Appendix C: Material Assets – Detailed Baseline and Assessment

4. Material Assets

4.1 Introduction

4.1.1 As set out in Chapter 2 (Background to the SEA) of the main Environmental Report, the SEA Directive includes Material Assets as a topic to be addressed in SEA but does not set out a specific definition of the factors it should encompass. In accordance with SEPA guidance on assessment of material assets (SEPA 2019), for the purposes of this SEA, the Material Assets topic considers the potential effect of the project on the following assets:

- Natural assets: watercourses, forestry and woodlands, soils, and agricultural land; and
- Built Assets: infrastructure relating to energy / heat generation and distribution, waste management and transport

4.1.2 The usage of raw materials and energy is considered within this appendix to take account of consumption of finite resources. The effect of this in the context of Greenhouse Gas (GHG) emissions and climate change is considered within Appendix C, Section 1 (Climatic Factors: Methodology). The impacts on material resource consumption will be assessed at the DMRB Stage 2 level of assessment within the Materials chapter.

4.2 Methodology

4.2.1 The study area for the assessment of Material Assets comprises a 2km route corridor taken from the centreline of the existing A83 route. The assessment also considers certain built assets outwith the route corridor. This includes waste disposal facilities, as the effect from waste generation is assessed against waste treatment facility capacity in the region.

4.2.2 Baseline data for material assets were obtained from the following sources:

- Carbon and Peatland Map;
- Climate Change trends and projections;
- Scotland's waste sites and capacity tool;
- Scottish Forestry;
- SEPA Flood maps;
- Available information on possible route options as described in Chapter 5 (Project Description); and
- Assessment scoring criteria and SEA Guide Questions set out in Chapter 6 (SEA Approach and Methods).

4.2.3 Potential effects on Material Assets have been assessed using the criteria defined in Table C4.1.

Table C4.1: Assessment criteria for Potential Effects on Material Assets

Score	Description	Colour coding and symbol
Minor positive effect	The route corridor has the potential to result in positive effects on natural Material Assets through protection and enhancement of natural assets. Positive effects on built material assets are possible through upgrades of infrastructure and ensuring its resilience to future climate change.	+
Minor negative or uncertain environmental effect	The route corridor contains land use resources that include peatland and forestry, but it could be possible to avoid these receptors through choice of route option within the corridor. Raw materials and energy would be consumed to construct the project and waste materials would be generated.	-

Score	Description	Colour coding and symbol
Significant negative effect	The route corridor contains land-use resources that include peatland and forestry. Loss or degradation of forestry and non-renewable peat would be impossible or difficult to avoid. Significant quantities of raw materials and energy would be consumed to construct the project and it would generate significant quantities of waste materials.	--

4.3 Detailed Baseline

4.3.1 The main challenges facing Material Assets are those from increasing demand for goods and services and the environmental implications for their manufacture, use and disposal. The primary SEA objective for this topic is to *'promote the sustainable use and management of material assets.'*

4.3.2 The key legislation, policies and plans in relation to Material Assets also relevant to the project are as follows:

- The Waste (Scotland) Regulations 2012 require that all organisations in Scotland separate and present specified waste materials for recycling. It defines when a material is considered a waste: 'any substance or object the holder discards or is required to discard.'
- The Environment Strategy for Scotland: Vision and Outcomes (Scottish Government 2020). One of the outcomes of the strategy is by 2045 '*to use and re-use resources wisely and have ended the throw-away culture*'. As such the strategy places importance on using resources sustainably and transitioning to a circular economy. However, the strategy outlines no statutory requirements for the construction industry and refers to the circular economy strategy (below) to support this.
- Making Things Last: A Circular Economy Strategy for Scotland (Scottish Government 2016). The strategy states that the construction and built environment sector accounts for about 50% of all waste in Scotland and is a major influence on the efficient use of resources. As such, the Scottish Government will seek to influence new build, end of life, maintenance, renovation and expansion stages of construction. Although the strategy sets no statutory requirements, it sets priorities to work with the construction sector to build capacity to delivery change in collaboration with the Construction Scotland Innovation Centre and other partners. In addition, the strategy sets the priority of avoiding depletion of primary aggregates and timber resources through enhanced recycling of demolition materials. As such, the strategy aligns with the EU target of 70% recycling and reuse of construction and demolition waste by 2020.
- Transport Scotland Road Asset Management Plan (RAMP) (Transport Scotland 2016). Transport Scotland document which looks to apply a lifecycle plan to road infrastructure.
- Design Manual for Roads and Bridges (DMRB) GG103: Introduction and general requirements for sustainable development and design (Highways England *et al.* 2019). The document provides principles, requirements and advice to be applied to all design lifecycle stages of a project through to the end of its life. Meeting the requirements of GG103 demonstrates compliance with relevant requirements and advice in the DMRB and is to be implemented on all schemes on Transport Scotland's motorway and trunk roads.

Overview

4.3.3 The region in which the route corridor is situated is rural, and at a high elevation. The key natural and built material assets within the route corridor are shown on Figure C4.1. Existing woodland and forestry strategy areas are displayed on Figure C9.2 (Landscape Topography, Land Cover and key Visual Receptors). Soil classification information is displayed on Figure C7.1 (Soil Types and Designated Geology) and Figure C7.2 (Peat Classification.)

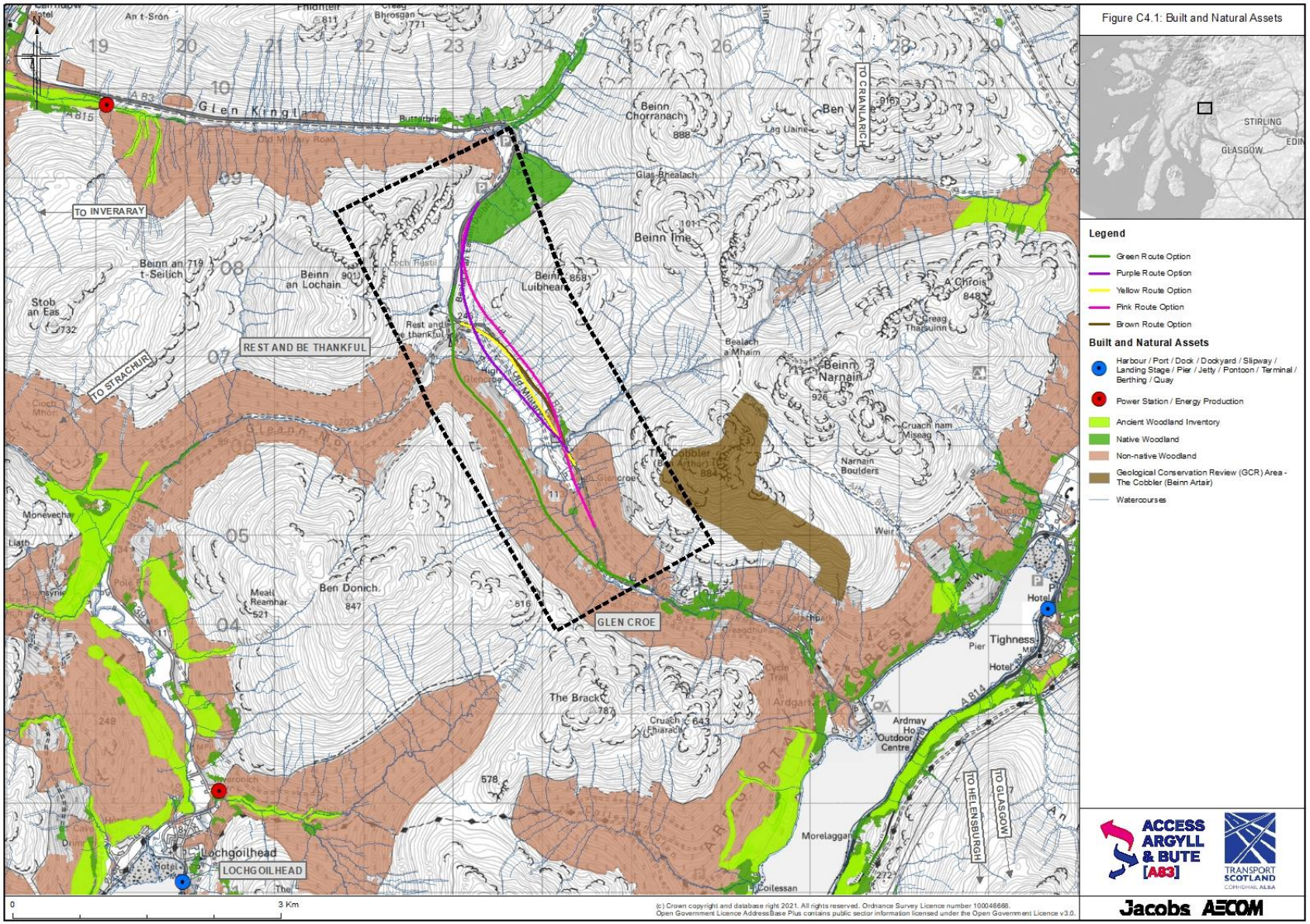

Figure C4.1: Built and Natural Assets

Natural Material Assets

Forestry and Woodland

4.3.4 In the east of the route corridor, the topography of the land is primarily steep hillside above the existing A83 carriageway. In the west of the route corridor, the topography of the land falls away steeply below the existing A83 carriageway. For the first 1.1km of the route corridor heading south, there is dense forestry on both sides of the centreline which is designated as predominantly F5 (limited flexibility for trees) in the west of the corridor and F4 (moderate flexibility for trees) to the east.

4.3.5 There is a section of designated Native Upland birchwood that follows the bank either side of Croe Water for 0.9km in the southern part of the route corridor. The forestry area to the west of the route corridor has recently been felled approximately 0.9km from the southern extent of the route corridor. Further sections of dense woodland are present at intervals along the remainder of the existing A83 until approximately 1.5km south of the Rest and Be Thankful viewpoint, after which it is mostly grassland. Conifer plantation woodland covers large areas of the route corridor, notably south of the B828, the west side of the Old Military Road, on the east of the A83, and south of where the road is intersected by Croe Water.

4.3.6 There are six parcels of woodland within the route corridor that are categorised as part of the Native Woodland Survey of Scotland (NWSS) (Forestry Commission 2014). There is one area listed on the Woodland and Forestry Strategy (Argyll and Bute Council 2011) that falls within the route corridor and most of the route corridor falls within the Loch Lomond Trossachs National Park Authority (LLTNPA) Trees and Woodland Strategy boundary (LLTNPA 2019).

4.3.7 In 2012, an assessment was instigated by the Forestry Commission Scotland (now Forestry Scotland) to determine the suitability of the land above the A83 in Glen Croe for tree planting to reduce incidence of debris flow onto the A83 (Research Agency of the Forestry Commission 2012). The report concluded that it would be realistic to expect that successful establishment of trees would be appropriate to potentially increase the stability of the area.

4.3.8 Forestry and Land Scotland data indicate that a Rest and Be Thankful Woodland Creation Project is being undertaken on the steep south western flanks of Bein Luibhean. Forestry and Land Scotland are working in partnership with Transport Scotland and propose planting mixed native woodland with a range of species selected to maximise slope stability (Forestry and Land Scotland 2020). Natural regeneration of native species will also be encouraged and there is scope for further planting adjacent to the core project area.

4.3.9 In addition, the LLTNPA Trees and Woodlands Strategy (2019) identifies large areas around the Highland summits as preferred or potential native woodland creation opportunities, while the Argyll and Bute Council Woodland and Forestry Strategy identifies small areas of potential woodland along the edges of existing woodland in Glen Kinglas. Further information on the woodland strategies is provided in Appendix C (Section 9: Landscape and Visual Amenity).

Agricultural Land

4.3.10 There are three different types of land classification in the route corridor as designated by the Land Capability for Agriculture (LCA) scale. 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). To the east of the A83 there is a large section of agricultural land class 6.10 (non-prime land capable of use as rough grazings with a high proportion of palatable plants). The remainder of the LCA is Class 7 (land of very limited agricultural value, primarily to the west of Loch Restil (The James Hutton Institute 2021a).

Soils

4.3.11 As outlined in Appendix C (Section 7: Soils), 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 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). As outlined in Appendix C (Section 1: Climatic Factors), the peat soils within the route corridor hold high carbon sequestration and sink value.

Watercourses

4.3.12 There are over 30 water features within the route corridor, including primary watercourses and a small Loch. The largest waterbody within the route corridor is Loch Restil, which lies between Glen Croe and Glen Kinglas adjacent to the existing A83. The loch is a freshwater body and feeds Kinglas Water. It is part of the important view from the Rest and Be Thankful Viewpoint. Refer to Appendix C (Section 6: Water Environment) for further details on waterbodies in the route corridor.

Built Material Assets

Transport

4.3.13 The existing 'A' and 'B' roads are the key built material assets in the route corridor, including the existing A83 and the B828. The Old military road is within the route corridor to the west of the existing A83. There are several forestry tracks within the route corridor.

4.3.14 There is a public car park at the highpoint of the Rest and be Thankful viewpoint where the B828 meets the A83. Within the carpark there is a bus stop for Intercity bus services 926 between Glasgow and Cambeltown and 976 between Glasgow and Oban. There is also the 302 service between Helensburgh and Arrochar.

4.3.15 The Highland Mainline Railway is located approximately 4.5km east of the route corridor, with the nearest station at Arrochar and Tarbet.

Energy Infrastructure

4.3.16 The region where the route corridor is located has several energy generating infrastructure assets, particularly associated with hydro and wind renewable electricity generation. However, there are no such assets within the route corridor, with the nearest located at Glenkinglas, 2.9km to the north west of the corridor.

Waste Management Facilities

4.3.17 The nearest operational waste management facility is located at Sandbank in Dunoon, approximately 58km south west of the route corridor. It has an annual permitted landfill capacity of 20,515 tonnes for non-hazardous waste (SEPA 2020).

4.4 Evolution of Baseline and Trends

4.4.1 The changing climate is expected to have an effect on material assets in future years. An increase in annual rainfall for Scotland and more frequent, higher intensity rainfall events poses a risk to the transport network, through flooding and disruption to earthworks along transport corridors resulting in landslips, undercutting and bridge scour (NERC 2015). UK infrastructure is already experiencing impacts due to the natural variability of the climate, and future climate projections have the potential to reduce the capacity and efficiency of infrastructure.

4.4.2 The natural material assets baseline of the route corridor will be influenced by the Rest and Be Thankful Woodland Creation Project. This proposes a mixed native woodland plantation to help stabilise the slopes.

4.5 Assessment

4.5.1 This section presents the potential significant effects on Material Assets (Natural and Built) during construction and operation of the project and provides a high-level commentary on the expected volume of raw materials that would be required to facilitate construction. The five possible route options (Green Yellow, Purple, Pink and Brown Route Options) within the route corridor have also been considered. The potential effects on Material Assets have been assessed using the criteria defined in Table C4.1.

Construction

Natural Assets

4.5.2 It is recognised that development of any possible route option for the project would cause an unavoidable permanent effect on non-priority peatland. The possible route options within the route corridor have the potential to cause indirect effects on peat such as a change in drainage or change in vegetation cover. Due to the location of peat within the route corridor and the alignments of the possible route options, it is considered unlikely that any nationally important peat would be affected by the possible route options.

4.5.3 Construction on areas of peatland would remove the material from its current setting, resulting in the release of stored carbon and removing high value carbon sequestration peat lands. Overall, degradation and removal of peatland would be considered to have the potential for minor negative or uncertain effects. Refer to Appendix C (Section 7: Soils) for further information on peatlands.

4.5.4 The project is assessed as having minor negative or uncertain effects on forestry. This recognises that there would likely be unavoidable loss and permanent loss of Land Capability for Forestry (LCF) Classes F4, F5 and F6, as categorised by The James Hutton Institute (2021b). The Green Route Option would potentially avoid LCF Class 4, the land with the greatest flexibility for growth and management of tree crops within the route corridor. The Argyll and Bute Council Woodland and Forestry Strategy identifies small areas of potential woodland along the edges of existing woodland in Glen Kinglas that could be affected by the project. Refer to Appendix C (Section 7: Soils) for further information on forestry.

4.5.5 The project would be expected to create additional impermeable road surface area, reducing the area for natural flood management. Removal of soils and forestry could also alter the natural hydrology within the route corridor, as shown in Appendix C (Section 6: Water Environment).

4.5.6 The Purple and Pink Route Options include a tunnel and therefore would be expected to have a lesser effect on surface material assets than that those at ground level. The Brown Route Option would also be expected to have a lesser effect on surface material assets as it predominantly follows the line of the existing A83.

Built Assets

4.5.7 During construction there is likely to be disruption to the existing A83 due to construction activities. This could affect the operation of the route, causing delays to road users travelling in the vicinity of the route corridor. This effect would be temporary in nature and minor negative.

4.5.8 Waste would be generated during demolition of existing infrastructure and during construction of the project and this would require treatment at a licensed waste management facility. The scale of this effect would be dependent on material requirements, waste generated and waste processing capacity of treatment facilities in the region and further afield. This effect would be permanent in nature and minor negative or uncertain. Appendix C (Section 1: Climatic Factors), considers waste management in terms of carbon emissions.

4.5.9 As no built assets related to energy generation have been identified within the route corridor, there are considered to be no effects on energy assets from the project. There are also no anticipated effects from the project on the highland mainline railway due to its distance from the route corridor.

Use of Materials

4.5.10 Construction of the elements that make up the project such as the carriageway, viaducts, road junctions and tunnels would have significant raw material and manufactured material requirements. Raw materials used in road construction include aggregates and manufactured materials include steel, concrete and tarmacadam. Manufacture of these materials would have an embodied carbon content from consumption of finite materials and energy consumption in the manufacturing process. The construction of the project would also consume energy from the activities on site, causing emissions from hydrocarbon combustion in plant and machinery.

4.5.11 At this stage of assessment, it is not possible to quantitatively differentiate between the possible route options due to a lack of detailed design information and construction footprint extents. However, it can be expected that the possible route options that require construction of a tunnel (Pink and Purple) would have the highest consumption of materials and energy for tunnel construction. Significant volumes of cut material would be generated, requiring treatment and disposal.

4.5.12 The possible route options requiring construction of viaducts (Yellow and Green) would be expected to have the next highest material requirements after the tunnel options. The Yellow Route Option would have greater material requirements due to the longer viaduct, with 37m high piers compared to the smaller Green Route Option viaduct of 0.3km length.

4.5.13 The Brown Route Option would be expected to have the lowest requirement for materials and would generate the least waste due to the option largely following the alignment of the existing A83, although it does require construction of a 0.3km viaduct.

Operation

4.5.14 Provision of an upgraded route within the route corridor would be expected to improve connectivity within the region. The existing route is often disrupted by precautionary and forced closure of the A83 due to landslide risks, therefore construction of a new corridor would improve the resilience of the route corridor and improve safety for users. This would be considered to be a positive and long-term effect.

Table C4.2: Material Assets assessment using SEA Objectives and Guide Questions

Material Assets SEA Objectives	SEA Assessment Guide Questions *'Does the Access to Argyll and Bute (A83) corridor…?'*	Route Corridor Assessment
Promote and improve the sustainable use of the transport network	▪ support improvements to transport technology, interchanges and timetabling?	The project will provide upgraded infrastructure within a rural region and a more resilient route, reducing the need for lengthy diversionary routes during weather closures. Improving the resilience of the A83 corridor would improve the reliability of public transport using the route. This could improve public transport operation, making it easier for the public to choose more sustainable transport options. Therefore, it is considered that the project would be expected to promote the sustainable use of the infrastructure.
	▪ Plan for future travel arrangements where journeys are made by a number of different modes? – e.g. electric vehicle for most of the journey, which is then parked and left to charge at a hub, cycle and walking assets, such as connected off-road paths, bike/e-bike share infrastructure.	The route corridor provides the opportunity to enhance linkages to active travel routes. There also exists an opportunity, through the infrastructure provided, to positively affect the uptake of active travel undertaken within the corridor. While there is the potential for local trips to be made via active modes, and for additional trips to be generated resulting from increased use of the infrastructure provided by visitors and tourists, it is unlikely, however, that the future level of active travel trips within the route corridor would be significant. This is due to the rural location of the project and lack of existing infrastructure to support bi-modal journeys, as well as the challenging topography of the route corridor.
	▪ Plan for future capacity of public transport, taking demographic and other societal changes (e.g. Covid-19 impacts) into account?	The purpose of the project is to improve the resilience of the A83 at the Rest and Be Thankful to adverse weather as opposed to creating additional capacity for vehicle traffic. It would, however, improve the reliability of the route corridor, allowing it to remain open during adverse weather. This would positively affect public transport provision.
	▪ Promote sustainable use and management of existing infrastructure e.g. water, heat, energy or flood protection infrastructure?	One of the major benefits expected by implementing this project is to improve the climate change resilience of the A83 to the effects of adverse weather, notably landslides caused by slope instability following extended periods of rainfall. The project would be designed with the appropriate tolerances in relation to flood risk and rainfall, so it has in-built adaptive capacity to future climate change projections. Therefore, it is determined that the project would be expected to contribute positively to promoting sustainable use and management of infrastructure.
Reduce use of natural resources	▪ ensure transport infrastructure and innovation delivers/contributes to the circular economy?	At this stage of assessment, detailed design information and choice of likely materials is not available. Therefore, it is not possible at this time to determine if the project would contribute to the circular economy.
	▪ ensure forestry removal is avoided and potential woodland creation areas are protected wherever possible?	The project could result in unavoidable loss of existing forestry as well as affect planned forestry within the LLTNPA Woodland Strategy. This would remove carbon sequestration land, reducing the mitigation of carbon emissions. Therefore, it is determined that the project would not be expected to protect existing and planned forestry.

4.6 Inter-relationships with other SEA topics

4.6.1 SEA Guidance sets out that the inter-relationship of environmental effects between topics should be considered within the SEA. The topics considered to have an inter-relationship with Material Assets are set out in Table C4.3.

Table C4.3: Inter-related SEA topics

SEA Topic	Relationship with Material Assets
Climate	Carbon emissions originate from the materials used to construct the project, emissions from construction activities and operational emissions from end-users. Changes to land-use within the route corridor would affect the carbon mitigation potential from natural sequestration from the soils and forestry. These carbon emissions add to the cumulative atmospheric carbon concentration that amplifies the greenhouse effect, causing climate change
Soils	Natural material assets encompass agricultural land and soils. The natural capital value of the soil types within the route corridor underpins the ecosystem functions that the soils provide to several other environmental topics.
Water environment	Natural material assets encompass watercourses and natural flood management. Construction of the project would create additional impermeable road surface within the route corridor and remove natural material assets that regulate the water cycle.

4.7 Conclusions

4.7.1 As set out in Table C4.4, the project has the potential to result in different types of effect – positive, negative, or uncertain – depending on the specific asset under consideration. Therefore, it is considered that the project does not fully meet the SEA Material Assets objective of reducing the use of material assets. However, it does contribute to the objective of improving the sustainable use of infrastructure and improving resilience to climate change.

4.7.2 At this stage of assessment, the project is not anticipated to have any significant negative effects on Material Assets. Information on material quantities is not available at this stage, resulting in the inability to assess the usage of materials and production of waste from the construction of the project. It is recognised that some effects on soils and forestry are unavoidable and the actual significance of effects will be assessed during the DMRB Stage 2 and DMRB Stage 3 processes.

4.7.3 A summary of the effects on Material Assets at the SEA stage is provided in Table C4.4.

Table C4.4: Summary of Effects on Material Assets

Material Assets Subtopic	Potential Effect Description	Effect Duration	Scoring Criteria
Natural Material Assets			
Soils	Unavoidable loss of peatlands, causing degradation and a loss of high value carbon sink and sequestration land.	Permanent	Minor negative or uncertain environmental effect
Forestry	Unavoidable loss of forestry, causing a loss of carbon sink and sequestration land.	Permanent	Minor negative or uncertain environmental effect
Built Material Assets			
Material Usage	Construction would consume raw materials and energy.	Permanent	Minor negative or uncertain environmental effect
Production of waste	Demolition and construction waste would be generated to build the project.	Permanent	Minor negative or uncertain environmental effect

Material Assets Subtopic	Potential Effect Description	Effect Duration	Scoring Criteria
Infrastructure Resilience	Provision of resilient infrastructure would positively contribute towards adapting the road network to climate change impacts.	Permanent	Minor positive environmental effect
Construction disruption	During construction, disruption of the existing A83 and surrounding road network would be expected due to construction activities.	Temporary	Minor negative or uncertain environmental effect

4.8 Design Development, Mitigation and Enhancement Recommendations

4.8.1 Mitigation and enhancement measures relevant to Material Assets are presented in Table C4.5. Mitigation measures for Climate are presented in Appendix C (Section 1: Climatic Factors). Mitigation measures for forestry are presented in Appendix C (Section 5: Biodiversity, Flora and Fauna) and mitigation measures for peat soils are presented in Appendix C (Section 7: Soils).

Table C4.5: Potential mitigation, enhancement, and design recommendations in relation to Material Assets

Mitigation / Enhancement / Monitoring Measure	Stage of Implementation (e.g. DMRB Stage 2, DMRB Stage 3)	Responsible Party for Implementation/ Monitoring of Measure	Consultation/ Approvals Required
The choice of materials used to construct the preferred route should consider where it can implement sustainably sourced and low carbon materials. Consideration should also be given to the location of suppliers to minimise transportation distances. This information should be included in design and CEMPs.	Throughout the lifecycle of the project	Designer & Contractor To be monitored by Transport Scotland during procurement and by contractor during construction.	n/a
Produce a waste management strategy and ensure that the waste hierarchy is followed.	Throughout the lifecycle of the project	Designer & Contractor To be monitored by Transport Scotland during subsequent DMRB stages and by contractor during design and construction.	n/a
The loss of woodland should be replaced through tailored planting mitigation.	Throughout the lifecycle of the project	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
Appropriate notice and diversionary routes should be provided prior to construction to inform road users of disruption.	Pre-construction and during construction	Contractor To be monitored through implementation of construction environmental management plans.	Consultation with Argyll and Bute Council and LLTNPA

4.9 Legislation

The Waste (Scotland) Regulations (2012).

4.10 References

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