Appendix C: Soils - Detailed Baseline and Assessment

7. Soils

7.1 Introduction

7.1.1 This section presents the Strategic Environmental Assessment (SEA) of the project and its potential effects on soils. For the purpose of this assessment 'soils' includes consideration of the following:

- Geology;
- Soils (association and type);
- Peat (priority and non-priority peatland);
- Land Capability for Agriculture; and
- Land Capability for Forestry.

7.1.2 This assessment has been carried out in cognisance of the SEA objective for Soils which is to *'Safeguard and improve soil quality in Scotland, particularly high value agricultural land and carbon rich soil'*.

7.2 Methodology

Study Area

7.2.1 The study area used to establish the soils baseline for the corridor was defined as an area extending to approximately 1,060ha following the existing A83. This study area contains all five possible route options (Brown, Pink, Yellow, Green and Purple Route Options) and is shown on Figure C7.1 with descriptions of these options provided in Section 5.4 of Chapter 5 (Project Description). This study area is hereafter referred to as the route corridor.

Overview of Assessment Approach

7.2.2 The assessment approach is cognisant of SEA SEPA Guidance Note 2 – Guidance on Consideration of soil in Strategic Environmental Assessment (SEPA 2019) and considers the potential for significant effects relating to disturbance to carbon rich soils, in particular peat; loss of organic matter; soil sealing and soil loss; structural degradation of soils; and soil biodiversity. Soil erosion and landslide risk are considered in the Design Manual for Roads and Bridges (DMRB) Stage 1 PES Report (Jacobs/AECOM 2021) and soil contamination is considered only in relation to potential for contamination of soils from construction of the project.

7.2.3 Professional judgement has been used during the assessment to determine whether a significant effect on soils is likely to arise as result of the project. The assessment took cognisance of the baseline, available information on the options within the route corridor, the assessment scoring criteria provided in Table C7.1 and the SEA objective and guide questions set out in Chapter 6 (SEA Approach and Methods). Construction and operation effects have been assessed together, as effects on soils are expected to be similar during both construction and operation phases. All potential effects are considered negative, direct and reversible unless otherwise stated. In addition to the SEPA SEA guidance on soils (SEPA 2019), the assessment has also been mindful of guidance, policies and legislation listed in paragraph 7.3.2.

Table C7.1: Assessment Criteria for Potential Effects on Soils

Score	Description	Colour coding and symbol
Minor positive effect	The corridor has the potential to result in positive impacts on soils and land use resources or provide opportunities for enhancement.	+
Minor negative or uncertain effect	The corridor contains soils and land use resources that include peatland (priority and non-priority) habitat and Geological Conservation Areas (GCR) and these receptors would likely be able to be avoided through choice of route alignment within the corridor or if unavoidable, mitigation is likely to be successful in reducing the potential for significant negative effects.	-
Significant negative effect	The corridor contains peatland (priority and non-priority) habitat and GCR and it is unlikely these receptors would be able to be avoided through choice of route alignment within the corridor and/or mitigation is unlikely to be fully successful in reducing the potential for significant negative effects.	--

7.2.4 The assessment methodology for soils, including the aspects of soils listed in paragraph 7.1.1, has been influenced by consultation with the Environmental Steering Group (ESG) which expanded the soils remit to include considering potential effects on land capability for forestry. Further information on consultation with the ESG is provided in Chapter 4 (Consultation and Stakeholder Engagement).

Data Sources

7.2.5 The soils baseline was established, and the assessment undertaken utilising the following sources:

- British Geological Survey (BGS) Geoviewer (BGS, 2021);
- National Soil Map of Scotland (The James Hutton Institute, 2021a);
- Land Capability for Agriculture (The James Hutton Institute, 2010);
- Land Capability for Forestry (The James Hutton Institute, 2021b)
- Carbon and Peatland 2016 (Scotland's soils, 2021); and
- Ordnance Survey base mapping/aerial imagery.

7.2.6 Some aspects of soils, including peat habitat, soil biodiversity and commercial forestry, are considered and discussed in Appendix C (Section 5: Biodiversity, Flora and Fauna) and Appendix C, (Section 9: Landscape and Visual Amenity).

Limitations to Assessment

7.2.7 No site walkovers have been undertaken to confirm the available baseline information, due to the coronavirus travel restrictions present at the time of writing.

7.3 Detailed Baseline

Overview

7.3.1 Soil is a non-renewable resource that supports a range of natural processes as well as providing environmental, societal and economic benefits. A number of essential land use resources are dependent on soil, including agriculture and forestry. Climate change and changes in land management practices, including built development, present the most significant pressures on Scotland's soils.

7.3.2 There is a range of guidance, policies and legislation in Scotland that protects different aspects of soil and influences how soils are managed. Some of the relevant guidance, policies and legislation which relate to the aspects of soil considered within this SEA are listed below:

- National Planning Framework 3 (The Scottish Government, 2014a);
- Scottish Planning Policy (SSP) (The Scottish Government, 2014b);
- The Scottish Soil Framework (The Scottish Government, 2009);
- National Peatland Plan (Scottish Natural Heritage, 2015);
- Advising on carbon-rich soils, deep peat and priority peatland habitat in development management (NatureScot, 2020);
- Strategic Environmental Assessment SEPA Guidance Note 2 - Guidance on consideration of soil in Strategic Environmental Assessment (SEPA, 2019);
- Forestry and Land Management (Scotland) Act (2018); and
- Scotland's Forestry Strategy 2019-2029 (The Scottish Government, 2019).

7.3.3 The National Planning Framework (NPF) and Scottish Planning Policy (SPP) recognise soil as a physical asset and highlight the need to manage our finite soil resource by maintaining and improving its condition. SPP aims to influence development and identifies the need to consider the implications of development on soil quality as one of its guiding principles. It also states that the planning system should seek to protect soils from damage such as erosion or compaction. The need to consider the implications of development management on peat and other carbon rich soils is specifically recognised in SPP.

7.3.4 The proposed Local Development Plan 2 (LDP2) for Argyll and Bute Council and the adopted LDP for Loch Lomond and The Trossachs National Park Authority (LLTNPA) have included policies to protect soil, peat and soil related resources from development:

- Policy 77 - Forestry, Woodland and Trees (Argyll and Bute Council 2019);
- Policy 78 – Woodland Removal (Argyll and Bute Council 2019);
- Policy 79 – Protection of Soil and Peat Resources (Argyll and Bute Council 2019);
- Policy 80 – Geodiversity (Argyll and Bute Council 2019);
- Natural Environment Policy 7 - Protecting Geological Conservation Review sites (LLTNPA 2016);
- Natural Environment Policy 8 - Development Impacts on Trees and Woodlands (LLTNPA, 2016);
- Natural Environment Policy 9 - Woodlands on or adjacent to development sites (LLTNPA, 2016); and
- Natural Environment Policy 10 - Protecting Peatlands (LLTNPA, 2016).

7.3.5 The Argyll and Bute Council Woodland and Forestry Strategy (Argyll and Bute Council, 2011) also outlines strategic priorities in relation to climate change, including CC5 - Encourage robust protection of peat soils to maintain their value as carbon stores.

7.3.6 The LLTNPA Trees and Woodland Strategy (LLTNPA 2019) also recognises the importance of protecting and restoring peatland as a means to reduce the impacts of climate change. Within the National Park, there is a target to restore 2,000 ha of peatland by 2023. There is a presumption against tree planting on deep peat (more than 50 cm) and on sites that would compromise the hydrology of adjacent peat bog habitats.

7.3.7 The above local authority policies and strategies, and how they are relevant to the project, are discussed in more detail within Appendix B (Plans, Policies and Strategies Review).

Geology

7.3.8 The majority of the bedrock within the corridor is metamorphic consisting of the Beinn Bheula Schist Formation - Psammite And Pelite in the north western half of the corridor, the Beinn Bheula Schist Formation - Pelite, Semipelite And Psammite in the south eastern half of the corridor with some igneous formations including South Of Scotland Granitic Suite - Diorite, Pyroxene-mica to the east of the A83 between the Cobbler and Beinn Luibhean (BGS, 2021). The superficial geology within the route corridor is predominantly Till – Diamicton with some sedimentary river deposits located along Croe Water (BGS, 2021). Some areas within the corridor do not have superficial geology, which implies bedrock geology is located at or close to the surface.

7.3.9 The Cobbler (Beinn Artair) Geological Conservation Review (GCR) site is located on the higher slopes of The Cobbler which falls partly within the south-eastern extent of the corridor and approximately 820m from the existing A83 (NatureScot, 2021). Only approximately 6.49ha, the equivalent of 4%, of the GCR total area, falls within the corridor boundary and constitutes less than 1% of the corridor total area. The GCR interest relates to mass movement and has not been notified as a Site of Special Scientific Interest (SSSI). The location of the GCR is relation to the corridor is shown on Figure C7.1.

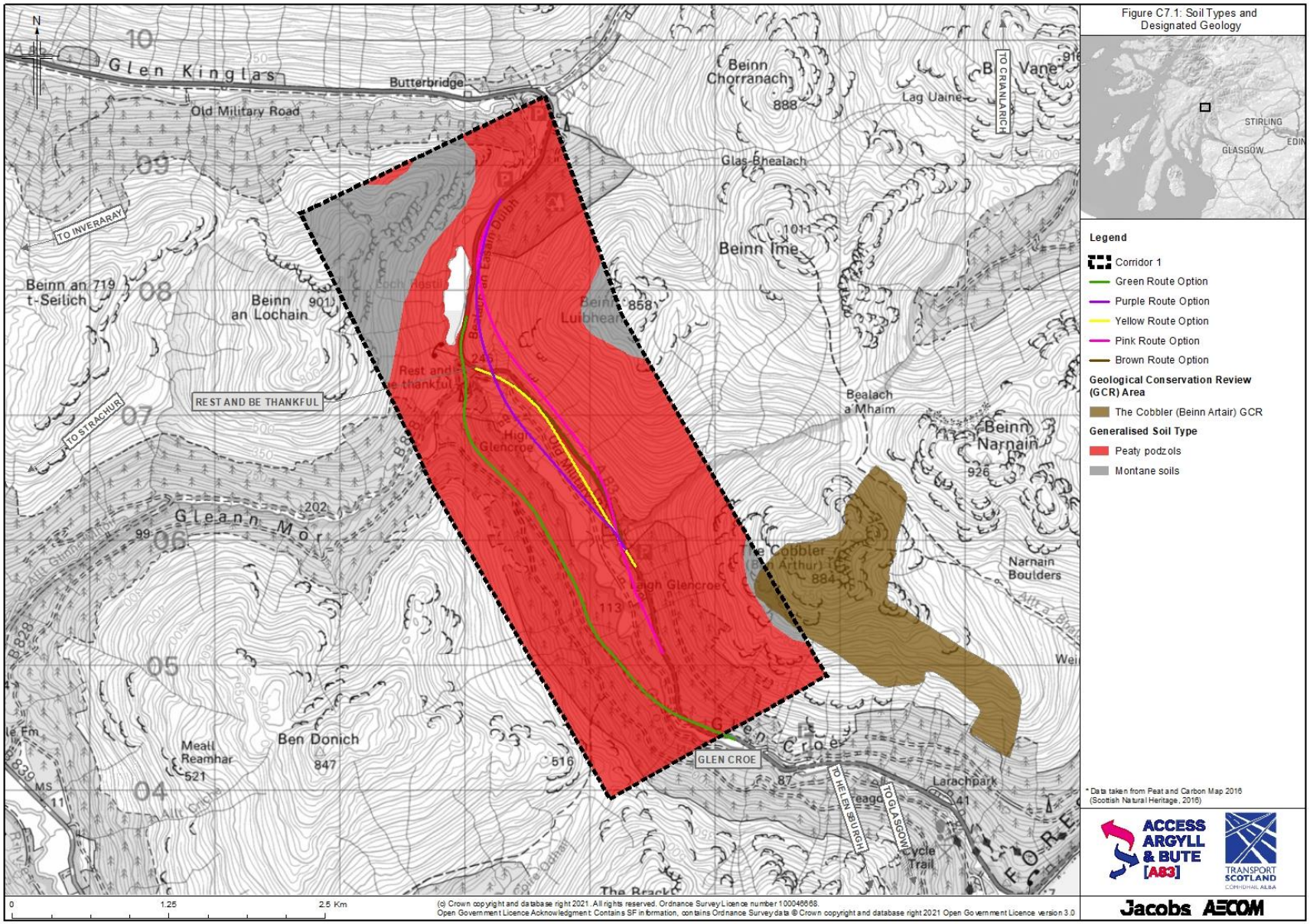

Figure C7.1: Soil Types and Designated Geology

7.3.10 As discussed in Chapter 1 (Introduction), the slopes above the A83, particularly between Croe Water and the Rest and Be Thankful car park, have a history of landslides and debris flows. These are triggered by heavy rainfall events and have deposited debris on the trunk road, resulting in road closures. Assessment of the geological conditions and potential geohazards has influenced the possible route options. A more detailed assessment of the geotechnical constraints and the susceptibility to instability of the corridor is presented in the DMRB Stage 1 PES Report (Jacobs/AECOM 2021).

Soils

7.3.11 The majority of soil within the route corridor can be characterised as peaty gleyed podzols with peaty gleys and dystrophic semi-confined peat with Strichen soil association (The James Hutton Institute, 2021a). The soils are adjacent to the existing A83 Trunk Road and on either side of Glen Croe valley. Towards the higher slopes within the route corridor are montane soils (The James Hutton Institute, 2021a) located on the mountains Beinn an Lochain, Beinn Luibhean and The Cobbler. Soil types within the route corridor are shown on Figure C7.1.

Peat

7.3.12 The majority of the route corridor transects land identified as Class 3 (not priority peatland habitat with carbon rich soils and some areas of deep peat), Class 4 (area unlikely to be associated with peatland or high carbon soils) and Class 5 (no peatland habitat recorded, soils are carbon rich and deep peat) on the Carbon and Peatland 2016 Map (Scottish Natural Heritage, 2016). A small area of peat identified as Class 1 (nationally important carbon rich soils, deep peat and priority peatland habitat, areas likely to be of high conservation value) has been identified in the route corridor on the higher slopes of Ben Donich to the west and where the A83 joins Glen Kinglas to the north. Approximate areas of the amount and classification of peat in relation to the route corridor is provided below in Table C7.2.

Table C7.2: Peat within Route Corridor

Peat Classification	Amount (ha)	% of Corridor
1	7	<1
3	305	29
4	117	11
5	467	44
Total	896	84

7.3.13 The remainder of land is characterised on the Carbon and Peatland 2016 Map as 'mineral soils' or 'non-soils' and include the montane geology on the high slopes of Beinn an Lochain, Beinn Luibhean, Ben Donich and The Cobbler, and the waterbody Loch Restil.

7.3.14 The locations of peat within the route corridor are shown on Figure C7.2.

7.3.15 Peat and how it functions as an ecological habitat is discussed in Appendix C (Section 5: Biodiversity, Flora and Fauna).

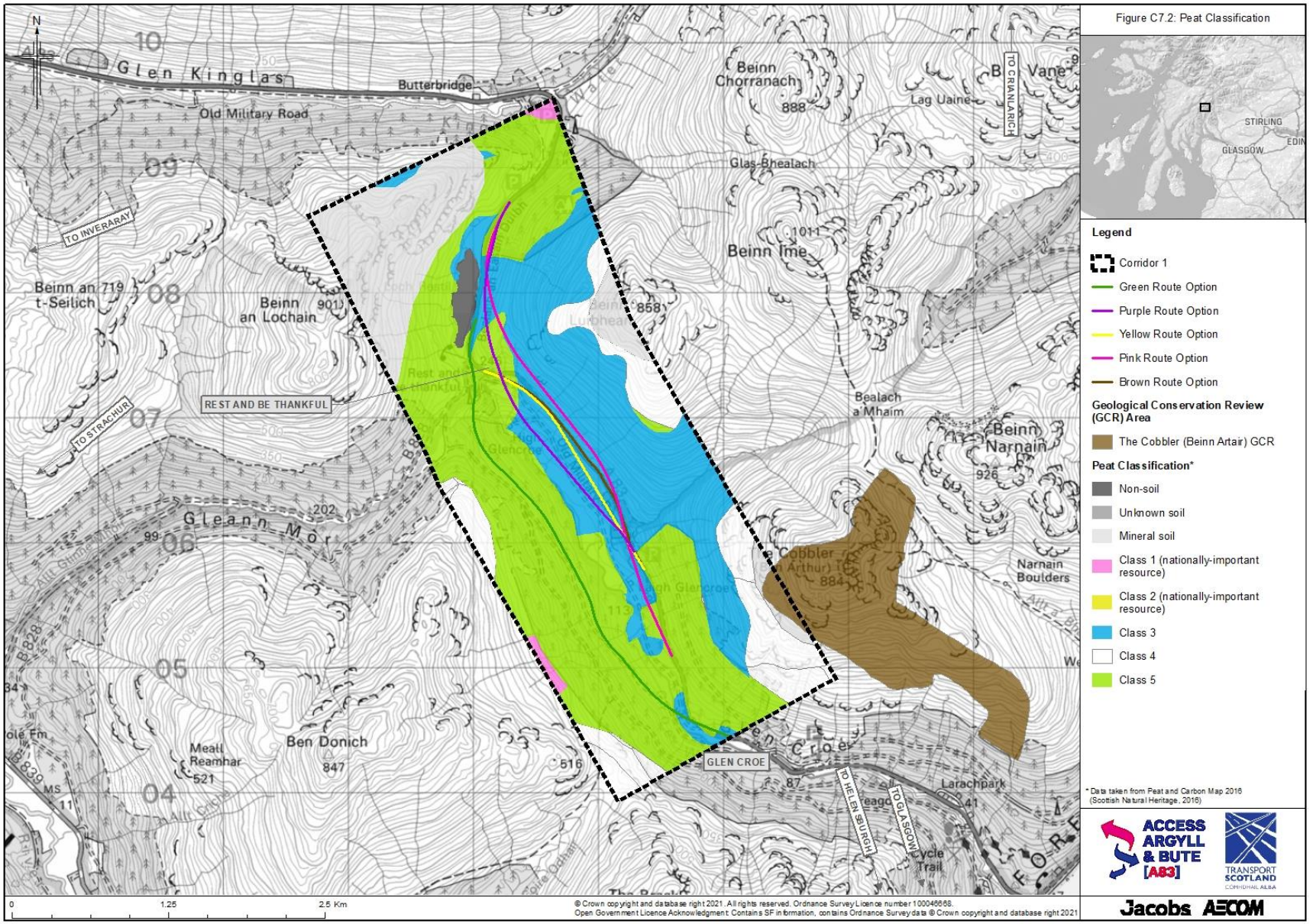

Figure C7.2: Peat Classification

Land Capability for Agriculture

7.3.16 Given the combination of soils, climatic conditions and topography, the most sensitive Land Capability for Agriculture (LCA)[1] Class within the route corridor is Class 6.1 (non-prime land capable of use as rough grazings with a high proportion of palatable plants) with approximately 216ha (20% of total corridor). The majority of LCA classification within the route corridor is Class 6.2 (non-prime land capable of use as rough grazings with moderate quality plants) with approximately 758ha (72% of the total corridor). The remainder of the LCA is Class 7 (land of very limited agricultural value) (The James Hutton Institute, 2010).

Land Capability for Forestry

7.3.17 Given the combination of soils, topography and climate the land with the most flexibility for the growth and management of tree crops within the route corridor is Land Capability for Forestry (LCF) Class F4 (land with moderate flexibility for the growth and management of tree crops) with 114ha (11% of the total corridor) located alongside the existing A83 in the lower slopes of Glen Croe. The majority of LCF classification within the route corridor is Class F6 (Land with very limited flexibility for the growth and management of tree crop) with 448ha (42% of the corridor). The remainder of the LCF is Class 5 (Land with limited flexibility for the growth and management of tree crops) and Class 7 (Land unsuitable for producing tree crops) (The James Hutton Institute, 2021b).

7.3.18 Forestry, including commercial practices and local forestry and management plans, is discussed in Appendix C (Section 9: Landscape and Visual Amenity). The ecological importance of forestry within the route corridor including ancient and native woodland is discussed in Appendix C (Section 5: Biodiversity, Flora and Fauna).

7.4 Evolution of Baseline and Trends

7.4.1 Scotland's soils are under pressure from the effects of climate change and changes in land-use and land management. The impacts of climate change include temperature change, run-off erosion from high-intensity rainfall which leads to soil degradation and soil losses through other sources of flooding. Land use and land management can improve the protection of soils or can potentially lead to soil sealing[2], compaction, loss or organic matter, contamination or erosion and landslides. These changes can cause secondary impacts on various other SEA topic receptors, including landscape, human health, flood risk and flora and fauna.

7.4.2 Soils and peat within the Argyll and Bute region have the potential to release sequestered carbon if not managed appropriately, and thus contribute to climate change.

7.5 Assessment

7.5.1 This section presents any likely significant effects on soils as a result of the project. The potential effects on soils for each of the possible route options have been assessed using the criteria defined in Table C7.1.

Geology

7.5.2 The project is assessed as having the potential for **irreversible minor negative or uncertain effects** in terms of geology. This recognises the potential disturbance of superficial and bedrock geology for those possible route options including a tunnel in their design. The Purple Route Option proposes approximately 1.6km of tunnel and the Pink Route Option proposes approximately 3.0km of tunnel. The effects, however, are considered to be minor negative or uncertain taking into account the geological composition of the route corridor and its widespread occurrence in the region and country, resulting in a minor overall percentage loss.

7.5.3 Due to its location on the high slopes of The Cobbler, it is considered that all possible route options are likely to avoid The Cobbler (Beinn Artair) GCR site.

Soils

7.5.4 The project is assessed as having the potential for **irreversible and reversible minor negative or uncertain effects** in terms of soils, including carbon-rich soils. This recognises that all five possible route options would have the potential to result in irreversible soil sealing and reversible disturbance of soils. The potential for reversible disturbance of soils would likely be mitigated. However, there is potential for reversible disturbance to extend to the medium-term arising from the potential loss of organic matter, change in soil biodiversity, contamination, compaction and structural degradation.

7.5.5 In general, the shortest option within the route corridor would be expected to have the least impact on soils and peat. However, whether the possible route option is online or offline and whether the design includes tunnels and/or viaducts influences the potential for soil sealing and disturbance of soils. The offline Purple Route Option extends to approximately 4.7km and includes 1.2km on embankment or a viaduct and 1.6km in a tunnel and so has the potential to result in irreversible soil sealing across 1.9km to 3.1km and reversible disturbance across up to 1.2km. The offline Yellow Route Option extends to approximately 2.1km and includes 1.8km on a viaduct and so has the potential to result in irreversible soil sealing across 0.3km and reversible disturbance across 1.8km. The offline Pink Route Option extends to approximately 3.7km of which 3.0km is in a tunnel and so has the potential to result in irreversible soil sealing across 0.7km. The on-line Brown Route Option extends to approximately 1.6km, of which 0.3km is on a viaduct and so has the potential to result in irreversible soil sealing across 1.3km and reversible disturbance across 0.3km. The offline Green Route Option extends to approximately 4.9km, of which 0.5km is on a viaduct and so has the potential to result in irreversible soil sealing across 4.4km and reversible disturbance across 0.5km.

Peat

7.5.6 The project is assessed as having the potential for **irreversible and reversible minor negative or uncertain effects** in terms of peat. This recognises that all five possible route options would have the potential to result in irreversible soil sealing of non-priority peatland (Class 3, Class 4, and Class 5) and reversible disturbance of non-priority peatland. The potential for reversible disturbance of peat would likely be mitigated. However, there is potential for reversible disturbance to extend to the medium-term arising from the potential loss of organic matter, change in soil biodiversity, contamination, compaction and structural degradation.

7.5.7 The project also has the potential to cause indirect effects on peat such as a change in drainage or change in vegetation cover. Due to the priority peat being located on the northern and western peripheries of the route corridor, it is considered unlikely that any priority peatland would be affected by the possible route options.

7.5.8 The Green Option would predominantly intersect Class 5 peat. The Purple, Brown, Pink and Yellow Route Options would predominantly intersect Class 3 peat. As all five possible route options incorporate

[1] Land Capability for Agriculture (LCA) is derived from data published by The James Hutton Institute (2010) and its primary objective is to rank land based on its potential productivity and cropping flexibility determined by the extent to which its physical characteristics impose long term restrictions on its agricultural use

[2] Soil sealing is the covering of ground by an impermeable material e.g. construction of a new road

tunnels and/or viaducts the potential for irreversible and reversible effects on peat is as described for soils in paragraph 7.5.5.

Land Capability for Agriculture

7.5.9 The project is assessed as having the potential for **irreversible minor negative or uncertain effects** in terms of sealing of non-prime agricultural land and reversible minor negative or uncertain effects in terms of disturbance of non-prime agricultural land.

Land Capability for Forestry

7.5.10 The project is assessed as having the potential for **irreversible minor negative or uncertain effects** in terms of sealing of land capable of use for forestry and reversible disturbance of land capable for use for forestry. This recognises that the land potentially affected is of LCF Classes F4, F5 and F6. The Green Route Option would potentially avoid LCF Class 4, the land with the greatest (moderate) flexibility for growth and management of tree crops within the route corridor.

Overview

7.5.11 A summary of the assessment in relation to the SEA soils objective and SEA Assessment Guide Questions as set out in Chapter 6 (SEA Approach and Methods) is provided in Table C7.3.

Table C7.3: Soils assessment using SEA Objectives and Guide Questions

Soils SEA Objective	SEA Assessment Guide Questions *'Does the Access to Argyll and Bute (A83) corridor…?'*	Route Corridor Assessment
Safeguard and improve soil quality in Scotland, particularly high value agricultural land and carbon-rich soil	▪ avoid and minimise disturbance of rare soils, high-carbon (including peat) and wetland soils and productive agricultural land?	The project has been assessed as having the potential to avoid priority peatland although, with all five possible route options, irreversible soil sealing, including non-priority peatland and carbon-rich soils, is likely. All five possible on-line and off-line options incorporate tunnels and/or viaducts which have the potential to reduce irreversible soil sealing and reversible disturbance effects on non-priority peatland and carbon rich soils. Reversible disturbance would be reduced where possible through mitigation, including development of a Peat Management Plan.
	▪ avoid indirect impacts on off-site peat and wetland soils to maintain natural processes of hydrological and ecological regimes?	Hydrological and ecological regimes would be maintained where possible through mitigation measures for the project reducing the potential for indirect impacts on off-site priority and non-priority peatland and carbon-rich soils. This would include development of a Peat Management Plan.
	▪ avoid or minimise land take of greenfield sites?	The project would reduce the potential for irreversible land-take (sealing) of greenfield land for off-line route options (Purple, Yellow, Pink and Green) through design, for example use of tunnels or viaduct structures and minimising earthworks where possible. All five possible route options incorporate tunnels and/or viaducts.
	▪ reduce risk of soil sealing, contamination or erosion on a significant scale?	The project would reduce the risk of irreversible soil sealing through design, for example considering on-line options (Brown Route Option), use of tunnel or viaduct structures for on-line and off-line (all possible route options), and reducing the extent of earthworks

Soils SEA Objective	SEA Assessment Guide Questions *'Does the Access to Argyll and Bute (A83) corridor…?'*	Route Corridor Assessment
		where possible. Potential risks of contamination and erosion would be mitigated.
	▪ influence the amount of vegetated and forested land-cover that helps maintain slope stability and reduces erosion risk?	The project would retain existing vegetation where practicable and land within the route corridor with the greatest flexibility for growth and management of tree crops would be avoided, again where practicable. The Green Route Option would potentially avoid LCF Class 4, the land with the greatest (moderate) flexibility for growth and management of tree crops within the route corridor. Opportunities for enhancing the amount of vegetated and forestry land cover to help maintain slope stability and reduce erosion risk would be explored where possible through mitigation and enhancement proposals.

7.6 Inter-relationships with other SEA topics

7.6.1 Table C7.4 presents the inter-relationships identified between soils and the other SEA topics.

Table C7.4: Inter-related SEA topics

SEA Topic	Relationship with Soil
Climate	Soils and peat store carbon within the route corridor and help maintain the balance of gases in the air. There is potential for carbon loss to the atmosphere through exposure of and disturbance to organic soils. Sealing of soils would reduce the capacity to assimilate carbon within the route corridor. Compaction/structural degradation and erosion can result in loss of carbon storage function and flux of greenhouse gases, thus affecting climactic factors.
Population and human health	Soils and peat support the agriculture and forestry industries within the route corridor and provide resources and means of employment for the population thus also supporting human health and well-being.
Material assets	Soils and peat are important natural assets that underpin other ecosystem services within the route corridor. Loss of organic matter and soil sealing would have the potential to result in loss of nutrients which in turn would lead to loss of fertility/productivity.
Water environment	Soils and peat regulate the flow of water and also provide water storage within the route corridor. They also filter and buffer pollutants. Soil erosion and runoff from compacted/degraded soils can lead to transportation of contaminated soils which can adversely affect water quality within the route corridor as well as changing hydrological regimes which also has the potential to affect flood risk.
Biodiversity	Soils and peat provide habitats and support biodiversity within the route corridor. Soil quality is defined as the ability of soils to carry out essential environmental, social and economic functions. Soil biodiversity is essential to most soil functions and affects the sustainability of species and habitats which rely on soils, whilst soil organisms play a vital role in maintaining soil carbon and soil nitrogen and exchange of greenhouse gases. Soil sealing would reduce the capacity of the route corridor to support habitats and biodiversity and potentially affect the sustainability of species and habitats that rely on soils and soil biodiversity.
Cultural heritage	Soils and peats preserve cultural and archaeological heritage within the route corridor. Soil sealing or loss/disturbance of peat may result in loss of historical artefacts or archaeological features within the corridor.
Landscape and visual	Soils and peat support the growth of plants and trees which provide landscape and visual value within the route corridor. Loss of organic matter or soil sealing may result in changes in habitats and land use that may affect visual amenity and landscape character.

7.7 Conclusions

7.7.1 At this stage of assessment, the project is not anticipated to have any significant negative effects on soils. It is assessed that some effects of the project on soils are potentially irreversible, such as soil sealing and the significance of effects will be assessed during the DMRB Stage 2 and DMRB Stage 3 processes.

7.7.2 A summary of the effects on soils at the SEA stage is provided in Table C7.5.

Table C7.5: Summary of Effects on Soils

Soil Element	Potential Effect Description	Effect Duration	Scoring Criteria
Soils	Loss of soil (sealing) including carbon-rich soils, and disturbance resulting in potential for loss of organic matter, compaction/structural degradation and changes in soil biodiversity	Irreversible sealing Reversible short-term to medium-term, disturbance	Minor negative or uncertain effect
Peat	Loss of non-priority peat (sealing), and disturbance resulting in potential for loss of organic matter, compaction/structural degradation and changes in soil biodiversity	Irreversible sealing Reversible short-term to medium-term disturbance	Minor negative or uncertain effect
Geology	Loss and disturbance of superficial and bedrock geology	Irreversible	Minor negative or uncertain effect
Land Capability for Agriculture	Loss of (sealing) and disturbance to non-prime agricultural land	Irreversible sealing Reversible short-term to medium-term disturbance	Minor negative or uncertain effect
Land Capability for Forestry	Loss of (sealing) and disturbance to LCF Classes 4, 5 and 6.	Irreversible sealing Reversible short-term to medium-term disturbance	Minor negative or uncertain effect

7.7.3 Due to the potential effects on soils (including carbon-rich soils and peat), albeit assessed as a minor negative or uncertain effect, it is considered that the project only partially meets the SEA objective of *'Safeguard and improve soil quality in Scotland, particularly high value agricultural land and carbon-rich soil'.*

7.7.4 The recommendations provided in Table C7.6 will be considered in order to reduce the potential effects and safeguard carbon-rich soils where possible and opportunities for enhancement will be explored at subsequent stages of the project to strive to meet the SEA objective more fully.

7.7.5 It is considered likely that negative effects on soils would reduce following implementation of the recommendations outlined in Table C7.6 and through development of appropriate mitigation measures where possible at subsequent DMRB stages.

7.8 Design Development, Mitigation and Enhancement Recommendations

7.8.1 Table C7.6 sets out the SEA recommendations in relation to soils mitigation and enhancement.

Table C7.6: Potential Mitigation, Enhancement, and Design Recommendations in Relation to Soils

Mitigation / Enhancement / Monitoring Measure	Stage of Implementation (e.g. DMRB Stage 2, DMRB Stage 3)	Responsible Party for Implementation	Consultation/ Approvals Required
Peat and carbon-rich soils surveys should be undertaken during design development to inform baseline conditions and design development should seek to reduce the overall land-take of soils and peat and avoid soil sealing where possible.	DMRB Stage 2 DMRB Stage 3 Detailed Design	Designer To be monitored by Transport Scotland during subsequent DMRB stages and by contractor during design and construction.	n/a
Where soils or peat are unavoidably disturbed, mitigation should be considered which reduces organic matter loss, contamination, erosion risk, compaction/structural degradation and soil biodiversity is maintained.	DMRB Stage 2 DMRB Stage 3 Detailed Design Construction	Designer & Contractor	n/a
Design development should avoid areas of nationally important peat (Class 1 and 2) and limit loss of and disturbance to non-priority peat (Class 3, 4 and 5) and carbon-rich soils as far as practicable. Design development should limit indirect impacts on peat where possible, for example a change in drainage, and mitigation should be developed where possible.	DMRB Stage 2 DMRB Stage 3 Detailed Design	Designer	n/a
Where areas of non-priority peat or carbon-rich soils cannot be avoided, mitigation measures should be considered where possible to safeguard peat and carbon-rich soils and measures should be detailed within a Peat Management Plan.	DMRB Stage 2 DMRB Stage 3 Detailed Design Construction	Designer & Contractor To be monitored by Transport Scotland during subsequent DMRB stages and by contractor during design and construction.	Consultation with Local Authority, Loch Lomond & The Trossachs National Park Authority and NatureScot. Compliance with the Peat Management Plan should be monitored by a suitably qualified and experienced person
Opportunities for peat habitat restoration, enhancement and creation should be explored where feasible and detailed within a Peat Management Plan.	DMRB Stage 2 DMRB Stage 3	Designer & Contractor To be monitored by Transport Scotland during subsequent DMRB stages and by contractor during construction.	Consultation with Local Authority, Loch Lomond & The Trossachs National Park Authority and NatureScot. Compliance with the Peat Management Plan should be monitored by a suitably qualified and experienced person.

Mitigation / Enhancement / Monitoring Measure	Stage of Implementation (e.g. DMRB Stage 2, DMRB Stage 3)	Responsible Party for Implementation	Consultation/ Approvals Required
Design development should aim to limit excavation and disturbance to the geology as far as practicable through, for example, optimising the cut/fill balance and re-use of site-won materials.	DMRB Stage 2, DMRB Stage 3, Detailed Design	Designer & Contractor To be monitored by Transport Scotland during subsequent DMRB stages and by contractor during construction.	n/a
Design development should seek to avoid, as far as possible, sites designated for their geological interest i.e. Geological Conservation Review (GCR) sites, where feasible.	DMRB Stage 2, DMRB Stage 3, Detailed Design	Designer To be monitored by Transport Scotland during subsequent DMRB stages.	n/a

7.9 References

Argyll and Bute Council (2011) Argyll and Bute Council Woodland and Forestry Strategy April 2011 [Online] Available from https://www.argyll-bute.gov.uk/sites/default/files/planning-and-environment/Woodland%20and%20Forestry%20Strategy%20April%202011.pdf. [Accessed 22 February 2021].

Argyll and Bute Council (2016) Local Development Plan Supplementary Guidance [Online] Available from https://www.argyll-bute.gov.uk/consultations/local-development-plan-supplementary-guidance. [Accessed 22 February 2021].

Argyll and Bute Council (2019) Proposed Local Development Plan 2 [Online] Available from: https://www.argyll-bute.gov.uk/ldp2 . [Accessed 22 February 2021]

British Geological Survey (BGS) (2021) Geoviewer [Online] Available from http://mapapps2.bgs.ac.uk/geoindex/home.html . [Accessed 22 February 2021]

Jacobs/AECOM (2021) *[on behalf of Transport Scotland]* Design Manual for Roads and Bridges (DMRB) Stage 1 PES Report

The James Hutton Institute (2010) Land Capability for Agriculture in Scotland [Online] Available from https://www.hutton.ac.uk/learning/exploringscotland/land-capability-agriculture-scotland. [Accessed 22 February 2021].

The James Hutton Institute (2021a) Soils Map of Scotland [Online] Available from https://www.hutton.ac.uk/learning/natural-resource-datasets/soilshutton/soils-maps-scotland [Accessed 22 February 2021]

The James Hutton Institute (2021b) Land Capability for Forestry (LCF) [Online] Available from https://www.hutton.ac.uk/learning/natural-resource-datasets/landcover/land-capability-forestry [Accessed 22 February 2021]

Loch Lomond and The Trossachs National Park Authority (LLTNPA) (2016) Local Development Plan 2017-2021. Section 4 Policies [Online] Available from http://www.lochlomond-trossachs.org/planning/planning-guidance/local-development-plan/ [Accessed 22 February 2021]

Loch Lomond and The Trossachs National Park Authority (LLTNPA) (2019) Trees and Woodland Strategy [Online] Available from https://www.lochlomond-trossachs.org/wp-content/uploads/2019/11/Trees_woodland_2019_2039.pdf [Accessed 22 February 2021]

NatureScot (2020) Advising on carbon-rich soils, deep peat and priority peatland habitat in development management [Online] Available from https://www.nature.scot/advising-carbon-rich-soils-deep-peat-and-priority-peatland-habitat-development-management [Last accessed 22 February 2021]

NatureScot (2021) SiteLink Map Search [Online] Available from https://sitelink.nature.scot/map [Accessed 22 February 2021]

Scottish Natural Heritage (2015) Scotland's National Peatland Plan: Working for our future [Online] Available at: https://www.nature.scot/scotlands-national-peatland-plan-working-our-future [Accessed 22 February 2021]

Scottish Natural Heritage (2016) Carbon-rich soils, deep peat and priority peatland habitat mapping: Consultation analysis report [Online] Available from https://www.nature.scot/sites/default/files/2018-05/Carbon%20and%20Peatland%20map%20consultation%20analysis%20report.pdf [Accessed 22 February 2021]

SEPA (2019) Strategic Environmental Assessment Guidance Note 2 (LUPS-SEA-GU2) Guidance on consideration of soil in Strategic Environmental Assessment, Version 3 [Online] Available from https://www.sepa.org.uk/media/162986/lups-sea-gu2-consideration-of-soil-in-sea.pdf. [Accessed 22 February 2021].

Scotland's Soils (2021) Carbon and Peatland 2016 map [Online] Available from https://soils.environment.gov.scot/maps/thematic-maps/carbon-and-peatland-2016-map/ [Accessed 22 February 2021]

The Scottish Government (2009) The Scottish Soil Framework [Online] Available from https://www.gov.scot/publications/scottish-soil-framework/ [Accessed 22 February 2021]

The Scottish Government (2014a) National Planning Framework 3 [Online] Available from https://www.gov.scot/publications/national-planning-framework-3/ [Accessed 22 February 2021]

The Scottish Government (2014b) Scottish Planning Policy [Online] Available from https://www.gov.scot/publications/scottish-planning-policy/ [Accessed 22 February 2021]

The Scottish Government (2019) Scotland's Forestry Strategy: 2019-2019 [Online] Available from https://www.gov.scot/publications/scotlands-forestry-strategy-20192029/ [Accessed 22 February 2021]