMBER**	diversions / undergrounding / outages			**AMBER**	
	no OHL crossings within corridor limits	**GREEN**	no crossings restrictions			**GREEN**	
Proximity to existing OHL transmission and distribution infrastructure	400kV, 275kV OHL's encroachment within corridor ,falling distance (1 x pole height)	**RED**	construction clearances limits exceeded / double circuit outages / diversions not practical	google earth / UMV / ENA 43-8 - OHL clearances	Proximity to both 132kV T route and 275kV AL route transmission lines.	**RED**	
	132kV, 33kV, 11kV and LV OHL's encroachment within corridor proximity / clearance requirements (1 x pole height)	**AMBER**	undergrounding / diversion / outage requirements			**AMBER**	
	no HV / LV OHL's in the corridor	**GREEN**	no restrictions			**GREEN**	

Mineworking areas (Opencast etc)	routing through known / previous or future planned mineworkings	**RED**	unknown ground conditions / excessive foundation designs / Heavy vehicular loads	environmental consultant data / British Geology Survey website	No areas of previous mining operations evident.	**RED**	
	routing adjacent to known / previous or future planned mineworkings / quarries within a distance of 50m	**AMBER**	known ground conditions / records of extents of mineworkings / special foundations design			**AMBER**	
	routing adjacent to previous or future planned mineworkings outwith recommended minimum distance of 50m	**GREEN**	no restrictions			**GREEN**	
Ground Conditions	contaminated land / organic soils (ie.Peat) / shallow coal deposits / unstable ground (ie. evidence of land slip)	**RED**	Unstable ground conditions / excessive foundation designs / Heavy vehicular loads / environmental concerns	British Geology Survey website http://mapapps2.bgs.ac.uk/ukso/home.html	Potential minor peat in the middle section of the line North of Eastriggs	**RED**	
	poor sub strata soils / flood zone / shallow rock types (ie. Shale) / high water table	**AMBER**	known ground conditions / special foundations design			**AMBER**	
	good sub strata soils	**GREEN**	standard foundations			**GREEN**	
Public Service Utilities (crossings / proximity)	major oil pipe / gas pipe / HV electrical cables	**RED**	no diversion permitted / within utility body statutory proximity limits	google earth / UMV	No noted pipelines within the corridor	**RED**	
	other underground / overground utility services present (excluding transmission OHL's)	**AMBER**	diversion achievable / outwith utility body statutory proximity limits			**AMBER**	

	nominal or no underground / overground utility services present	**GREEN**	no restrictions			**GREEN**	
Watercourse / Catchment Areas Crossings (ie. River, Loch, Reservoir)	large span crossings in excess of ≥ 400m	**RED**	span lengths / clearance limits exceeded	google earth / OS maps / TIN model of corridor using PLS-Cadd (if available) / ENA 43-8 - OHL clearances	Crossing of Kirtle Water, Dornock Burn and proximity to irrigation burns/ channels along the route.	**RED**	
	expansive areas / recreational activities (ie. Fishing, Sailing etc)	**AMBER**	within workable span / clearance limitation requirements			**AMBER**	
	small span crossings / no known activities (ie. Recreational or Work related)	**GREEN**	no significant span and /or clearance restrictions			**GREEN**	
Road / Railway Crossings along corridor	major transport infrastructure crossings (i.e. multiple motorway, road, rail, waterway)	**RED**	span lengths / clearance limitations exceeded	google earth / OS maps / ENA 43-8 - OHL clearances	Multiple country road crossings, crossing of the B6357, A75 and a railway crossing	**RED**	
	railway crossings / roads with high load requirements / level crossings	**AMBER**	within workable span / clearance limitation requirements			**AMBER**	
	minor road / rail crossings only	**GREEN**	no significant span and/or clearance restrictions			**GREEN**	
Windfarms	existing / future windfarm developments corridor encroachment	**RED**	falling distance and rotary wake effects (3 x rotor diameter)	SPEN Wayleaves, Estates data / ENA engineering recommendation L44 'Separation between Wind Turbines and Overhead Lines'	No signs of surrounding windfarms	**RED**	
	existing / future windfarm developments in proximity of corridor limits	**AMBER**	outwith falling distance and rotary wake effects (3 x rotor diameter)			**AMBER**	
	no existing / future windfarms developements within proximity of corridor limits	**GREEN**	no restrictions			**GREEN**	

Residential / Industrial Areas	large residential / heavy industrial areas within corridor limits	**RED**	unachievable clearances / access	google earth / OS maps / TIN model of corridor using PLS-Cadd (if available) / ENA 43-8 - OHL Clearances	Passing south of Gretna and through country side with multiple farm houses and dwellings. Proximity to North of Westlands Country Park.	**RED**	
	residential / industrial areas in proximity of corridor limits	**AMBER**	restrictive clearances / restrictive access			**AMBER**	
	no residential / industrial areas within corridor limits	**GREEN**	no clearances or access restrictions			**GREEN**	
Pollution	route of corridor through area of heavy pollution (corrosion rate 4-5)	**RED**	coastal / heavy industrialised areas (average life of 85µm galv. coating < 50years)	corrosion map : www.galvanizing.org.uk	Corridor traverses coastal rural / rural areas - corrosion rate of 1.5	**RED**	
	route of corridor through area of medium pollution (corrosion rate 2-3)	**AMBER**	Inland urban areas (average life of 85µm galv. Coating 50 < 85years)			**AMBER**	
	route of corridor through area of low pollution (corrosion rate 1)	**GREEN**	Inland rural areas (average life of 85µm galv. Coating >100years)			**GREEN**	


Kirtlebridge
Brydekirk
Kirkpatrick-Fleming
40 m
13.6 km -2.5%
Annan
Gretna
Rigg
Eastriggs
Newbie
© 2020 Google
Google Earth
2009
Imagery Date: 6/30/2018 55°00'04.22" N 3°08'55.89" W elev 28 m eye alt 12.35 km
Graph: Min, Avg, Max Elevation: 7, 36, 65 m
Range Totals: Distance: 13.7 km Elev Gain/Loss: 111 m, -79.2 m Max Slope: 4.9%, -4.8% Avg Slope: 1.3%, -1.4%
65 m
50 m
40 m
30 m
20 m
7 m
40 m
-2.5%
1 km
2 km
3 km
4 km
5 km
6 km
7 km
8 km
9 km
10 km
11 km
12 km
13.6 km

OHL ROUTE CORRIDOR (AK & T – ROUTE 2)

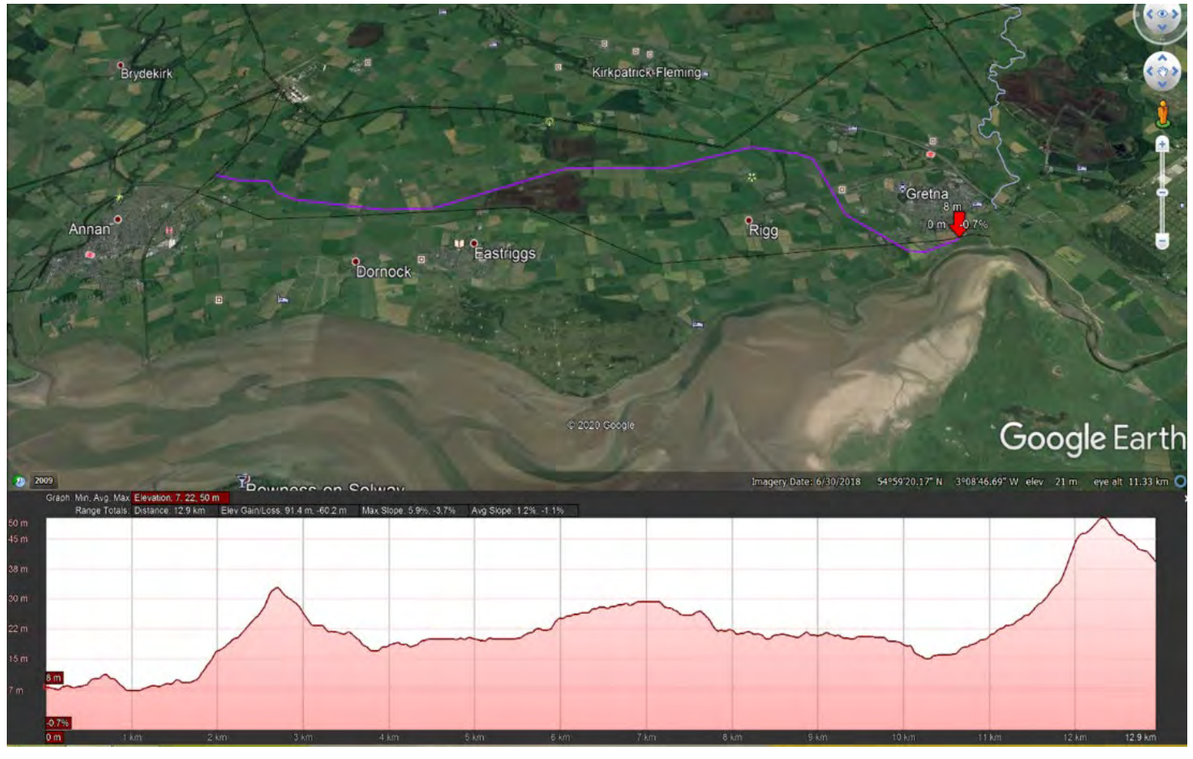
RISK DESCRIPTION	RISK APPRAISAL MEASURES	RISK - IMPACT RATING CATEGORY (R.A.G.)	CONSIDERATION COMMENTS	SOURCE OF REVIEW INFORMATION	CORRIDOR ASSESSMENT	RISK - IMPACT RATING	RISK AREA IDENTIFICATION
Route length		**AMBER**		PLS-Cadd / Google Earth / Drawings	~13.1km	**RED**	
		GREEN				**AMBER**	
		GREEN				**GREEN**	
Altitude - Above Ordnance Datum (AOD)	≥ 500m AOD	**RED**	very short spans	PLS-Cadd / Google Earth	all of the corridor <200m highest point of corridor ~51m	**RED**	
	≥ 200m ≤ 500m AOD.	**AMBER**	high structure loads / H poles required / reduced spans			**AMBER**	
	≤ 200m AOD.	**GREEN**	ENA 43-50 can be followed			**GREEN**	
Topography	steep ground slope Longditudinal > 11% Transversal > 22%	**RED**	extensive landscape remodeling for access / helicopter access only	TIN model of corridor using PLS-Cadd	approx. 100% of corridor steep ground slopes < 6º approx. 0% of corridor transversal steep slopes > 11º approx. 0% of corridor transverse steep slopes > 22	**RED**	
	ground slope Longditudinal ≥ 6% ≤ 11% Transversal < 22%	**AMBER**	highly loaded vehicular access difficulties / helicopter access / pole design constraints			**AMBER**	
	ground slope Longditudinal ≤ 6% Transversal < 22%	**GREEN**	no access or build restrictions			**GREEN**	
Buildability Access Constraints	no existing major, minor roads / forestry tracks	**RED**	challenging landscape with complex access difficulties / areas	Google earth / OS maps / TIN model of corridor using PLS-Cadd	approx. 30% of corridor with potentail access	**RED**	

	/ access tracks infrastructure / severe terrain		of environmental important		difficulties Mostly available access roads with some additional access areas of remote terrain (middle of fields etc).		
	restrictive roads, forestry access tracks network available / severe terrain	**AMBER**	restrictive vehicular access / helicopter access / limited communications / environmental concerns			**AMBER**	
	suitable roads, forestry access tracks network available	**GREEN**	no access restrictions			**GREEN**	
Crossings to existing OHL transmission and distribution infrastructure	400kV, 275kV OHL crossings / oversails without required clearances	**RED**	diversions / undergrounding not practical	google earth / UMV / ENA 43-8 - OHL clearances	~12 11kV OHL crossings Two existing 33kV crossing Crossing of T route at Gretna end	**RED**	
	132kV, 33kV, 11kV and LV OHL crossings	**AMBER**	diversions / undergrounding / outages			**AMBER**	
	no OHL crossings within corridor limits	**GREEN**	no crossings restrictions			**GREEN**	
Proximity to existing OHL transmission and distribution infrastructure	400kV, 275kV OHL's encroachment within corridor ,falling distance (1 x pole height)	**RED**	construction clearances limits exceeded / double circuit outages / diversions not practical	google earth / UMV / ENA 43-8 - OHL clearances	Proximity to the existing T route at the Gretna end of the route.	**RED**	
	132kV, 33kV, 11kV and LV OHL's encroachment within corridor proximity / clearance requirements (1 x pole height)	**AMBER**	undergrounding / diversion / outage requirements			**AMBER**	
	no HV / LV OHL's in the corridor	**GREEN**	no restrictions			**GREEN**	
Mineworking areas (Opencast etc)	routing through known / previous or future planned mineworkings	**RED**	unknown ground conditions / excessive foundation designs / Heavy vehicular loads	environmental consultant data / British Geology Survey website	No areas of previous mining operations evident.	**RED**	

	routing adjacent to known / previous or future planned mineworkings / quarries within a distance of 50m	**AMBER**	known ground conditions / records of extents of mineworkings / special foundations design			**AMBER**	
	routing adjacent to previous or future planned mineworkings outwith recommended minimum distance of 50m	**GREEN**	no restrictions			**GREEN**	
Ground Conditions	contaminated land / organic soils (ie.Peat) / shallow coal deposits / unstable ground (ie. evidence of land slip)	**RED**	Unstable ground conditions / excessive foundation designs / Heavy vehicular loads / environmental concerns	British Geology Survey website	Areas of peat north of Eastriggs, this route looks to pass through the middle of the two large patches of peat.	**RED**	
	poor sub strata soils / flood zone / shallow rock types (ie. Shale) / high water table	**AMBER**	known ground conditions / special foundations design			**AMBER**	
	good sub strata soils	**GREEN**	standard foundations			**GREEN**	
Public Service Utilities (crossings / proximity)	major oil pipe / gas pipe / HV electrical cables	**RED**	no diversion permitted / within utility body statutory proximity limits	google earth / UMV	No noted pipelines within the corridor.	**RED**	
	other underground / overground utility services present (excluding transmission OHL's)	**AMBER**	diversion achievable / outwith utility body statutory proximity limits			**AMBER**	
	nominal or no underground / overground utility services present	**GREEN**	no restrictions			**GREEN**	

Watercourse / Catchment Areas Crossings (ie. River, Loch, Reservoir)	large span crossings in excess of ≥ 400m	**RED**	span lengths / clearance limits exceeded	google earth / OS maps / TIN model of corridor using PLS-Cadd (if available) / ENA 43-8 - OHL clearances	Crossing of Kirtle Water, Dornock Burn and proximity to irrigation burns/ channels along the route.	**RED**	
	expansive areas / recreational activities (ie. Fishing, Sailing etc)	**AMBER**	within workable span / clearance limitation requirements			**AMBER**	
	small span crossings / no known activities (ie. Recreational or Work related)	**GREEN**	no significant span and /or clearance restrictions			**GREEN**	
Road / Railway Crossings along corridor	major transport infrastructure crossings (i.e. multiple motorway, road, rail, waterway)	**RED**	span lengths / clearance limitations exceeded	google earth / OS maps / ENA 43-8 - OHL clearances	Multiple country road crossings, crossing of the B6357, A75 and a railway crossing	**RED**	
	railway crossings / roads with high load requirements / level crossings	**AMBER**	within workable span / clearance limitation requirements			**AMBER**	
	minor road / rail crossings only	**GREEN**	no significant span and/or clearance restrictions			**GREEN**	
Windfarms	existing / future windfarm developments corridor encroachment	**RED**	falling distance and rotary wake effects (3 x rotor diameter)	SPEN Wayleaves, Estates data / ENA engineering recommendation L44 'Separation between Wind Turbines and Overhead Lines'	No signs of surrounding windfarms	**RED**	
	existing / future windfarm developments in proximity of corridor limits	**AMBER**	outwith falling distance and rotary wake effects (3 x rotor diameter)			**AMBER**	
	no existing / future windfarms developments within proximity of corridor limits	**GREEN**	no restrictions			**GREEN**	

Residential / Industrial Areas	large residential / heavy industrial areas within corridor limits	**RED**	unachievable clearances / access	google earth / OS maps / TIN model of corridor using PLS-Cadd (if available) / ENA 43-8 - OHL Clearances	Passing south of Gretna and through country side with multiple farm houses and dwellings. Proximity to the south of Westlands Country Park.	**RED**	
	residential / industrial areas in proximity of corridor limits	**AMBER**	restrictive clearances / restrictive access			**AMBER**	
	no residential / industrial areas within corridor limits	**GREEN**	no clearance or access restrictions			**GREEN**	
Pollution	route of corridor through area of heavy pollution (corrosion rate 4-5)	**RED**	coastal / heavy industrialised areas (average life of 85µm galv. coating < 50years)	corrosion map : www.galvanizing.org.uk	Corridor traverses coastal rural / rural areas - corrosion rate of 1.5	**RED**	
	route of corridor through area of medium pollution (corrosion rate 2-3)	**AMBER**	Inland urban areas (average life of 85µm galv. Coating 50 < 85years)			**AMBER**	
	route of corridor through area of low pollution (corrosion rate 1)	**GREEN**	Inland rural areas (average life of 85µm galv. Coating >100years)			**GREEN**	


Brydekirk
Kirkpatrick Fleming
Annan
Dornock
Eastriggs
Rigg
Gretna
8 m
0 m
-0.7%
© 2020 Google
Google Earth
2009
Imagery Date: 6/30/2018 54°59'20.17" N 3°08'46.69" W elev 21 m eye alt 11.33 km
Graph: Min, Avg, Max Elevation: 7, 22, 50 m
Range Totals: Distance: 12.9 km Elev Gain/Loss: 91.4 m, -60.2 m Max Slope: 5.9%, -3.7% Avg Slope: 1.2%, -1.1%
50 m
45 m
38 m
30 m
22 m
15 m
7 m
8 m
-0.7%
0 m
1 km
2 km
3 km
4 km
5 km
6 km
7 km
8 km
9 km
10 km
11 km
12 km
12.9 km

OHL ROUTE CORRIDOR (ROUTE 3)

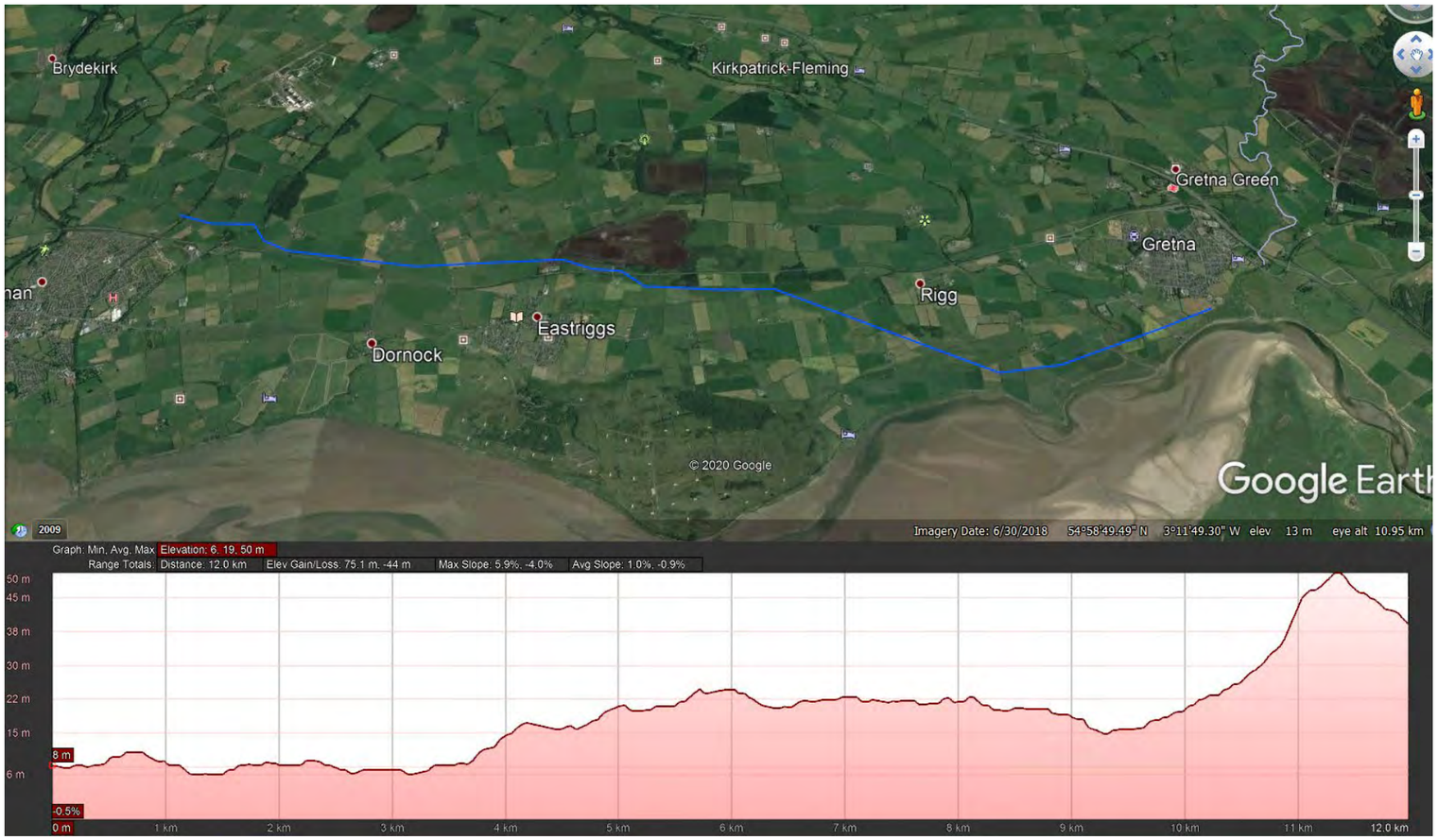
RISK DESCRIPTION	RISK APPRAISAL MEASURES	RISK - IMPACT RATING CATEGORY (R.A.G.)	CONSIDERATION COMMENTS	SOURCE OF REVIEW INFORMATION	CORRIDOR ASSESSMENT	RISK - IMPACT RATING	RISK AREA IDENTIFICATION
Route length		**AMBER**		PLS-Cadd / Google Earth / Drawings	~12.9km	**RED**	
		GREEN				**AMBER**	
		GREEN				**GREEN**	
Altitude - Above Ordnance Datum (AOD)	≥ 500m AOD	**RED**	very short spans	PLS-Cadd / Google Earth	all of the corridor <200m highest point of corridor ~50m	**RED**	
	≥ 200m ≤ 500m AOD.	**AMBER**	high structure loads / H poles required / reduced spans			**AMBER**	
	≤ 200m AOD.	**GREEN**	ENA 43-50 can be followed			**GREEN**	
Topography	steep ground slope Longditudinal > 11% Transversal > 22%	**RED**	extensive landscape remodelling for access / helicopter access only	TIN model of corridor using PLS-Cadd	approx. 100% of corridor steep ground slopes < 6º approx. 0% of corridor transversal steep slopes > 11º approx. 0% of corridor transverse steep slopes > 22	**RED**	
	ground slope Longditudinal ≥ 6% ≤ 11% Transversal < 22%	**AMBER**	highly loaded vehicular access difficulties / helicopter access / pole design constraints			**AMBER**	
	ground slope Longditudinal ≤ 6% Transversal < 22%	**GREEN**	no access or build restrictions			**GREEN**	
Buildability Access Constraints	no existing major, minor roads / forestry tracks / access tracks	**RED**	challenging landscape with complex access difficulties / areas of environmental important	Google earth / OS maps / TIN model of corridor using PLS-Cadd	approx. 30% of corridor with potential access difficulties	**RED**	

	infrastructure / severe terrain				Mostly available access roads with some additional access areas of remote terrain (middle of fields etc).		
	restrictive roads, forestry access tracks network available / severe terrain	**AMBER**	restrictive vehicular access / helicopter access / limited communications / environmental concerns			**AMBER**	
	suitable roads, forestry access tracks network available	**GREEN**	no access restrictions			**GREEN**	
Crossings to existing OHL transmission and distribution infrastructure	400kV, 275kV OHL crossings / oversails without required clearances	**RED**	diversions / undergrounding not practical	google earth / UMV / ENA 43-8 - OHL clearances	~12 11kV OHL crossings two existing 33kV crossing Crossing of T route at Gretna end	**RED**	
	132kV, 33kV, 11kV and LV OHL crossings	**AMBER**	diversions / undergrounding / outages			**AMBER**	
	no OHL crossings within corridor limits	**GREEN**	no crossings restrictions			**GREEN**	
Proximity to existing OHL transmission and distribution infrastructure	400kV, 275kV OHL's encroachment within corridor ,falling distance (1 x pole height)	**RED**	construction clearances limits exceeded / double circuit outages / diversions not practical	google earth / UMV / ENA 43-8 - OHL clearances	Proximity to the existing T route , existing 11 kV and 33kV OHLs	**RED**	
	132kV, 33kV, 11kV and LV OHL's encroachment within corridor proximity / clearance requirements (1 x pole height)	**AMBER**	undergrounding / diversion / outage requirements			**AMBER**	
	no HV / LV OHL's in the corridor	**GREEN**	no restrictions			**GREEN**	
Mineworking areas (Opencast etc)	routing through known / previous or future planned mineworkings	**RED**	unknown ground conditions / excessive foundation designs / Heavy vehicular loads	environmental consultant data / British Geology Survey website	No areas of previous mining operations evident.	**RED**	

	routing adjacent to known / previous or future planned mineworkings / quarries within a distance of 50m	**AMBER**	known ground conditions / records of extents of mineworkings / special foundations design			**AMBER**	
	routing adjacent to previous or future planned mineworkings outwith recommended minimum distance of 50m	**GREEN**	no restrictions			**GREEN**	
Ground Conditions	contaminated land / organic soils (ie.Peat) / shallow coal deposits / unstable ground (ie. evidence of land slip)	**RED**	Unstable ground conditions / excessive foundation designs / Heavy vehicular loads / environmental concerns	British Geology Survey website	Areas of peat north of Eastrigg, could affect parts of the middle section of the route.	**RED**	
	poor sub strata soils / flood zone / shallow rock types (ie. Shale) / high water table	**AMBER**	known ground conditions / special foundations design			**AMBER**	
	good sub strata soils	**GREEN**	standard foundations			**GREEN**	
Public Service Utilities (crossings / proximity)	major oil pipe / gas pipe / HV electrical cables	**RED**	no diversion permitted / within utility body statutory proximity limits	google earth / UMV	No noted pipelines within the corridor.	**RED**	
	other underground / overground utility services present (excluding transmission OHL's)	**AMBER**	diversion achievable / outwith utility body statutory proximity limits			**AMBER**	
	nominal or no underground / overground utility services present	**GREEN**	no restrictions			**GREEN**	

Watercourse / Catchment Areas Crossings (ie. River, Loch, Reservoir)	large span crossings in excess of ≥ 400m	**RED**	span lengths / clearance limits exceeded	google earth / OS maps / TIN model of corridor using PLS-Cadd (if available) / ENA 43-8 - OHL clearances	Crossing of Kirtle Water, Dornock Burn and proximity to irrigation burns/ channels along the route.	**RED**	
	expansive areas / recreational activities (ie. Fishing, Sailing etc)	**AMBER**	within workable span / clearance limitation requirements			**AMBER**	
	small span crossings / no known activities (ie. Recreational or Work related)	**GREEN**	no significant span and /or clearance restrictions			**GREEN**	
Road / Railway Crossings along corridor	major transport infrastructure crossings (i.e. multiple motorway, road, rail, waterway)	**RED**	span lengths / clearance limitations exceeded	google earth / OS maps / ENA 43-8 - OHL clearances	Multiple country road crossings, crossing of the B6357, A75 and a railway crossing	**RED**	
	railway crossings / roads with high load requirements / level crossings	**AMBER**	within workable span / clearance limitation requirements			**AMBER**	
	minor road / rail crossings only	**GREEN**	no significant span and/or clearance restrictions			**GREEN**	
Windfarms	existing / future windfarm developments corridor encroachment	**RED**	falling distance and rotary wake effects (3 x rotor diameter)	SPEN Wayleaves, Estates data / ENA engineering recommendation L44 'Separation between Wind Turbines and Overhead Lines'	No signs of surrounding windfarms	**RED**	
	existing / future windfarm developments in proximity of corridor limits	**AMBER**	outwith falling distance and rotary wake effects (3 x rotor diameter)			**AMBER**	
	no existing / future windfarms developements within proximity of corridor limits	**GREEN**	no restrictions			**GREEN**	
Residential / Industrial Areas	large residential / heavy industrial areas within corridor limits	**RED**	unachievable clearances / access	google earth / OS maps / TIN model of corridor using PLS-Cadd (if available) / ENA 43-8 - OHL Clearances	Passing south of Gretna and through country side with multiple farm houses	**RED**	

	residential / industrial areas in proximity of corridor limits	**AMBER**	restrictive clearances / restrictive access		and dwellings. Proximity to the south of Westlands Country Park.	**AMBER**	
	no residential / industrial areas within corridor limits	**GREEN**	no clearance or access restrictions			**GREEN**	
Pollution	route of corridor through area of heavy pollution (corrosion rate 4-5)	**RED**	coastal / heavy industrialised areas (average life of 85µm galv. coating < 50years)	corrosion map : www.galvanizing.org.uk	Corridor traverses coastal rural / rural areas - corrosion rate of 1.5	**RED**	
	route of corridor through area of medium pollution (corrosion rate 2-3)	**AMBER**	Inland urban areas (average life of 85µm galv. Coating 50 < 85years)			**AMBER**	
	route of corridor through area of low pollution (corrosion rate 1)	**GREEN**	Inland rural areas (average life of 85µm galv. Coating >100years)			**GREEN**	


Brydekirk
Kirkpatrick-Fleming
Gretna Green
Gretna
Rigg
Eastriggs
Dornock
© 2020 Google
Google Earth
2009
Imagery Date: 6/30/2018 54°58'49.49" N 3°11'49.30" W elev 13 m eye alt 10.95 km
Graph: Min, Avg, Max Elevation: 6, 19, 50 m
Range Totals: Distance: 12.0 km Elev Gain/Loss: 75.1 m, -44 m Max Slope: 5.9%, -4.0% Avg Slope: 1.0%, -0.9%
50 m
45 m
38 m
30 m
22 m
15 m
8 m
6 m
-0.5%
0 m
1 km
2 km
3 km
4 km
5 km
6 km
7 km
8 km
9 km
10 km
11 km
12.0 km

OHL ROUTE CORRIDOR (ROUTE 4)

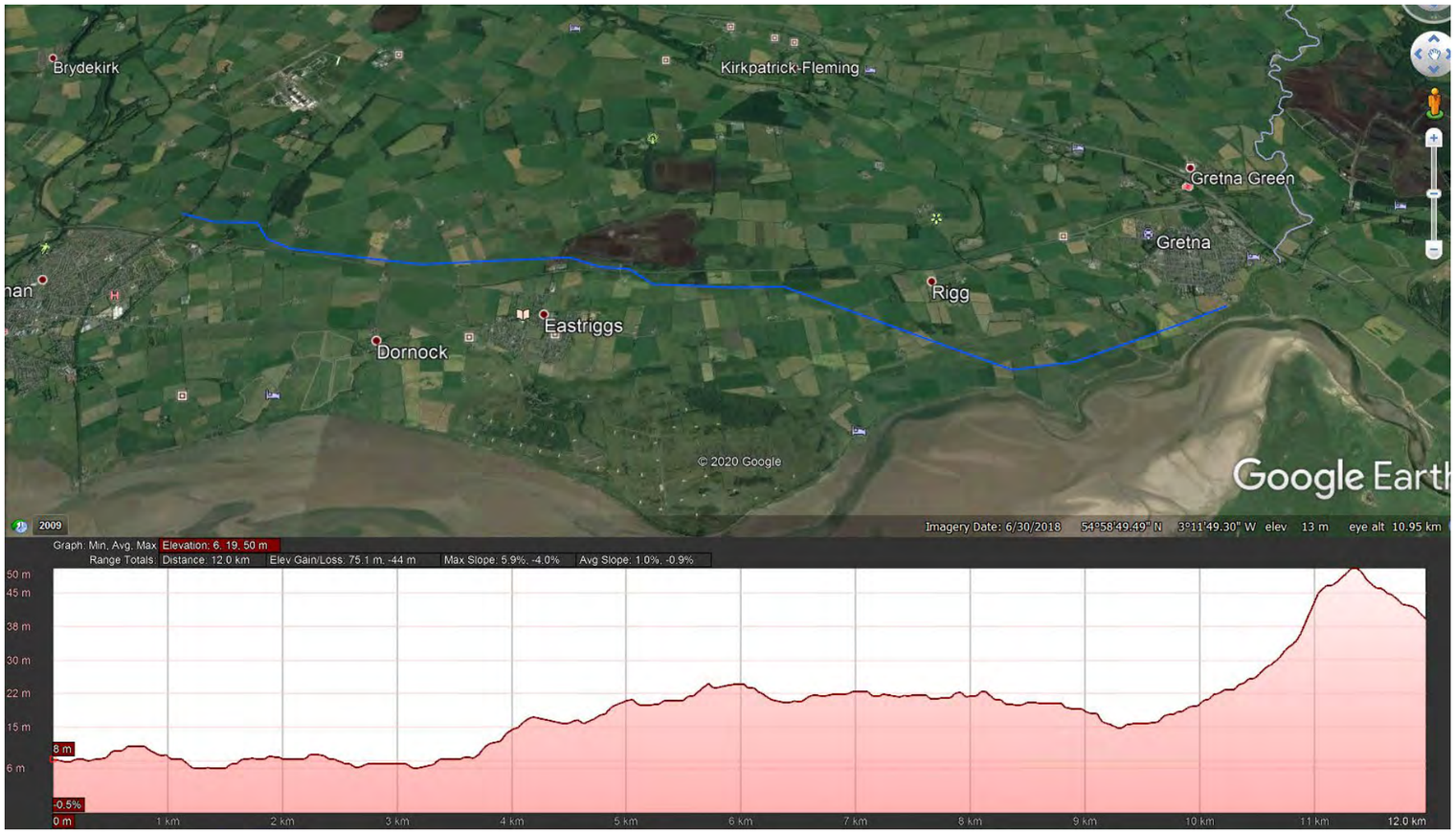
RISK DESCRIPTION	RISK APPRAISAL MEASURES	RISK - IMPACT RATING CATEGORY (R.A.G.)	CONSIDERATION COMMENTS	SOURCE OF REVIEW INFORMATION	CORRIDOR ASSESSMENT	RISK - IMPACT RATING	RISK AREA IDENTIFICATION
Route length		**AMBER**		PLS-Cadd / Google Earth / Drawings	~12km	**RED**	
		GREEN				**AMBER**	
		GREEN				**GREEN**	
Altitude - Above Ordnance Datum (AOD)	≥ 500m AOD	**RED**	very short spans	PLS-Cadd / Google Earth	all of the corridor <200m highest point of corridor ~50m	**RED**	
	≥ 200m ≤ 500m AOD.	**AMBER**	high structure loads / H poles required / reduced spans			**AMBER**	
	≤ 200m AOD.	**GREEN**	ENA 43-50 can be followed			**GREEN**	
Topography	steep ground slope Longditudinal > 11% Transversal > 22%	**RED**	extensive landscape remodeling for access / helicopter access only	TIN model of corridor using PLS-Cadd	approx. 100% of corridor steep ground slopes < 6º approx. 0% of corridor transversal steep slopes > 11º approx. 0% of corridor transverse steep slopes > 22	**RED**	
	ground slope Longditudinal ≥ 6% ≤ 11% Transversal < 22%	**AMBER**	highly loaded vehicular access difficulties / helicopter access / pole design constraints			**AMBER**	
	ground slope Longditudinal ≤ 6% Transversal < 22%	**GREEN**	no access or build restrictions			**GREEN**	
Buildability Access Constraints	no existing major, minor roads / forestry tracks / access tracks	**RED**	challenging landscape with complex access difficulties / areas of environmental important	Google earth / OS maps / TIN model of corridor using PLS-Cadd	approx. 30% of corridor with potential access difficulties	**RED**	

	infrastructure / severe terrain				Mostly available access roads with some additional access areas of remote terrain (middle of fields etc).		
	restrictive roads, forestry access tracks network available / severe terrain	**AMBER**	restrictive vehicular access / helicopter access / limited communications / environmental concerns			**AMBER**	
	suitable roads, forestry access tracks network available	**GREEN**	no access restrictions			**GREEN**	
Crossings to existing OHL transmission and distribution infrastructure	400kV, 275kV OHL crossings / oversails without required clearances	**RED**	diversions / undergrounding not practical	google earth / UMV / ENA 43-8 - OHL clearances	~9 11kV OHL crossings	**RED**	
	132kV, 33kV, 11kV and LV OHL crossings	**AMBER**	diversions / undergrounding / outages		one existing 33kV crossing Crossing of T route at Gretna end	**AMBER**	
	no OHL crossings within corridor limits	**GREEN**	no crossings restrictions			**GREEN**	
Proximity to existing OHL transmission and distribution infrastructure	400kV, 275kV OHL's encroachment within corridor ,falling distance (1 x pole height)	**RED**	construction clearances limits exceeded / double circuit outages / diversions not practical	google earth / UMV / ENA 43-8 - OHL clearances	Proximity to the existing T route , existing 11 kV and 33kV OHLs	**RED**	
	132kV, 33kV, 11kV and LV OHL's encroachment within corridor proximity / clearance requirements (1 x pole height)	**AMBER**	undergrounding / diversion / outage requirements			**AMBER**	
	no HV / LV OHL's in the corridor	**GREEN**	no restrictions			**GREEN**	
Mineworking areas (Opencast etc)	routing through known / previous or future planned mineworkings	**RED**	unknown ground conditions / excessive foundation designs / Heavy vehicular loads	environmental consultant data / British Geology Survey website	No areas of previous mining operations evident.	**RED**	

	routing adjacent to known / previous or future planned mineworkings / quarries within a distance of 50m	**AMBER**	known ground conditions / records of extents of mineworkings / special foundations design			**AMBER**	
	routing adjacent to previous or future planned mineworkings outwith recommended minimum distance of 50m	**GREEN**	no restrictions			**GREEN**	
Ground Conditions	contaminated land / organic soils (ie.Peat) / shallow coal deposits / unstable ground (ie. evidence of land slip)	**RED**	Unstable ground conditions / excessive foundation designs / Heavy vehicular loads / environmental concerns	British Geology Survey website	Areas of peat north of Eastrigg, could affect parts of the middle section of the route.	**RED**	
	poor sub strata soils / flood zone / shallow rock types (ie. Shale) / high water table	**AMBER**	known ground conditions / special foundations design			**AMBER**	
	good sub strata soils	**GREEN**	standard foundations			**GREEN**	
Public Service Utilities (crossings / proximity)	major oil pipe / gas pipe / HV electrical cables	**RED**	no diversion permitted / within utility body statutory proximity limits	google earth / UMV	No noted pipelines within the corridor.	**RED**	
	other underground / overground utility services present (excluding transmission OHL's)	**AMBER**	diversion achievable / outwith utility body statutory proximity limits			**AMBER**	
	nominal or no underground / overground utility services present	**GREEN**	no restrictions			**GREEN**	

Watercourse / Catchment Areas Crossings (ie. River, Loch, Reservoir)	large span crossings in excess of ≥ 400m	**RED**	span lengths / clearance limits exceeded	google earth / OS maps / TIN model of corridor using PLS-Cadd (if available) / ENA 43-8 - OHL clearances	Crossing of Kirtle Water, Dornock Burn and proximity to irrigation burns/ channels along the route.	**RED**	
	expansive areas / recreational activities (ie. Fishing, Sailing etc)	**AMBER**	within workable span / clearance limitation requirements			**AMBER**	
	small span crossings / no known activities (ie. Recreational or Work related)	**GREEN**	no significant span and /or clearance restrictions			**GREEN**	
Road / Railway Crossings along corridor	major transport infrastructure crossings (i.e. multiple motorway, road, rail, waterway)	**RED**	span lengths / clearance limitations exceeded	google earth / OS maps / ENA 43-8 - OHL clearances	Multiple country road crossings, crossing of the B6357, A75 and a railway crossing	**RED**	
	railway crossings / roads with high load requirements / level crossings	**AMBER**	within workable span / clearance limitation requirements			**AMBER**	
	minor road / rail crossings only	**GREEN**	no significant span and/or clearance restrictions			**GREEN**	
Windfarms	existing / future windfarm developments corridor encroachment	**RED**	falling distance and rotary wake effects (3 x rotor diameter)	SPEN Wayleaves, Estates data / ENA engineering recommendation L44 'Separation between Wind Turbines and Overhead Lines'	No signs of surrounding windfarms	**RED**	
	existing / future windfarm developments in proximity of corridor limits	**AMBER**	outwith falling distance and rotary wake effects (3 x rotor diameter)			**AMBER**	
	no existing / future windfarms developements within proximity of corridor limits	**GREEN**	no restrictions			**GREEN**	
Residential / Industrial Areas	large residential / heavy industrial areas within corridor limits	**RED**	unachievable clearances / access	google earth / OS maps / TIN model of corridor using PLS-Cadd (if available) / ENA 43-8 - OHL Clearances	Passing south of Gretna and through country side with multiple	**RED**	

	residential / industrial areas in proximity of corridor limits	**AMBER**	restrictive clearances / restrictive access		farm houses and dwellings.	**AMBER**	
	no residential / industrial areas within corridor limits	**GREEN**	no clearance or access restrictions			**GREEN**	
Pollution	route of corridor through area of heavy pollution (corrosion rate 4-5)	**RED**	coastal / heavy industrialised areas (average life of 85µm galv. coating < 50years)	corrosion map : www.galvanizing.org.uk	Corridor traverses coastal rural / rural areas - corrosion rate of 1.5	**RED**	
	route of corridor through area of medium pollution (corrosion rate 2-3)	**AMBER**	Inland urban areas (average life of 85µm galv. Coating 50 < 85years)			**AMBER**	
	route of corridor through area of low pollution (corrosion rate 1)	**GREEN**	Inland rural areas (average life of 85µm galv. Coating >100years)			**GREEN**	


Brydekirk
Kirkpatrick-Fleming
Gretna Green
Gretna
Rigg
Eastriggs
Dornock
© 2020 Google
Google Earth
2009
Imagery Date: 6/30/2018 54°58'49.49" N 3°11'49.30" W elev 13 m eye alt 10.95 km
Graph: Min, Avg, Max Elevation: 6, 19, 50 m
Range Totals: Distance: 12.0 km Elev Gain/Loss: 75.1 m, -44 m Max Slope: 5.9%, -4.0% Avg Slope: 1.0%, -0.9%
50 m
45 m
38 m
30 m
22 m
15 m
8 m
6 m
-0.5%
0 m
1 km
2 km
3 km
4 km
5 km
6 km
7 km
8 km
9 km
10 km
11 km
12.0 km

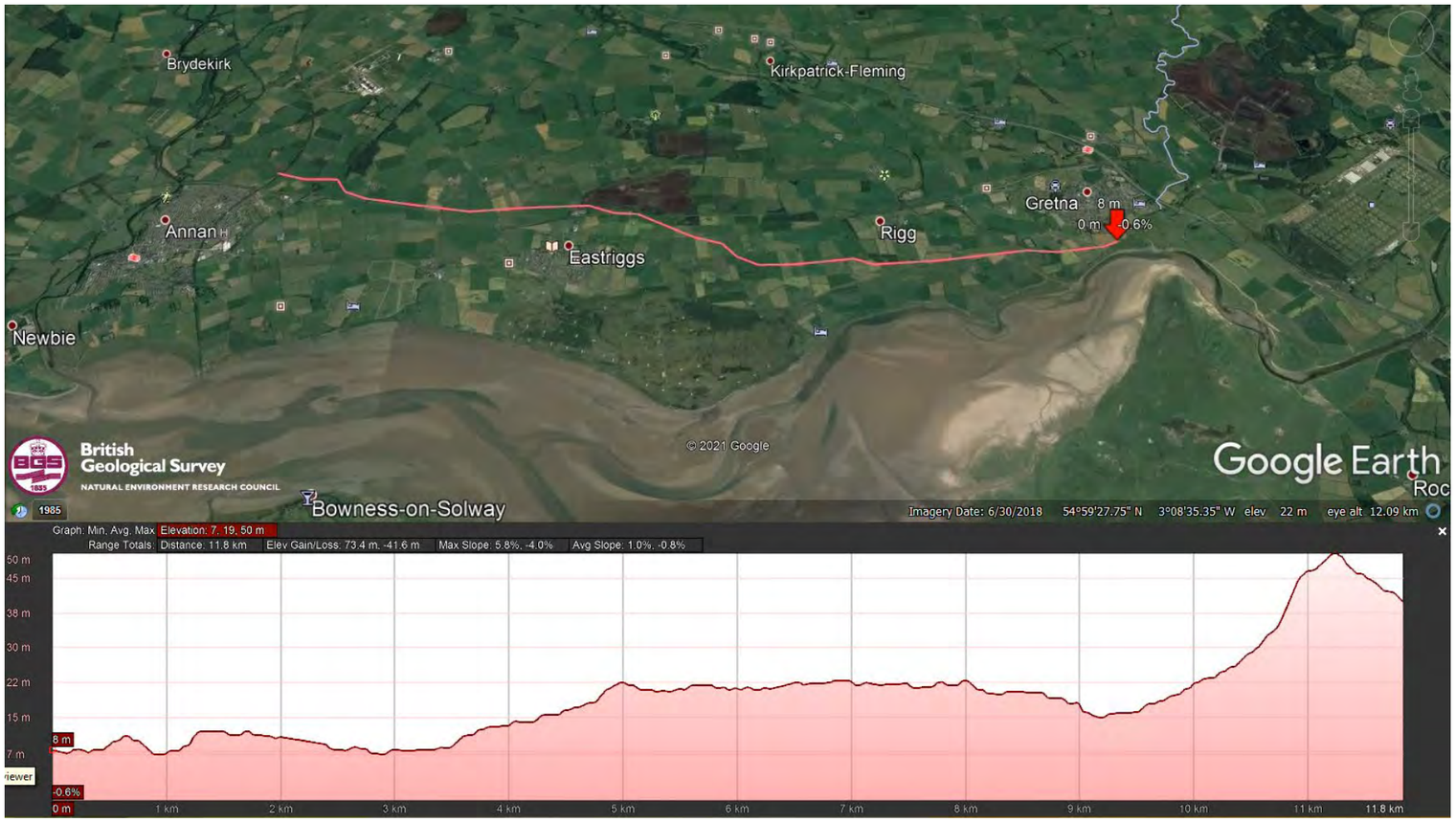
OHL ROUTE CORRIDOR (ROUTE 5)

RISK DESCRIPTION	RISK APPRAISAL MEASURES	RISK - IMPACT RATING CATEGORY (R.A.G.)	CONSIDERATION COMMENTS	SOURCE OF REVIEW INFORMATION	CORRIDOR ASSESSMENT	RISK - IMPACT RATING	RISK AREA IDENTIFICATION
Route length		**AMBER**		PLS-Cadd / Google Earth / Drawings	~11.8km	**RED**	
		GREEN				**AMBER**	
		GREEN				**GREEN**	
Altitude - Above Ordnance Datum (AOD)	≥ 500m AOD	**RED**	very short spans	PLS-Cadd / Google Earth	all of the corridor <200m highest point of corridor ~50m	**RED**	
	≥ 200m ≤ 500m AOD.	**AMBER**	high structure loads / H poles required / reduced spans			**AMBER**	
	≤ 200m AOD.	**GREEN**	ENA 43-50 can be followed			**GREEN**	
Topography	steep ground slope Longditudinal > 11% Transversal > 22%	**RED**	extensive landscape remodelling for access / helicopter access only	TIN model of corridor using PLS-Cadd	approx. 100% of corridor steep ground slopes < 6º approx. 0% of corridor transversal steep slopes > 11º approx. 0% of corridor transverse steep slopes > 22	**RED**	
	ground slope Longditudinal ≥ 6% ≤ 11% Transversal < 22%	**AMBER**	highly loaded vehicular access difficulties / helicopter access / pole design constraints			**AMBER**	
	ground slope Longditudinal ≤ 6% Transversal < 22%	**GREEN**	no access or build restrictions			**GREEN**	
Buildability Access Constraints	no existing major, minor roads / forestry tracks / access tracks infrastructure / severe terrain	**RED**	challenging landscape with complex access difficulties / areas of environmental important	Google earth / OS maps / TIN model of corridor using PLS-Cadd	approx. 30% of corridor with potential access difficulties Mostly available	**RED**	

	restrictive roads, forestry access tracks network available / severe terrain	**AMBER**	restrictive vehicular access / helicopter access / limited communications / environmental concerns		access roads with some additional access areas of remote terrain (middle of fields etc).	**AMBER**	
	suitable roads, forestry access tracks network available	**GREEN**	no access restrictions			**GREEN**	
Crossings to existing OHL transmission and distribution infrastructure	400kV, 275kV OHL crossings / oversails without required clearances	**RED**	diversions / undergrounding not practical	google earth / UMV / ENA 43-8 - OHL clearances	~11 11kV OHL crossings one existing 33kV crossing Crossing of T route 5 times	**RED**	
	132kV, 33kV, 11kV and LV OHL crossings	**AMBER**	diversions / undergrounding / outages			**AMBER**	
	no OHL crossings within corridor limits	**GREEN**	no crossings restrictions			**GREEN**	
Proximity to existing OHL transmission and distribution infrastructure	400kV, 275kV OHL's encroachment within corridor ,falling distance (1 x pole height)	**RED**	construction clearances limits exceeded / double circuit outages / diversions not practical	google earth / UMV / ENA 43-8 - OHL clearances	Proximity to the existing T route , existing 11 kV and 33kV OHLs	**RED**	
	132kV, 33kV, 11kV and LV OHL's encroachment within corridor proximity / clearance requirements (1 x pole height)	**AMBER**	undergrounding / diversion / outage requirements			**AMBER**	
	no HV / LV OHL's in the corridor	**GREEN**	no restrictions			**GREEN**	
Mineworking areas (Opencast etc)	routing through known / previous or future planned mineworkings	**RED**	unknown ground conditions / excessive foundation designs / Heavy vehicular loads	environmental consultant data / British Geology Survey website	No areas of previous mining operations evident.	**RED**	
	routing adjacent to known / previous or future planned mineworkings / quarries within a distance of 50m	**AMBER**	known ground conditions / records of extents of mineworkings / special foundations design			**AMBER**	
	routing adjacent to previous or future planned mineworkings outwith recommended minimum distance of 50m	**GREEN**	no restrictions			**GREEN**	

Ground Conditions	contaminated land / organic soils (ie.Peat) / shallow coal deposits / unstable ground (ie. evidence of land slip)	**RED**	Unstable ground conditions / excessive foundation designs / Heavy vehicular loads / environmental concerns	British Geology Survey website	Areas of peat north of Eastrigg, could affect parts of the middle section of the route.	**RED**	
	poor sub strata soils / flood zone / shallow rock types (ie. Shale) / high water table	**AMBER**	known ground conditions / special foundations design			**AMBER**	
	good sub strata soils	**GREEN**	standard foundations			**GREEN**	
Public Service Utilities (crossings / proximity)	major oil pipe / gas pipe / HV electrical cables	**RED**	no diversion permitted / within utility body statutory proximity limits	google earth / UMV	No noted pipelines within the corridor.	**RED**	
	other underground / overground utility services present (excluding transmission OHL's)	**AMBER**	diversion achievable / outwith utility body statutory proximity limits			**AMBER**	
	nominal or no underground / overground utility services present	**GREEN**	no restrictions			**GREEN**	
Watercourse / Catchment Areas Crossings (ie. River, Loch, Reservoir)	large span crossings in excess of ≥ 400m	**RED**	span lengths / clearance limits exceeded	google earth / OS maps / TIN model of corridor using PLS-Cadd (if available) / ENA 43-8 - OHL clearances	Crossing of Kirtle Water, Dornock Burn and proximity to irrigation burns/ channels along the route.	**RED**	
	expansive areas / recreational activities (ie. Fishing, Sailing etc)	**AMBER**	within workable span / clearance limitation requirements			**AMBER**	
	small span crossings / no known activities (ie. Recreational or Work related)	**GREEN**	no significant span and /or clearance restrictions			**GREEN**	
Road / Railway Crossings along corridor	major transport infrastructure crossings (i.e. multiple motorway, road, rail, waterway)	**RED**	span lengths / clearance limitations exceeded	google earth / OS maps / ENA 43-8 - OHL clearances	Multiple country road crossings, crossing of the B6357, A75 and a railway crossing	**RED**	
	railway crossings / roads with high load requirements / level crossings	**AMBER**	within workable span / clearance limitation requirements			**AMBER**	
	minor road / rail crossings only	**GREEN**	no significant span and/or clearance restrictions			**GREEN**	

Windfarms	existing / future windfarm developments corridor encroachment	**RED**	falling distance and rotary wake effects (3 x rotor diameter)	SPEN Wayleaves, Estates data / ENA engineering recommendation L44 'Separation between Wind Turbines and Overhead Lines'	No signs of surrounding windfarms	**RED**	
	existing / future windfarm developments in proximity of corridor limits	**AMBER**	outwith falling distance and rotary wake effects (3 x rotor diameter)			**AMBER**	
	no existing / future windfarms developments within proximity of corridor limits	**GREEN**	no restrictions			**GREEN**	
Residential / Industrial Areas	large residential / heavy industrial areas within corridor limits	**RED**	unacheivable clearances / access	google earth / OS maps / TIN model of corridor using PLS-Cadd (if available) / ENA 43-8 - OHL Clearances	Passing south of Gretna and through country side with multiple farm houses and dwellings.	**RED**	
	residential / industrial areas in proximity of corridor limits	**AMBER**	restrictive clearances / restrictive access			**AMBER**	
	no residential / industrial areas within corridor limits	**GREEN**	no clearances or access restrictions			**GREEN**	
Pollution	route of corridor through area of heavy pollution (corrosion rate 4-5)	**RED**	coastal / heavy industrialised areas (average life of 85µm galv. coating < 50years)	corrosion map : www.galvanizing.org.uk	Corridor traverses coastal rural / rural areas - corrosion rate of 1.5	**RED**	
	route of corridor through area of medium pollution (corrosion rate 2-3)	**AMBER**	Inland urban areas (average life of 85µm galv. Coating 50 < 85years)			**AMBER**	
	route of corridor through area of low pollution (corrosion rate 1)	**GREEN**	Inland rural areas (average life of 85µm galv. Coating >100years)			**GREEN**	


Brydekirk
Kirkpatrick-Fleming
Gretna
8 m
0 m
-0.6%
Annan
Rigg
Eastriggs
Newbie
British Geological Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL
© 2021 Google
Google Earth
Bowness-on-Solway
Imagery Date: 6/30/2018 54°59'27.75" N 3°08'35.35" W elev 22 m eye alt 12.09 km
Graph: Min, Avg, Max Elevation: 7, 19, 50 m
Range Totals: Distance: 11.8 km Elev Gain/Loss: 73.4 m, -41.6 m Max Slope: 5.8%, -4.0% Avg Slope: 1.0%, -0.8%
50 m
45 m
38 m
30 m
22 m
15 m
7 m
8 m
-0.6%
0 m
1 km
2 km
3 km
4 km
5 km
6 km
7 km
8 km
9 km
10 km
11 km
11.8 km

OHL ROUTE CORRIDOR (ROUTE 6)

RISK DESCRIPTION	RISK APPRAISAL MEASURES	RISK - IMPACT RATING CATEGORY (R.A.G.)	CONSIDERATION COMMENTS	SOURCE OF REVIEW INFORMATION	CORRIDOR ASSESSMENT	RISK - IMPACT RATING	RISK AREA IDENTIFICATION
Route length		**AMBER**		PLS-Cadd / Google Earth / Drawings	~13.4km	**RED**	
		GREEN				**AMBER**	
		GREEN				**GREEN**	
Altitude - Above Ordnance Datum (AOD)	≥ 500m AOD	**RED**	very short spans	PLS-Cadd / Google Earth	all of the corridor <200m highest point of corridor ~45m	**RED**	
	≥ 200m ≤ 500m AOD.	**AMBER**	high structure loads / H poles required / reduced spans			**AMBER**	
	≤ 200m AOD.	**GREEN**	ENA 43-50 can be followed			**GREEN**	
Topography	steep ground slope Longditudinal > 11% Transversal > 22%	**RED**	extensive landscape remodelling for access / helicopter access only	TIN model of corridor using PLS-Cadd	approx. 100% of corridor steep ground slopes < 6º approx. 0% of corridor transversal steep slopes > 11º approx. 0% of corridor transverse steep slopes > 22	**RED**	
	ground slope Longditudinal ≥ 6% ≤ 11% Transversal < 22%	**AMBER**	highly loaded vehicular access difficulties / helicopter access / pole design constraints			**AMBER**	
	ground slope Longditudinal ≤ 6% Transversal < 22%	**GREEN**	no access or build restrictions			**GREEN**	
Buildability Access Constraints	no existing major, minor roads / forestry tracks / access tracks infrastructure / severe terrain	**RED**	challenging landscape with complex access difficulties / areas of environmental important	Google earth / OS maps / TIN model of corridor using PLS-Cadd	approx. 30% of corridor with potential access difficulties Mostly	**RED**	

	restrictive roads, forestry access tracks network available / severe terrain	**AMBER**	restrictive vehicular access / helicopter access / limited communications / environmental concerns		available access roads with some additional access areas of remote terrain (middle of fields etc).	**AMBER**	
	suitable roads, forestry access tracks network available	**GREEN**	no access restrictions			**GREEN**	
Crossings to existing OHL transmission and distribution infrastructure	400kV, 275kV OHL crossings / oversails without required clearances	**RED**	diversions / undergrounding not practical	google earth / UMV / ENA 43-8 - OHL clearances	~14 11kV OHL crossings one 33kV OHL crossing Crossing of T route 3 times	**RED**	
	132kV, 33kV, 11kV and LV OHL crossings	**AMBER**	diversions / undergrounding / outages			**AMBER**	
	no OHL crossings within corridor limits	**GREEN**	no crossings restrictions			**GREEN**	
Proximity to existing OHL transmission and distribution infrastructure	400kV, 275kV OHL's encroachment within corridor ,falling distance (1 x pole height)	**RED**	construction clearances limits exceeded / double circuit outages / diversions not practical	google earth / UMV / ENA 43-8 - OHL clearances	Proximity to the existing T route , existing 11 kV and 33kV OHLs	**RED**	
	132kV, 33kV, 11kV and LV OHL's encroachment within corridor proximity / clearance requirements (1 x pole height)	**AMBER**	undergrounding / diversion / outage requirements			**AMBER**	
	no HV / LV OHL's in the corridor	**GREEN**	no restrictions			**GREEN**	
Mineworking areas (Opencast etc)	routing through known / previous or future planned mineworkings	**RED**	unknown ground conditions / excessive foundation designs / Heavy vehicular loads	environmental consultant data / British Geology Survey website	No areas of previous mining operations evident.	**RED**	
	routing adjacent to known / previous or future planned mineworkings / quarries within	**AMBER**	known ground conditions / records of extents of mineworkings / special foundations design			**AMBER**	

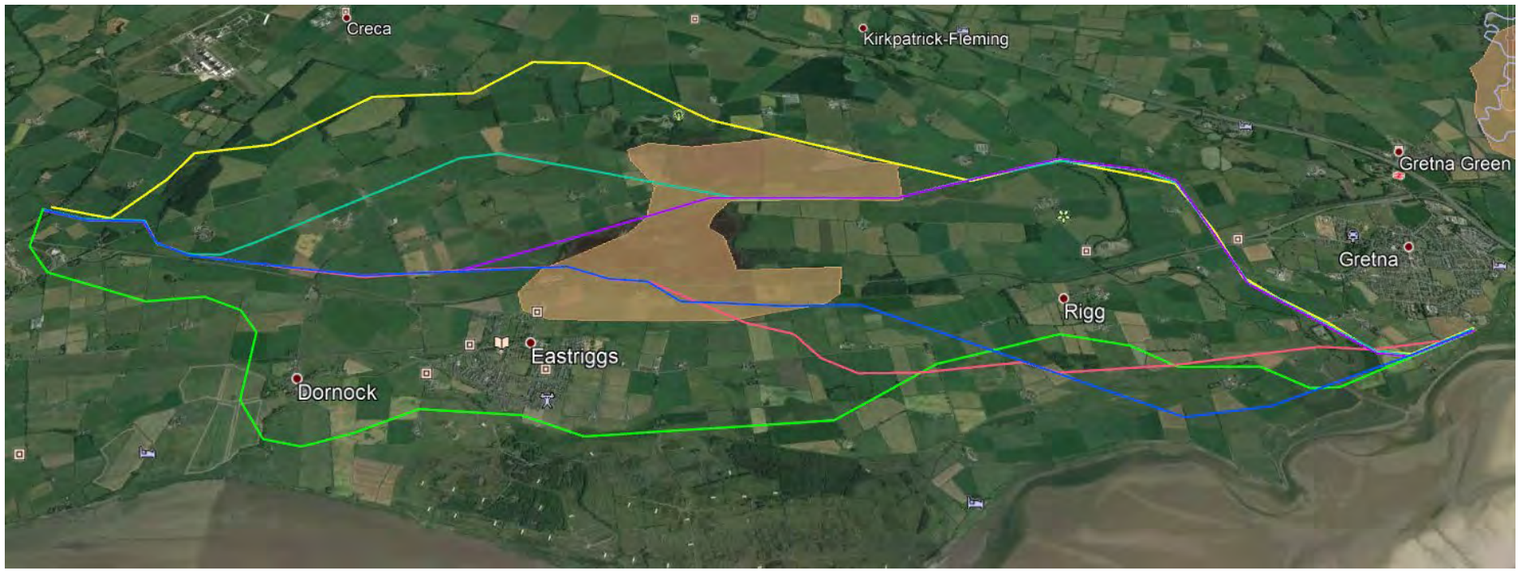
	a distance of 50m						
	routing adjacent to previous or future planned mineworkings outwith recommended minimum distance of 50m	**GREEN**	no restrictions			**GREEN**	
Ground Conditions	contaminated land / organic soils (ie.Peat) / shallow coal deposits / unstable ground (ie. evidence of land slip)	**RED**	Unstable ground conditions / excessive foundation designs / Heavy vehicular loads / environmental concerns	British Geology Survey website	No areas of peat seen along the route.	**RED**	
	poor sub strata soils / flood zone / shallow rock types (ie. Shale) / high water table	**AMBER**	known ground conditions / special foundations design			**AMBER**	
	good sub strata soils	**GREEN**	standard foundations			**GREEN**	
Public Service Utilities (crossings / proximity)	major oil pipe / gas pipe / HV electrical cables	**RED**	no diversion permitted / within utility body statutory proximity limits	google earth / UMV	No noted pipelines within the corridor.	**RED**	
	other underground / overground utility services present (excluding transmission OHL's)	**AMBER**	diversion achievable / outwith utility body statutory proximity limits			**AMBER**	
	nominal or no underground / overground utility services present	**GREEN**	no restrictions			**GREEN**	
Watercourse / Catchment Areas Crossings (ie.	large span crossings in excess of ≥ 400m	**RED**	span lengths / clearance limits exceeded	google earth / OS maps / TIN model of corridor using PLS-Cadd (if available) /	Crossing of Kirtle Water, Birkhill Burn, Saugh-hope	**RED**	

River, Loch, Reservoir)	expansive areas / recreational activities (ie. Fishing, Sailing etc)	**AMBER**	within workable span / clearance limitation requirements	ENA 43-8 - OHL clearances	Burn and proximity to irrigation burns/ channels along the route.	**AMBER**	
	small span crossings / no known activities (ie. Recreational or Work related)	**GREEN**	no significant span and /or clearance restrictions			**GREEN**	
Road / Railway Crossings along corridor	major transport infrastructure crossings (i.e. multiple motorway, road, rail, waterway)	**RED**	span lengths / clearance limitations exceeded	google earth / OS maps / ENA 43-8 - OHL clearances	Multiple country road crossings, crossing of the A75, B6357, B721 and a railway crossing	**RED**	
	railway crossings / roads with high load requirements / level crossings	**AMBER**	within workable span / clearance limitation requirements			**AMBER**	
	minor road / rail crossings only	**GREEN**	no significant span and/or clearance restrictions			**GREEN**	
Windfarms	existing / future windfarm developments corridor encroachment	**RED**	falling distance and rotary wake effects (3 x rotor diameter)	SPEN Wayleaves, Estates data / ENA engineering recommendation L44 'Separation between Wind Turbines and Overhead Lines'	No signs of surrounding windfarms	**RED**	
	existing / future windfarm developments in proximity of corridor limits	**AMBER**	outwith falling distance and rotary wake effects (3 x rotor diameter)			**AMBER**	
	no existing / future windfarms developments within proximity of corridor limits	**GREEN**	no restrictions			**GREEN**	
Residential / Industrial Areas	large residential / heavy industrial areas within corridor limits	**RED**	unachievable clearances / access	google earth / OS maps / TIN model of corridor using PLS-Cadd (if available) / ENA 43-8 - OHL Clearances	Passing south of Gretna and through country side with multiple farm houses and dwellings. Passing south of Dornock and Eastriggs	**RED**	
	residential / industrial areas in proximity of corridor limits	**AMBER**	restrictive clearances / restrictive access			**AMBER**	

	no residential / industrial areas within corridor limits	**GREEN**	no clearances or access restrictions		residential areas	**GREEN**	
Pollution	route of corridor through area of heavy pollution (corrosion rate 4-5)	**RED**	coastal / heavy industrialised areas (average life of 85µm galv. coating < 50years)	corrosion map : www.galvanizing.org.uk	Corridor traverses coastal rural / rural areas - corrosion rate of 1.5	**RED**	
	route of corridor through area of medium pollution (corrosion rate 2-3)	**AMBER**	Inland urban areas (average life of 85µm galv. Coating 50 < 85years)			**AMBER**	
	route of corridor through area of low pollution (corrosion rate 1)	**GREEN**	Inland rural areas (average life of 85µm galv. Coating >100years)			**GREEN**	


Brydekirk
Kirkpatrick-Fleming
Annan
Eastriggs
Rigg
Gretna
Newbie
Bowness-on-Solway
© 2021 Google
British Geological Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL
Google Earth
1985
Imagery Date: 6/30/2018 54°59'21.28" N 3°08'37.30" W elev 21 m eye alt 11.82 km
Graph: Min, Avg, Max Elevation: 6, 17, 45 m
Range Totals: Distance: 13.4 km Elev Gain/Loss: 84.8 m, -54.2 m Max Slope: 4.0%, -3.1% Avg Slope: 1.0%, -0.9%
45 m
38 m
30 m
22 m
15 m
6 m
9 m
0.1%
1 km
2 km
2.47 km
3 km
4 km
5 km
6 km
7 km
8 km
9 km
10 km
11 km
12 km
13.4 km

INFO (PEAT)


Creca
Kirkpatrick-Fleming
Gretna Green
Gretna
Rigg
Eastriggs
Dornock