



**SP ENERGY
NETWORKS**

**The Glenmuckloch 33kV Connection Project
Routeing & Consultation Report**

SP Energy Networks

January 2019

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Preface

This Routeing and Consultation Report has been prepared on behalf of SP Energy Networks (SPEN). It relates to the identification and appraisal of route options for a new 33kV overhead line to connect from the consented Glenmuckloch Wind Farm (WF) substation to the existing 132kV substation at Glenglass, Dumfries and Galloway ("the Glenmuckloch 33kV Connection Project").

This document presents the methodology and findings of the routeing study which has been undertaken, to inform consultation being undertaken on the Glenmuckloch 33kV Connection Project.

The Routeing and Consultation Report is available to download free of charge from:

www.spenergynetworks.co.uk/pages/community_consultation

The Routeing and Consultation Report will also be available in hard copy from the following locations from the 19th of February 2019:

Dumfries and Galloway Planning Department, Kirkbank House. English Street, Dumfries DG1 2HS

Kirkconnel Library DG Customer Services, Kirkconnel, Greystone Avenue, Kelloholm DG4 6RA

Sanquhar Library, DG Customer Services, Sanquhar, 100 High Street, Sanquhar DG4 6DZ

Representations to this consultation should be received no later than midnight on 26th March 2019. Submissions can be made to the following:

By email to glenmucklochprojectmanager@spenergynetworks.co.uk

By post to Glenmuckloch Projects Project Manager,

SPEN Environmental Planning,
3rd Floor Ochil House,
10 Technology Avenue, Blantyre,
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1 Introduction

Purpose of this Report

- 1.1 This document has been prepared by LUC on behalf of SP Energy Networks (SPEN). It relates to the identification and appraisal of route options for a new 33kiloVolt (kV) overhead line (OHL) supported on wood poles, from the consented Glenmuckloch windfarm (WF) substation to the existing 132kV substation at Glenglass (hereafter referred to as the Glenmuckloch 33kV Connection Project). The location of the Glenmuckloch 33kV Connection Project is shown on **Figure 1.1**.
- 1.2 This report presents the methodology adopted for routeing the new OHL, culminating with the description of the 'preferred route' for the OHL connection. This report also sets out the process for the consultation which will be undertaken. This process is designed to gather feedback from stakeholders, including the public, to inform the subsequent stages of the Glenmuckloch 33kV Connection Project.

The Need for the Glenmuckloch 33kV Connection Project

- 1.3 The Glenmuckloch WF is located in Dumfries and Galloway and is situated adjacent to the Glenmuckloch opencast coal mine and the consented Glenmuckloch Pumped-Storage Hydro (PSH) scheme. The Glenmuckloch WF application was approved by Dumfries and Galloway Council in 2016¹ and the consented scheme, with the capacity to produce up to 25.6MW of generation, is proposed by Buccleuch Estates subsidiary Glenmuckloch Renewable Energy Limited. SPEN are proposing to construct a new 33kV OHL grid connection which is required to connect the consented Glenmuckloch WF to the existing grid network via the 132kV substation at Glenglass.
- 1.4 SPEN has a legal duty under the Electricity Act 1989 to provide, develop and maintain a technically feasible and economically viable transmission and distribution system grid connections to new electricity generating developments. SPEN also has a duty to provide a connection for new generation (i.e. the consented Glenmuckloch WF) to the wider electricity transmission network.
- 1.5 Findings of the SPEN network design study confirmed the Glenmuckloch WF project would require connection to the existing Glenglass substation via a 33kV OHL supported on wood poles.
- 1.6 Further details of the components of the Glenmuckloch 33kV Connection Project are provided in **Chapter 2**.

Other Current Connections

- 1.7 In addition to the Glenmuckloch 33kV OHL connecting from the Glenmuckloch WF to Glenglass substation, SPEN is also currently undertaking routeing studies to connect three other renewable generating developments to the existing Glenglass substation within a shared study area. These comprise:
 - The Glenmuckloch 132kV Connection Project;
 - The Sanquhar II Wind Farm Connection Project²;
 - Sandy Knowe Wind Farm 132kV OHL.

¹ Consent issued in 2017

² As of preparation of this report, the routeing study for this connection has not commenced and does therefore not influence the routeing of the Glenmuckloch 33kV connection.

- 1.8 Routeing of each OHL connection is being progressed independently of the others, however as they share a study area, cognisance will be undertaken of the emerging preferred routes for each connection to seek to minimise the wirescape and other cumulative environmental effects, whilst meeting the technical requirements of each connection. Further information is provided in **Chapter 3**.

Future Connections

- 1.9 There are two additional connections which SPEN are aware will be required within the study area in future, for which routeing work has not yet begun. These comprise the connections from:
- Twentyshillig Hill Wind Farm: consented in 2015, connection being progressed by the windfarm developer to a location approximately 100m from Glenglass Substation via 33kV underground cable;
 - Lethans Wind Farm: the wind farm was consented in 2018 and the developer is in consultation with SPEN in relation to a connection agreement.
- 1.10 These additional wind farm connections are not yet progressed to an extent that they can be formally considered as part of, or influence, this routeing appraisal.

SPEN's Statutory and Licence Duties

- 1.11 As a transmission licence holder for southern Scotland, SPEN³ is required under Section 9(2) of the Electricity Act 1989 to:
- develop and maintain an efficient, co-ordinated and economical system of electricity transmission; and
 - facilitate competition in the supply and generation of electricity.
- 1.12 SPEN is required in terms of its statutory and licence obligations to provide for new electricity generators wishing to connect to the transmission system in its licence area. SPEN is also obliged to make its transmission system available for these purposes and to ensure that the system is fit for purpose through appropriate reinforcements to accommodate the contracted capacity.
- 1.13 Schedule 9 of the Electricity Act 1989 imposes a further statutory duty on SPEN to take account of the following factors in formulating proposals for the installation of overhead transmission lines:
- "(a) to have regard to the desirability of preserving natural beauty, of conserving flora, fauna and geological or physiographical features or special interest and of protecting sites, buildings and objects of architectural, historic or archaeological interest; and*
- (b) to do what it reasonably can to mitigate any effects which the proposals would have on the natural beauty of the countryside or any such flora, fauna, features, sites, buildings or objects."*
- 1.14 SPEN's 'Schedule 9 Statement' sets out how it will meet the duty placed upon it under Schedule 9. The Statement also refers to the application of best practice methods to assess the environmental impacts of proposals and to identify appropriate mitigation measures.
- 1.15 As a result of the above, SPEN is required to identify electrical connections that meet the technical requirements of the electricity system, which are economically viable, and cause on balance, the least disturbance to both the environment and the people who live, work and enjoy recreation within it.

³ SPEN owns and operates the electricity transmission and distribution networks in central and southern Scotland through its wholly-owned subsidiaries SP Transmission plc (SPT) and SP Distribution plc (SPD). SP Transmission plc is the holder of a transmission licence. The references below to SPEN in the context of statutory and licence duties and the application for section 37 consent below should be read as applying to SP Transmission plc

The Development and Consenting Process

- 1.16 The Project comprises three key phases:
- Phase One: Routeing and Consultation.
 - Phase Two: Environmental Appraisal.
 - Phase Three: Application for Consent.

Phase One: Routeing and Consultation

- 1.17 This report relates to Phase One, which comprises a review of environmental, technical and economic considerations and the application of established step-by-step routeing principles to identify and appraise potential route options to establish a 'preferred' route for the OHL.
- 1.18 SPEN is committed to ongoing consultation with interested parties, including statutory and non-statutory consultees and local communities. Whilst there is no statutory requirement to consult during the early routeing stages, SPEN nonetheless considers it good practice to introduce consultation at this stage.
- 1.19 Responses to the consultation process will be evaluated and the 'proposed' route confirmed for progression to the next stage.

Phase Two: Environmental Appraisal

- 1.20 The Glenmuckloch 33kV Connection Project could be considered an EIA development under Schedule 2 of The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017⁴. However, due to its nature, size and location with regard to the selection criteria for screening schedule 2 development presented as Schedule 3 (Regulation 7(2)(a) of the Regulations, an Environmental Impact Assessment may not be required.
- 1.21 Following confirmation of the Proposed Route, to determine whether the Glenmuckloch 33kV Connection Project is EIA Development, and therefore an EIA is required, SPEN will submit a request for a screening opinion to the Scottish Ministers in accordance with Regulation 8(1) of the Regulations. The request will be accompanied by the relevant information in accordance with Regulation 8(2) and 8(3) and will take into account the selection criteria in Schedule 3 and the findings of the work undertaken to date as part of the routeing process.
- 1.22 Should the Scottish Ministers determine that the Glenmuckloch 33kV Connection Project is not EIA development and that subsequent provisions of the EIA Regulations do not apply, SPEN will undertake an environmental appraisal in relation to key topics (to be agreed with consultees) and prepare a supporting Environmental Report to accompany the S37 application⁵.

Phase Three: Application for Consent

- 1.23 Following completion of the Environmental Report, SPEN will be applying to Scottish Ministers for consent under Section 37 of the Electricity Act 1989 ('the Electricity Act'), as amended, to install, and keep installed, the proposed OHL identified above. In conjunction with the Section 37 application, SPEN will apply for deemed planning permission for the OHL under Section 57(2) of the Town and Country Planning (Scotland) Act 1997, as amended. The Environmental Report (or Environmental Impact Assessment Report if the Ministers deem the project to be EIA development) will accompany the application.

⁴ Hereafter referred to as the Regulations.

⁵ <https://www.gov.scot/binaries/content/documents/govscot/publications/advice-and-guidance/2018/12/energy-consents-overhead-line-applications-without-an-eia-report/documents/s37-applications-without-an-eia-report-guidance/s37-applications-without-an-eia-report-guidance/govscot%3Adocument?forceDownload=true>

Stakeholder Engagement

- 1.24 Stakeholder engagement, including public involvement, is an important component of the Scottish planning and consenting system. Legislation and government guidance aim to ensure that the public, local communities, statutory and other consultees and interested parties have an opportunity to have their views taken into account throughout the planning process.
- 1.25 Striking the right balance can be challenging, and in seeking to achieve this SPEN recognises the importance of consulting effectively on proposals and of being transparent about the decisions reached. SPEN is keen to engage with key stakeholders including local communities and others who may have an interest in the Glenmuckloch 33kV Connection Project. This engagement process begins at the early stages of development of a project, and continues into construction once consent has been granted.
- 1.26 SPEN's approach to stakeholder engagement for major electrical infrastructure projects is outlined in Chapter 5 of the document 'Major Infrastructure Projects: Approach to Routeing and Environmental Impact Assessment'⁶. SPEN aims to ensure effective, inclusive and meaningful engagement with the public, local communities statutory and other consultees and interested parties through three key engagement steps:
- Information gathering to inform the routeing stage;
 - Consultation on specific requirements;
 - Obtaining feedback on the preferred route; and
 - The Environmental Appraisal stage.
- 1.27 In addition, and as noted above, SPEN as a holder of a transmission licence, has a duty under section 38 and Schedule 9 of the Electricity Act 1989, when formulating proposals for new electricity lines and other transmission development, to have regard to the effect of work on communities, in addition to the desirability of the preservation of amenity, the natural environment, cultural heritage, landscape and visual quality.

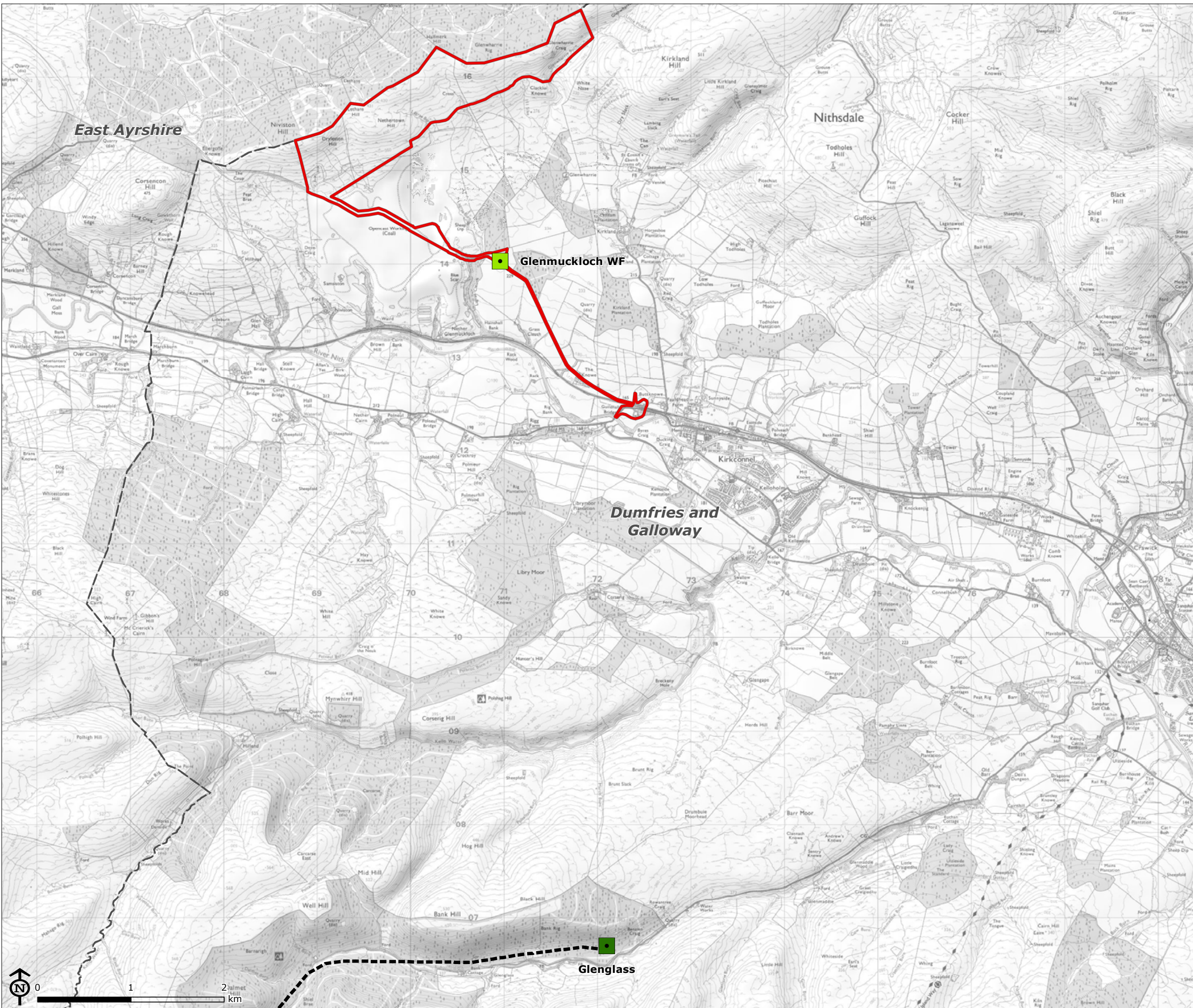
The Structure of the Report

- 1.28 This report comprises of the following chapters:
- **Chapter 1:** Introduction
 - **Chapter 2:** Project Description
 - **Chapter 3:** Approach to Routeing
 - **Chapter 4:** Identification of Route Options
 - **Chapter 5:** Appraisal of Route Options
 - **Chapter 6:** Appraisal Findings
 - **Chapter 7:** The Consultation Process and Next Steps
- 1.29 This report is also supported by a number of figures and appendices, as listed in the contents page above.

⁶ ScottishPower Energy Networks (2015), Major Electrical Infrastructure Projects, Approach to Routeing and Environmental Impact Assessment: https://www.spenergynetworks.co.uk/userfiles/file/SPEN_Approach_to_Routeing_FINAL_20150527.pdf

Figure 1.1: Existing Network and Points of Connection

- Glenmuckloch Wind Farm Substation
- Existing Glenglass Substation
- Glenmuckloch Wind Farm Site Boundary
- Existing 132kV Overhead Line South West Scotland (SWS) Project
- Local Authority Boundary



Map Scale: 1:40,000 @ A3



2 Project Description

Connection Requirements

- 2.1 A new 33kV single circuit overhead line is required between the consented Glenmuckloch WF substation and the existing Glenglass Substation to accommodate the connection requirements of the Glenmuckloch WF.

Overhead Line Infrastructure

- 2.2 With the overhead line, conductors (or wires) are suspended at a specified height above ground and supported by wooden poles, spaced at intervals. Conductors can be made either of aluminium or steel strands. Most overhead lines at 33kV carry one 3-phase circuit with each phase strung on top of the wood pole via steel work. An earth wire may be required to provide lightning protection.
- 2.3 Conductors are strung from insulators attached to the pole steel work and prevent the electric current from crossing to the pole body.

Wood Pole Types

- 2.4 The proposed OHL will be constructed using a wood pole design (L36 type) supporting aluminium conductors on insulators. The proposed design is described below and examples of pole designs and photographs are shown on **Figure 2.1**. Wood poles are fabricated from pressure impregnated softwood, treated with a preservative to prevent damage to structural integrity.
- 2.5 There are three types of pole:
- Intermediate: where the pole forms part of a straight line section.
 - Angle: there is one type of angle pole which can support changes in direction up to a maximum of 75 degrees. All angle structures will require to be back stayed.
 - Terminal: where the OHL terminates into a substation or on to an underground cable section via a cable sealing end.

Wood Pole Heights and Span Lengths

- 2.6 Span lengths between poles generally average 100m however these can increase or decrease as required depending on topography to maintain safety clearance. The standard height of poles varies from 14m to 16m. Where the OHL is located above 200m AOD double or 'H' poles will be required as shown on **Figure 2.1**.

Wood Pole Treatment

- 2.7 New wood poles are dark brown in colour and weather over the years to a light grey.

Underground Cables

- 2.8 Where a section of underground cable is required, for example where the OHL terminates and connects into the substation, the conductors are encased in insulated material and buried in a backfilled trench of suitable depth and width. Whilst the number of cables, and the depth and width of the trench depends on the circuit rating and voltage, the width of the trench can be substantial. This would be dependent on the installation method, environmental issues, ground conditions and access requirements during construction. Where connected to an overhead line, an underground cable may also involve the creation of a fenced compound for the siting of terminal supports and sealing end compounds above ground.

Construction Process

- 2.9 The construction of overhead lines and underground cables requires additional temporary infrastructure such as temporary accesses to tower locations and construction compounds to store materials. All have limited maintenance requirements and all are subject to well-established procedures for dismantling/decommissioning.

Overhead Lines

Wood Pole Construction

- 2.10 The construction of the OHL will follow a well-established sequence of activities as outlined below:
- preparation of accesses;
 - excavation of foundations;
 - delivery of poles;
 - erection of poles;
 - delivery of conductor drums and stringing equipment;
 - insulators and conductor erection and tensioning;
 - clearance and reinstatement.
- 2.11 Prior to constructing the OHL, temporary working areas around each pole location will be required for foundation excavation and pole erection. Any vegetation that requires to removal will be removed or lopped.
- 2.12 The erection of the wood poles will require a small excavation to allow the pole brace block and/or steel foundation braces to be positioned in place. The excavated material will be sorted and stored and used for backfilling purposes and no concrete is required.
- 2.13 Poles are erected in sections, i.e. between angle support poles and/or terminal support pole. The insulator fittings, and wood poles forming the pole support, will be assembled local to the pole site and lifted into position utilising the tracked excavator which excavated the foundations. The pole foundation holes will then be backfilled and the pole stay wire supports attached to the ground in preparation for conductor stringing, erection and tensioning.

Access

- 2.14 Temporary accesses to all pole locations will be taken from the existing main road network wherever feasible, with the use of selected unclassified roads also likely to be required. The use of existing tracks and watercourse crossings will be maximised, with the upgrading of these where necessary.
- 2.15 The initial preference when taking temporary access is to use low ground pressure vehicles and plant. Where access is required to be taken through any sensitive areas identified during the environmental appraisal process, other less intrusive methods such as temporary steel matting, or timber roadways may be employed.
- 2.16 All temporary tracks will be removed after commissioning with land being restored to its former condition.

Temporary Working

- 2.17 Temporary working areas will be required for the duration of the construction works. Temporary vehicular access is required to every pole location. Wood pole locations will have a working area of approximately 30m x 30m and could also extend to accommodate conductor pulling if required. In some cases the shape or size of the working area will be determined by nearby environmental or land use constraints, identified during the environmental appraisal process / prior to construction. Each working area will be taped off to delineate the area for environmental protection reasons.
- 2.18 Following the completion of the construction works, the temporary working areas will be reinstated and restored to former conditions.

Construction Timescales

- 2.19 Construction and erection of a standard single pole generally takes approximately half a day depending on ground conditions and location, i.e. it may take more hours if the ground is softer. Angle poles and H-poles can take longer due to the need for 'stay wires' to stabilise the pole in the ground.

Operation and Maintenance

- 2.20 Whilst most OHL components are maintenance free, exposed elements which suffer from corrosion, wear, deterioration and fatigue may require inspection and periodic maintenance. OHL cables generally require refurbishment after approximately 40 years.
- 2.21 Any felled wayleave areas will also have to be managed to maintain the required clearances whilst the connection remains in service. Walkover surveys or flyovers will identify where there is a requirement to clear wayleaves of new growth.

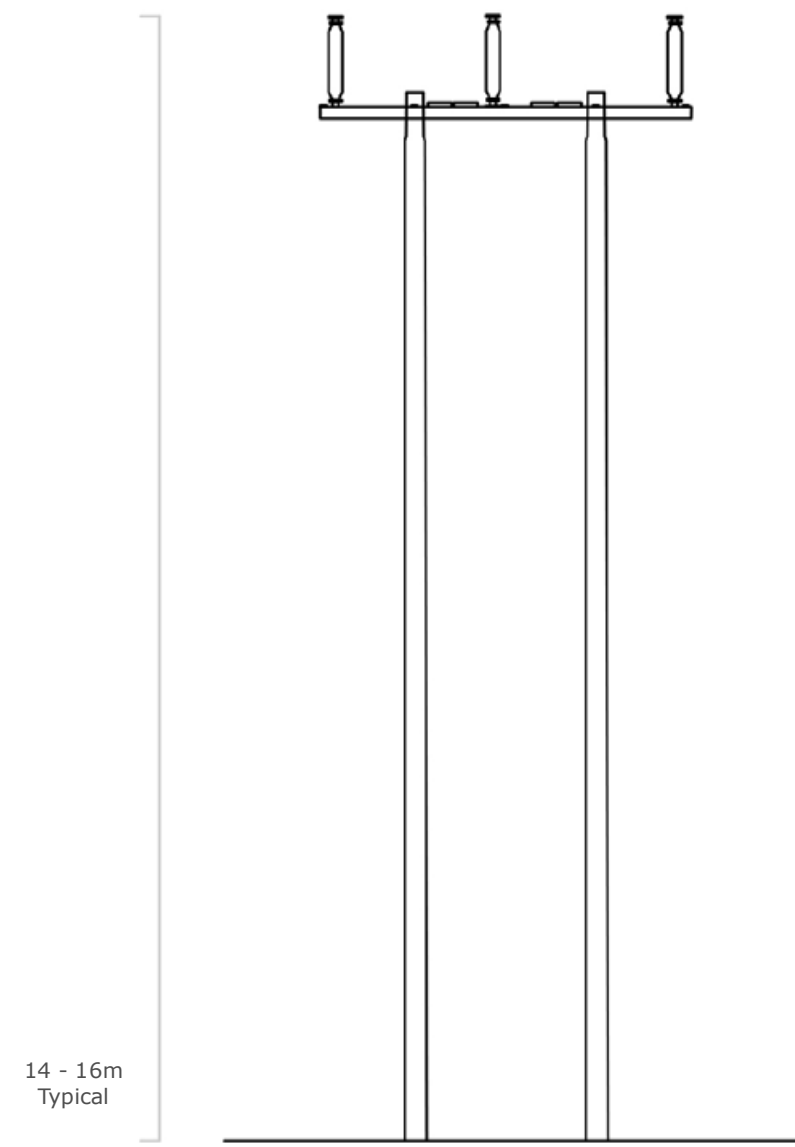
Decommissioning

- 2.22 When the operational life of the proposed OHL comes to an end, it is possible that the line may be re-equipped with new conductors and insulators and refurbished. Alternatively, the OHL may be decommissioned fully. Wood poles will be removed with components re-used where possible. Foundations (if required) are removed to a minimum depth of one metre below ground level, the area cleared and ground reinstated to its former condition.

Underground Cables

- 2.23 Open cut trenching is the most frequently used construction method for cable installation. However, in crossing under watercourses or motorways for example, a trenchless technique such as directional drilling may be used. Works at each section commonly consist of the construction of a haul road, the excavation of the cable trench by mechanical excavators, cable laying, the backfilling of the trench with sand and native material and surface reinstatement. A typical cable installation rate is up to 160m per week, depending on the terrain. A temporary construction compound is also required and again this is generally located close to the midpoint of the cable route.
- 2.24 Annual maintenance checks on foot are commonly required during operation. The cable route will also be kept clear of all but low growing vegetation. In the unlikely event that there is a fault along the cable, the area around the fault is excavated and the fault repaired or a new section of cable inserted as a replacement. If lines are decommissioned, cables can either be left in situ or carefully excavated and removed.

Figure 2.1: Typical Wood Pole (L36)



Typical Wood Pole (L36)

3 Approach to Routeing

SPEN's Overall Approach

- 3.1 The Government, Ofgem and the electricity industry, including SPEN, have reviewed their positions on OHLs. They remain of the view that the need to balance economic, technical and environmental factors, as a result of statutory duties and licence obligations, continues to support an OHL approach in most cases.
- 3.2 It is therefore SPEN's view that wherever practical an OHL approach is taken when planning and designing new transmission lines. However, SPEN accepts that there are specific circumstances in which an undergrounding approach should be considered.
- 3.3 In 2015, SPEN published a summary document outlining the approach taken to routeing transmission infrastructure (Major Infrastructure Projects: Approach to Routeing and Environmental Impact Assessment, SPEN 2015). This document is available at www.spenergynetworks.co.uk/pages/community_consultation.

The Glenmuckloch 33kV Connection Project Routeing Objective

- 3.4 In accordance with SPEN's approach to routeing , the routeing objective for the Glenmuckloch 33kV Connection Project is:

"To identify a technically feasible and economically viable route for a continuous 33kV overhead line connection supported on wood poles from the Glenmuckloch WF substation to Glenglass substation. The route should, on balance, cause the least disturbance to the environment and the people, who live, work and enjoy recreation within it."

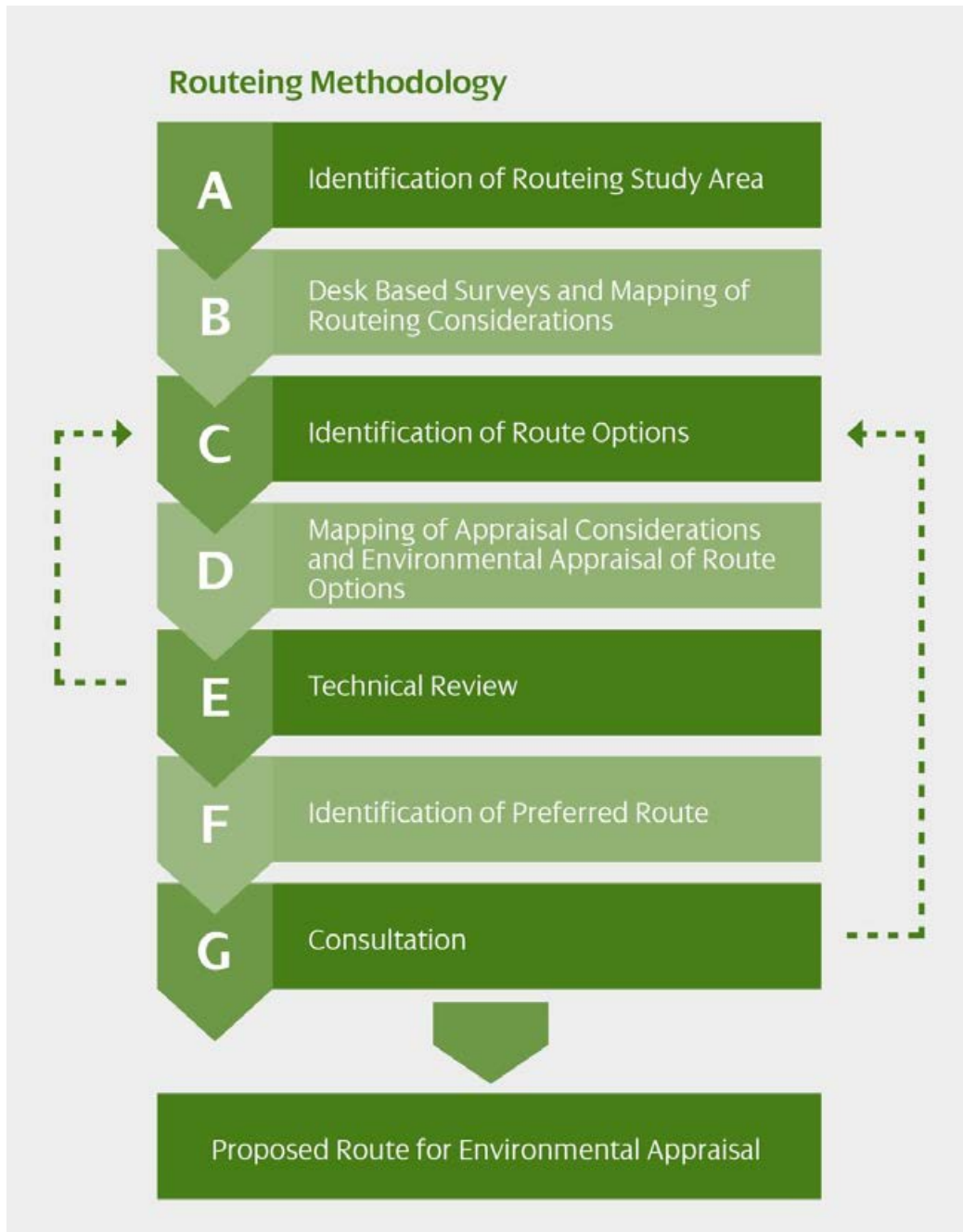
Established Practice for Overhead Line Routeing

- 3.5 SPEN's overall approach is based on the premise that the main effect of an OHL is visual, as a result of its scale relative to objects in the vicinity such as buildings and trees, and that as there is no technical way of reducing this other than choice of support (towers and poles), and only limited ways of achieving screening through planting, the most effective way of causing least visual disturbance is by careful routeing. In addition, a well routed OHL takes account of other environmental and technical considerations, even if the length is increased as a consequence.
- 3.6 It is generally accepted across the electricity industry that the guidelines developed by the late Lord Holford in 1959 for routeing OHLs, 'The Holford Rules'⁷, should continue to be employed as the basis for routeing high voltage OHLs. The Holford Rules were reviewed circa 1992 by the National Grid Company (NGC) Plc. (now National Grid Electricity Transmission Plc (NGT)) as owner and operator of the electricity transmission network in England and Wales, with notes of clarification added to update the Rules. A subsequent review of the Holford Rules (and NGC clarification notes) was undertaken by ScottishHydro Electric Transmission Limited (SHETL) in 2003 to reflect Scottish circumstances.
- 3.7 The Holford Rules and the NGC and SHETL clarification notes are included in **Appendix 1**. These guidelines for the routeing of new high voltage overhead transmission lines form the basis for routeing the Glenmuckloch 33kV Connection Project. Key principles of the Holford Rules include avoiding prominent ridges and skylines, following broad wooded valleys, avoiding settlements and residential properties and maximising opportunities for 'backclothing' infrastructure.

⁷ NGC 1992, SHETL 2003

3.8 For simplicity, the methodology is set out in a linear manner (as shown in **Figure 3.1**), with the findings of each step informing the next step, building up an ever increasing level of understanding to inform the routeing process. However, it is important to note that this process remains iterative, with the steps subject to a technical review and consultation where necessary. This enables assumptions to be confirmed and ensures confidence in the findings, prior to the commencement of subsequent steps.

Figure 3.1: Glenmuckloch 33kV Connection Project Routeing Methodology



Overview of Routeing Process

Study Area

3.9 A study area is first defined, which is large enough to accommodate all likely route options, taking account of the technical requirements (i.e. connection points) and factors such as topography.

Baseline mapping of the routeing considerations outlined below then enables routeing constraints and opportunities to be identified.

Environmental Considerations

- 3.10 Statutory duties imposed by Section 38 and Schedule 9 of the Electricity Act 1989 require licence holders to seek to preserve features of natural and cultural heritage interest, and to mitigate where possible, any effects which their proposals may have on such features. The construction and operation of an overhead transmission line will have potential effects on people and the environment, including potential effects on (in no hierarchical order):
- visual amenity;
 - landscape character;
 - ecology and ornithology;
 - hydrology, hydrogeology, geology and water resources;
 - cultural heritage including archaeology;
 - land uses including mineral operations, agriculture, committed development and forestry;
 - recreation and tourism.
- 3.11 Some effects can be avoided or limited through careful routeing. Other effects are best mitigated through local deviations of the route, the refining of steel tower locations and/or specific construction practices. These are reviewed as part of the environmental appraisal process.

Technical Considerations

- 3.12 Technical considerations which can influence routeing include the existing and proposed electricity transmission network, access requirements/opportunities, slope gradient, altitude, waterbodies, peat, and windfarms⁸.

Economic Considerations

- 3.13 In compliance with the duties imposed on SPEN in terms of Section 9 of the Electricity Act 1989, the proposed route must be 'economically viable'. This is interpreted by SPEN as meaning that as far as is reasonably practicable, and all other concerns being equal, the line should be as direct as possible and the route should avoid areas where technical difficulty or compensatory requirements would render the scheme unviable on economic grounds.

Identification and Appraisal of Route Options

- 3.14 Following identification of the study area a number of possible 'route options' for the Glenmuckloch 33kV Connection Project are identified. This process involves the avoidance where possible of areas of high 'amenity' value. These areas generally include areas of natural and cultural heritage value designated at a national, European or international level as these are afforded the highest levels of policy protection. The study area also includes consideration of matters such as altitude and slope gradients, over which technical limitations would mean a route was unachievable.
- 3.15 The route options are then appraised against environmental and technical criteria, including the length of the proposed route option.

⁸ Constructed windfarms were considered as a technical consideration. Windfarms were also considered within the appraisal of committed development.

Selection of the Preferred Route

- 3.16 The comparative appraisal of route options leads to identification of an 'emerging preferred route' which is subjected to a technical review to confirm that the emerging preferred route is technically feasible. At this stage the emerging preferred route is subjected to a review of potential cumulative effects with other proposed connections within the study area, as outlined below. Following the cumulative review, with associated revisiting or modification of routes as necessary, the 'preferred route' is selected.
- 3.17 The preferred route is the option which is considered technically feasible and economically viable whilst causing the least disturbance to the environment and to people. This is then taken forward for stakeholder and public consultation. The preferred route is subjected to further consideration in response to public consultation, and may be modified further in the light of these consultations. Modifications may result in further consultation if necessary.
- 3.18 The preferred route, modified to take into account consultations and the consideration of specific local issues, is then confirmed as the 'proposed route'. The proposed route is subjected to further environmental survey, detailed design and subsequent environmental appraisal, resulting in the further modifications required to avoid and/or minimise effects on the environment.

Cumulative Review

- 3.19 As outlined in **Chapter 1**, the routeing process also gives cognisance to the other OHL connections, which share the project study area and have progressed their routeing study⁹. These comprise the Glenmuckloch Wind Farm 132kV Connection Project, and the Sandy Knowe Wind Farm Connection.
- 3.20 The Glenmuckloch PSH 132kV Connection Project comprises a 132kV OHL connection supported on steel lattice towers which will connect the Glenmuckloch PSH onsite substation to the existing network at the Glenglass substation. The Sandy Knowe Wind Farm Connection will require a 132kV wood pole OHL connection directly into the existing Blackhill to Glenglass steel lattice tower overhead line at Glenglass substation.
- 3.21 Further details in relation to the routeing of these projects can be found online at https://www.spenergynetworks.co.uk/pages/community_consultation.aspx.
- 3.22 Cumulative appraisal can only be undertaken for the connections outlined above, noting that the "future connections" (Twentyshilling Hill and Lethans) described in **Chapter 1** as well as Sanquhar II Wind Farm, are not sufficiently progressed at present to reliably inform this routeing study.
- 3.23 Following the identification of emerging preferred routes for each OHL connection, a technical and environmental cumulative appraisal is undertaken of all the emerging preferred OHL routes together to ensure that, in combination, the routes continue to meet the routeing objective and SPEN's statutory duties.
- 3.24 SPEN's overall approach in relation to environmental considerations is the premise that the key effects of an overhead line which are best minimised through careful routeing are visual effects. On this basis the environmental review of potential cumulative effects considers the potential cumulative visual effects on receptors, such as residential properties and settlements and sequential effects on people travelling within the study area i.e. by train or road through the Nith valley. Potential cumulative visual effects are considered alongside other potential environmental effects which may be challenging to mitigate at the detailed design stage e.g. localised effects on landscape.
- 3.25 SPEN's technical review reflects the objectives of seeking to avoid unnecessary crossing of overhead lines (existing and proposed), maintaining the required safety clearance between overhead lines during construction and operation, and design requirements reflecting the topographic conditions and other characteristics of the study area.

⁹ These are not considered as 'committed development' for the purposes of routeing as they are currently not the subject of valid planning applications.

- 3.26 Following the environmental and technical cumulative review, and balancing of the findings of both, if it is considered that potential cumulative effects are likely to be significant, a review will be undertaken of the second best performing route for each connection in combination with the other routes, as outlined in **Figure 3.1**, the findings of which will inform SPENs decision on which (if any) project's identified preferred route should be changed. The outcome of the cumulative review comprises the 'preferred route' for each connection upon which stakeholder consultation is undertaken.

4 Identification of Route Options

The Project Routeing Strategy

- 4.1 The routeing strategy , which has informed the identification and appraisal of the route options is:
- "Route options will recognise the grain of the River Nith valley, making use of appropriate crossing points and the containing landform to avoid areas of highest amenity value and sensitivity as far as possible. Proximity to settlements and other forms of development within the study area will also require consideration to limit, potential visual and cumulative effects".*

The Study Area

- 4.2 The first step in the routeing process involved identification of the study area, predominantly for the purposes of gathering data specific to the project area. In identifying the study area, it was important to ensure that this was large enough to accommodate all likely route options reflecting the Routeing Objective and Routeing Strategy.
- 4.3 On this basis, the study area was required to be able to accommodate a continuous 33kV OHL from the Glenmuckloch WF substation to the Glenglass substation. Due to the other OHLs connecting into or in proximity to the Glenglass substation, the study area also required to take account of these projects.
- 4.4 A preliminary check was also carried out to identify the presence of International, European or Nationally Designated areas within or immediately adjacent to, the study area, to ensure that potential effects on these areas could be considered. Taking account of the above, and also informed by topography, the maximum area across which the route options were likely to be located, was identified. The study area is shown in **Figure 4.1**, which as outlined above also reflects the study area for the other connections connecting into Glenglass. An overview of the study area characteristics is provided below.

Study Area Description

- 4.5 The study area extends broadly from the consented Glenmuckloch WF substation, north west of Kirkconnel, southwards to the existing Glenglass substation situated to the south west of Sanquhar. To accommodate the routeing requirements of the 33kV and taking cognisance of the other known OHL projects, the study area encompasses an area of approximately 70ha and incorporates land within the council area of Dumfries and Galloway. Much of the study area is rural in nature, comprising primarily of agricultural and forested areas outside of the main settlements of Kirkconnel and Sanquhar.
- 4.6 The landscape of the study area is largely defined by the valley of the River Nith and the adjacent Southern Uplands. The course of the river here is generally from west to east but, in the south east of the study area, it gradually takes a more southerly direction towards the coast near Dumfries. The ground level of the valley floor is approximately 140m AOD while the hill summits above include Bank Hill, at 530m AOD, and so there is a notable range in elevation across the study area. The uplands are generally formed of rounded hills or undulating ridgelines and they feature several incised valleys which drain towards, and feed into, the Nith.
- 4.7 The relatively broad valley of the River Nith has become an important transportation corridor for the area and it is passed through by the A76 road, between Kilmarnock and Dumfries, and the Glasgow South Western Line railway, between Glasgow and Carlisle via Kilmarnock and Dumfries.
- 4.8 The main settlement within the study area is Kirkconnel and Kelloholm, with Sanquhar located immediately adjacent to the study area. Outwith these settlements, the population is dispersed

across the study area comprising individual and small clusters of farmsteads and residential properties.

- 4.9 Coal workings which are evident today within the study area are those at Glenmuckloch; these are currently undergoing phased restoration in advance of development of the pumped storage hydro scheme. This area partly occupies an area of undulating and gently sloping land between the valley floor to the south and the steeper slope to the north.
- 4.10 The main valley floor and adjacent undulating land continues to be farmed and is divided into medium scale fields between the valley slopes, the railway and the main road. The River Nith meanders considerably and several stretches of embankment have been formed alongside it to protect the adjacent pastures from flooding. On the valley slopes and undulating areas there are several areas of coniferous plantation, often rectilinear in form. There are also smaller areas of mixed and deciduous woodland, often associated with farmsteads and narrow stretches alongside the Nith and smaller watercourses positioned in the incised tributary valleys.
- 4.11 Above the valley floor and lower slopes, land use gives way to rough grazing and managed moorland mixed with plantation. Several of the hilltops and ridges have been developed for wind energy production, including Hare Hill Wind Farm, Sanquhar Community Wind Farm and Whiteside Hill Wind Farm.
- 4.12 There are a number of core paths connecting Kirkconnel with the uplands to the north and south. There is also a section of the Southern Upland Way located beyond the study area boundary (to the south east) at Sanquhar.
- 4.13 The main infrastructure links within the study area comprise the following:
- The A76 which passes through the central section of the study area, to the west of Kirkconnel, connecting Kilmarnock to Dumfries via Sanquhar.
 - Various access roads are found within the study area.
 - The railway which cuts through the central section of the study area, running parallel to the A76 in an east / west direction through New Cumnock and Kirkconnel. This connects Glasgow with Carlisle in northern England;

Planning Policy Context

Local and Strategic Planning Policy

- 4.14 The Local Development Plan (LDP) covering the study area is the Dumfries and Galloway Local Development Plan (adopted 29 September 2014)¹⁰.
- 4.15 The Dumfries and Galloway LDP sets a spatial strategy in which to guide the future use and development of land in towns, villages and the rural area. It also provides a snapshot of where development should happen and where it should not. The LDP sets out this strategy through planning policies, which outline the criteria by which proposals acceptability will be considered. The policies are structured around the themes of economic development, housing, historic environment, natural environment, community services and facilities, infrastructure and transport. The LDP recognises the importance of delivering supporting infrastructure and that provision of infrastructure is fundamental to the deliverability of development proposals and ensuring that infrastructure and service improvement requirements can be met.

National Planning Policy

- 4.16 **The Third National Planning Framework (NPF3)**¹¹, which was laid in the Scottish Parliament on 23rd June 2014, is the spatial expression of the Scottish Government's Economic Strategy and plans for infrastructure investment and development priorities over the next 20 to 30 years. NPF3 strengthens the link between strategy and delivery through 14 national development priorities identified within Annex A. In relation to development priority number four of Annex A, 'An

¹⁰ The Dumfries and Galloway Local Development Plan (September 2014), Available [online] at: <http://www.dumgal.gov.uk/ldp>

¹¹ The National Planning Framework (2014) available [online] at: <<http://www.gov.scot/Publications/2014/06/3539>>

Enhanced High Voltage Electricity Network', the statement of need is as follows: "These classes of development are needed to support the delivery of an enhanced high voltage electricity transmission grid which is vital in meeting national targets for electricity generation, statutory climate change targets, and security of energy supplies." In terms of the description of Classes of Development it includes, new or upgraded onshore electricity cabling of or in excess of 132kV as constituting national development.

- 4.17 **The updated Scottish Planning Policy (SPP)**¹² document was published in June 2014 and is a statement of Scottish Government policy on development and land use planning. Paragraph 156 states that "strategic development plans should support national priorities for the construction or improvement of strategic energy infrastructure, including generation, storage, transmission and distribution networks."

Identification and Mapping of Routeing Considerations

- 4.18 The Holford Rules are broadly hierarchical, with Rule 1 deemed the first rule to be considered in routeing. Rule 1 relates to the avoidance, where possible, of "major areas of highest amenity value". Holford Rule 2 makes the following recommendation: "avoid smaller areas of high amenity value or scientific interest by means of deviation". As the Holford Rules do not define what constitutes a major area (Rule 1), and the importance of the area is irrespective of size, smaller areas of highest amenity value e.g. Listed Buildings were also mapped at this stage alongside the larger areas.
- 4.19 The Holford Rules do not identify which designated areas constitute areas of *highest amenity value*. However, SHETL clarification note b) (see **Appendix 1**) states that areas of highest amenity value "require to be established on a project-by-project basis considering Schedule 9 of the Electricity Act, 1989", and provides examples to be considered.
- 4.20 In this routeing study, the term 'environmental' has also been used in place of 'amenity' (with the exception of residential amenity) to reflect more recent thinking which also seeks to recognise the intrinsic value of such areas.
- 4.21 On this basis, 'areas of highest environmental value' (Holford Rule 1) located within the study area, and therefore considered within this stage of the routeing process, include the national level designations listed below, and shown on **Figure 4.2**¹³:
- Sites of Special Scientific Interest (SSSIs): SSSIs are defined in the Wildlife and Countryside Act 1981 (as amended) as areas of land or water which are of special interest by reason of their flora, fauna or geological or physiographical features.
 - Unscheduled Archaeology of National Importance.
 - Category B and C Listed Buildings¹⁴ (LBs): Listed Buildings are also protected under the Listed Buildings and Conservation Areas (Scotland) Act 1997.
- 4.22 Supplementary Note a) of the Rules relates to residential areas, stating "avoid routeing close to residential areas as far as possible on grounds of general amenity". In this routeing report, settlements have been mapped and included as areas of highest environmental value. Settlements are defined as towns and villages identified within the Local Development Plan. Within the study area these comprise Kirkconnel and Kelloholm.
- 4.23 As noted in **Chapter 3**, for some projects, it can be helpful to introduce additional considerations into the appraisal to help inform the selection of a preferred route option. These may be of more local importance and smaller in scale. The SHETL note a) on Holford Rule 2 (see **Appendix 1**) states that other areas of "regional or local high amenity value" should be identified from Development Plans. For this routeing study, these other areas which have also been considered include:

¹² Scottish Planning Policy available [online] at: <<https://beta.gov.scot/publications/scottish-planning-policy/pages/2/>>

¹³ Designations which would constitute Areas of Highest Environmental Value but are not located within the study area are not discussed, including international and European level designations.

¹⁴ There are no Category A Listed Buildings within the study area.

- Areas of Ancient Woodland (AW) as defined by the Ancient Woodland Inventory (AWI).
 - Local Nature Conservation Sites (LNCS): a 'catch-all' term used to define various local nature conservation sites designated by local authorities. In most cases, these are designated as they represent a viable example of a habitat or species of conservation interest at a local level.
- 4.24 These have been mapped where present and treated as 'avoid where possible', or where not possible, 'balance with other considerations'.
- 4.25 Furthermore, and whilst it is recognised that proximity to properties is not an absolute constraint to routeing, a 150m 'trigger for consideration' has been mapped around each residential property to allow this proximity to be balanced with other considerations, while also helping identify possible 'pinch points'.
- 4.26 A full list of environmental considerations is included in **Appendix 2**. **Appendix 2** also lists all the environmental considerations which have been considered within the routeing study but which are not present within the study area.
- 4.27 At this stage all operational wind farms, wind farms with consent and those with valid planning applications were also mapped as these form an environmental constraint to routeing as committed development and also as a technical constraint due to the requirement for a separation distance between turbines and the OHL. Turbines were mapped with a 1.5x tip height buffer included as 'avoid where possible' constraint to routeing.

Identification of Route Options

- 4.28 Given the nature of overhead lines the primary environmental effects are likely to be landscape and visual effects. The best way to limit adverse effects on landscape and visual amenity is by careful line routeing, led by landscape architects, based on professional judgement and informed by fieldwork.
- 4.29 Holford Rules 1 and 2, as described above, form the basis for the landscape led identification of route options. In addition, Rules 4 and 5 of the Holford Rules identify that OHL infrastructure is judged to be more widely visible from surrounding areas when located on higher ground, for example ridges and skylines. Holford Rule 3 which states that, other things being equal, the most direct line should be chosen, with no sharp changes in direction, is also taken account of in identifying route options.

Identification of Route Options

- 4.30 The nature of the topography and of the technical and environmental constraints in the study area between the Glenmuckloch WF scheme and the Glenglass substation termination search area informed the identification of four variable width 'route options' (see **Figure 4.3**).
- 4.31 It is important to note that the route 'edges', as mapped, do not represent fixed boundaries to routeing. The identification of routes was undertaken to identify the broad geographic area within which routeing of an OHL was considered to be preferable, relative to other geographic areas.

Description of Route Options

- 4.32 Each of the route options was given a numerical reference: 1-4. All route options have the same connection points commencing at the consented Glenmuckloch WF substation and terminating at the existing Glenglass Substation. These are shown on **Figure 4.3 (a-d)**.

Route Options 1 and 2

- 4.33 Route options 1 and 2 are located in the west of the study area and follow the same alignment for the majority of their length, diverging at Kello Water, approximately 3km north-west of the existing Glenglass Substation.

- 4.34 From the consented Glenmuckloch WF substation, the route options run south across improved pasture. They cross the River Nith valley and climb south and then southwest, avoiding areas of broadleaf riparian woodland where possible and residential properties of the nearby farmsteads.
- 4.35 South of the A76, the route options route west of the residential properties in the vicinity of Cockroy and run perpendicular to the slope, west of Polneul Burn and the consented Sandy Knowe Wind Farm. The route options cross the containing valley ridge west of the Sandy Knowe WF on-site substation at approximately 450m AOD and then drop into the valley of the Kello Water, near Mynwhirr Hill, where the route options diverge.
- 4.36 Route Option 1 turns south-west, following the alignment of Glengap Burn and set within its steep-sided valley before crossing into the valley of the Euchar Water to the west of Bank Hill. From here, the option runs parallel to existing overhead line of the SWS Project to the Glenglass Substation.
- 4.37 From the point of divergence, Route Option 2 runs east and south-east across the northern slopes of Hog Hill and Black Hill, below the operational Sanquhar Community Wind Farm turbines. The route option then turns south to the Glenglass Substation.

Route Option 3

- 4.38 From the consented Glenmuckloch WF substation, Route Option 3 follows a similar alignment to Route Options 1 and 2 until crossing the A76. From here it runs east of the residential properties in the vicinity of Crockroy. It then would run east, below the slope at Sandy Knowe where consented turbines would be located, to the forestry plantation at Libry Moor.
- 4.39 From Libry Moor, Route Option 3 passes through an area of plantation woodland west and south of Corserig Farm to cross the Kello Water. The option then runs parallel to contours across Drumbuie Moorhead and follows the line of the recently constructed Whiteside Hill WF/SWS Project access track to the Glenglass substation.

Route Option 4

- 4.40 This is similar to Route Option 3 in terms of its northern and southern extents; it differs between the A76 and the Kello Water crossing west of Glengape.
- 4.41 From the point of crossing the A76, Route Option 4 turns southeast and runs to the north of Rig and Libry Moor forestry Plantations. East of Corserig, the route option crosses the Kello Water at a point between Kello Bridge and Glengape to avoid riparian woodland and steep gradients. The route option then runs perpendicular to contours across Drumbuie Moorhead before following the line of a recently constructed Whiteside Hill WF/SWS Project access track to the Glenglass substation.

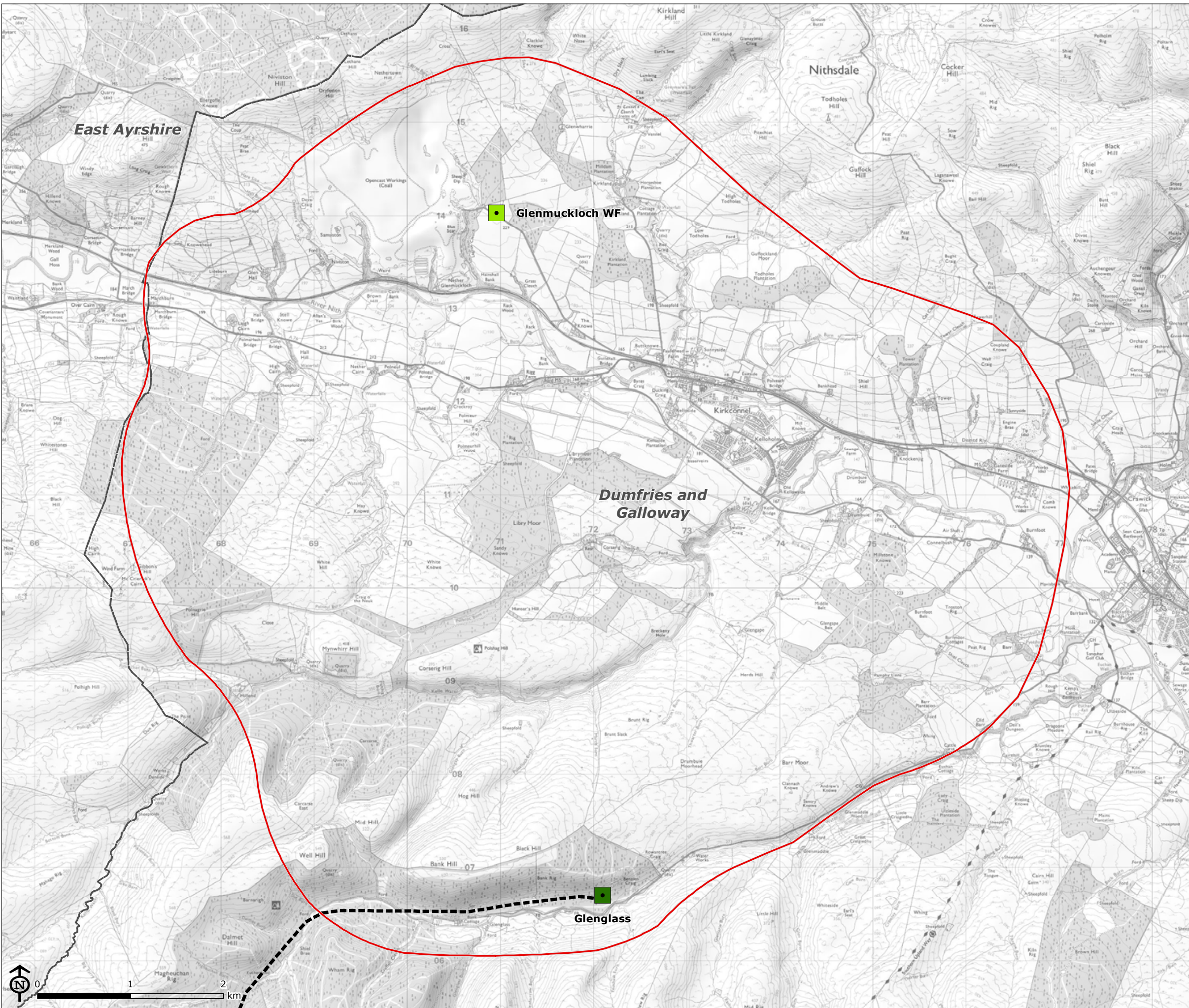


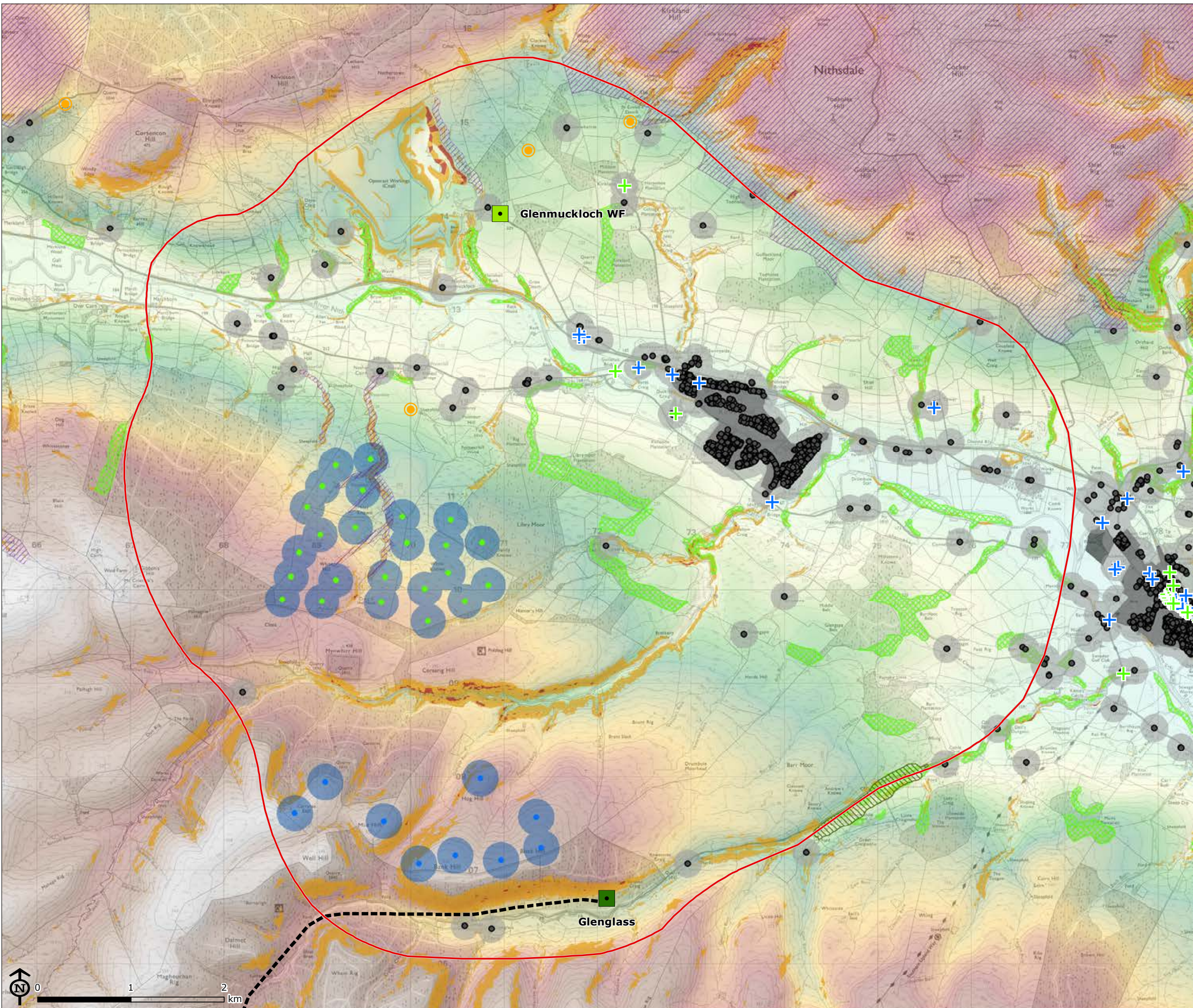
Figure 4.1: Study Area

- Glenmuckloch Wind Farm Substation
- Existing Glenglass Substation
- Study Area
- Existing 132kV Overhead Line South West Scotland (SWS) Project
- Local Authority Boundary

Map Scale: 1:40,000 @ A3



Figure 4.2: Areas of Highest Environmental Value



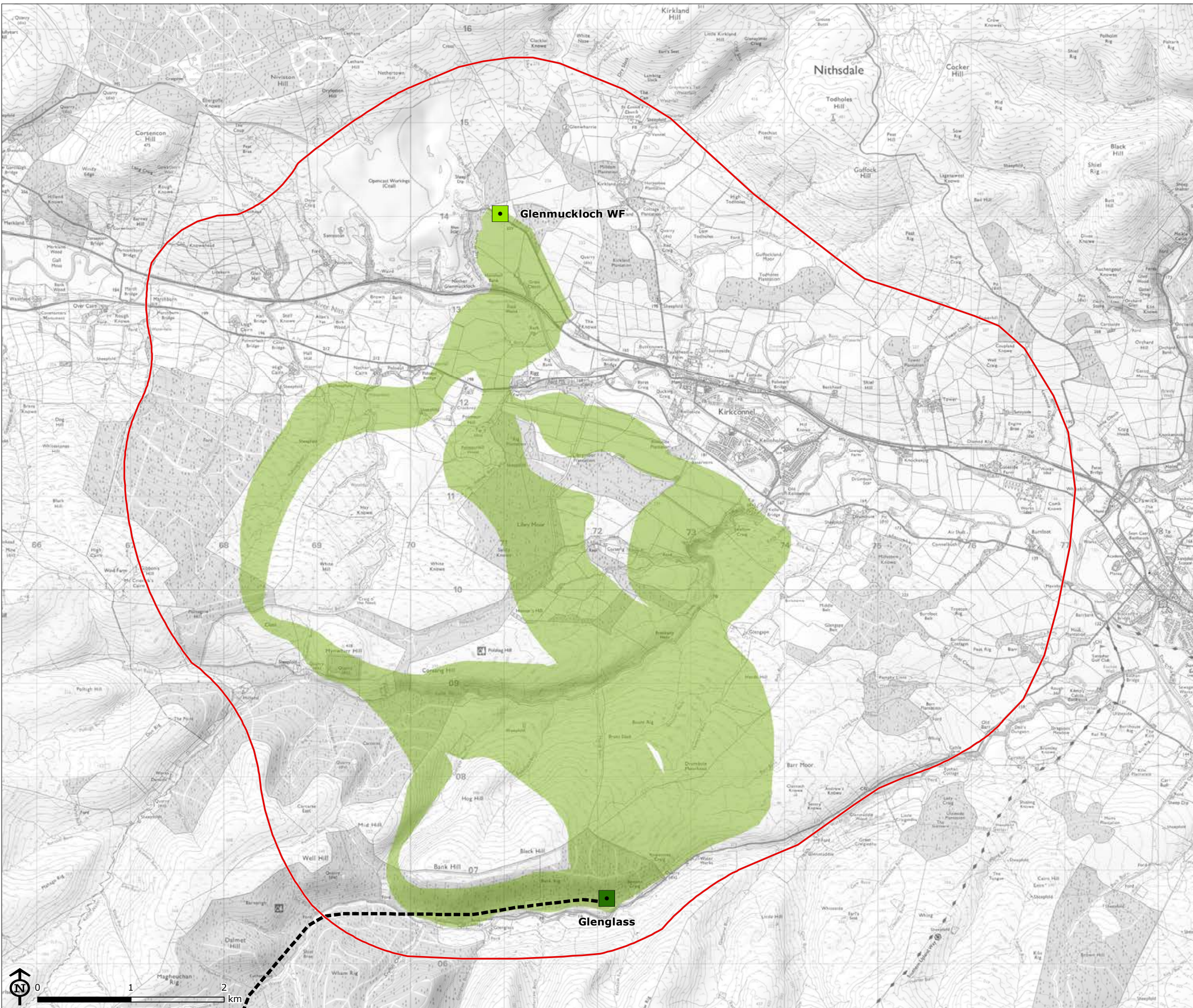
- Glenmuckloch Wind Farm Substation
 - Existing Glenglass Substation
 - Study Area
 - Existing 132kV Overhead Line South West Scotland (SWS) Project
- Areas of Highest Environmental Value**
- Site of Special Scientific Interest (SSSI)
 - Unscheduled Archaeology of National Importance
 - Listed Building - Category B
 - Listed Building - Category C
 - Settlement
 - Ancient Woodland Inventory (AWI)
 - Local Nature Conservation Site
 - Residential Property
 - Residential Property - 150m buffer
 - Turbine - Operational
 - Turbine - Consented
 - Wind Farms Min Distance (1.5 x Tip Height)
 - Slope > 22 degrees
 - Slope > 40 degrees
- Topography**
- High : 694.6
 - Low : 115.23

Map Scale: 1:40,000 @ A3



Figure 4.3: Route Options Overview

- Glenmuckloch Wind Farm Substation
 - Existing Glenglass Substation
 - Study Area
 - Existing 132kV Overhead Line South West Scotland (SWS) Project
- Route Options Overview**
- Route Options 1-4

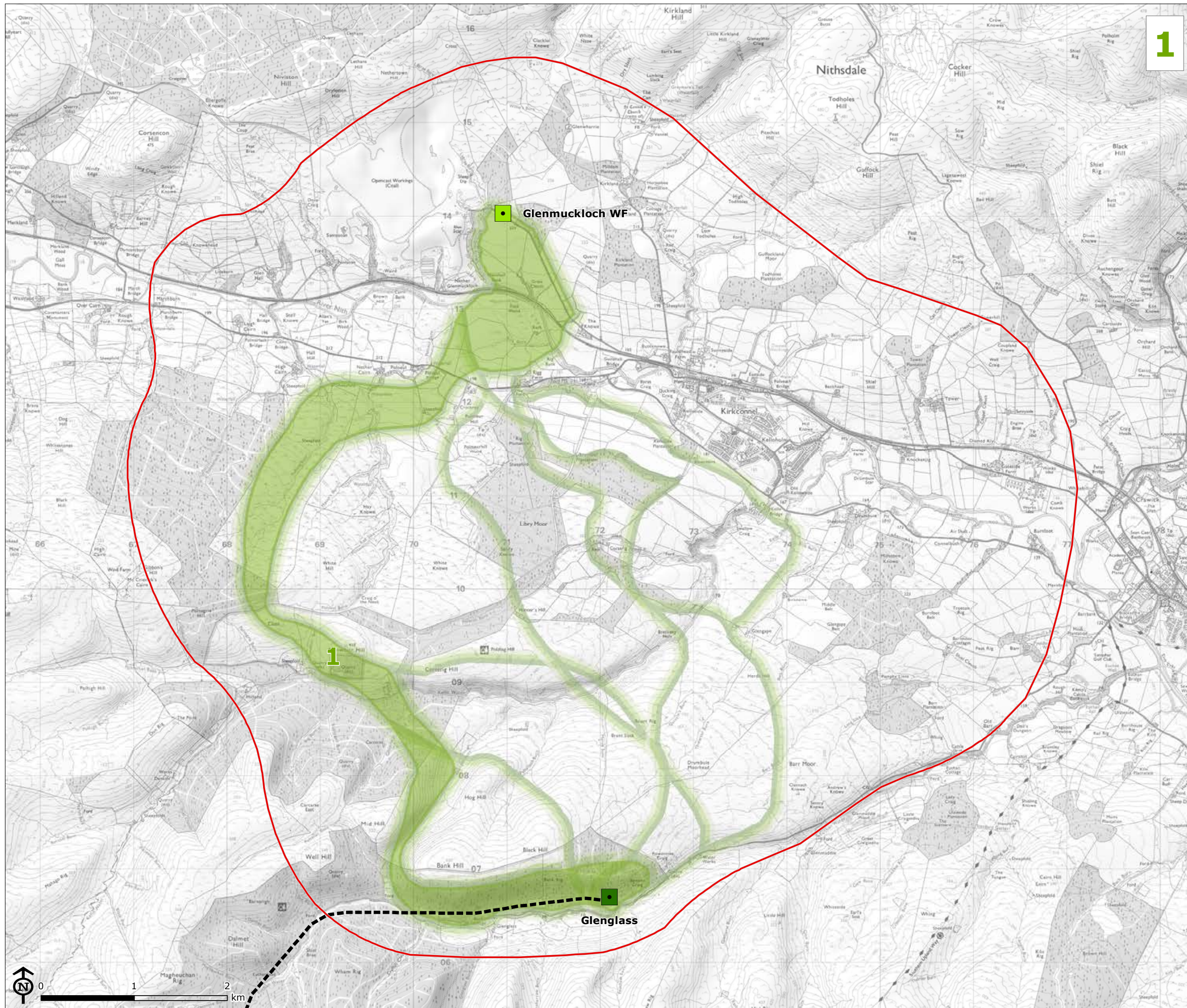


Map Scale: 1:40,000 @ A3



Figure 4.3a: Route Option 1

- Glenmuckloch Wind Farm Substation
- Existing Glenglass Substation
- Study Area
- Existing 132kV Overhead Line South West Scotland (SWS) Project
- Route Option
- Route Options Overview

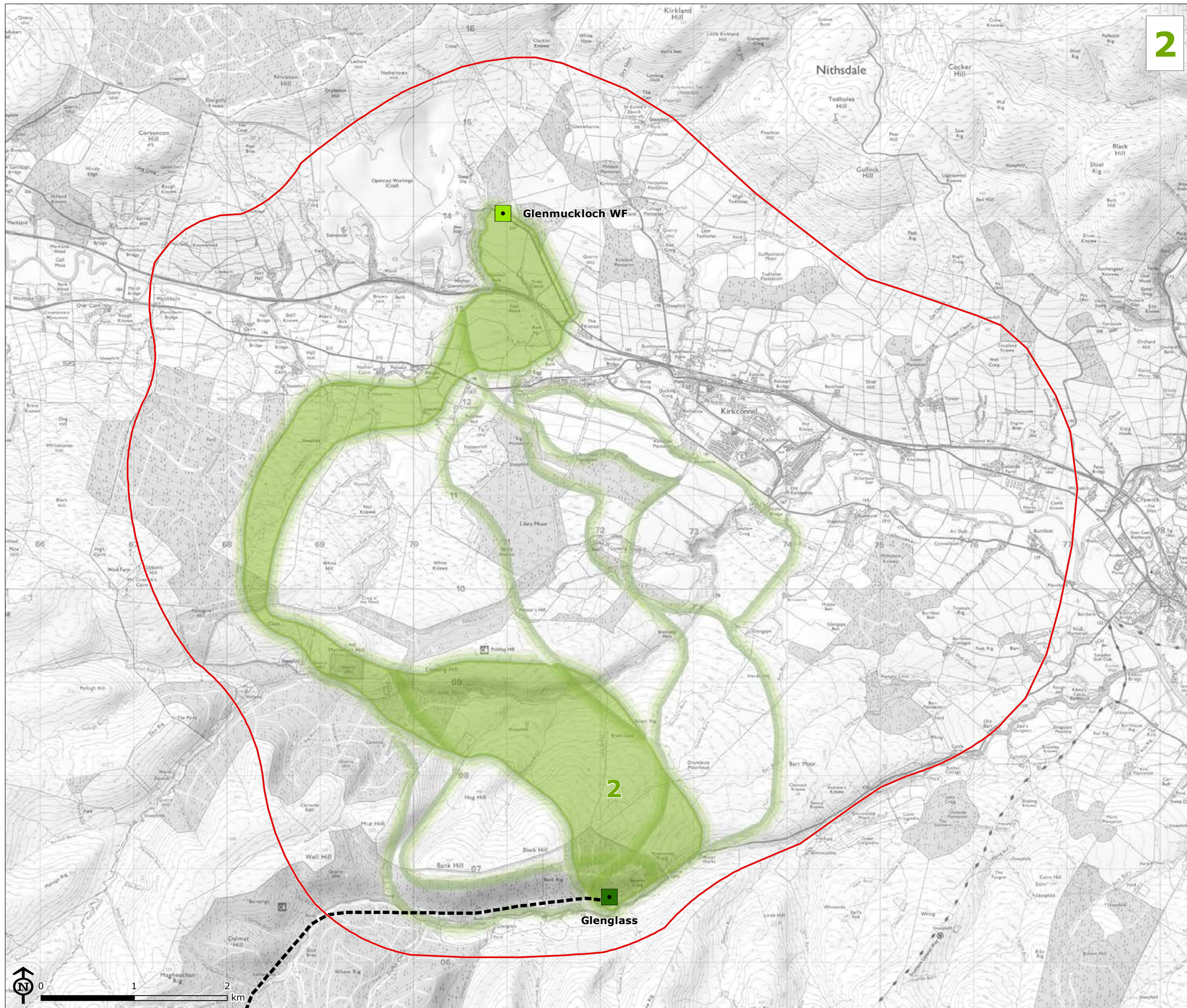


Map Scale: 1:40,000 @ A3



Figure 4.3b: Route Option 2

- Glenmuckloch Wind Farm Substation
- Existing Glenglass Substation
- Study Area
- Existing 132kV Overhead Line South West Scotland (SWS) Project
- Route Option
- Route Options Overview

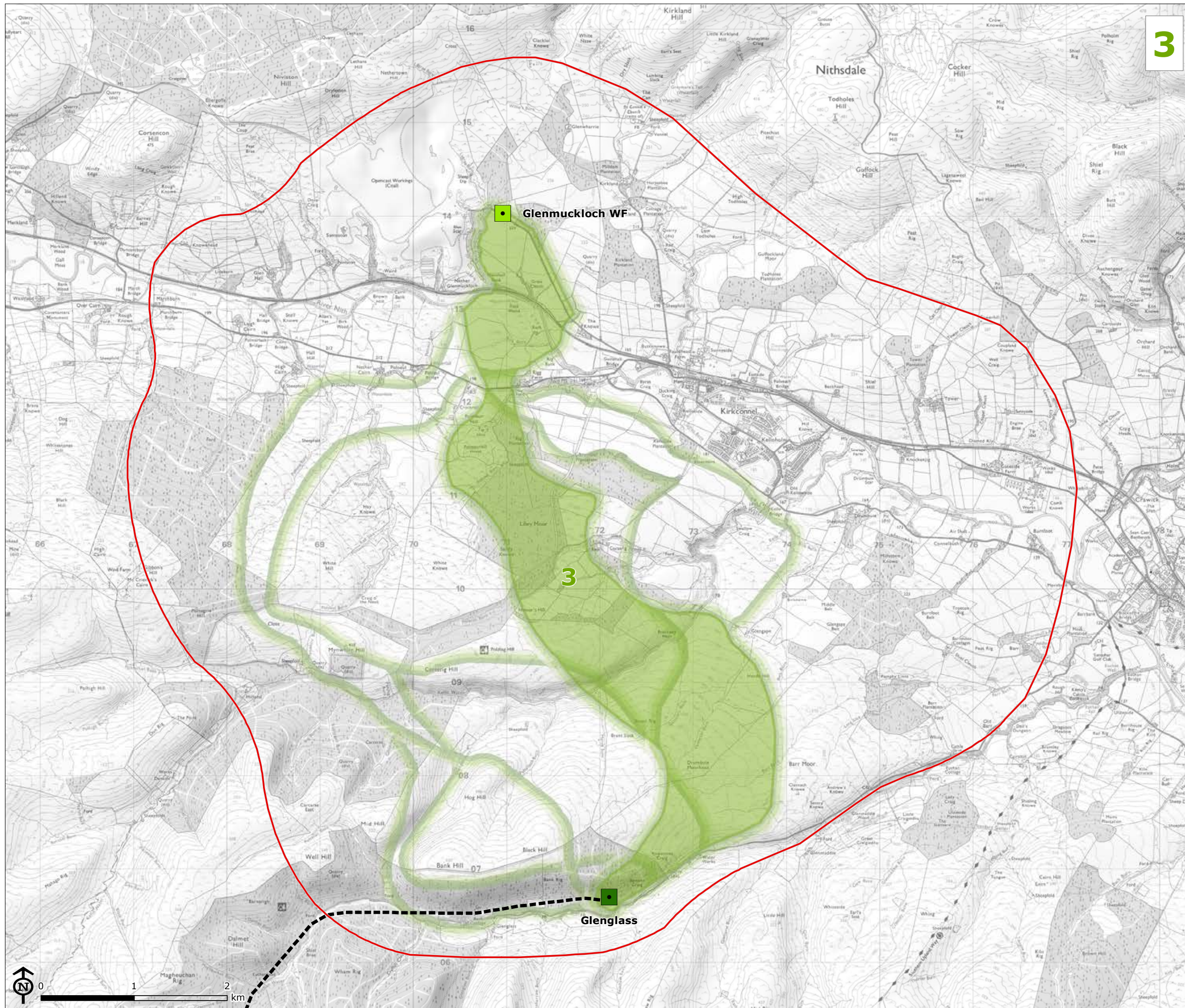


Map Scale: 1:40,000 @ A3



Figure 4.3c: Route Option 3

- Glenmuckloch Wind Farm Substation
- Existing Glenglass Substation
- Study Area
- Existing 132kV Overhead Line South West Scotland (SWS) Project
- Route Option
- Route Options Overview

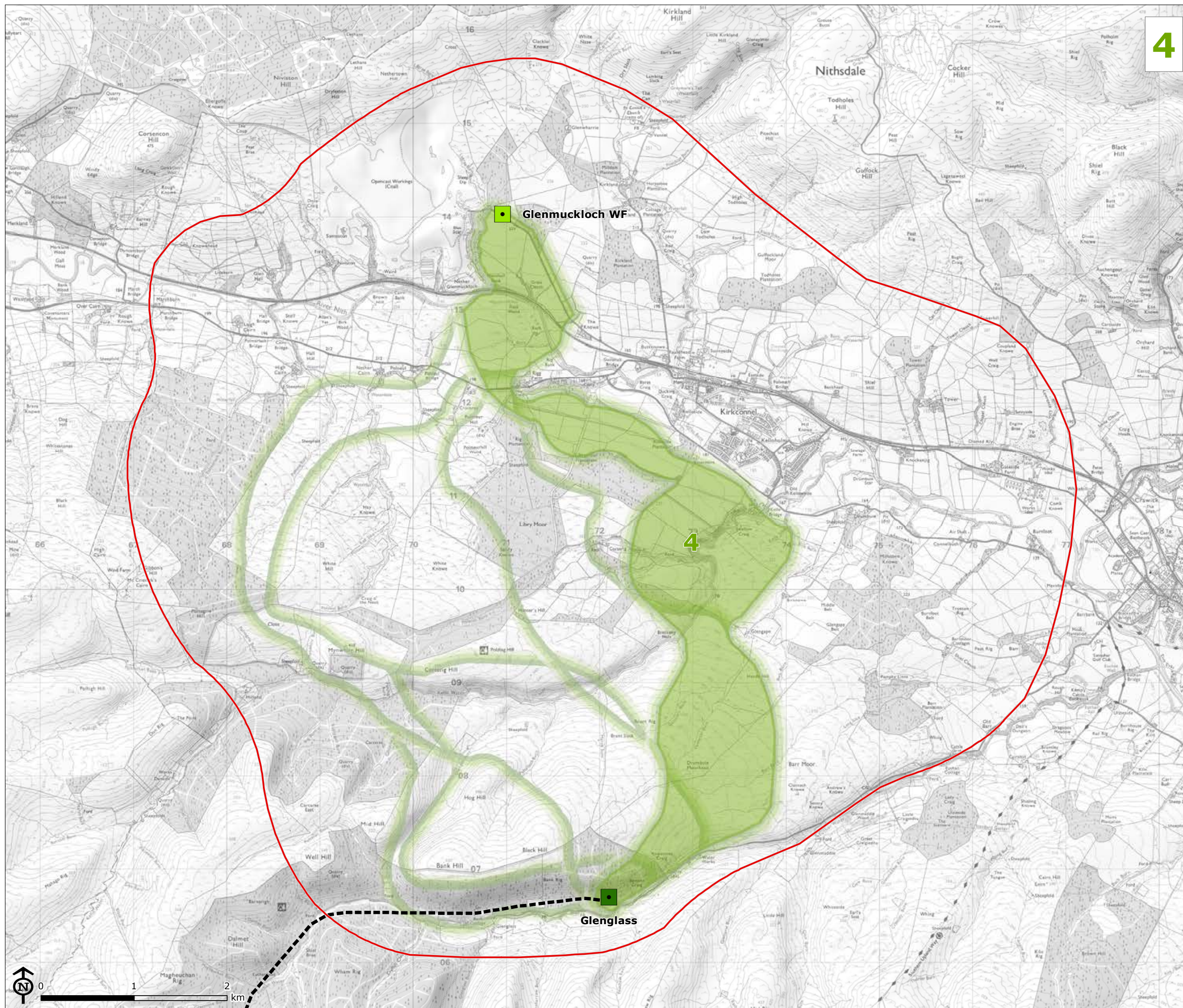


Map Scale: 1:40,000 @ A3



Figure 4.3d: Route Option 4

- Glenmuckloch Wind Farm Substation
- Existing Glenglass Substation
- Study Area
- Existing 132kV Overhead Line South West Scotland (SWS) Project
- Route Option
- Route Options Overview



Map Scale: 1:40,000 @ A3



5 Appraisal of Route Options

Approach to Appraisal of Route Options

- 5.1 The objective of the appraisal of the route options was to identify a preferred route for the Project, in a comparable, documented and transparent way to identify an overall preferred route option. As outlined in the Routeing Strategy, where the characteristics of the study area were such that they required to be balanced to enable the overarching Routeing Objective to be met, professional judgement, informed by both desk studies and field work, and reflecting the Holford Rules, was employed to identify the preferred route. This professional judgement was made on a case by case basis.
- 5.2 The process also sought to:
- continue to reflect the overall Routeing Objective and Routeing Strategy;
 - continue to reflect SPEN's Approach to Routeing and EIA document¹⁵;
 - continue to reflect the Holford Rules for Routeing Overhead Transmission Lines;
 - draw out distinctions between the routes to enable the relative strengths and weaknesses of each to be identified.
- 5.3 The comparative appraisal of route options was undertaken in stages as set out below:
- (i) identification of appraisal criteria, together with their reasoning for inclusion;
 - (ii) application of appraisal criteria to each route option, following the appraisal methodology;
 - (iii) comparative appraisal of route options to identify a preferred route;
 - (iv) SPEN technical review, reflecting system design requirements;
 - (v) cumulative appraisal with other OHL connections within the study area.

Appraisal Criteria

- 5.4 Based on the established practice for the line routeing and the routeing considerations for the project, the route options were appraised using the following criteria, which continue to reflect the key considerations of the routeing methodology:
- length of route;
 - biodiversity and geological conservation;
 - landscape and visual amenity (including recreation and tourism);
 - cultural heritage;
 - land use;
 - forestry; and
 - flood risk.
- 5.5 The reasoning for the use of these criteria and an outline of the methodology for appraising each route option is set out below.

¹⁵ SPEN (May 2015) Major Electrical Infrastructure Projects Approach to Routeing and Environmental Impact Assessment

Length of Route Option

- 5.6 Holford Rule 3 states that “other things being equal choose the most direct line”. Although this rule primarily relates to avoiding sharp changes in direction, and therefore the need for more visually intrusive angle towers/poles, choosing the most direct route may result in fewer adverse effects, than a longer, less direct route (taking due consideration of other constraints).

Biodiversity and Geological Conservation

- 5.7 SNH has published a series of maps and guidance documents relating to priority peatlands (Mapping of SNH Carbon Rich Soil, Deep Peat and Priority Peatlands (CPP) (July 2016). By dividing peatland habitat types into 4 broad ‘classes’, SNH has mapped those areas of Scotland of greatest value for carbon sequestration through peat formation. Class 1 and 2 peatlands are those which offer greatest restoration or carbon-sequestration potential. Whilst not avoided during the identification of route options, the spatial extent of these areas which could potentially be affected by the location of poles was included in the appraisal of route options.
- 5.8 An ornithological ‘trigger for consideration’ zone of 2km from Muirkirk and North Lowther Uplands SPA (designated for breeding golden plover, hen harrier, merlin, peregrine and short-eared owl, and for non-breeding hen harrier) and SSSI (designated for the breeding bird assemblage and breeding hen harrier) is applied to reflect the core range of the majority of these species in relation to connectivity with the SPA as their breeding and foraging area (SNH Guidance Note: *Assessing Connectivity with Special Protection Areas (SPAs)* (2016)).
- 5.9 The ornithological ‘trigger for consideration’ zones are included as a criterion within the appraisal of route options. Species constituting the qualifying features of these designated sites are likely to be reliant on habitats adjacent to, but outside, the designated site boundaries for foraging and, in some cases, for nesting. Hence, for individuals of these species, the presence of a route in the ‘trigger for consideration zones’ may present a risk of disturbance and collision, and the risk is considered to be proportionate to the length of the route option within this ‘trigger for consideration zone’. The appraisal highlights the length of route which intersects with these ‘trigger for consideration zones’ and whether they can be avoided during the alignment stage, and / or whether suitable mitigation can be implemented during construction.
- 5.10 Further ‘trigger for consideration’ zones have been applied to known nesting sites of Annex 1/ Schedule 1 listed raptor species and to display sites (leks) of black grouse. These ‘trigger for consideration’ zones have been derived from the literature primarily Whitfield, Ruddock and Bullman (*Expert Opinion as a tool for quantifying bird tolerance to human disturbance* Biological Conservation 2008). A distance of 500m was applied for a single peregrine nest site and single goshawk site, while any black grouse leks of more than one individual had a 750m distance applied¹⁶.
- 5.11 No records of high concentrations of Annex 1/Schedule 1 raptor species were identified.
- 5.12 The Biodiversity features included in the appraisal are shown on **Figure 5.1**.

Landscape and Visual Amenity

- 5.13 Consideration of landscape sensitivity to the type of OHL proposed, using landscape character types defined at a more localised scale, was supplemented by observations made during fieldwork to appraise the relative landscape fit of each route option. Consideration was also given to the presence of landscape designations¹⁷. The findings of the landscape sensitivity appraisal are presented as **Appendix 3**.
- 5.14 Non-residential visual amenity as experienced by those in the wider landscape, e.g. travelling along roads and using rail, was also a factor in the appraisal of Route Options. This allowed consideration of topography, potential backclothing and visual prominence to be considered (similar to Holford Rule 4).

¹⁶ Due to the confidential nature of the peregrine and goshawk data and limited number of black grouse leks these are not shown on the figure..

¹⁷ There are no landscape designations in the study area but a ‘Sensitive Landscape Area’ (Policy ENV 7 of the East Ayrshire Local Development Plan, April 2017) is located immediately to the west of the study area.

- 5.15 In relation to residential visual amenity, the following matters were considered: (1) the number of properties in proximity to the route option; (2) where the route option might encroach within the 150m 'trigger for consideration zone'; and (3) the implications for principal views from individual properties.
- 5.16 Consideration was also given to tourism receptors such as promoted/ key recreational viewpoints and promoted routes such as core paths. Landscape and visual receptors are shown on **Figure 5.2**.

Cultural Heritage

- 5.17 When appraising the route options, where a route was located within proximity to, or not able to avoid Listed Buildings and Unscheduled Archaeology of National Importance, the implications of this in relation to direct effects during the alignment stage have been highlighted within the appraisal. Unscheduled Archaeology of regional and local significance (recorded in the Dumfries and Galloway Council HER) was also mapped at this stage and taken account of in the appraisal.
- 5.18 Potential effects of the OHL on the setting of cultural heritage assets¹⁸, have been assessed by initially identifying assets within 3km of the route options, and 'screening' the assets using professional judgement to identify and appraise assets with the potential to experience an effect on their setting. The cultural heritage features included in the appraisal are shown on **Figure 5.3**.

Land Use

- 5.19 When appraising the route options, where a route was located within proximity to committed development (e.g. within the 150m 'trigger for consideration zone'), the implications of this for the alignment and/or subsequent environmental appraisal stage are highlighted. Existing and consented wind farms were also considered at this stage, with a 'trigger for consideration' zone of a 1.5x tip height buffer being placed around all turbines.
- 5.20 Committed development data has been obtained directly from Dumfries and Galloway Council.
- 5.21 Land Capability for Agriculture classes 1, 2 and 3.1 in Scotland are referred to as 'Best and Most Versatile' land (with regards to agricultural productivity), and are afforded protection from development. There are no class 1, 2 and 3.1 within the study area; therefore agriculture as a land use has not informed the route appraisal process.
- 5.22 With regard to areas committed for extraction, review of the following sources was undertaken to identify areas either already committed to or with potential for future minerals resource development:
- Geological maps of the area published by the BGS at 1:10,000 and 1:50,000 scale.
 - Local knowledge of mineral extraction sites and proposed developments in the study area.
 - Details of past and extant planning applications, consents and screening and scoping opinions in respect of mineral extraction within the area from Dumfries and Galloway Council;
 - Consultation with the Dumfries and Galloway Council Planning Officer.
 - BGS Database of available borehole and non-coal mine plan data.
 - Information on the current position with regard to areas licenced by the Coal Authority to mineral operators in respect of opencast coal mining operations, together with plans showing details of former opencast and underground mining operations within the area.
 - Available reference data obtained from the BGS including Sand and Gravel Resources of the Dumfries and Galloway Region of Scotland, Report 77/22 and Geology of the New Cumnock District, sheet description for Map 15w.
 - The Adopted Mineral Planning Policy Documents published by Dumfries and Galloway Council, together with the Mineral Assessment Technical Paper (September 2014).

¹⁸ Including Sanquhar conservation area which is located outwith the study area for routeing but within the 3km setting study area

- A visit to existing sites and areas identified with future extraction potential which was undertaken on 22 March 2018.

5.23 Areas with committed minerals development, comprising existing operational sites, areas allocated for minerals extraction in the Development Plan and those with valid licences/planning applications were included in the appraisal of route options. Former extraction areas, which have been restored and no longer with planning consent, extraction agreement or under licence, and areas which are considered to have mineral extraction potential, but are not subject to a valid planning application, were considered viable for routeing and were therefore not included in the appraisal process at this stage. Furthermore, the Glenmuckloch opencast site has been omitted from the appraisal as this will be fully restored as part of the Glenmuckloch PSH project and is therefore considered viable for routeing the Glenmuckloch WF 33kV OHL.

5.24 Land use features are shown on **Figure 5.4**.

Forestry

5.25 Forest areas within each of the route options were identified through the use of aerial photography, combined with digital data available from forest landowners, SNH and Forestry Commission Scotland (FCS) sources.

5.26 These forests were then divided into three groupings:

- 1 Conifer forest.
- 2 Ancient and Semi Natural Woodland sites (ASNW).
- 3 Native Woodlands from the Native Woodland Survey of Scotland (NWSS).

5.27 It is recognised that there is often overlap between 1 and 2 and also between 2 and 3. There is no perceived overlap between 1 and 3.

5.28 Appraisal against the forestry criterion comprised analysis of the extent and location of each forest type within the route options to identify net areas for these three forest types. The forestry is shown on **Figure 5.5**.

5.29 In general terms, the objective in identifying a preferred route is based on identifying the lowest impact for all three types of forest. This requires a subjective review which places greater weight on reducing the impact on types 2 and 3 ahead of type 1. This reflects the importance of the local resource of these woodland types and as such, the implications of the proposed removal of this type of forest within the wayleave (area of forestry felled to accommodate the OHL). In addition, for the ASNW forest designated areas, consideration was given as to whether this forest type was commercial forestry planted on an ancient forest site, rather than native forest. Whilst the importance of this is recognised in terms of the opportunity to restore these sites, it is deemed to merit less weight than the removal of NWSS.

5.30 In undertaking the appraisal, consideration was given as to whether or not the ASNW and NWSS forests can be avoided during the route alignment/environmental appraisal stage, assuming that the final wayleave within forestry will be up to 80m in width (i.e. 40m on either side of the OHL). In order to do so, two models based on the 80m wayleave were considered- the first using the central line of the route option and the second deviating away from the central line of the route option to seek to avoid woodland where possible whilst staying within the route to model a reduced impact route, as due to the often scattered and broken nature of natural forests, there is frequently the opportunity to avoid areas through careful consideration of the line alignment.

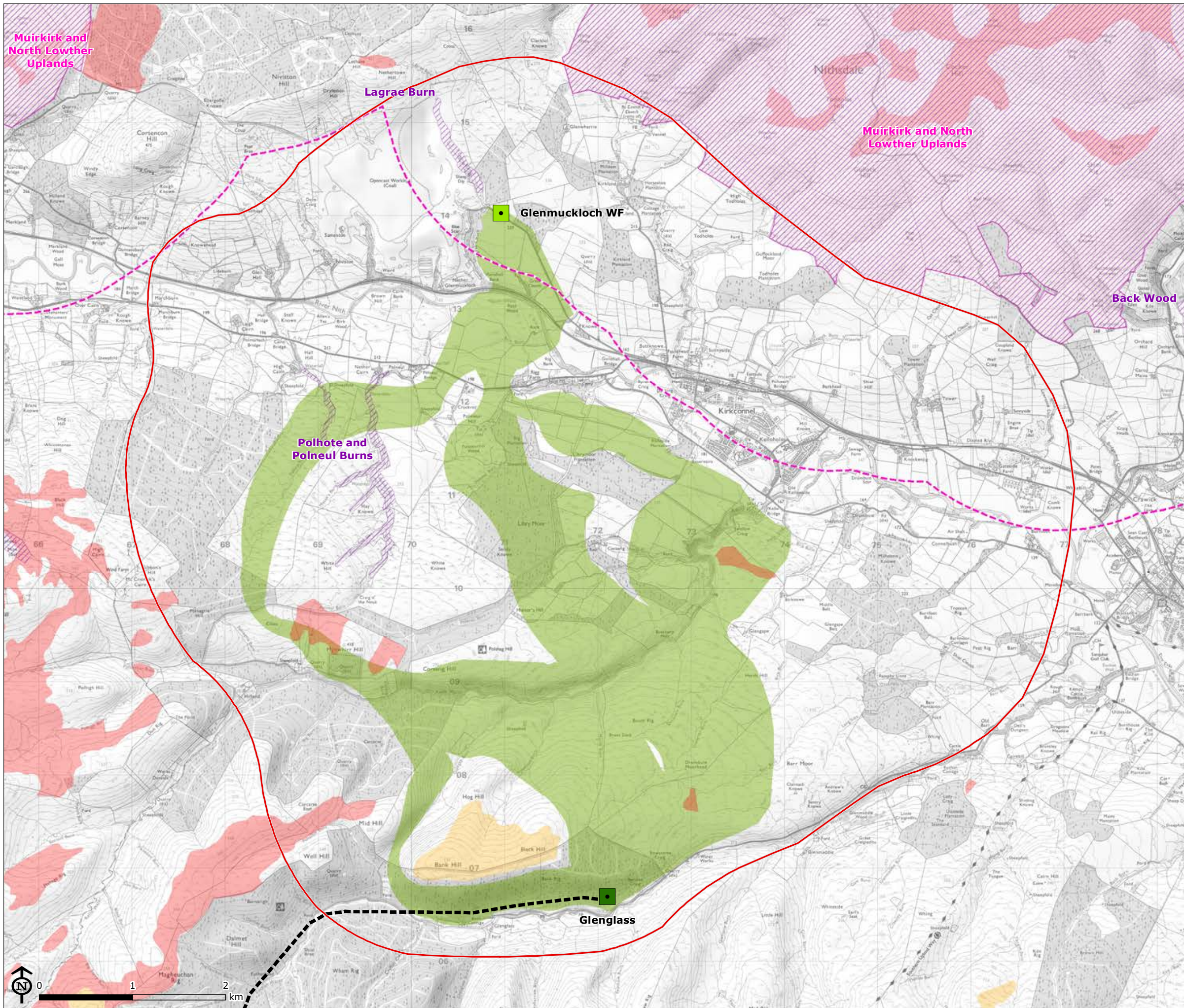
5.31 Further consideration will also be given to minimising impacts on forestry at the route alignment stage, taking account of the need to create long term stable forest edges and to minimise impacts on any forestry management practices. During the alignment/environmental appraisal stage consideration will be given to all three forest types through:

- taking account of existing, and planned, windfarm boundaries to minimise sterilisation of commercial woodland areas and reduce the requirements for additional felling outwith the wayleave;

- taking account of forest design plans and liaising with forestry owners/managers to avoid, or reduce restrictions on forest management operations/techniques e.g. maintaining access to woodland blocks for harvesting/safety; and
- identification of opportunities to retain and/or plant particularly lower growing shrub species within the wayleave.

Flood Risk

- 5.32 In relation to potential conflicts with policy relating to flooding and to avoid potential increase to flood risk, SEPA flood zones were mapped using GIS. When appraising the route options, the ability to span the flood zone (average span of 100m for wood pole) was considered. The appraisal considered the potential to cross the flood zone at the narrowest point, all other environmental/ technical considerations being equal.
- 5.33 The flood risk considerations taken into account during the route option appraisal are shown on **Figure 5.6** along with watercourses.
- 5.34 The appraisal criteria are presented in **Appendix 2**. Where an environmental factor was not located within the study area, or did not influence the appraisal, it is not included within **Appendix 2** or the appraisal tables.



**Glenmuckloch 33kV Project
Routing and Consultation Report**

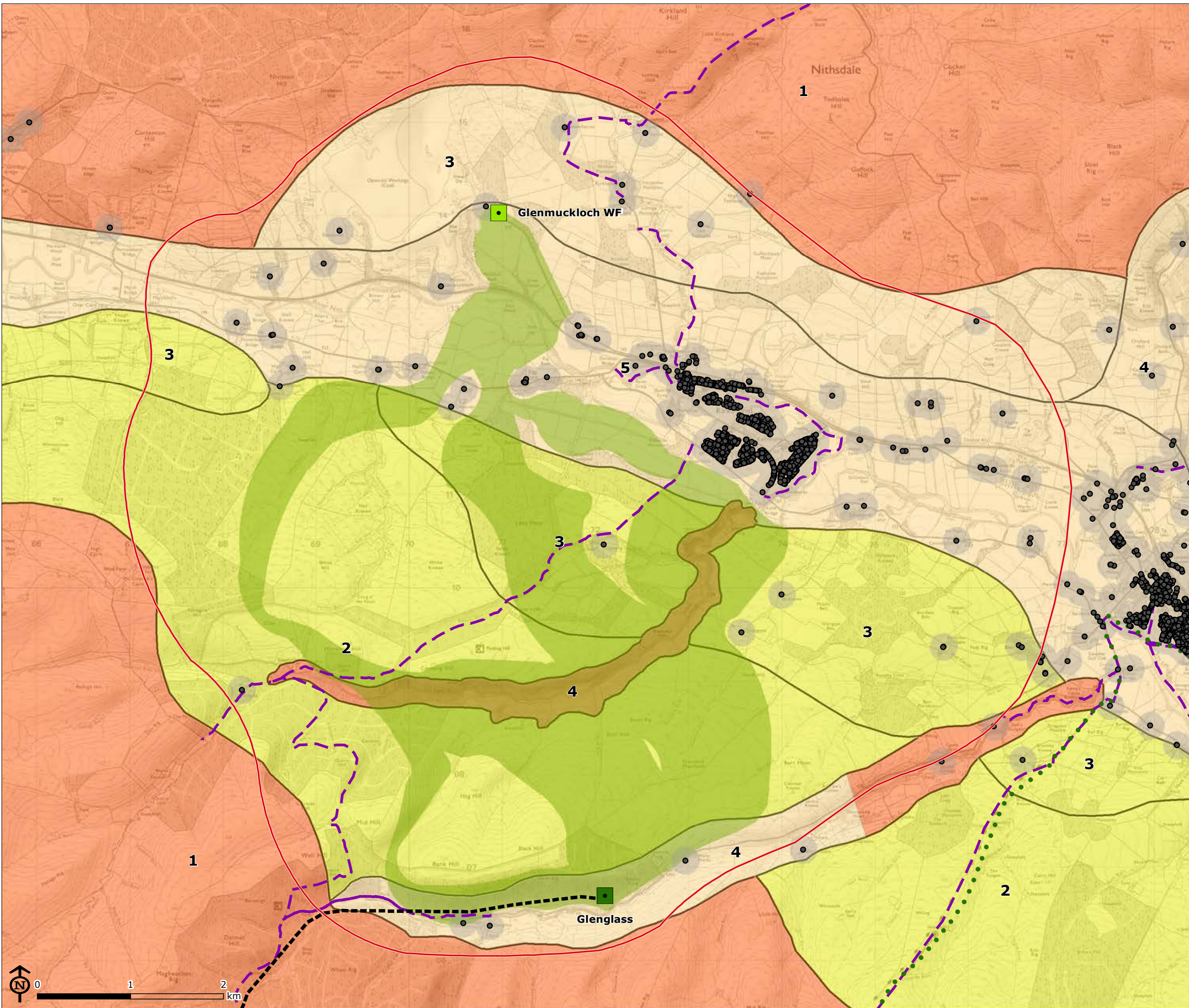
Figure 5.1: Biodiversity and Geological Conservation

- Glenmuckloch Wind Farm Substation
 - Existing Glenglass Substation
 - Study Area
 - Existing 132kV Overhead Line South West Scotland (SWS) Project
 - Route Options Overview
- Biodiversity and Geological Conservation**
- Special Protection Area (SPA)
 - Special Protection Area - 2km buffer
 - Site of Special Scientific Interest (SSSI)
 - Priority Peatland Habitats - Category 1 (SNH)
 - Priority Peatland Habitats - Category 2 (SNH)

Map Scale: 1:40,000 @ A3



Figure 5.2: Landscape and Visual Receptors

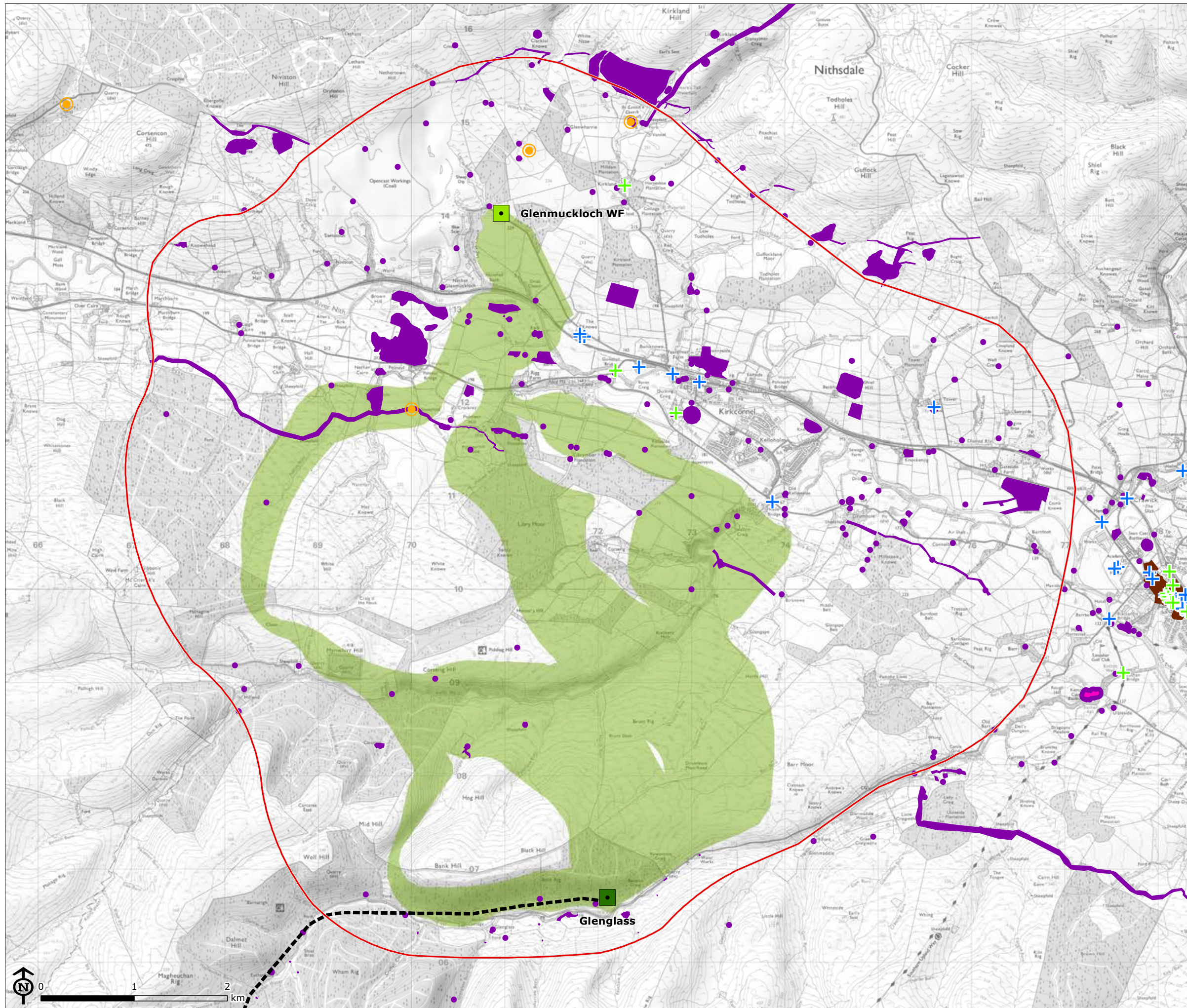


- Glenmuckloch Wind Farm Substation
- Existing Glenglass Substation
- Study Area
- Existing 132kV Overhead Line South West Scotland (SWS) Project
- Route Options Overview
- Landscape and Visual Receptors**
- Southern Upland Way
- Core Path
- Residential Property
- Residential Property - 150m buffer
- Landscape Sensitivity: (33kV Wood Pole)**
- Higher
- Medium
- Lower
- Local Landscape Character Types
- 1. Southern Uplands
- 2. Transitional Slope
- 3. Undulating Midslope
- 4. Incised Tributary Valley
- 5. River Nith Valley Floor

Map Scale: 1:40,000 @ A3



Figure 5.3: Cultural Heritage



- Glenmuckloch Wind Farm Substation
- Existing Glenglass Substation
- Study Area
- Existing 132kV Overhead Line South West Scotland (SWS) Project
- Route Options Overview
- Cultural Heritage**
- + Listed Building - Category B
- + Listed Building - Category C
- Scheduled Monument
- Conservation Area
- Unscheduled Archaeology of National Importance
- Undesignated Archaeology of Regional / Local Importance (HER)
- Historic Environment Record - Point
- Historic Environment Record - Polygon

Map Scale: 1:40,000 @ A3



Figure 5.4: Land Use

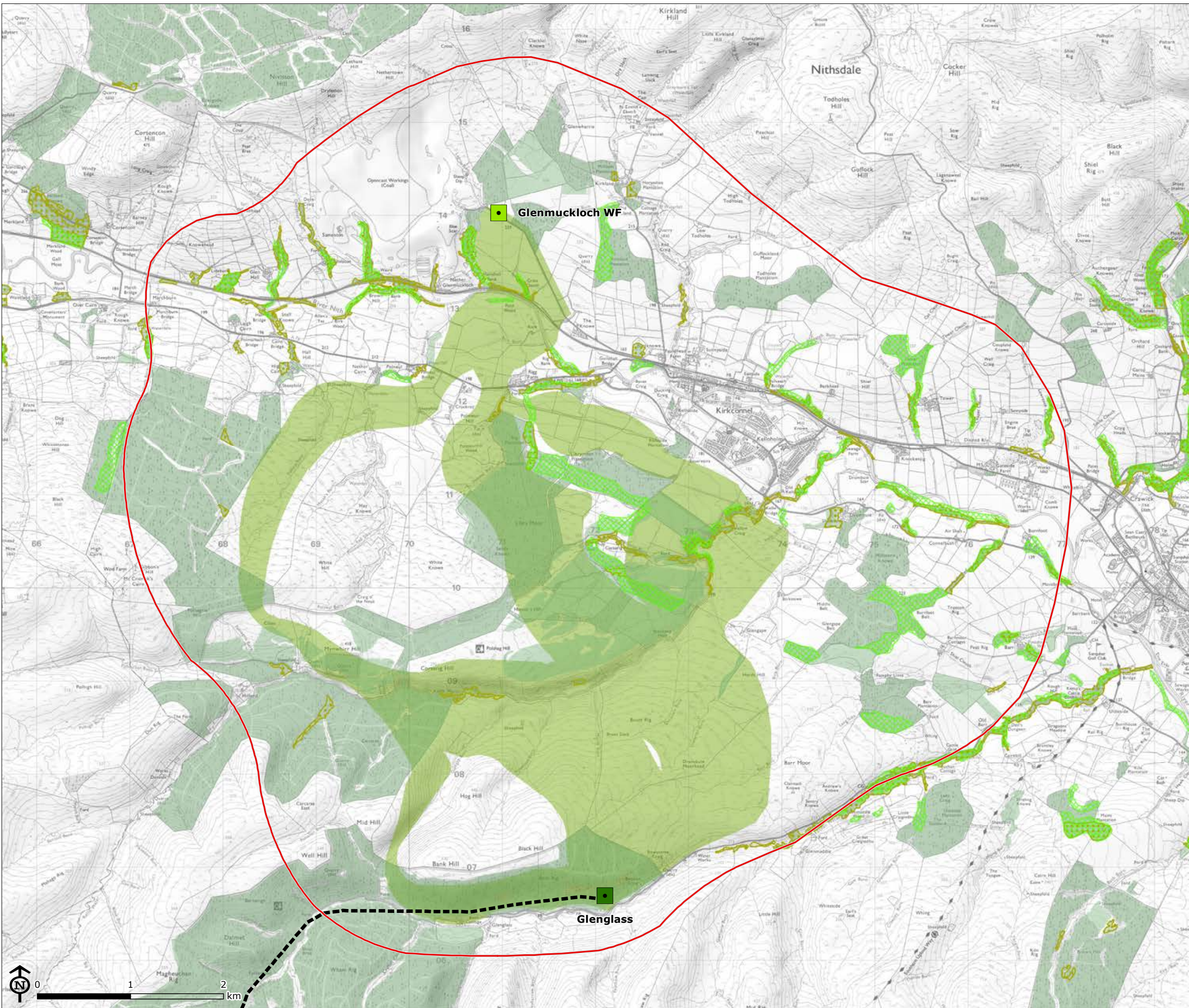
- Glenmuckloch Wind Farm Substation
 - Existing Glenglass Substation
 - Study Area
 - Existing 132kV Overhead Line South West Scotland (SWS) Project
 - Route Options Overview
- Land Use**
- Turbine - Operational
 - Turbine - Consented
 - Wind Farms Min Distance (1.5 x Tip Height)



Map Scale: 1:40,000 @ A3



Figure 5.5: Forestry



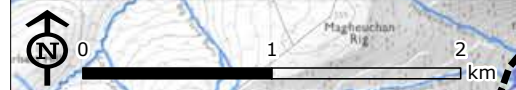
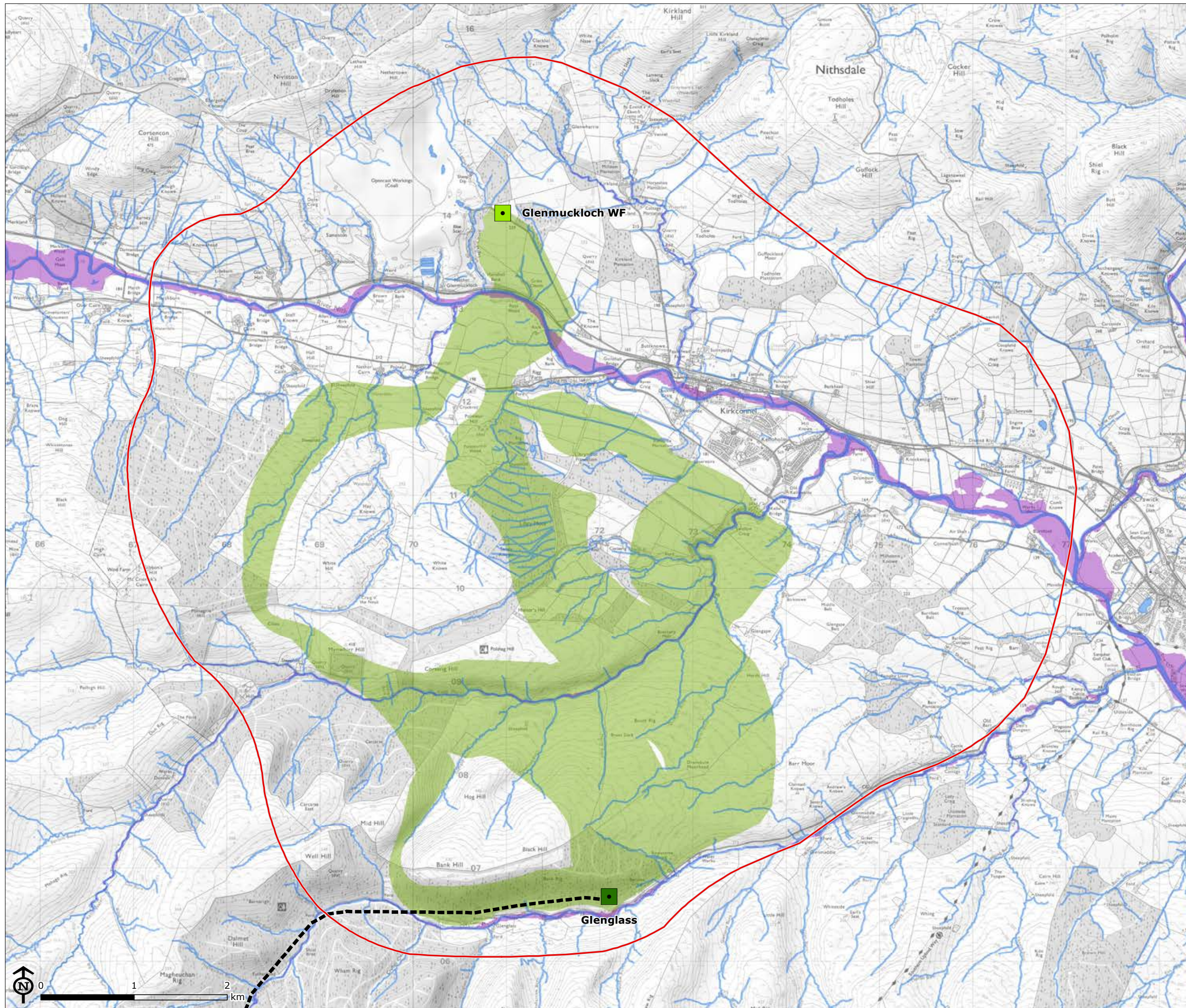
- Glenmuckloch Wind Farm Substation
 - Existing Glenglass Substation
 - Study Area
 - Existing 132kV Overhead Line South West Scotland (SWS) Project
 - Route Options Overview
- Forestry**
- Ancient Woodland Inventory (AWI)
 - Native Woodland (NWSS)
 - National Forestry Inventory (NFI)

Map Scale: 1:40,000 @ A3



Figure 5.6: Flood Risk Zones and Watercourses

- Glenmuckloch Wind Farm Substation
 - Existing Glenglass Substation
 - Study Area
 - Existing 132kV Overhead Line South West Scotland (SWS) Project
 - Route Options Overview
- Flood Risk Zones and Watercourses**
- Watercourse 10m Buffer
 - Flood Risk (1 in 200 years)



Map Scale: 1:40,000 @ A3



6 Appraisal Findings

- 6.1 The emerging preferred route for the 33kV OHL, i.e. the preference taking account of environmental considerations only, is Route Option 3. Route Option 3 is the shortest route and also has the best potential, relative to other options, to minimise visual effects on residential receptors and effects on the wider landscape.
- 6.2 During route alignment within Route Option 3 however, careful consideration will be required to be given to minimising direct effects on Unscheduled Archaeology of National Importance and Undesignated Archaeology of Regional/Local Importance as well as indirect effects on the setting of features during route alignment. Whilst both ancient and native woodland can be avoided within Route Option 3 during route alignment, felling of commercial woodland cannot be avoided during route alignment.
- 6.3 The detailed appraisal findings are included as **Appendix 4**.

Technical Review of Emerging Preferred Route Option

- 6.4 Following the environmental appraisal of options, the emerging preferred route was reviewed by SPEN in relation to the system/network design requirements. This review was undertaken to ensure that, based on the level of detail available, the preferred route is within the technical parameters required to construct OHLs. This included consideration of altitude, topography, slope gradients, watercourse crossings (e.g. River Nith and Kello Water), existing OHLs and other infrastructure (e.g. the A76 and railway).
- 6.5 At this stage, design engineers highlighted that the crossing of the Kello Water in Route Option 3 may (subject to detailed topographic survey) require the use of a single steel lattice tower on either side of the watercourse.
- 6.6 Primarily due to their greater height and form of structure, there is potential for steel lattice towers to have greater visual effects than wood poles. Therefore to consider the visual effects of the potential use of steel lattice towers to cross the Kello Water, a computer model of the study area was created and a series of viewpoints reviewed. Using indicative alignments, this allowed comparison of Route Option 3 (using the combination of wood pole and steel lattice) with the next preferred option: Route Option 4 (using wood pole only).
- 6.7 Comparison confirmed the likelihood that a greater number of visual receptors would be affected by Route Option 4 than Route Option 3. It was also shown that the combination of commercial plantation, topography of the surrounding area and outlook of nearby visual receptors would limit the change which would be experienced as a result of using steel lattice towers at the Kello Water within Route Option 3. As a result of this comparison, use of steel lattice towers at the Kello Water would not change the emerging preference for Route Option 3.
- 6.8 On this basis the technical and subsequent environmental review confirmed the emerging preferred route could be progressed to the cumulative appraisal stage as outlined below.

Consideration of Cumulative Effects of Emerging Route Option Preferences

- 6.9 As set out in **Chapter 3**, the routeing process takes cognisance of other OHL connections which share the project study area. When considering more than one project, combined or cumulative effects can arise from the concentration of effects in one area or the distribution of effects across a wider area. It is therefore necessary to find an appropriate balance using professional judgement and experience. The objective of this review was to ensure that, in combination, the

preferred routes for each OHL connection continue to meet the routing objective and SPEN's statutory duties.

- 6.10 The other OHL connections considered in the cumulative appraisal comprise the Glenmuckloch PSH 132kV Connection Project and the Sandy Knowe Wind Farm Connection. The emerging preferred routes for both of these connections are shown on **Figure 6.1**, overlaid with the emerging preferred route for the Glenmuckloch 33kV Connection Project, Route Option 3.
- 6.11 Details of the routing processes for each connection are presented in the following documents:
- Sandy Knowe Wind Farm to Glenglass Substation, Routing and Consultation Document (May 2017)¹⁹.
 - Glenmuckloch PSH 132kV Connection Routing and Consultation Report (Jan 2019).
- 6.12 Following technical confirmation of the emerging route preference for the 33kV Project, an environmental review was undertaken of the above connections in combination with each other.
- 6.13 The environmental review found that there is potential for the 33kV Project to result in cumulative effects in combination with the steel tower connection of the Glenmuckloch PSH 132kV Connection project. There is also potential for cumulative effects in combination with the Sandy Knowe Wind Farm Connection, particularly in the proximity to the Glenglass substation. The key areas in relation to potential cumulative effects with each of the other proposed projects are outlined below.

Glenmuckloch PSH 132kV Connection Project

- 6.14 The emerging preferred route option for the Glenmuckloch PSH 132kV Connection Project is Route Option 4 therefore, both connections would largely run alongside one another from Nith Valley up to the Glenglass substation. The crossing of the River Nith valley (including crossing of the river, railway and the A76) is an area of complex landform overlooked by a concentration of residential and sequential (i.e. transportation) visual receptors.
- 6.15 It is judged that the contrasting form, vertical height and differing span between structures of the two connection types (i.e. wood pole and steel tower) has the potential to result in cumulative visual effects if both connections were located in the same Route Option in the sensitive valley area (in accordance with Holford Rule 6). In accordance with the routing methodology an environmental and technical review was undertaken of the cumulative implications of the second best performing route option.
- 6.16 The technical review found that there was a requirement to avoid the 132kV and 33kV overhead lines crossing over each other. If the 132kV overhead line crossed the 33kV overhead line, any time maintenance was required to be carried out on one line there would also be a requirement for an outage to be taken on the other line. This can have a negative impact on project programmes and requires added safety measures. If the 33kV was undergrounded below the 132kV overhead line this would introduce more technical difficulties, costs and points of potential failure into the proposed system. On this basis, the preference from the technical review is to have the two overhead lines within their own separate route options, which provides the safest solution primarily in terms of construction and maintenance of the lines.
- 6.17 The environmental review found that all route options for the Glenmuckloch WF 33kV Connection Project would cross the River Nith in a similar area, i.e. between Netherton and The Knowe, with alternative route options not being identified due to the combination of technical and environmental constraints elsewhere in the study area. The environmental review of the 132kV route options found that on balance, the effects associated with the second best performing route option for the 132kV, Route 3, are broadly comparable to those of Route 4. Route 4 crosses the sensitive valley approximately 2.5km to the west which is considered, with intervening landscape features, to provide sufficient distance that both overhead lines are unlikely to create a 'wirescape' of confusing appearance (Holford Rule 6).

¹⁹ SPEN (May 2017) Proposed 132kV Overhead Line Connection from Sandy Knowe Wind Farm to Glenglass Substation, Routing and Consultation Document (May 2017). Available[online] at: https://www.spenergynetworks.co.uk/pages/sandy_knowe_wind_farm_connection_project.aspx

- 6.18 Consequently, the emerging preferred Route Option for the Glenmuckloch WF 33kV Connection Project has been taken forward as the preferred route (i.e. Route Option 3) and the second best performing option for the Glenmuckloch PSH 132kV Connection Project is being taken forward as the preferred route (Route Option 3) to avoid the concentration of cumulative effects in the sensitive Nith valley crossing area whilst also meeting the technical requirements (see **Figure 6.2**).

Sandy Knowe Wind Farm Connection

- 6.19 The combination of the 33kV Project, the Glenmuckloch PSH 132kV Connection Project and the Sandy Knowe Wind Farm Connection will result in a concentration of cumulative effects in the vicinity of the existing Glenglass Substation. This is common in proximity to substations into which a number of overhead lines converge. In the wider study area, the three connections will result in diffuse cumulative effects.
- 6.20 None of the alternative route options would avoid or reduce potential cumulative effects in the vicinity of the existing Glenglass substation (due to the technical requirements of all the projects to connect into here). In the wider study area, it is not considered likely that cumulative effects would be of a level sufficient to necessitate consideration of alternatives.
- 6.21 The decision was therefore made that the Glenmuckloch WF 33kV Connection Project would not be amended to avoid potential cumulative effects in combination with the Sandy Knowe Wind Farm Connection Project.
- 6.22 Cumulative effects will continue to be considered, and assessed where appropriate, throughout the detailed alignment design and environmental appraisal process.

Conclusion

- 6.23 In accordance with the overarching project routeing strategy, the selection of the preferred route has primarily reflected the findings of the landscape and visual appraisal, including residential amenity, subject to avoiding areas of highest amenity value. This is on the basis that the routeing stage comprises the most effective way of avoiding and/or minimising potential landscape and visual effects, whereas effects on other environmental characteristics, such as cultural heritage can more readily be avoided/minimised during the route alignment stage (and potentially through adoption of mitigation measures).
- 6.24 On this basis, the environmental and technical appraisal undertaken as part of the routeing process has identified a continuous 33kV OHL route which meets the project routeing objective. The preferred route is confirmed as Route Option 3 and is shown on **Figure 6.2**. The preferred route, along with the alternative route options considered, form the basis of this round of consultation with stakeholders and the public. Further details in relation to the consultation process are provided in **Chapter 7**.

Figure 6.1: Emerging Preferred Routes

Glenmuckloch 33kV Connection Project

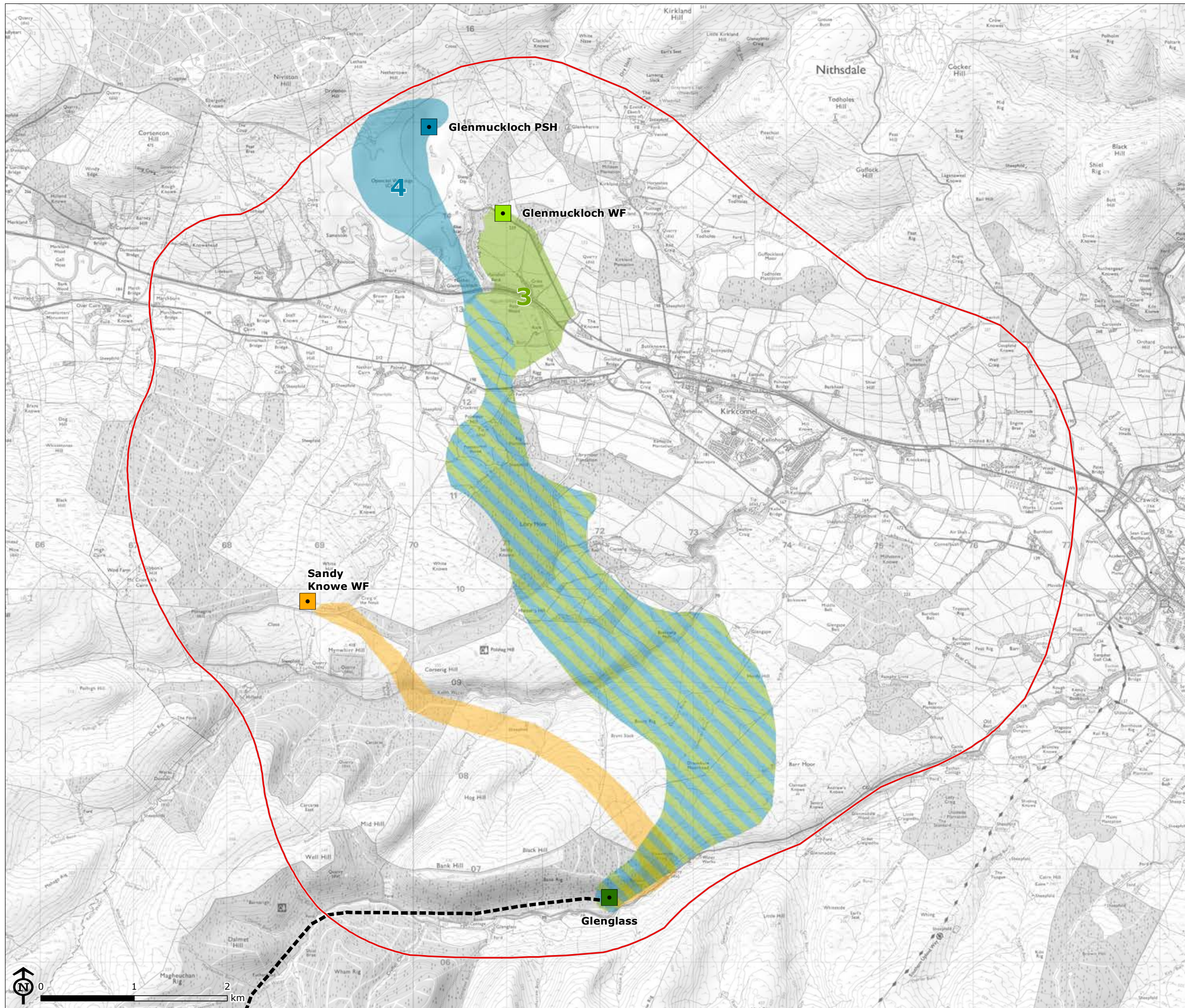
- Glenmuckloch Wind Farm Substation
- Existing Glenglass Substation
- 33kV Connection Route Option 3
- Study Area

Glenmuckloch 132kV Connection Project

- Consented Glenmuckloch Pumped-Storage Hydro Substation
- Preferred Route Option 4

Sandy Knowe Wind Farm Connection

- Sandy Knowe Substation
- Preferred Route Option

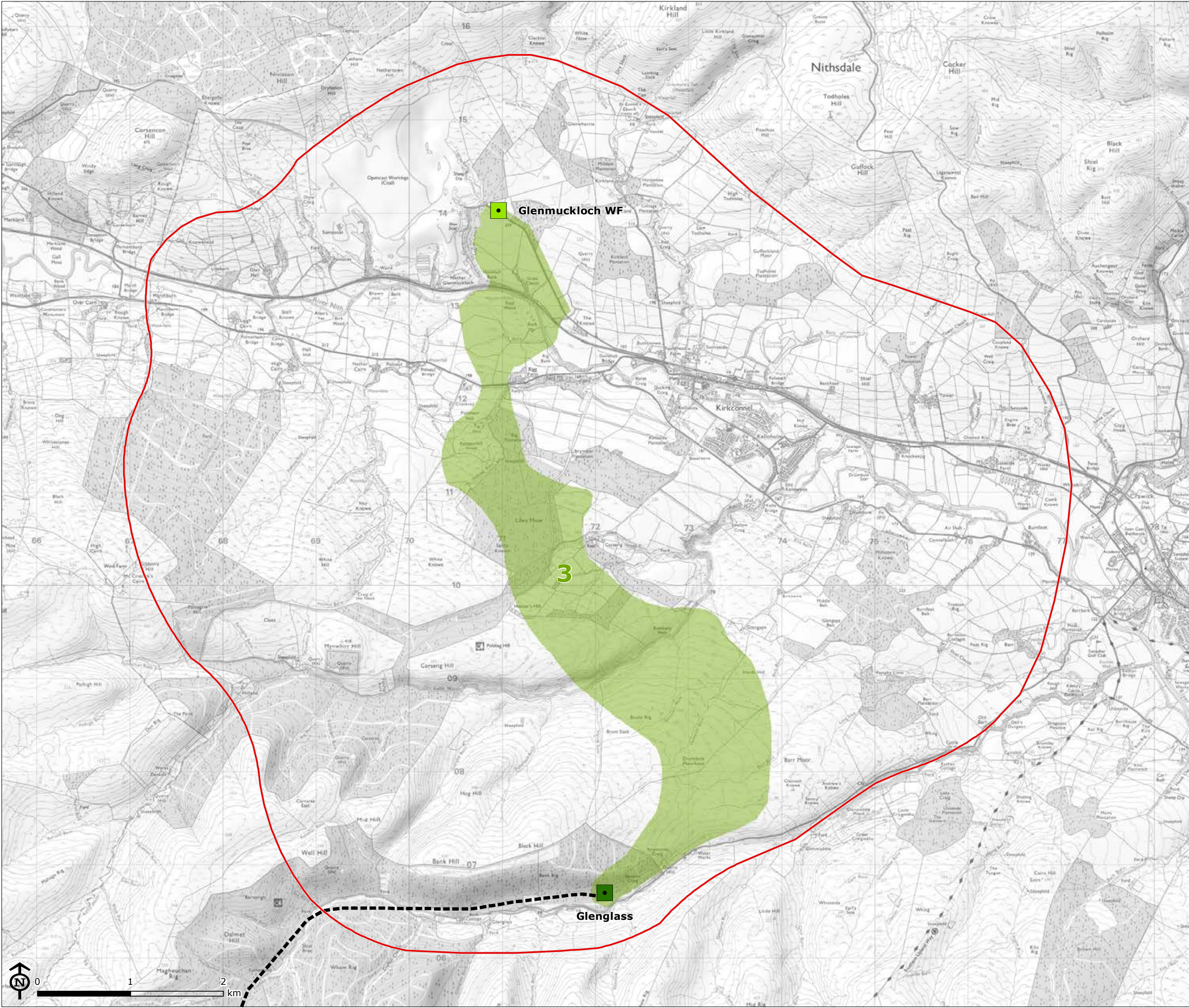


Map Scale: 1:40,000 @ A3



Figure 6.2: Preferred Route

- Glenmuckloch Wind Farm Substation
- Existing Glenglass Substation
- Study Area
- Existing 132kV Overhead Line South West Scotland (SWS) Project
- Preferred Route**
- 33kV Connection Route



Map Scale: 1:40,000 @ A3



7 Consultation Process and Next Steps

The Consultation Process

- 7.1 As set out in **Chapter 1**, SPEN will apply to Scottish Ministers for consent for the new 33kV OHL comprising the Glenmuckloch 33kV Connection Project under Section 37 of the Electricity Act 1989 for consent to install and keep installed the overhead electricity line. SPEN will also apply for deemed planning permission for the line and associated works under Section 57(2) of the Town and Country Planning (Scotland) Act 1997. While there are no formal pre-application requirements for consultation in seeking section 37 consent/deemed planning permission, SPEN is embracing best practice as outlined in the *Scottish Government Energy Consents Unit's Best Practice Guidance (January 2013)*. This guidance encourages applicants to engage with stakeholders and the public in order to develop their proposals in advance of such applications being made.
- 7.2 Therefore, prior to the submission, SPEN is carrying out consultation with stakeholders and the public.
- 7.3 Following the submission of application for Section 37 consent and deemed planning permission, the Scottish Government Energy Consents Unit will, on behalf of Scottish Ministers, carry out further consultation with the public and stakeholders, including Dumfries and Galloway Council.

Consultation Strategy

- 7.4 SPEN attaches great importance to the effect that its works may have on the environment and local communities and is very keen to hear the views of local people to help it develop the Glenmuckloch 33kV Connection Project in the best way.
- 7.5 The overall objective of the consultation process is to ensure that all parties with an interest in the Glenmuckloch 33kV Connection Project continue to have access to up to date information and are given clear and easy ways in which to shape and inform SPEN's proposals at the pre-application stage.
- 7.6 In addition, it is envisaged that the key issues identified through this process can be recorded and presented to decision makers in order to assist the consents process.

Consultation Launch and Duration

- 7.7 The consultation will run for four weeks from 26th February until 26th March 2019.
- 7.8 Prior to the consultation, adverts will appear in local weekly newspapers at least seven days before the first exhibition. A news release will be issued to local media announcing the impending start of the consultation.

Consultees

- 7.9 SPEN wishes to consult with relevant stakeholders and gain their views on the proposed route of the Glenmuckloch 33kV Connection Project. The consultation will seek to gain views from the following broad groups:
- statutory and non-statutory consultees, including community councils;
 - local residents and businesses along the route;
 - known local interest and community groups operating in the study area;

- elected members of Dumfries and Galloway Council area, the Member of Parliament (MP) and Members of the Scottish Parliament (MSPs) whose constituencies are within the Dumfries and Galloway Council area; and
- the public in general.

The Focus of the Consultation

- 7.10 This report presents the findings of Phase One of the Glenmuckloch 33kV Connection Project, the routeing process, resulting in the identification of a preferred route.
- 7.11 The focus of the consultation will be to ask for people's views on:
- the preferred route;
 - the alternative route options considered during the routeing process;
 - any other issues, suggestions or feedback; particularly views on the local area, for example areas used for recreation, local environmental features, and any plans to build along the preferred route.

Sources of Information about the Consultation

- 7.12 The principal sources of information regarding the consultation will comprise the Glenmuckloch 33kV Connection Project leaflet and the project website: www.spenergynetworks.co.uk/pages/community_consultation

Project Leaflet

- 7.13 The leaflet will include details of the scheme, the consultation process, how to find out more and how to submit comments by feedback form, website, post or email, and by when. The leaflet will be emailed to community councils and known local interest and community groups operating in the Dumfries and Galloway Council area and made available in the public viewing locations.

Project Website

- 7.14 The website (www.spenergynetworks.co.uk/pages/community_consultation) will build on the information in the leaflet, with publicly available consultation documents for viewing or download, and an online feedback form. The feedback form will be available from 26th February 2019 until the deadline for receipt of feedback at midnight on 26th March 2019.

Consultation Documents

- 7.15 Hard copies of consultation documents will be lodged at publicly-accessible information points from 19th February 2019 for those who do not have access to the internet, cannot attend an exhibition or would prefer to see them in person. Details of these information points are listed in the Preface of this document and in other consultation materials.

How People can make a Comment

- 7.16 There will be a number of ways for people to make comments:
- in person at an exhibition;
 - by post, using as paper feedback form, or by letter; or
 - by email.

In person

- 7.17 SPEN will hold two public exhibitions on February 26th and February 27th 2019 within the local area where people can look at maps, talk to members of the project team and pick up a feedback form. Locations have been chosen so that people within the consultation zone are only a short distance from their nearest exhibition by car or public transport. The dates and venues are listed in full in the project leaflet and on the website. The format will be an afternoon/evening drop-in.
- 7.18 The exhibitions will be held at the following locations from 2pm until 8pm on the days stated:
- Tuesday 26th February 2019 at the Kirkconnel Miners Memorial Hall

- Wednesday 27th February 2019 at the Sanquhar Town Hall

Post

- 7.19 A hard-copy feedback form will be available at public exhibitions, for download from the website, by request to glenmucklochprojectmanager@spenergynetworks.co.uk . Completed forms must be returned to Glenmuckloch Project Manager, SPEN Environmental Planning, 3rd Floor Ochil House, 10 Technology Avenue, Blantyre, G72 0HT no later than midnight on the 26th March 2019. If returning completed forms by post people are advised to allow up to 7 days for these to be received. It may not be possible to consider forms received after this date.

E-Mail

- 7.20 SPEN will also accept comments relating to the specific focus of this round of consultation by e-mail to glenmucklochprojectmanager@spenergynetworks.co.uk no later than midnight on 26th March 2019.

Next Steps: Route Alignment and Environmental Appraisal

- 7.21 The responses received from the consultation process will be considered in combination with the findings of this report to enable SPEN to decide on the 'proposed' route to be progressed to the next stage.
- 7.22 The proposed route will then progress to a more detailed review to identify an OHL alignment, including individual pole positioning, which will be informed by the parallel environmental appraisal stage, detailed engineering ground surveys and discussions with landowners. This alignment, including all ancillary development will be included in the application for Section 37 Consent and deemed planning permission.
- 7.23 SPEN will consult fully with affected landowners and occupiers on all aspects of the Glenmuckloch 33kV Connection Project and will give them an opportunity to comment on proposals as they progress.

Appendices

Appendix 1 The Holford Rules and SHETL Clarification Notes

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

Rule 1

Avoid altogether, if possible, the major areas of highest 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 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 Guidelines¹⁵, 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 (NPPG 14)¹⁶

Special Protection Area (NPPG 14)¹⁷

Ramsar Site (NPPG 14)¹⁸

National Scenic Areas (NPPG 14)¹⁹

National Parks (NPPG 14)²⁰

National Nature Reserves (NPPG 14)²¹

Protected Coastal Zone Designations (NPPG 13)²²

Sites of Special Scientific Interest (SSSI) (NPPG 14)²³

Schedule of Ancient Monuments (NPPG 5)²⁴

Listed Buildings (NPPG 18)²⁵

Conservation Areas (NPPG 18)²⁶

World Heritage Sites (a non-statutory designation) (NPPG 18)²⁷

Historic Gardens and Designed Landscapes (a non-statutory designation) (NPPG 18)²⁸

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 which are used when lines change direction.

¹⁵ The National Planning Policy Guidelines ("NPPG") have been superseded by the Scottish Planning Policy ("SPP") published on 23 June 2014. The references to the relevant equivalent paragraphs of the SPP are noted.

¹⁶ Now noted in SPP paragraph 207.

¹⁷ Now noted in SPP paragraph 207.

¹⁸ Now noted in SPP paragraph 211.

¹⁹ Now noted in SPP paragraph 212.

²⁰ Now noted in SPP paragraph 212.

²¹ Now noted in SPP paragraph 212.

²² Now noted in SPP paragraph 87.

²³ Now noted in SPP paragraphs 211-212.

²⁴ Now noted in SPP paragraph 145.

²⁵ Now noted in SPP paragraph 141.

²⁶ Now noted in SPP paragraph 143.

²⁷ Now noted in SPP paragraph 147.

²⁸ Now noted in SPP paragraph 148.

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) Impacts 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 landuses 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.

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 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 impacts 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 impacts on the amenity of existing development and on proposals for new development.
- c) When siting substations take account of the impacts 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 Regional and Local Importance

Where possible choose routes which cause the least disturbance to Areas of Great Landscape Value and other similar designations of Regional or Local Importance.

c) Alternative Lattice Steel Tower Designs

In addition to adopting appropriate routeing, evaluate where appropriate the use of alternative lattice steel 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 lattice steel towers in Scotland and summarised these in a document entitled *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 house, 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.

Supplementary Notes on the Siting of Substations

- a) Respect areas of high amenity value (see Rule 1) and take advantage of the containment of natural features such as woodland, fitting in with the landscape character of the area.
- b) Take advantage of ground form with the appropriate use of site layout and levels to avoid intrusion into surrounding areas.
- c) Use space effectively to limit the area required for development, minimizing the impacts on existing land use and rights of way.
- d) Alternative designs of substation may also be considered, e.g. 'enclosed', rather than 'open', where additional cost can be justified.
- e) Consider the relationship of tower and substation structures with background and foreground features, to reduce the prominence of structures from main viewpoints.
- f) When siting substations take account of the impacts of line connections that will need to be made.

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

1 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, or 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 license 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 NPPG5: 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: Archaeology and Planning refers to the setting of scheduled ancient monuments and NPPG 18: Planning and the Historic Environment refers to the setting Listed Buildings. None of these documents define setting.

APPENDIX B

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

Major Areas of Highest Amenity Value

1 In Scotland relevant national or international designations for major areas of highest amenity value include the following identified from Scottish Planning Policies and National Policy Guidelines²⁹:

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	(NPPG 18)
Historic Gardens and Designated Landscapes	(NPPG 18)

Other Smaller Areas of High Amenity Value

2 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

²⁹ See footnotes under Holford Rule 1 (note on Rule 1) for references update.

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

- 3 Legislation sets out the procedure for designation of areas relating to flora, fauna and to geographical and physiogeographical features. Designations relevant to the routing 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

- 4 Certain designations covering more limited areas are of relevance to the protection of views and the settings of towns, villages, buildings or 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 Designated Landscapes included in the Inventory of Gardens and Designated Landscapes of Scotland

Green Belts

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

Appendix 2: Environmental Considerations

Topic	Consideration	Objectives
Length	Length of overhead line route.	To seek to identify the shortest most direct route (Holford Rule 3).
Technical	Existing Electricity Network (132kV and above)	To avoid technical conflicts with existing or planned infrastructure.
	Slope Angle: >22 degrees (wood pole) >40 degrees (steel tower)	To avoid steep slopes unsuitable for wood poles or steel towers.
Biodiversity and Geological Conservation	SSSI Sites (Holford Rule 1)	To seek to avoid/reduce, as far as practical, effects on designated sites of ecological or geological conservation importance. (Holford Rule 1 and 2).
	RAMSAR Sites* (Holford Rule 1)	
	Special Protection Areas (SPA)(Holford Rule 1)	To seek to avoid/reduce, as far as practical, effects on ornithological species of high conservation value. (Holford Rule 1)
	Special Areas of Conservation (SAC)*(Holford Rule 1)	To seek to avoid/reduce loss of peatlands in accordance with Scottish Planning Policy (SPP). (Holford Rule 2).
	National Nature Reserves*(Holford Rule 1)	
	Scottish Wildlife Trust Reserve* (Holford Rule 2)	
	Local Wildlife Sites (Holford Rule 2)	
	Local Nature Reserves* (Holford Rule 2)	
	Known nest sites of Annex 1/Schedule 1 raptor species and Black Grouse Leks (Holford Rule 1)	
SNH Priority Peatland Habitats (Classes 1 and 2) (Holford Rule 2)		
Landscape and Visual Amenity	National Scenic Areas*(Holford Rule 1)	To seek to avoid/reduce, as far as practical, effects on designated landscapes. (Holford Rule 1 and 2).
	Wild Land Areas*(Holford Rule 1)	To contribute to the understanding of likely landscape and visual sensitivities within different areas for routing. (Holford Rules 4, 5, 6 and 7).
	Visual Amenity (Holford Rule 4)	
	Residential Visual Amenity with '150m trigger for consideration zone'	To seek to avoid/reduce, as far as practicable, potential effects on views

Topic	Consideration	Objectives
	<p>Landscape Character Area (and sensitivity to the type of OHL proposed) (Holford Rule 4, 5, 6 and 7)</p> <p>Regional Scenic Areas/ Local Landscape Designations* (Holford Rule 2)</p> <p>Regional Parks* (Holford Rule 2)</p> <p>Tourism and Recreation: OS promoted viewpoints (visual amenity – SUSTRANS routes, core paths, long distance trails, tourist attractions and recreational areas such as golf courses) (Notes on Clarification to The Holford Rules)</p>	<p>from residential receptors.</p> <p>To seek to avoid/reduce, as far as practicable, potential effects on formal/informal recreational areas and tourism features. (Further Notes on Clarification to the Holford Rules).</p>
Cultural Heritage	<p>Scheduled Monuments* (Holford Rule 1)</p> <p>Archaeologically Sensitive Areas* (Holford Rule 1)</p> <p>Inventory Gardens and Designed Landscapes* (Holford Rule 1)</p> <p>Conservation Areas (Holford Rule 1)</p> <p>World Heritage Site* (Holford Rule 1)</p> <p>Listed Buildings, Category A*, B and C (Holford Rule 1)</p> <p>Unscheduled Archaeology of National Importance (HER) (Holford Rule 1)</p> <p>Non – Inventory Gardens and Designed Landscapes* (Holford Rule 2)</p> <p>Undesignated Archaeology of Regional / Local Importance within route options (HER) (Holford Rule 2)</p>	<p>To seek to avoid/reduce, as far as practical, direct effects and indirect effects on the setting of designated features of cultural heritage interest. (Holford Rule 1 and 2).</p>
Land Use	<p>Existing and Committed Development (include valid planning applications for residential properties*, and larger scale developments such as wind farms (turbines only) and minerals extraction*).(Holford Rule 7)</p> <p>Scotland Land Capability for Agriculture Classes 1, 2 and 3.1* (Holford Rule 7)</p>	<p>To seek to avoid/reduce, as far as practical in the circumstances, effects on existing and committed development. (Holford Rule 7).</p> <p>To seek to avoid/reduce, as far as practical, effects on best and most versatile agricultural land. (Holford Rule 7).</p>

Topic	Consideration	Objectives
Forestry	Ancient Woodland (AWI) (Holford Rule 2)	To seek to avoid/reduce, as far as practical, effects of forestry, particularly areas of ancient woodland and native woodland, and on future forestry operations. (Holford Rule 5).
	Native Woodland (NWSS) (Holford Rule 5)	
	Forestry (NFI) (Holford Rule 5)	
Flood Risk	Flood Zones and Waterbodies	To cross flood zones at their narrowest point with overhead lines to minimise locating infrastructure within flood zones.

*Those entries marked with an asterisk have been included within the environmental considerations, but have not been appraised as they fall outside of the study area or do not influence the routeing and/or appraisal

Appendix 3: Landscape Sensitivity Appraisal

Introduction

- 1.1 Potential effects upon landscape character which may arise from a proposed development are generally considered as part of a landscape and visual impact assessment (LVIA). Following confirmation of the 'proposed' route (and as part of subsequent design development) an LVIA for the Glenmuckloch 33kV Connection Project will be carried out as part of Phase Two: Environmental Impact Assessment.
- 1.2 At this stage, i.e. during Phase One: Routeing and Consultation, there is insufficient design detail to carry out a robust LVIA. Instead, the following appraisal focuses on landscape susceptibility and has, along with other environmental and technical considerations, been undertaken to help inform the selection of a potential route option.

Landscape Susceptibility

- 1.3 Scottish Natural Heritage (SNH) state that *"the terms 'landscape capacity' or 'landscape sensitivity' are often used interchangeably to refer to landscape studies that assesses a landscape's susceptibility to a particular type of development. This is a legacy of the early evolution of this work and how it was recognised in the wording of early planning guidance. We [SNH] intend to continue using the term 'landscape capacity study' for continuity and ease of understanding, but will be clear via introductory links or in other text that 'susceptibility' would be a more correct description that reflects the terms of GLVIA3: i.e. an assessment of 'sensitivity' to a development type that does not take landscape value(s) into account"*¹.
- 1.4 The above statement shows that the term 'landscape susceptibility' can be considered by some as interchangeable with 'landscape capacity' (despite subtle differences in meaning). Because it is intended to use some of the information contained in this appraisal to inform LVIA at a later date, it is important to be consistent in the use of the term throughout the project phases.
- 1.5 The LVIA will be carried out in accordance with the 'Guidelines for Landscape and Visual Impact Assessment'² (GLVIA3). GLVIA3 sets out that landscape susceptibility is an essential consideration in assessing the potential effects of a development proposal; along with landscape value, it is a component of landscape sensitivity (GLVIA3, Para. 3.26).
- 1.6 The term landscape susceptibility is therefore used here and with the following definition from GLVIA3: the ability of the receptor *"to accommodate the proposed development without undue consequences for the maintenance of the baseline situation"* (GLVIA3, Para. 5.40).

Proposed Development

- 1.7 It is intended that the Glenmuckloch 33kV Connection Project will be formed of an overhead line, supported on wood poles, between the consented Glenmuckloch Wind Farm (WF) substation and the existing Glenglass Substation to accommodate the connection requirements of the Glenmuckloch WF.
- 1.8 Beyond the construction phase, the majority of landscape-related effects will arise from the presence of the proposed wood poles and their interaction with the surrounding landscape. It is therefore these poles which have been used as the determining factor in considering landscape susceptibility.
- 1.9 The design of specific wood poles may vary (within certain technical parameters) depending on their location. This is explained further in Chapter 2: Project Description. For the purposes of this

¹ SNH website: <https://www.nature.scot/professional-advice/landscape-change/landscape-tools-and-techniques/landscape-capacity-study> (accessed 28th June 2018).

² Landscape Institute and Institute of Environmental Management & Assessment (2013), *Guidelines for Landscape and Visual Impact Assessment*, Third Edition.

appraisal, it has been assumed that towers will generally be 14m to 16m in height (see **Figure 2.1**) with a 'span length' (distance between them) of between 80m and 100m.

- 1.10 This design information will be considered in the context of the landform, scale, existing and potential future features in the landscape of the study area when determining landscape susceptibility.

Landscape Character

- 1.11 To assist with appraisal of landscape susceptibility (and with future assessment work), the landscape of the study area has been divided into different landscape character types (LCTs). This is based on the existing landscape characteristics and attributes.
- 1.12 An initial desktop review has included reference to Ordnance Survey (OS) mapping, local planning documents and published landscape character assessments; namely the SNH Landscape Character Assessment for Dumfries and Galloway³ (LCADG). This desktop exercise has been supplemented by site visits to note the current condition of the landscape and any changes in character which may have resulted since the 1998 assessment was published. Site visits have also been used to develop a finer grain of characterisation to help further inform the routeing assessment.

Landscape Character Assessment for Dumfries and Galloway

- 1.13 The LCADG describes the landscape of Dumfries and Galloway using a hierarchical framework with three levels:
- Regional Character Areas;
 - Landscape Character Types; and
 - Landscape Units.
- 1.14 The Regional Character Area (RCA) for the study area is West Southern Uplands (LCADG, Para. 7.2), one of four RCAs for the region. At a finer grain, the published assessment identifies 21 Landscape Character Types (LCTs), some of which are divided further into subtypes, and names these as different Landscape Units (LCADG, Para. 7.16). **Figure A3.1** maps those within the study area and a summary is provided **Table 1** below.

Table 1: Hierarchy of Landscape Character

Regional Character Area	Landscape Character Types	Landscape Units
West Southern Uplands	Upper Dale (Valley)	Upper Nithsdale
	Southern Upland	Nithsdale
		North West Lowthers
	Southern Upland with Forest*	Ken

* N.B. Southern Upland with Forest is a sub-type of the Southern Upland LCT

Regional Character Areas

- 1.15 The West Southern Uplands RCA is described broadly as a landscape of "uplands and dales" with smooth hills of upland grazing or forestry contrasting with the relatively settled valley floors which often feature arable and intensive pastoral agriculture and serve as communication corridors.
- 1.16 This general description matches well with the range of landscapes observed whilst undertaking the site surveys.

³ Land Use Consultants (1998), *Landscape Character Assessment for Dumfries and Galloway*, SNH Report No. 94.

Landscape Character Types

- 1.17 As indicated by **Table 1** above, the West Southern Uplands RCA includes various LCTs and three of these are located in the Study Area. The following sections present a brief summary of these LCTs and, where necessary, highlight any differences between the individual Landscape Units and any changes which may have occurred since the assessment was published.

Upper Dale (Valley)

- 1.18 This LCT occurs as two Landscape Units within Dumfries and Galloway. One of these Landscape Units is located within the Study Area and it is identified as 'Upper Nithsdale'. This is labelled as DGW10 on **Figure A3.1**.
- 1.19 Key Characteristics for the LCT are described as:
- *"Wide 'V'-shaped valley, enclosed by high peaks and moorland;*
 - *Open with long views;*
 - *Improved pastures becoming rougher on the valley sides;*
 - *Riparian woodlands along the main river and up tributary channels;*
 - *Medium to large scale forestry plantations on the valley sides and extending over horizons from higher ground;*
 - *Mining settlements and remnants of industrial activity, e.g. mine ruins and bings".*
- 1.20 During site survey, it was noted that this unit of the LCT matches well with the published Key Characteristics (particularly the pattern of pasture transitioning to rougher grazing with forestry plantations on higher ground). The settlements of Kirkconnel and Kelloholm have mining connections and there are partially restored and remnant mining and industrial features here and nearby.
- 1.21 The valley form is not a typical 'V'-shape here, being broad and open, with gentle gradients as compared to the tighter landform outside of the study area. There are level areas of flood plain either side of the river, as well as broad areas of very gently sloping mid-slopes on both sides of the River Nith. There are open views in some areas but various features such as settlement, woodland and varied landform can limit these, particularly from the valley floor. With much of the riparian woodland being deciduous, views are more open in winter when trees lose their leaves. Burns, in small scale glens with a more intimate character and which are often associated with riparian woodland run into the River Nith, perpendicular to the main valley.
- 1.22 Since the assessment was published, wind energy development has taken place on the upper slopes and summits and is seen alongside the forestry plantations, influencing the landscape character. During site survey, it was also noted that some areas of coniferous plantation have been felled and that broadleaf woodland planting has been taking place on some lower slopes, particularly to the south to the River Nith.

Southern Upland

- 1.23 The Southern Upland LCT occurs as 11 Landscape Units in Dumfries and Galloway, two of which are located in the Study Area: 'Nithsdale' and 'North West Lowthers'. These are labelled as DGW22 on **Figure A3.1**, respectively at the southern and northern edges of the study area.
- 1.24 Key Characteristics of the LCT are described as:
- *"Large, smooth dome/conical shaped hills, predominantly grass covered;*
 - *Open and exposed character except within incised valleys;*
 - *Distinctive dark brown/purple colour of heather on some higher areas;*
 - *Pockets of woodland in incised valleys;*
 - *Stone dykes occasionally define lower limit;*
 - *The legacy of lead and other mining activity".*
- 1.25 Landform, landcover and the presence of stone wall boundaries were all generally found to match well with these Key Characteristics during site survey. The incised valleys, the woodland located

within them and their marked contrast with the majority of the uplands were particularly noticeable within the study area. These are relatively intimate and small scale valleys: their distinctive and complex landform and their associated woodlands are attractive features in this otherwise open and large scale landscape.

- 1.26 However, it was also noted that a prominent coniferous plantation marks the boundary of the North West Lowthers unit of the LCT at Lethans and that there are plantation blocks within the Euchar Water valley at Glenglass and on lower slopes south of Drumbuie. Within the study area, the legacy of mining activity was not particularly noticeable in this LCT. Although part of the large scale opencast workings at Glenmuckloch, below Lethans Hill, is within this LCT, its influence is limited due to the containing landform and ongoing restoration work.
- 1.27 To the south of the study area, ongoing construction of a line of steel lattice towers and the Glenglass substation has introduced electrical transmission infrastructure to the Nithsdale unit of this LCT, in the upper reaches of Glenglass.
- 1.28 Construction of wind energy development is currently having an influence on the character of the landscape and the completed wind farms, along with construction of further consented schemes, will continue and increase this influence.

Southern Upland with Forest

- 1.29 This subtype of the Southern Upland LCT occurs in four Landscape Units in Dumfries and Galloway. The unit which occurs in the Study Area is identified as 'Ken' and is labelled as DGW23 on **Figure A3.1**.
- 1.30 Key Characteristics of the LCT are described as:
- *"Large, smooth dome-shaped hills with large scale dark green plantations on slopes and over lower summits;*
 - *Sitka Spruce dominated, interspersed with Larch;*
 - *Changing landscapes with large scale felling, ploughing and replanting".*
- 1.31 During site visits, it was noted that this unit of the LCT matches well with the key characteristics described above. However, there are currently wind farms under construction here and these are having an influence on the character of the landscape. The completed wind farms, along with construction of further consented schemes, will continue and increase this influence.

Local Landscape Character

- 1.32 The published regional landscape character assessment provides a broad picture of the landscape character of the study area. As part of this Glenmuckloch 33kV Project Routeing and Consultation Report, a finer grain landscape character assessment of the study area has been undertaken. The following Local LCTs have been included in this appraisal and are shown on **Figure A3.2**:
- Southern Uplands;
 - Transitional Slope;
 - Undulating Midslope;
 - Incised Tributary Valley; and
 - River Nith Valley Floor.
- 1.33 Further detail on the Key Characteristics of these Local LCTs is given in **Table 3** below.

Landscape Susceptibility

- 1.34 Each Local LCT which is potentially affected by a route option has been evaluated (using desk based analysis combined with on-site assessment and verification) and then categorised as having higher or lower susceptibility to the steel lattice tower OHL typology being proposed. This is a relative grading across the landscape of the study area.

- 1.35 Indicators of the relative levels of landscape susceptibility to accommodate OHL development are shown in the **Table 2** below. The application of professional judgement in this categorisation also draws on the principles set out in the Holford Rules.

Table 2: Indicators of Landscape Susceptibility

Criteria	Characteristics indicating a lower susceptibility to OHL development	Characteristics indicating a higher susceptibility to OHL development
Scale	Large scale	Small scale
Landform and skylines	Absence of strong topographical variety Skylines less distinct: opportunities for backclothing	Presence of strong topographical variety Skylines form distinctive features: less opportunity for backclothing
Landscape pattern and complexity	Simple pattern of land use Rugged or uniform	Complex pattern of land use Rugged and irregular
Settlement and man-made influence	Presence of contemporary structures e.g. utility, infrastructure or industrial elements A less intact landscape, modified by recent human influences	Absence of modern development A more intact rural landscape characterised by traditional features
Perceptual aspects	Close to visible or audible signs of human activity and modern development	Remote from visible or audible signs of human activity and modern development

- 1.36 In 2017, Dumfries and Galloway Council adopted a Wind Farm Landscape Capacity Study as part of their Local Development Plan Supplementary Guidance⁴. This considers different landscapes within the local authority area and advises on their capacity to accommodate wind turbines of different scales.
- 1.37 GLVIA3 states that existing landscape capacity studies may provide useful background information where they consider development of the general type which is proposed (GLVIA3, Para. 5.42). While not directly comparable, the Dumfries and Galloway Supplementary Guidance provides a means of comparing local conditions (observed on-site for this appraisal of landscape susceptibility) with regional trends and static vertical structures (steel lattice towers) with similar sized and larger wind turbines.
- 1.38 **Table 3** below contains the description of key landscape characteristics, informed by desk study and field work undertaken for this project, and appraisal of landscape susceptibility to OHL development of the type proposed including, where relevant, reference to the published Dumfries and Galloway Supplementary Guidance.

⁴ Dumfries and Galloway Council (adopted 2017), *Dumfries & Galloway Wind Farm Landscape Capacity Study*. Appendix C to Part 1 of Local Development Plan Supplementary Guidance.

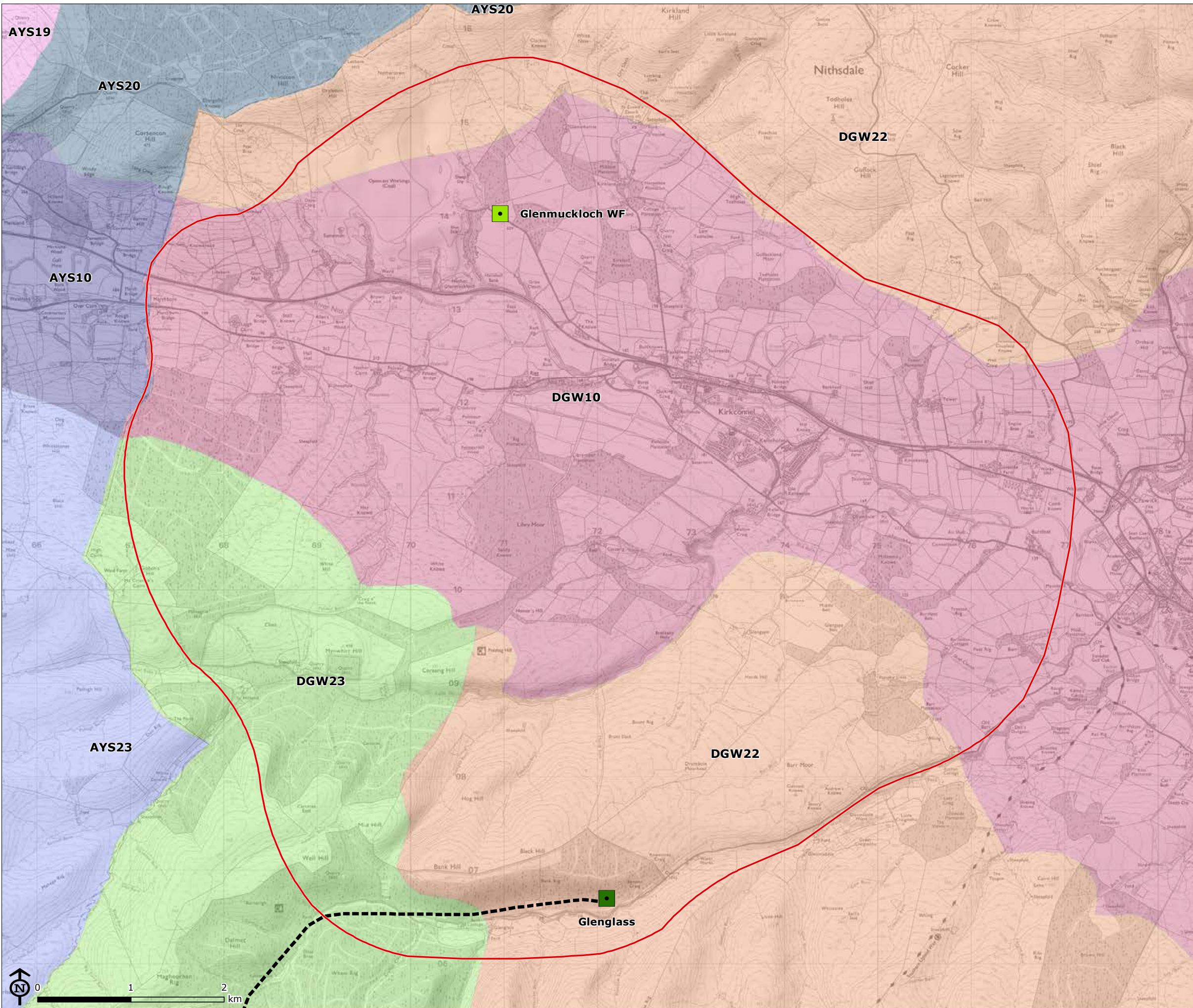
Table 3: Susceptibility of Local Landscape Character Types within the Study Area

Local LCT	Key Landscape Characteristics	LUC Appraisal of Landscape Susceptibility to OHL Development of the Type Proposed
River Nith Valley Floor	<p>This is a broad and meandering valley floor, relatively simple in its topographic form, but with tributary burns in intimate valleys with a more complex and smaller scale. The breadth of the valley floor has led to settlement (based upon historic farmsteads initially, following by the expansion of Kirkconnel and Kelloholm as mining villages supporting the opencast works). Development of transport corridors (the railway, A76 and several minor access routes) has followed the alignment of the valley. There are fields of improved pasture with belts of mature broadleaf woodland, often associated with farmsteads and dwellings, or with watercourses. There is a contrast between busy and active transport corridors and settlements and the rural character of the wider river corridor.</p> <p>It is noted that there are currently several wood pole OHL in this area but that they are of a smaller scale than that which is proposed.</p>	<p>For a large area which includes this relatively small Local LCT, Pages 136 to 139 of the D&G Wind Farm Landscape Capacity Study describe sensitivity to small-medium turbines (20-50m) which would range from low to medium in terms of the factors considered in this susceptibility appraisal, with the majority being medium. OHL development of the type proposed would be approximately 5-35m lower than the turbine type considered.</p> <p>Site survey has identified some local factors which would reduce this when considering OHL development of the type proposed in this study area (recent human influence), as well as others that are of greater susceptibility (the pattern of riparian woodlands and more complex topography and intimate character of the tributary valleys).</p> <p>The combination of a broad, flat and simple landform with the presence of contemporary elements and perceived human activity currently indicates medium susceptibility to the proposed OHL development.</p> <p>However, if existing OHL can be removed and/or consolidated as part of this project, there may be opportunity to reduce this to lower susceptibility.</p>
Undulating Midslope	<p>These areas sit above the main valley floor and feel separated from it by areas of woodland and gentle hills and ridges left through glacial deposition. Landform is generally gently sloping and undulating. Despite proximity to the valley floor, they have a secluded and tranquil character. The area to the north of the River Nith is clearly contained by the steep open slopes which rise above it and overlook it. There are fields of improved pasture (often divided by traditional stone walling) with blocks of mature broadleaf woodland, often associated with farmsteads and dwellings, and some coniferous plantation. The character of development is generally historic and there is a complexity to the relationship between different elements of the landscape. The tributary valleys of the River Nith pass through these midslopes, from the rising ground of the hills above and down to the valley, and often form more intimate and complex elements, with riparian woodland.</p> <p>It is noted that there are currently several wood pole OHL in this area but that they are of a smaller scale than that which is proposed.</p>	<p>For a large area which includes the relatively small units of this Local LCT, Pages 331 to 335 of the D&G Wind Farm Landscape Capacity Study describe sensitivity to small-medium turbines (20-50m) which would range from low to medium in terms of the factors considered in this susceptibility appraisal, with the majority being medium. OHL development of the type proposed would be approximately 5-35m lower than the turbine type considered.</p> <p>Site survey has identified local factors which would result in different levels of susceptibility for different units of this Local LCT when considering OHL development of the type proposed in this study area.</p> <p>Although large scale and simple, seclusion and tranquillity combine with a lack of modern built form or infrastructure here, as well as the presence of the more intimate valleys containing the tributary burns to the River Nith. This would indicate a medium susceptibility to the proposed OHL development in the unit north of the River Nith. However, if existing OHL can be removed and/or consolidated as part of this project, there may be opportunity to reduce this to lower susceptibility.</p> <p>South of the River Nith, landscape units feature a greater degree of enclosure by woodland or plantation and have greater scope to accommodate OHL development of the type proposed. This would indicate a lower susceptibility to the proposed OHL development.</p>

Local LCT	Key Landscape Characteristics	LUC Appraisal of Landscape Susceptibility to OHL Development of the Type Proposed
Incised Tributary Valley	<p>There are two of these incised valleys within the study area. They are steep-sided and relatively deep tributary valleys feed which feed into the River Nith from the south, and are much larger than the small scale features discussed above, leading to them being drawn out individually. Intensive management is rare here and often precluded by the steepness of slopes, leading to a rough texture and blocks of native broadleaf riparian woodland.</p> <p>One of the valleys (Kello Water) features little or no contemporary man-made developments while the other (Euchan Water) includes a small road and isolated historic dwellings. The Euchan Water valley is increasingly being influenced by electrical generation and transmission infrastructure, particularly in its upper section. Nevertheless, its lower reaches remain an attractive and intimate landscape, of complex topography and enclosed with woodland.</p>	<p>The D&G Wind Farm Landscape Capacity Study does not consider landscape units at this scale.</p> <p>However, the small scale and pronounced landform indicate a higher susceptibility to the proposed OHL development for this Local LCT in general.</p> <p>However, ongoing development means that the upper section of the Euchan Water valley, where it is characterised by coniferous plantations on the glen sides, has a medium susceptibility to the proposed OHL development.</p>
Transitional Slope	<p>This is a transitional landscape which is influenced by a mixture of rough grazing and large regular shaped blocks of coniferous plantation, with straight edges. It forms the majority of the landscape along the south side of the main valley and is relatively large in scale, and open, outside the forest areas. It feels set apart and secluded from the river valley because of the convex topography. There is variety in the landform resulting from the influences of hilltops beyond, the main river valley below and small tributary watercourses which pass through it. Although not as pronounced as the incised valleys, these smaller tributaries create smaller scale folds and undulations in the landscape, lending interest and complexity. Blocks of coniferous plantation and the current and future influence of wind energy development are evidence of contemporary human influence.</p>	<p>Pages 349 to 353 of the D&G Wind Farm Landscape Capacity Study (describe sensitivity to medium turbines (50-80m), the smallest turbines considered by the study for this area, which would range from low to medium in terms of the factors considered in this susceptibility appraisal, with the majority being medium.</p> <p>Site survey has identified local factors which would reduce this when considering OHL development of the type proposed (which would be approximately 35-65m lower than the turbine type considered) in this study area.</p> <p>On balance, the scale, variety and secluded nature of the landscape, its large scale and simplicity and the opportunity to backcloth infrastructure against the forestry would indicate a lower susceptibility to the proposed OHL development. However, there are some instances where this will be higher, e.g. along the tributary burns.</p>
Southern Uplands	<p>These are open rounded hills, elevated and varied in their landform with a series of ridgelines and valleys. There are views from the hills down to the valleys below. The transition between the midslopes and hills is well defined by the break in slope to the north of the River Nith valley. Scale is large and, although there is separation from large-scale transport infrastructure and development, there is an increasing influence from electrical generation and transmission infrastructure. Despite this, the landscape remains relatively tranquil and secluded.</p>	<p>Pages 349 to 353 of the D&G Wind Farm Landscape Capacity Study (describe sensitivity to medium turbines (50-80m), the smallest turbines considered by the study for this area, which would range from low to medium in terms of the factors considered in this susceptibility appraisal, with the majority being medium.</p> <p>Site survey has identified some local factors which are broadly similar with this when considering OHL development of the type proposed (which would be approximately 35m to 65 lower than the turbine type considered) in this study area.</p> <p>However, the open, rolling hills rise to over 500m AOD and resulting skylines are a defining characteristic of the valley landscape. These are therefore more susceptible to change, with limited opportunities for backclothing. This indicates a higher susceptibility to the proposed OHL development.</p>

Appendix A3.1: SNH Regional Landscape Character Types

- Glenmuckloch Wind Farm Substation
 - Existing Glenglass Substation
 - Study Area
 - Existing 132kV Overhead Line South West Scotland (SWS) Project
- Landscape Character Types**
- AYS10. Upper River Valleys
 - AYS19. Plateau Moorland
 - AYS20. Plateau Moorland with Forest
 - AYS23. Southern Uplands
 - DGW10. Upper Dale (Valley)
 - DGW22. Southern Uplands
 - DGW23. Southern Uplands with Forest



Map Scale: 1:40,000 @ A3

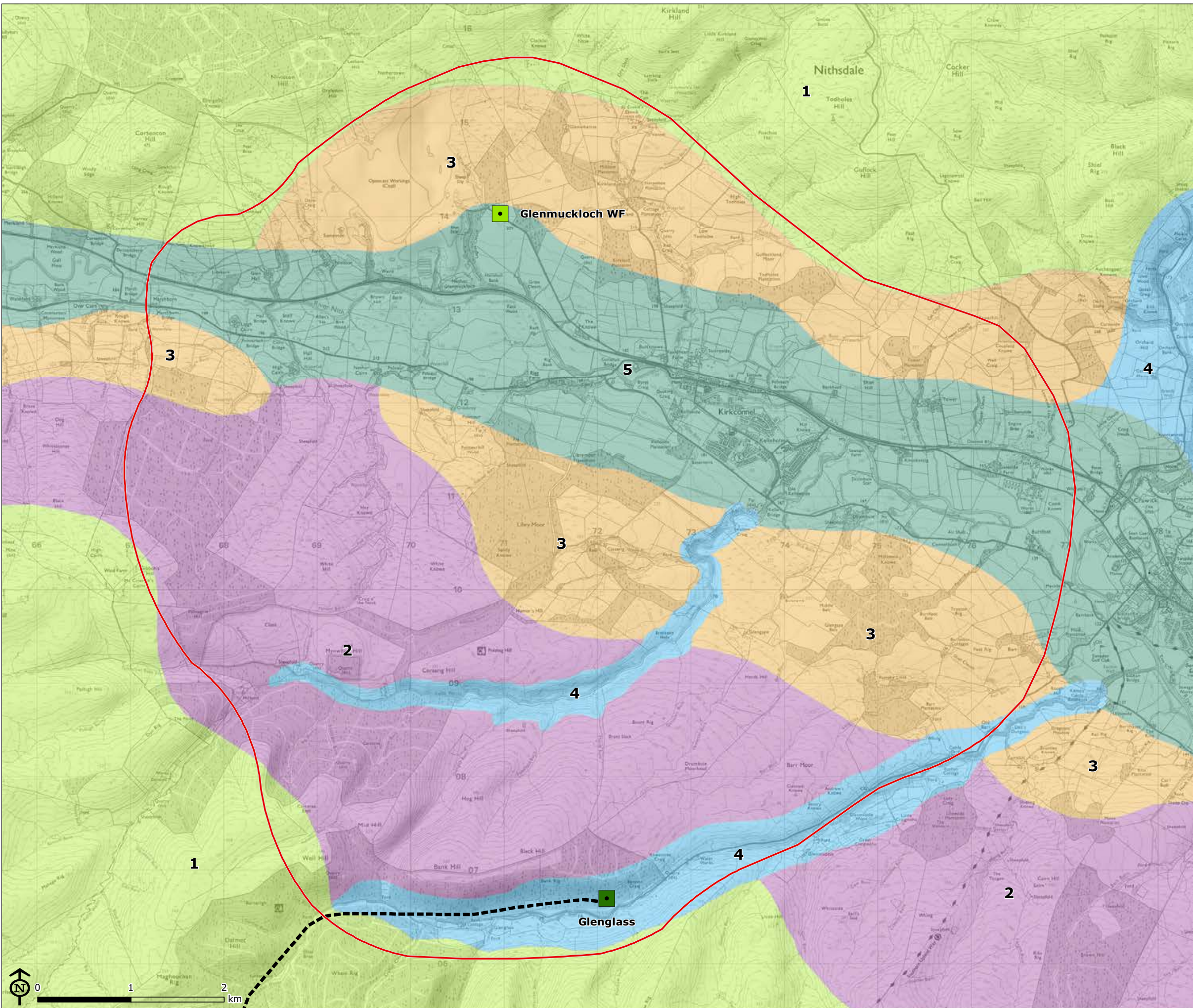


Appendix A3.2: Local Landscape
Character Types

- Glenmuckloch Wind Farm Substation
- Existing Glenglass Substation
- Study Area
- Existing 132kV Overhead Line South West Scotland (SWS) Project

Local Landscape Character Types

- 1. Southern Uplands
- 2. Transitional Slope
- 3. Undulating Midslope
- 4. Incised Tributary Valley
- 5. River Nith Valley Floor



Map Scale: 1:40,000 @ A3



Appendix 4: 33kV Appraisal Table

Criterion	Sub-Criteria	Route Option 1	Route Option 2	Route Option 3	Route Option 4	Preference
Approximate Length of Line Route (km)	N/A	12.17km	11.5km	8.86km	9.4km	Route Option 3 is the preferred route as this is the shortest route option.
Biodiversity and Geological Conservation	Special Protection Areas (SPA)	The northern section of the route (at the substation end for approximately 800m) is located within the 2 km 'trigger for consideration' zone of the Muirkirk and North Lowther Uplands SPA). This cannot be avoided during routeing due to the location of the substation.				All Route Options are of equal preference as the timing of construction periods will avoid disturbance to bird species and designated sites can be spanned.
	SSSI Sites	Polhote Burn SSSI (geological designation) is partly overlapped by the route; however this can be avoided or spanned during detailed route alignment. Polneul Burn transects this Route Option which will at its widest point cross 100m of the SSSI, and cannot be avoided during route alignment, however this can be spanned, therefore no infrastructure will be located within the SSSI.	There are no SSSIs within either Route Options 3 or 4.			
	Known nest sites of Annex 1/Schedule 1 raptor species and Black Grouse Leks	None of the Route Options are within the 500m trigger for consideration zone of one regularly occupied nest site of Annex 1/Schedule 1 raptor species. Route Options 1 and 2 pass within the 500m trigger for consideration zone of two locations previously used by a Schedule 1 raptor species. Breeding and roosting barn owl may occur in a few locations. May include foraging areas and areas of flight activity for these species	None of the Route Options are within the 500m trigger for consideration zone of one regularly occupied nest site of Annex 1/Schedule 1 raptor species. Breeding and roosting barn owl may occur in a few locations. Routes 3 and 4 contain one location where records of black grouse lekking are greater than two individuals in the past decade, elsewhere some individuals possible. May include foraging areas and areas of flight activity for these species.			
	SNH Priority Peatland Habitats	Class 1 peatland habitat is present within Route Option 1 and 2 at two locations. This can be avoided or spanned during route alignment.	Class 1 peatland habitat is present at one location within Route Option 3. This can be avoided or spanned during route alignment.	Class 1 peatland habitat is present at two locations within Route Option 4. These can be avoided or spanned during route alignment.		
Landscape and Visual Amenity	Residential Visual Amenity with '150m trigger for consideration zone'	All Route Options pass within the 150m trigger for consideration zone of Lagrae, close to the consented wind farm substation. This property is currently in use as a site office for the Glenmuckloch Opencast site and it is understood that there is no current intent to return it to residential use. Route Option 1 passes within the 150m trigger for consideration zone of two residential properties at Glenglass to the south of the route. Both Bank Cottage and Glenglass are positioned close to the Euchar Water. Glenglass is an isolated farmstead with areas of mature woodland adjacent to it, and with a limited outlook. Due to ongoing construction works, it was not possible to survey Bank Cottage. However, aerial photography suggests a relatively open outlook in views to the north, towards the route option, with the containing valley slope beyond.	All Route Options pass within the 150m trigger for consideration zone of Lagrae, close to the consented wind farm substation. This property is currently in use as a site office for the Glenmuckloch Opencast site and it is understood that there is no current intent to return it to residential use. The south eastern edges of these Route Options pass within the 150m trigger for consideration zone of one property to the east of Glenglass substation. This is an unnamed property positioned to the north of the access road and close to the water works. Garden planting is extensive and dense, limiting the outlook from the property. Detailed routeing opportunities exist to avoid the trigger for consideration zone for this property.			Route Option 3 is the preferred route. Relative to other options, it has the best potential to minimise visual effects upon receptors and to make use of topography and woodland to minimise the geographical extent of effects upon the wider landscape.

Criterion	Sub-Criteria	Route Option 1	Route Option 2	Route Option 3	Route Option 4	Preference
		Detailed routing opportunities exist to avoid the trigger for consideration zones for these properties.				
	Visual Amenity	<p>All route options would be visible, and potentially prominent, at the point they cross the River Nith, the railway and the A76.</p> <p>South of the A76, Route Option 1 would run perpendicular to the south slope of the River Nith valley and cross the containing ridgeline west of Mynwhirr Hill. There is potential for the overhead line to be widely visible to users of the A76, the railway and residential properties at these elevated, prominent locations.</p> <p>West of Glenglass substation, the valley would provide visual containment, limiting the potential effect of Route Option 1 here.</p>	<p>All route options would be visible, and potentially prominent, at the point they cross the River Nith, the railway and the A76.</p> <p>South of the A76, Route Option 2 would run perpendicular to the south slope of the River Nith valley and cross the containing ridgeline west of Mynwhirr Hill. There is potential for the overhead line to be widely visible to users of the A76, the railway and residential properties at these elevated, prominent locations.</p> <p>Route Option 2 would be seen positioned on high ground north of Glenglass substation and there is potential for it to be widely visible to users of the A76 and residential receptors crossing this elevated, open moorland.</p>	<p>All route options would be visible, and potentially prominent, at the point they cross the River Nith, the railway and the A76.</p> <p>South of the A76, there is less potential for Route Option 3 to be visible from properties in Kirkconnel and Kelloholm and from the A76 and railway when compared to Route Option 4.</p> <p>Route Option 3 generally stays lower than Route Options 1 & 2 reducing the potential for skylining when compared to these.</p> <p>North and east of Glenglass substation, there is potential for the route option to be visible to users of the A76 and residential receptors crossing this elevated, open moorland.</p>	<p>All route options would be visible, and potentially prominent, at the point they cross the River Nith, the railway and the A76.</p> <p>South of the A76, there is greater potential for Route Option 4 to be visible from properties in Kirkconnel and Kelloholm and from the A76 (because of proximity to the valley floor and settlement) when compared to Route Option 3.</p> <p>Route Option 4 generally stays lower than Route Options 1 & 2 reducing the potential for skylining when compared to these.</p> <p>North and east of Glenglass substation, there is potential for the route option to be visible to users of the A76 and residential receptors crossing this elevated, open moorland.</p>	
	Local Landscape Character	<p>From north to south, the Route Options pass through the following Local Landscape Character Types:</p> <ul style="list-style-type: none"> • River Nith Valley Floor (lower susceptibility); • Undulating Midslope (medium susceptibility); • Transitional Slope (lower susceptibility); • Incised Tributary Valley (higher susceptibility); • Transitional Slope (lower susceptibility); • Incised Tributary Valley (Euchan Water Upper) (medium susceptibility). <p>The two route options diverge at Mynwhirr Hill and the Kello Water valley. Route Option 2 would run parallel, or near parallel, to the Incised Tributary Valley and therefore affect a greater extent of this higher susceptibility landscape.</p> <p>Route Option 1 passes through some steep ground east of Mid Hill which is of higher susceptibility to effects on landscape, and along the northern side of Glenglass, where it is also steep and close to the existing lines, reducing the scope for avoidance by detailed routing.</p>		<p>From north to south, the Route Options pass through the following Local Landscape Character Types:</p> <ul style="list-style-type: none"> • River Nith Valley Floor (lower susceptibility); • Undulating Midslope (medium susceptibility); • Incised Tributary Valley (higher susceptibility); • Transitional Slope (lower susceptibility); • Incised Tributary Valley (Euchan Water Upper) (medium susceptibility). <p>Route Option 4 would run parallel to the main valley in the lower susceptibility River Nith Valley Floor whereas Route Options 3 would run through a medium susceptibility unit of Undulating Midslope in this area.</p> <p>South of Libry Moor, the Route Options would affect a comparable extent of the higher susceptibility Incised Tributary Valley and lower susceptibility Transitional Slope.</p>		
	Tourism and Recreation: OS promoted viewpoints (visual amenity – SUSTRANS routes, core paths, long distance trails, tourist attractions and recreational areas such as golf courses)	<p>The Route Option crosses a Dumfries & Galloway (D&G) Core Path at Mynwhirr Hill and runs alongside a further D&G Core Path at Glenglass.</p> <p>The Core Path at Mynwhirr Hill is relatively open (with limited plantation nearby) and, when travelling west to east, there is a chance that the OHL would be visible cresting the ridge above and crossing the</p>	<p>The Route Option crosses a D&G Core Path at Mynwhirr Hill.</p> <p>The Core Path at Mynwhirr Hill is relatively open (with limited plantation nearby) and, when travelling west to east, there is a chance that the OHL would be visible cresting the ridge above and crossing the hillside.</p>	<p>The Route Option crosses a D&G Core Path at Libry Moor.</p> <p>In terms of visibility, this route passes through an area of plantation woodland but this is not yet mature and it is likely that the OHL would be visible. However, the route options would run perpendicular to the direction of</p>	<p>The Route Option crosses a D&G Core Path at Kelloside Plantation.</p> <p>This is an area of open farmland and so the OHL would be visible in both directions. However, due to convex landform and the route option running perpendicular to the direction of travel, potential effects would be limited to a relatively short section of</p>	

Criterion	Sub-Criteria	Route Option 1	Route Option 2	Route Option 3	Route Option 4	Preference
		<p>hillside.</p> <p>The route option would run along the valley slope toward Glenglass substation (parallel to the Core Path), in an area which already includes OHL development.</p>	<p>There is potential for this option to be visible from a greater extent of this path than Route Option 1.</p>	<p>travel, thereby limiting potential effects to a short duration of the journey.</p>	<p>the journey.</p>	
Cultural Heritage	Listed Buildings Category A, B and C	<p>There are 10 Listed Buildings within the 3km study area.</p> <p>Of these 5 are farmhouses (LB10239 (Grade C); LB10240 (Grade B); LB10240 (Grade B); LB10240 (Grade B); LB10278 (Grade C)) which derive heritage significance from their functional/ historical relationship with the surrounding countryside. As such, they may be susceptible to setting change.</p> <p>It is not currently anticipated that the setting of the remaining Listed Buildings - LB10275, LB17259, LB10238, LB13345 and LB10237 - would be affected in a way that will affect its heritage significance.</p>			<p>There are 11 Listed Buildings within the 3km study area.</p> <p>Of these 6 are farmhouses - (LB10278 (Grade C); LB10240 (Grade B); LB10240 (Grade B); LB10240 (Grade B); LB10239 (Grade c); and LB10242 (Grade B)) - which derive heritage significance from their functional/ historical relationship with the surrounding countryside. As such, they may be susceptible to setting change.</p> <p>It is not currently anticipated that the setting of the remaining Listed Buildings - LB10275, LB17259, LB10238, LB13345 and LB10237 - would be affected in a way that will affect its heritage significance.</p>	Route Option 3 is the preferred route as it has the joint least potential for effects on the setting of Listed Buildings and unscheduled heritage assets of National Importance, while also having the fewest heritage assets of Regional/ Local Importance to be avoided during route alignment.
	Unscheduled Archaeology of National Importance	<p>An Iron Age to 19th century earthwork, known as 'Deils Dyke' (MDG11247 and MDG11235), is located within the route option. This cannot be avoided during routeing, however at approximately 50m wide this can be spanned during route alignment.</p>			<p>There are no known unscheduled assets of National Importance within the route option.</p>	
	Undesignated Archaeology of Regional/Local Importance (recorded in D&G Council HER)	<p>The following heritage assets are present within the route option:</p> <p>Post-medieval to 18th century Farmstead – Rack (MDG17017)</p> <p>Post-medieval to 18th century Ridge and Furrow; Field Boundary – Rack Wood (MDG26117)</p> <p>Medieval to Post-medieval Farmstead? - Rack (MDG26118)</p> <p>Post-medieval to 18th century Kiln Barn? Polneul Burn (MDG26121)</p> <p>Medieval to Modern Mine - Nether Carn (MDG12911)</p> <p>Physical effects to these assets could be avoided during route alignment.</p>	<p>The following heritage assets are present within the route option:</p> <p>Post-medieval to 18th century Farmstead – Rack (MDG17017)</p> <p>Post-medieval to 18th century Ridge and Furrow; Field Boundary – Rack Wood (MDG26117)</p> <p>Medieval to Post-medieval Farmstead? - Rack (MDG26118)</p> <p>Post-medieval to 18th century Kiln Barn? Polneul Burn (MDG26121)</p> <p>Medieval to Modern Mine - Nether Carn (MDG12911)</p> <p>Glengap Post-medieval Farmstead (MDG24806)</p> <p>Physical effects to these assets could be avoided during route alignment.</p>	<p>The following heritage assets are present within the route option:</p> <p>Post-medieval to 18th century Farmstead – Rack (MDG17017)</p> <p>Post-medieval to 18th century Ridge and Furrow; Field Boundary – Rack Wood (MDG26117)</p> <p>Medieval to Post-medieval Farmstead? - Rack (MDG26118)</p> <p>Post-medieval to 18th century Kiln Barn? Polneul Burn (MDG26121)</p> <p>Physical effects to these assets could be avoided during route alignment.</p>	<p>The following heritage assets are present within the route option:</p> <p>Post-medieval to 18th century Farmstead – Rack (MDG17017)</p> <p>Post-medieval to 18th century Ridge and Furrow; Field Boundary – Rack Wood (MDG26117)</p> <p>Medieval to Post-medieval Farmstead? - Rack (MDG26118)</p> <p>Post-medieval to 18th century Kiln Barn? Polneul Burn (MDG26121)</p> <p>Post-medieval to 20th century Enclosure; Farmstead?; Sheepfold - Gallows Rig (MDG25506)</p> <p>Medieval to 19th century Enclosure/ Field Boundary? – Kello Water (MDG21077)</p> <p>Physical effects to these assets could be avoided during route alignment.</p>	

Criterion	Sub-Criteria	Route Option 1	Route Option 2	Route Option 3	Route Option 4	Preference
Land Use	Existing and Committed Development: areas allocated within the LDP including existing buildings/sites, residential use applications and valid planning applications for other non-residential uses of a size and geographic location to be considered 'major areas' (including minerals and windfarm turbine)	There are no other areas of committed development within or in close proximity to these route options. The 'trigger for consideration' zones for windfarm turbines could be avoided during route alignment.				There is no preferred route option as there are opportunities to avoid all consented or operational windfarms.
Forestry*	Ancient Woodland (AWI)	There is a total 2.00ha of AWI within Route Options 1, 2 and 3. All AWI within these routes can be avoided during route alignment. Based on an 80m wayleave corridor running through the centre line, the route will cross up to 0.5ha of AWI. This can be avoided during route alignment.			There is a total 19.58ha of AWI within this Route Option. There is one area of AWI of within this route that cannot be avoided during alignment and will have to be crossed by the line south of Rigg Farm. 0.95-1.87ha of AWI would be intersected by an 80m wayleave corridor depending on whether the OHL runs through the centre line of the route or if it is routed to avoid AWI.	Route Option 2 is preferred as there is opportunity to avoid felling areas of both ancient and native woodland within the route. This is similar to Route Option 1 and 3; however Route Option 2 also affects less commercial woodland when routed to avoid forestry.
	Native Woodland (NWSS)	There is a total of 2.14ha of native woodland within this Route Option. Based on an 80m wayleave corridor running through the centre line, the route will cross up to 0.42ha of NWSS. If an 80m wayleave is routed to avoid NWSS, Route Option 1 will cross no NWSS.	There is a total of 5.63ha of native woodland within this Route Option. Based on an 80m wayleave corridor running through the centre line, the route will cross up to 0.44ha of NWSS. If 80m wayleave is routed to avoid NWSS, Route Option 2 will cross no NWSS.	There is a total of 3.52ha of native woodland within this Route Option. Based on an 80m wayleave corridor running through the centre line, the route will cross up to 0.78ha of NWSS. If 80m wayleave is routed to avoid NWSS, Route Option 3 will cross no NWSS.	There is a total of 11.28ha of native woodland within this route option. Based on an 80m wayleave corridor running through the centre line, the route will cross up to 1.04ha of NWSS. If 80m wayleave is routed to avoid NWSS, Route Option 4 will cross no NWSS.	
	Forestry (NFI)	There is a total of 159.5ha of NFI within this route option. 32.51-36.45ha of NFI would be intersected by an 80m wayleave corridor depending on whether the OHL runs through the centre line of the route or if it is routed to avoid forestry.	There is a total of 134.93 ha of NFI within this route option. 12.02-19.46ha of NFI would be intersected by an 80m wayleave corridor depending on whether the OHL runs through the centre line of the route or if it is routed to avoid forestry.	There is a total of 237.67ha of NFI within this route option. 20.73-25.01ha of NFI would be intersected by an 80m wayleave corridor depending on whether the OHL runs through the centre line of the route or if it is routed to avoid forestry.	There is a total of 102.35ha of NFI within this route option. 5.28-9.78ha of NFI would be intersected by an 80m wayleave corridor depending on whether the OHL runs through the centre line of the route or if it is routed to avoid forestry.	
Flood Risk	Flood Zones and Waterbodies	This route option includes a number of watercourses which can be spanned during route alignment. This route includes two areas of 1/200 year flood risk zone at the River Nith and the Kello Water. These can be spanned during route alignment.		This route option includes a number of watercourses and drainage ditches (in the Libry Moor woodland) which can be spanned during route alignment. This route includes two areas of 1/200 year flood risk zone at the River Nith and the Kello Water. These can be spanned during route alignment.	This route option includes a number of watercourses which can be spanned during route alignment. This route includes two areas of 1/200 year flood risk zone at the River Nith and the Kello Water. These can be spanned during route alignment.	There is no preferred route option as there are opportunities to span all the watercourses and the flood risk zones during route alignment.

Criterion	Sub-Criteria	Route Option 1	Route Option 2	Route Option 3	Route Option 4	Preference
Overall Emerging Preference	<p>Overall emerging preferred route is Route Option 3</p> <p>Route 3 is the shortest route and also has the best potential, relative to other options, to minimise visual effects on residential receptors and effects on the wider landscape during the alignment stage through siting of wood poles.</p> <p>Whilst route option 3 remains the best balance of all the environmental issues considered, felling of commercial woodland cannot be avoided and this will require to be taken into consideration during route alignment to minimise woodland loss where possible.</p>					
Preferred Route (following cumulative review)	<p>Route 3 is the Preferred Route.</p> <p>A cumulative technical and environmental review with the Glenmuckloch 132kV PSH connection and the Sandy Knowe Wind Farm 132kV connection was undertaken, which found that all route options for the Glenmuckloch WF 33kV Connection Project would cross the River Nith in a similar area, with alternative route options not being identified due to the combination of technical and environmental constraints elsewhere in the study area. The environmental review of the 132kV route options found that on balance, the effects associated with the second best performing route option for the 132kV, Route 3, are broadly comparable to those of Route 4. On this basis, the emerging preferred Route Option for the Glenmuckloch WF 33kV Connection Project has been taken forward as the preferred route (i.e. Route Option 3) and the second best performing option for the Glenmuckloch PSH 132kV Connection Project is being taken forward as the preferred route (Route Option 3).</p>					

*It should be noted that at this stage the forestry appraisal has been conducted through a desk based approach, utilising aerial photography, combined with digital data available from forest landowners, SNH and Forestry Commission Scotland (FCS) sources where possible.