

Appendix C Baseline Information and Assessment

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C.1 Biodiversity, Flora and Fauna

Baseline

Legislation, Policy and Plans

This section has been undertaken in the context of the following legislative instruments and national policy:

- Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (the ‘Habitats Directive’);
- Directive 2009/147/EC on the conservation of wild birds (the ‘Birds Directive’);
- Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy (the ‘Water Framework Directive’);
- Regulation 1143/2014 on the prevention and management of the introduction and spread of invasive alien species (the ‘Invasive Species Regulations’);
- Convention on Wetlands of International Importance (‘Ramsar Convention’);
- Conservation (Natural Habitats, &c.) Regulations 1994 (as amended) (the ‘Habitats Regulations’);
- Wildlife and Countryside Act 1981 (as amended) (the ‘WCA’);
- Nature Conservation (Scotland) Act 2004 (as amended);
- Wildlife and Natural Environment (Scotland) Act 2011 (as amended) (the ‘WANE Act’);
- Protection of Badgers Act 1992 (as amended).
- Scottish Planning Policy (SPP) 2014;
- Scotland’s Forestry Strategy 2019 – 2029; and,
- Birds of Conservation Concern (BoCC) 4.

Of relevance to nature conservation, note that **Scottish Planning Policy (SPP)** (2014) states in paragraph 194 that the planning system should:

- *“conserve and enhance protected sites and species, taking account of the need to maintain healthy ecosystems and work with the natural processes which provide important services to communities;*
- *promote protection and improvement of the water environment, including rivers, lochs, estuaries, wetlands, coastal waters and groundwater, in a sustainable and co-ordinated way;*
- *protect and enhance ancient semi-natural woodland as an important and irreplaceable resource, together with other native or long-established woods, hedgerows and individual trees with high nature conservation or landscape value;*
- *seek benefits for biodiversity from new development where possible, including the restoration of degraded habitats and the avoidance of further fragmentation or isolation of habitats”.*

The Scottish Government's **Control of Woodland Removal** (2009) policy document sets out the policy direction for decision on woodland removal in Scotland and sets out the following 'Guiding Principles' on Page 6:

- *“There is a strong presumption in favour of protecting Scotland’s woodland resources.*
- *Woodland removal should be allowed only where it would achieve significant and clearly defined additional public benefits. In appropriate cases a proposal for compensatory planting may form part of this balance.*
- *Approval for woodland removal should be conditional on the undertaking of actions to ensure full delivery of the defined additional public benefits.*
- *Planning conditions and agreements are used to mitigate the environmental impacts arising from development and Forestry Commission Scotland will also encourage their application to development-related woodland removal.*
- *Where felling is permitted but woodland removal is not supported, conditions conducive to woodland regeneration should be maintained through adherence to good forestry practice as defined in the UK Forestry Standard.”*

Scotland's Natural Heritage (NatureScot) set out the wide range of benefits provided by healthy peatlands, including a rich biodiversity, good water quality and carbon storage and opportunities for managing and restoring our peatlands in **Scotland's National Peatland Plan** (2015). The aim of the plan is to *“protect, manage and restore peatlands to maintain their natural functions, biodiversity and benefits”*.

Relevant local planning policies for North Lanarkshire Council are detailed in the **North Lanarkshire Local Development Plan** (North Lanarkshire Council, 2012) (LDP). Policies relevant to nature conservation are summarised below:

- NBE1 'Protecting the Natural and Built Environment' – This policy lists requirements for protected sites and species:
 - a) Appropriate Assessment is required if significant effects are possible on European sites, and if a development will adversely affect the integrity of the site it will only be permitted where there are no alternative solutions and there are allowable imperative reasons of overriding public interest.
 - b) Sites of Special Scientific Interest (SSSIs) are treated similarly: development will only be permitted where the designated area and overall integrity will be maintained unless adverse effects are clearly outweighed by social or economic benefits of national importance.
 - c) Similarly, for Local and Other Sites of Importance it must be demonstrated to the Council's satisfaction that there will be no adverse impact or that any impacts can be appropriately mitigated.
 - d) Development affecting protected species will only be permitted where it is demonstrated that the protected species would not be compromised, or adverse effects mitigated through planning conditions or planning agreements.
- NBE2 'Promoting the Natural and Built Environment' – The Council will promote the Green Network by requiring proposals to contribute to its enhancement. Of particular relevance to biodiversity is the emphasis on:

- e) Creation of woodland in support of the Central Scotland Forest Programme and Local Forestry Framework.
- f) Existing trees and groupings of trees should be retained and integrated where possible, including street and garden trees.

The current **North Lanarkshire Local Development Plan - Modified Proposed Plan** (North Lanarkshire Council, 2018) includes policy that is very similar to that described above for the adopted LDP. The policy most relevant to ecology is contained within 'Part A Policy – Natural Environment and Green Network Assets', which comprises:

- Category A1 – sets out requirements for proposals in respect of international nature conservation designations, as dictated by legislation, and similarly to the relevant part of NBE1 in the adopted LDP.
- Category A2 – sets out requirements for proposals in respect of SSSIs, as dictated by legislation and similarly to the relevant part of NBE1 in the adopted LDP. Category A2 also notes that development affecting woodland should adhere to the Scottish Government Policy on Control of Woodland Removal (Forestry Commission Scotland, 2009), which states a strong presumption against loss of semi-natural ancient woodland, woodland integral to international/national sites, and areas supporting priority habitat/species in Scotland, and against fragmentation of important forest networks.
- Category A3 – sets out requirements for proposals in respects of local nature conservation sites, such as SINCs, similarly to the relevant part of NBE1 in the adopted LDP.
- Category A4 – this is entitled 'Urban Green Network', referring to natural areas contributing to quality of life in local communities, and including in this wildlife corridors, trees and woodland, watercourses and wetlands. Proposals potentially affecting such features must demonstrate no adverse impact or that sufficient mitigation can be provided.
- Category A5 – sets out requirements for proposals in respect of protected species, i.e. those protected by law. States that adverse effects should be mitigated to protect individuals, reduce disturbance to a minimum and sustain at least the current local population levels of the species.

The **North Lanarkshire Biodiversity Action Plan** (NLBAP) 2015 – 2020 (North Lanarkshire Council, 2015) outlines a series of Action Plans relevant to the Stage 2 Options. General Action Plan topics include Green infrastructure and green networks, Landscape scale conservation, Habitat fragmentation and Invasive non-native species. Habitats discussed in detail include Lowland raised bog, Rivers and burns, and Woodland. Species include bean goose *Anser fabalis*, small pearl-bordered fritillary *Boloria selene*, water vole *Arvicola amphibius* and great crested newt *Triturus cristatus*.

Designated Sites

There are eleven statutory designated sites (a Local Nature Reserve (LNR), Sites of Special Scientific Interest (SSSI), Special Areas of Conservation (SAC), Special Protection Areas (SPA) and a Ramsar Wetland) within the wider area. These are shown in Figure 2 'Statutory Sites', and summarised in Table C-1 'Statutory Designated Sites' below which orders them by increasing distance from the Scheme Options and describes their relationship with the Study Area.

Table C-1 Statutory Designated Sites

Designation	Reason(s) for Designation	Relationship to Site
Lady Bell's Moss SSSI	One of the best examples of raised bog in Lanarkshire with areas of Sphagnum lawn and wet heath. The notified feature is raised bog.	600 m east of the nearest option, separated by a disused quarry, grazed pastures and a small strip of conifer plantation.
North Bellstane Plantation SSSI	The best example of its type of wet woodland in central / south-west Scotland. The site comprises species-poor wet woodland surrounding an area of raised bog. The notified feature is wet woodland.	900 m north of the nearest option, separated by conifer plantation (South Bellstane Plantation), grazing land, and the A73.
Brownsburn Community Park LNR	Comprises an extensive area of grassland, woodland and wetland which provides habitat for a range of species including water vole.	2 km west of the nearest option, separated by the largely wooded and often steeply sloping North Calder Water valley.
Slamannan Plateau SPA/ SSSI	Slamannan Plateau SPA encompasses Slamannan Plateau SSSI, West Fannyside Moss SAC and West Fannyside Moss SSSI (see below). The qualifying interest Taiga bean goose, non-breeding.	3.75 km north-east of the nearest option, separated mainly by arable fields, conifer plantation and a few small settlements.
West Fannyside Moss SAC/ SSSI	Extensive blanket bog on the Slamannan Plateau supporting peat-forming vegetation at an unusual relatively low altitude. The qualifying interest is Blanket bog. The site is used by Taiga bean geese (see Slamannan Plateau SPA and SSSI above) and is also a SSSI.	4 km north-east of the nearest option, separated mainly by arable fields, conifer plantation and a few small settlements.
Black Loch Moss SAC/ SSSI	One of the least-disturbed active raised bogs remaining in the central belt of Scotland, with a large area of undamaged bog surface. This area is also a SSSI. The qualifying interests are Active raised bog and Degraded raised bog.	6.5 km east of the nearest option separated by woodland, Hillend reservoir and Caldercruix.
North Shotts Moss SAC/ Hassockrigg & North Shotts Mosses SSSI	Two separate bogs with extensive Sphagnum carpets and areas of lagg fen. The qualifying interests are Active raised bog and Degraded raised bog. North Shotts Moss SAC is also part of the Hassockrigg & North Shotts Mosses SSSI.	7.7 km south-east of the nearest option separated by the M8, farmland, woodland and conifer plantation.
Blawhorn Moss SAC / SSSI/ NNR	One of the larger, least-disturbed active raised bogs in the central belt of Scotland, with well-developed hummock and hollow topography. The qualifying interests are Active raised bog and Degraded raised bog. This site is also is also a SSSI and is a National Nature Reserve.	9.4 km east of the nearest option separated by woodland, fields and Hillend reservoir.
Clyde Valley Woods SAC/ Garrion Gill SSSI	The most extensive complex of woodland gorges with Tilio-Acerion forests in Scotland. The qualifying interest is Mixed woodland on base-rich soils associated with rocky slopes. The nearest section of this SAC is also Garrion Gill SSSI.	At closet 8.9 km south of the nearest option, separated by the M8, Carfin and the outskirts of Motherwell.
Inner Clyde SPA/ Ramsar	A heavily industrialised estuary with intertidal flats supporting large numbers of wintering waterfowl. The qualifying interest is Redshank <i>Tringa totanus</i> .	Approximately 27 km west of the nearest option, separated by the north of Glasgow including settlements such as Stepps and Bishopbriggs. However, there is hydrological connectivity via the North Calder Water, which is crossed by all of the options.
Inner Clyde SSSI	A heavily industrialised estuary with intertidal flats supporting large numbers of wintering waterfowl. The notified features include the following wintering birds: <ul style="list-style-type: none"> • Cormorant <i>Phalacrocorax carbo</i> • Eider <i>Somateria mollissima</i> • Oystercatcher <i>Haematopus ostralegus</i> • Goldeneye <i>Bucephala clangula</i> • Red-breasted merganser <i>Mergus serrator</i> • Red-throated diver <i>Gavia stellata</i> • Redshank Saltmarsh habitat is also a notified feature.	Approximately 27 km west of the nearest option, separated by the north of Glasgow including settlements such as Stepps and Bishopbriggs. However, there is hydrological connectivity via the North Calder Water, which is crossed by all of the options.

Non-statutory Designated Sites

The 42 Sites of Importance of Nature Conservation (SINC) are spread throughout the Study Area and are particularly numerous along the North Calder Water, which is itself a SINC. The main habitats covered by these SINCs are woodland, watercourses, wetland, grassland and (in the vicinity of the northern parts of the Scheme Options) blanket bog.

The SINCs that are most critical are those that are liable to suffer significant adverse effects (as opposed to minor or neutral effects), for which the primary interests are blanket bog, semi-natural ancient woodland, other semi-natural woodland, and watercourses especially the North Calder Water and Shotts Burn and associated habitats.

Ancient Woodland and Native Woodland

There are numerous areas of woodland listed in the Ancient Woodland Inventory (AWI) within 1 km of the Scheme Options as shown in Figure 1 'Key Environmental Constraints'. This includes several areas of ancient woodland of semi-natural origin (the most ecologically valuable type of ancient woodland). The key areas of most relevance to the Scheme Options are in SINCs in the valley of the North Calder Water, and along the Shotts Burn in Fairy Glen (Shotts Burn Glen) SINC.

There are also woodlands present classified in the AWI as long-established (of plantation origin). The majority of these woodlands appear to be mature broadleaved woodland.

All areas of native woodland, as identified by the Native Woodland Survey Scotland (NWSS), within the Desk Study Area are classified as 'native' (rather than the alternative category of 'nearly native'). Areas of native woodland are numerous and widespread across the Desk Study Area, with the exception of the urban areas of Airdrie, Calderbank and Chapelhall.

Ancient woodland of semi-natural origin is also classified as native woodland, as would be expected.

Habitats

In addition to the intrinsic value of all the SINCs, several contain priority UK habitats that are also considered important in national policy, namely blanket bog (and associated deep peat) and semi-natural ancient woodland. Part of Drumshangie Moss is identified as Class 1 on the Carbon & Peatland Map 2016. Class 1 areas are nationally important carbon-rich soils, deep peat and priority peatland habitat and are likely to be of high conservation value.

Other notable habitats are also present in the Study Area, partly within SINCs, including unimproved neutral grassland and ponds that may support great crested newt, a species known to be present in the Drumshangie Moss vicinity north-east of Airdrie.

Protected Species

The following protected species are known or considered likely or potentially present are:

- Otter;
- Badger;
- Bats;
- Water vole; and,
- Great crested newt.

Future Baseline

Biodiversity loss has been well documented over the last 50 years, and today there are a range of pressures with the potential to impact on Scotland's wildlife and biodiversity. Key ongoing issues include climate change, land use pressures (e.g. loss or damage of natural habitats from development or agricultural intensification and land use change), and the pollution of air, water, and land. Climate change and future development are the biggest drivers for the possible changes in the future baseline. Whilst a future baseline is difficult to predict for every ecological feature, trends and targets can provide a useful indication of future biodiversity.

Within Scotland's designated sites (SSSI, SAC, SPA and Ramsar sites), 78.8% of natural features were in favourable condition on 31st March 2020 (NatureScot, 2020a). This is an increase of 1.6% since 2011, when 77.2% of natural features were in favourable condition (SNH, 2011c). Over the same period, the percentage of qualifying habitats features in favourable condition has increased by 4.9% (from 73.8% in 2011 to 78.7% in 2020), but the percentage of qualifying species features in favourable condition has declined by 2.3% (from 75.4% in 2011 to 73.1% in 2020) (SNH, 2011c; NatureScot, 2020a). Whilst these figures hide fluctuation between years (such as 80.4% of natural features in favourable condition in 2016, the highest since monitoring began in 2005), they indicate that the percentage of natural features in favourable condition within Scotland's designated sites will not be significantly different by 2029.

Table C-2 sets out the designated sites within the wider area as discussed above along with the current negative pressures on their key features, their latest assessed condition and any management measures.

Table C-2 Pressures on Key Features of Designated Sites

Designation	Negative Pressures ¹	Features	Latest Assessed Condition	Management Measures
Lady Bell's Moss SSSI	<ul style="list-style-type: none"> Burning Water Management 	Raised bog	Unfavourable No change (Oct 2016)	Management agreements are in place over most of the SSSI, and provide for measures to protect and enhance the condition of the bog, including the damming of ditches, the erection of fences, and scrub removal.
North Bellstane Plantation SSSI	<ul style="list-style-type: none"> Over grazing - Deer 	Wet woodland	Unfavourable No change (March 2009)	The majority of the site was covered by a management agreement which expired in early 2009. This required the gradual removal of exotic or non-native species; the control of colonising tree species on the existing open raised bog habitat; and the prevention of all forms of tipping of waste and other materials. When the agreement was adopted existing waste on the site was removed. Now that the management agreement has expired the site could continue to be managed through the South Scotland Bog Scheme. This scheme has been developed, as part of the SNH Natural Care programme to help land managers achieve the objectives for management listed below. The aim of this scheme is to support and reward land managers for managing the land so as to maintain and enhance the habitats of interest
Brownsburn Community Park LNR	n/a	n/a	n/a	North Lanarkshire Council manage Brownsburn LNR through habitat improvement projects and events including bog works, removal and damming works. The friends of Brownsburn Community Park are actively involved with the site and hold volunteer days with Greenspace Development throughout the year where activities such as tree and bulb planting are carried out.
Slamannan Plateau SPA/ SSSI	<ul style="list-style-type: none"> Changes to farming practices Renewable abiotic energy centre Recreation/ disturbance 	Taiga bean goose (<i>Anser fabalis fabalis</i>), non-breeding	Favourable Maintained (Oct 2016)	The RSPB own some land at Fannyside which is managed primarily for nature conservation and in particular for bean geese. Most of this land is within the SSSI.
West Fannyside Moss SAC/ SSSI	<ul style="list-style-type: none"> Over grazing Renewable abiotic energy centre Local infrastructure (incl. transport and utilities) Game/ fisheries management Recreation/ disturbance Air pollution Invasive non-native species Problematic native species Burning Water Management 	<p>Blanket bog</p> <hr/> <p>Taiga bean goose (<i>Anser fabalis fabalis</i>), non-breeding</p>	<p>Favourable Maintained (Sept 2017)</p> <hr/> <p>Favourable Maintained (March 2005)</p>	The South of Scotland Bog Scheme and the Bean Goose Scheme have been developed, as part of the Natural Care programme, to help land managers achieve the objectives for management. The aim of both schemes is to support and reward land managers for managing the land so as to maintain and enhance the habitats of interest, in this case blanket bog and grasslands. This will be achieved by, for example, implementing appropriate grazing levels, restoring water levels in blanket bog, and limiting vehicle use to less sensitive areas of vegetation.
Black Loch Moss SAC/ SSSI	<ul style="list-style-type: none"> Over grazing Encroachment of forest planting 	Raised bog	Favourable Recovered (Oct 2012)	Part of the site was covered by an SNH Management Agreement for 10 years until September 2006. Prescriptions included the maintenance of the high water table through ditch damming and tree/shrub removal, in addition to monitoring the level of grazing on site. No management agreements are

¹ Information regarding negative pressures on SAC Sites has been gathered from the relevant Standard Data Form for sites within the 'UK national site network of European sites' (JNCC).

Designation	Negative Pressures ¹	Features	Latest Assessed Condition	Management Measures
	<ul style="list-style-type: none"> Mining and quarrying Local infrastructure (incl. transport and utilities) and buildings Air pollution Invasive non-native species Burning Water Management 			currently in place for the site; however there are two management agreements under the South of Scotland Bog Scheme (SSBS) which are currently in draft form.
North Shotts Moss SAC	<ul style="list-style-type: none"> Over grazing Encroachment of forest planting Mining and quarrying Local infrastructure (incl. transport and utilities) and buildings Air pollution Invasive non-native species Burning Water Management 	<p>Active raised bog</p> <hr/> <p>Degraded raised bog</p>	<p>Favourable Maintained (Oct 2013)</p> <hr/> <p>Unfavourable No change (Oct 2013)</p>	<p>Despite positive management of part of the site under a Rural Development Contract (RDC), the condition of the raised bog is currently judged to be unfavourable as a result of historic burning, drainage and localised overgrazing.</p> <p>Management measures are in place that should, in time, improve the feature to Favourable condition (Unfavourable Recovering Due to Management).</p>
Hassockrigg and North Shotts Mosses SSSI	<ul style="list-style-type: none"> Burning Over grazing Water management 	Raised bog	Unfavourable No change (July 2008)	
Blawhorn Moss SAC/ SSSI/ NNR	<ul style="list-style-type: none"> Over grazing Encroachment of forest planting Mining and quarrying Local infrastructure (incl. transport and utilities) and buildings Air pollution Invasive non-native species Burning Water Management 	<p>Active raised bog</p> <hr/> <p>Degraded raised bog</p>	<p>Unfavourable Recovering (Sept 2014)</p> <hr/> <p>Unfavourable Recovering (Sept 2014)</p>	This SAC is almost entirely owned by NatureScot and managed as an NNR with a key management aim being to improve the condition of the qualifying features of the SAC. This management has led to a significant improvement in the condition of the active raised bog to the point where 95% of the bog is now considered to be active raised bog.
Clyde Valley Woods SAC/ Garrion Gill SSSI	<ul style="list-style-type: none"> Over grazing Urbanisation Air pollution Invasive non-native species 	Mixed woodland on base-rich soils associated with rocky slopes	Favourable Maintained (Sept 2002)	The Clyde Valley Woods SAC consists of 11 separate SSSI woodlands (including Garrion Gill). Of these, four are also part of the Clyde Valley Woodlands National Nature Reserve (NNR). These NNR sites are jointly owned and managed by the Scottish Wildlife Trust, South Lanarkshire Council and NatureScot. A steering group, comprising these three organisations, oversees the ecological and visitor management of these SAC/ NNR woodland sites

Designation	Negative Pressures ¹	Features	Latest Assessed Condition	Management Measures
	<ul style="list-style-type: none"> Problematic native species 			
Inner Clyde SPA/ Ramsar	<ul style="list-style-type: none"> Game/ fisheries management Recreation/ disturbance 	Redshank (Tringa totanus), non-breeding	Favourable Maintained (Feb 2007)	Approximately half of the land adjoining the site, along with areas of saltmarsh on the southern shore, is managed for agriculture (arable land and grazing pasture). Areas of foreshore and intertidal habitat at Dumbuck and Parklea are managed by the RSPB as a nature reserve.
Inner Clyde SSSI	<ul style="list-style-type: none"> Game/ fisheries management Recreation/ disturbance 	Cormorant (Phalacrocorax carbo), non- breeding	Unfavourable Declining (Feb 2014)	Several areas adjacent to the site are used for recreation, with Brucehill playing fields and Levensgrove Park at Dumbarton on the north shore, and Kelburn Park at Port Glasgow on the south shore. Public access to the foreshore is facilitated over much of the site by the existence of more or less formalised footpaths, notably including the coastal path running along the southern shore from Newark Castle to Parklea.
		Eider (Somateria mollissima), non- breeding	Favourable Maintained (Feb 2014)	
		Goldeneye (Bucephala clangula), non- breeding	Favourable Maintained (Feb 2014)	
		Oystercatcher (Haematopus ostralegus), non- breeding	Favourable Maintained (Feb 2014)	
		Red-breasted merganser (Mergus serrator), non- breeding	Favourable Maintained (Feb 2014)	
		Red-throated diver (Gavia stellata), non- breeding	Favourable Maintained (Feb 2014)	
		Redshank (Tringa totanus), non-breeding	Unfavourable Declining (Feb 2014)	
		Saltmarsh	Favourable Maintained (Feb 2014)	

Source: <https://informatics.sepa.org.uk/ProtectedNatureSites/>.

Habitats and species, including designated sites, have the potential to come under increasing pressure from the provision of new housing, employment and infrastructure in the Study Area. In this context, the current and modified proposed Local Development Plan in the Study Area have allocations for housing and employment land. An overview of the Local Development Plan is provided in Section 3 'Legislative and Policy Context'.

Development pressure could include increased disturbance (recreational, noise and light) and atmospheric pollution as well as the loss of habitats and fragmentation of biodiversity networks. The loss and fragmentation of habitats will be exacerbated by the effects of climate change, which has the potential to lead to changes in the distribution and abundance of species and changes to the composition and character of habitats.

Limitations

Desk study information is dependent on records having been submitted for the area of interest. As such, a lack of records for particular habitats or species does not necessarily mean they are absent from the area of interest. Similarly, the presence of records for particular habitats and species does not automatically mean they still occur within the area of interest or are relevant in the context of the Scheme Options.

As noted above, physical fieldwork access for the Extended Phase 1 Habitat survey was limited to areas of safe public access only. Where physical access was not possible (as was the case over large parts of the survey area) owing to lack of public access, habitat assessment was carried out using binoculars from available publicly accessible viewpoints. Where neither physical access nor satisfactory inspection from publicly accessible viewpoints were possible, an assessment of likely habitat was made by an experienced habitat surveyor using freely available aerial photography; this was also the case for the northern part of Option B4 which was added after completion of the fieldwork. Detailed surveys at Stage 3 should verify the Phase 1 Habitats, in particular those derived primarily from inspection of aerial photography.

More accurate assessment of ecological effects is not possible until detailed surveys have been completed at Stage 3, the route has been finalised, and mitigation has been appropriately developed. Therefore the provided impact levels and significances of effect are at this point a best estimate. The residual effects are dependent on the potential mitigation being implemented.

Assessment

This section considers the potential impacts on biodiversity as a result of the Scheme Options. The Scheme Options assessment in relation to biodiversity, flora and fauna considers the SEA Objectives and guide questions presented in below. Where there are notable differences in effects between the Scheme Options, these are stated.

Table C-3 Biodiversity, Flora and Fauna Assessment against SEA Objectives and Guide Questions

SEA Objective	Assessment Questions	Scheme Options Assessment
Protect and enhance the natural environment (including the aquatic	Will the option/proposal help to... Avoid, or if not minimise impacts of new transport	There are no predicted effects on statutory nature conservation sites from any of the Scheme Options.

SEA Objective	Assessment Questions	Scheme Options Assessment
environment), wildlife, its habitats and other natural features, including internationally and nationally designated sites.	infrastructure on designated sites?	However, all Scheme Options would likely impact non-statutory Sites of Nature Conservation Importance (SINCs), which are designated by North Lanarkshire Council and subject to local policy protection. This is because there are numerous SINCs in the Study Area, and, in addition to the intrinsic value of all the SINCs, several contain priority UK habitats that are also considered important in national policy, namely blanket bog (and associated deep peat) and semi-natural ancient woodland.
	<p>Will the option/proposal help to... Avoid, or if not minimise impacts of new transport infrastructure on nationally important habitats in the wider countryside, such as ancient woodland and Class 1 peatland?</p>	<p>Notable habitats are present in the Study Area, partly within SINCs, including unimproved neutral grassland and ponds that may support great crested newt, a species known to be present in the Drumshangie Moss vicinity north-east of Airdrie.</p> <p>All Scheme Options (except Option B4 which avoids all impacts on blanket bog) will also have impacts on areas of Class 1 peatland within Drumshangie Moss. However, there appears (pending detailed Stage 3 survey) to be a potential pathway approximately 200m east of the current routing of all Scheme Options other than B3 that would minimise direct impacts on this blanket bog.</p> <p>All scheme options will have direct impacts on ancient woodland, non-ancient semi-natural woodland, on commercial conifer plantation and on additional woodland across the North Calder Water</p>
	<p>Will the option/proposal help to... Will the option/proposal protect, or minimise impacts of new transport infrastructure on, wider biodiversity interests, including ecological networks?</p>	<p>At this stage, the integrity of existing habitat connections within the road corridor cannot be confirmed based on desk-study information.</p> <p>The iterative design process provides opportunities to protect the integrity of existing habitat, green/blue networks and other wildlife corridors.</p> <p>Where appropriate, enhancement opportunities for biodiversity within the corridor should be considered at DMRB Stage 3 and developed in consultation with NatureScot and other consultees to ensure that these align with local and national biodiversity policies.</p>
	<p>Will the option/proposal help to... Deliver net gains for biodiversity, including restored or improved biodiversity networks?</p>	<p>Where appropriate, enhancement opportunities for biodiversity within the corridor should be considered at DMRB Stage 3 and developed in consultation with NatureScot and other consultees to ensure that these align with local and national biodiversity policies.</p>

All Scheme Options identified have the potential for minor and significant negative effects on biodiversity. Therefore, it is considered that the project does not fully meet the SEA objective of ‘avoid, or if not minimise impacts of new transport infrastructure on biodiversity, including designated sites’. However, it is considered likely that negative effects on biodiversity would reduce following the implementation of mitigation measures.

Of the five Scheme Options, Option B4 is considered the most preferable ecologically as it bypasses impacts on blanket bog. Options B, B2 and E have the potential to be rerouted to minimise impacts on blanket bog. Option B3 does not have the potential to avoid blanket bog impacts and therefore is the least preferable ecologically.

The potential impacts and effect are provided in Table C-4 below. Mitigation measures should be implemented at subsequent design and assessment stages to reduce the negative effects on biodiversity. Enhancement opportunities should be considered to help produce a net gain for biodiversity and meet the SEA objective. Further details are provided in Table C-6.

Table C-4 Potential Biodiversity Impacts and Effects

Receptor	Potential Impact	Effect Scoring	Effect Duration
Statutory Designated Sites			
Construction and Operation	All Scheme Options may have potential indirect construction impacts through pollution/hydrological effects.	Uncertain effect	Short to Long-term, temporary/reversible
Operation	All Scheme Options may have potential indirect operational impacts through pollution/hydrological effects.		
Non-statutory Designated Sites			
Construction	All Scheme Options would result in temporary loss of areas of multiple SINC.	Significant negative effect	Short to medium-term, temporary
Operation	All Scheme Options have potential direct and indirect impacts on multiple SINC.	Significant negative effect	Long-term, permanent
	All Scheme Options have potential indirect operational impacts through pollution/hydrological effects.	Minor negative effect	Long-term, temporary/reversible
Blanket Bog			
Construction	Options B, E, B2 and B3 would result in temporary loss of areas of blanket bog at Drumshangie Moss.	Significant negative effect	Short to medium-term, temporary
Operation	Options B, E, B2 and B3 will have potential direct and indirect impacts on areas of blanket bog at Drumshangie Moss.	Significant negative effect	Long-term, permanent
	Options B, E, B2 and B3 will have airborne traffic pollution effects, likely most significant within 200 m	Minor negative effect	Long-term, temporary/reversible
Ancient Woodland			
Construction	All Scheme Options would result in temporary loss of areas of semi-natural woodland at Fairy Glen (Shotts Burn Glen)	Significant negative effect	Short to medium-term, temporary

Operation	All Scheme Options have potential direct impact on semi-natural woodland at Fairy Glen (Shotts Burn Glen)	Significant negative effect	Long-term, permanent
Non-ancient Semi-natural Woodland			
Construction	Option B3 would result in temporary loss of areas of mature damp birch (willow) woodland at north end of Study Area. Options B and E would result in temporary loss of areas of mature damp birch (willow) woodland at north end of Study Area. Options B, E, B2 and B3 would result in temporary loss of other areas of non-ancient semi-natural woodland. Option B4 would result in temporary loss of multiple other areas of non-ancient semi-natural woodland but to a lesser degree than other options.	Minor negative effect	Short to medium-term, temporary
Operation	Option B3 will have minimal impact on mature damp birch (willow) woodland at north end of Study Area. Options B and E will have potential direct impact on mature damp birch (willow) woodland at north end of Study Area. Options B, E, B2 and B3 will have potential impact on multiple other areas of non-ancient semi-natural woodland. Option B4 will also have potential impact on multiple other areas of non-ancient semi-natural woodland but to a lesser degree than other options.	Minor negative effect	Long-term, permanent
Other (Plantation) Woodland			
Construction	All Scheme Options would result in temporary loss of commercial conifer plantation and on additional woodland across the North Calder Water.	Minor negative effect	Short to medium-term, temporary
Operation	All Scheme Options will have a potential direct impact on commercial conifer plantation and on additional woodland across the North Calder Water.	Minor negative effect	Long-term, permanent
Watercourses and Ponds			
Construction	All Scheme Options will have potential temporary direct impacts on North Calder Water with one crossing, and one crossing of the small Shotts Burn and upper part of Clattering Burn. Options B, E, B2 and B3 will also result in a temporary loss of pond habitat depending on exact routing.	Minor negative effect	Short to medium-term, temporary
Operation	All Scheme Options will have a potential direct impact on North Calder Water with one crossing, and one crossing of the small Shotts Burn and upper part of Clattering Burn. Options B, E, B2 and B3 will also result in a possible loss of pond habitat depending on exact routing.	Minor negative effect	Long-term, permanent
Invasive Non-native Species			
Construction	All Scheme Options will have the potential to spread of invasive plants (including Japanese knotweed) elsewhere along the North Calder Water or within the numerous SINC.	Significant negative effect	Short-term, temporary/reversible
Bats			
Construction	All Scheme Options will have a potential direct impact on bats.	Significant negative effect	Short to Medium-term, temporary

Operation	All Scheme Options will have a potential impact on bat fatalities as a result of crossing or following road.	Significant negative effect	Long-term, temporary/reversable
Great Crested Newt			
Construction	Options B, E, B2 and B3 have the potential to result in loss or impacts on great crested newt breeding ponds/fatalities.	Significant negative effect	Short to Medium-term, temporary
Operation	All Scheme Options will have a potential impact on newt fatalities crossing the road.	Significant negative effect	Long-term, temporary/reversable
Otter, Water Vole and Badger			
Construction	All Scheme Options will have a potential direct impact on otter, badger or water vole refuges.	Significant negative effect	Short to Medium-term, temporary
Operation	All Scheme Options will have a potential impact on otter, badger or water vole fatalities crossing the road.	Significant negative effect	Long-term, temporary/reversable
Birds			
Construction	All Scheme Options will have the potential to result in the breeding disturbance of Schedule 1 bird species such as kingfisher, peregrine falcon, or barn owl, if present in suitable habitat in the Study Area. All Scheme Options will have the potential to impact on general breeding bird through habitat loss/nest destruction.	Significant negative effect	Short to Medium-term, temporary
Operation	All Scheme Options will have the potential to result in breeding bird suppression near operational road through noise effects	Minor negative effect	Long-term, temporary/reversable
Fish			
Construction	All Scheme Options will have potential pollution impact/habitat loss on fish population.	Significant negative effect	Short to Medium-term, temporary
Operation	All Scheme Options will have the potential to result in operational run-off pollution of fish habitat.	Significant negative effect	Long-term, temporary/reversable

Inter-relationships with Other SEA Themes

Table C-5 below presents the inter-relationship identified between Biodiversity and the other SEA themes.

Table C-5 Inter-related SEA Themes: Biodiversity, Flora and Fauna

SEA Theme	Potential Interactions
Water	Changes to water quality and hydromorphology, including groundwater, could impact biodiversity within the Study Area.
Soil	Soil and peat provide habitats and support biodiversity within the Study Area. Soil biodiversity is essential to most soil functions and affects the sustainability of species and habitats which rely on soils. Soil sealing would reduce the capacity of the Study Area to support habitats and biodiversity and potentially affect the sustainability of species and habitats that rely on soils and soil biodiversity.
Air	Changes to air quality within the Study Area could impact the resilience of the local biodiversity. Nitrogen deposition due to vehicle emissions can impact on the functioning of ecosystems and growth of trees.
Climactic Factors	Changes to climate and the increasing occurrence of extreme weather events could alter available resources, environmental conditions and species life cycles within the Study Area. Trees, woodlands and peatlands act as 'carbon sinks' by sequestering more carbon from the atmosphere than they release. These flora and habitats provide a useful contribution to mitigating climate change. Deforestation and degradation of peatlands results in the release of carbon into the atmosphere, which fuels further climate change.
Landscape	Landscape changes could alter habitats and their connectivity, which could result in negative or positive interactions with biodiversity within the Study Area. Any mitigation and enhancement measures implemented for landscape and visual amenity could have biodiversity benefits, and vice versa. Therefore, any mitigation planting proposals should be developed with input from both disciplines.

Design Development, Mitigation and Enhancement Recommendations

Mitigation and enhancement measures relevant to biodiversity are presented in Table C-6 below.

Table C-6 Potential Biodiversity Mitigation, Enhancement and Design Recommendations

Potential Impact	Measure	Stage of Implementation	Responsible Party	Consultation/ Approvals Required
All Scheme Options have potential direct and indirect impacts on multiple SINC.	Microsite scheme away from SINCS as far as possible	<ul style="list-style-type: none"> DMRB Stage 3 	Designer and contractor	N/A
All Scheme Options have potential indirect operational impacts through pollution/hydrological effects.	Maintain as much distance as possible from SINCS that are not currently directly impacted to avoid/minimise hydrological effects.	<ul style="list-style-type: none"> DMRB Stage 3 Pre-construction 	Designer and contractor	N/A
Options B, E, B2 and B3 will have potential direct and indirect impacts on areas of blanket bog at Drumshangie Moss.	Reroute scheme away from blanket bog where possible.	<ul style="list-style-type: none"> DMRB Stage 3 	Designer and contractor	N/A
Options B, E, B2 and B3 will have airborne traffic pollution effects, likely most significant within 200 m.	Plant screening strip of trees along relevant verges to avoid airborne traffic pollution effects	<ul style="list-style-type: none"> DMRB Stage 3 Pre-construction Construction <p><i>Planting/regrowth would be monitored. Details to be developed at DMRB Stage 3.</i></p>	Designer and contractor	N/A
All Scheme Options have potential direct impact on semi-natural woodland at Fairy Glen (Shotts Burn Glen).	Reroute scheme away from ancient woodland if possible.	<ul style="list-style-type: none"> DMRB Stage 3 	Designer and contractor	N/A
All Scheme Options have potential direct impact on non-ancient semi-natural woodland and other (plantation) woodland.	Bridge over woodland if possible, leaving understorey/ground flora.	<ul style="list-style-type: none"> DMRB Stage 3 	Designer and contractor	N/A
	The loss of woodland and other notable habitats should be replaced through tailored planting mitigation to ensure contiguousness of woodland	<ul style="list-style-type: none"> DMRB Stage 3 Pre-construction <p><i>Planting/regrowth would be monitored. Details to be developed at DMRB Stage 3.</i></p>	Designer and contractor	Consultation with NatureScot
All Scheme Options will have a potential direct impact on North Calder Water with one crossing, and one crossing of the small Shotts Burn and upper part of Clattering Burn.	Bridge watercourses as high as possible and retain as much bank habitat as possible.	<ul style="list-style-type: none"> DMRB Stage 3 	Designer and contractor	N/A
Options B, E, B2 and B3 will result in a possible loss of pond habitat depending on exact routing.	Microsite scheme away from ponds as far as possible	<ul style="list-style-type: none"> DMRB Stage 3 	Designer and contractor	N/A
All Scheme Options will result in possible impacts on protected species that are known or considered likely or potentially present (otter, bats, badger, water vole, great crested newt, birds and fish)	The project should seek to ensure permeability for wildlife. This could include, where appropriate, the provision of mammal crossings, sensitive tree planting/design or fish passage through culverts.	<ul style="list-style-type: none"> DMRB Stage 3 Pre-construction Construction 	Designer and contractor	Consultation with NatureScot
All	A Construction Environmental Mitigation Plan (CEMP) should be developed. This should include a Biosecurity	<ul style="list-style-type: none"> DMRB Stage 3 Pre-construction 	Designer and contractor	Consultation with NatureScot

Potential Impact	Measure	Stage of Implementation	Responsible Party	Consultation/ Approvals Required
	Plan, an Ecological Management Plan and Species Management Plans as required.	<ul style="list-style-type: none"> Construction <p><i>The plans would be refined and updated during the construction stage and finalised at the end of construction to support future management and operation</i></p>		
All	<p>Schedule construction activities to reduce disturbance to species of conservation interest where practicable (e.g. seasonal restrictions or avoidance of works during the hours of darkness).</p> <p>Compliance would be monitored by an Ecological Clerk of Works (ECoW) for the duration of works</p>	<ul style="list-style-type: none"> DMRB Stage 3 Construction 	Designer and contractor	N/A

C.2 Population and Human Health

Baseline

Legislation, Policy and Plans

This section has been undertaken in the context of the following legislative instruments and national policy:

- National Planning Framework 3 (NPF3) (Scottish Government, 2014);
- Scottish Planning Policy (SPP) (Scottish Government, 2014);
- A More Active Scotland: Scotland's Physical Activity Delivery Plan (Scottish Government, 2018).

A More Active Scotland: Scotland's Physical Activity Delivery Plan sets out the actions the Scottish Government intends to take in order to ensure the population are encouraged and supported to be physically active. The plan has been developed to align with international best practice including the World Health Organization's (WHO) Global Action Plan on Physical Activity and the United National Sustainable Development Goals. The actions are consistent with the Scottish Government's Programme for Scotland 2017-18.

Of the six outcomes established within the plan, 'Outcome 4: We improve our active infrastructure – people and places' is of greatest relevance. This outcome relates to the role the physical environment has in encouraging and enabling people to lead active lifestyles. Several actions are associated with each outcome, of particular note is the following Outcome 4 action: 'We will build an Active Nation, boosting investment in walking and cycling and putting active travel at the heart of our transport planning' (Page 24).

This section has also been undertaken in the context of the **Glasgow and the Clyde Valley Strategic Development Plan** (Clydeplan, 2017). The Strategic Development Plan (SDP) for the Clydeplan Region covers the Local Authorities of East Dunbartonshire, East Renfrewshire, Glasgow City, Inverclyde, North Lanarkshire, Renfrewshire, South Lanarkshire and West Dunbartonshire. SDP sets out a vision for long term development of the city regions and deal with cross boundary issues including transport and set clear parameters for subsequent Local Development Plans.

The Clydeplan SDP includes a policy to support the City Deal programme and related projects and the 'Plan Lanarkshire Orbital Transport Corridor' (of which the Scheme is a part) is identified as an infrastructure project to be taken forward.

Airdrie is identified as a strategic centre providing housing supply and leisure functionality. Schedule 15 outlines the threshold for strategic development, in transport and infrastructure sector, as any project where the construction exceeds 8km. Strategic developments will need to support the vision, spatial development strategy and place making policies of the SDP including supporting strategic centres, business and employment and new homes. They should also seek to maximise green network benefits, minimise impacts on forestry and woodland, greenbelt, impacts relating to extraction of resources and manage flood risk and drainage. They should also seek to promote sustainable transport and active travel.

The Study Area is located within the North Lanarkshire Council (NLC) area; therefore, the **North Lanarkshire Local Development Plan (LDP)** (North Lanarkshire Council, 2012) has been considered.

The Economic Development and Infrastructure topic within the LDP establishes NLCs policies to address economic development and infrastructure issues within North Lanarkshire over the life of LDP through: protecting areas important for economic development and infrastructure; promoting development; and, assessing planning applications.

The LDP Proposals Map includes numerous designations within the Study Area such as housing and development sites, Conservation Area Sites, Town Parks and Community Parks or Industrial and Business Sites.

This includes various designated housing and development sites which may be relevant to the Scheme. These are:

- Within Airdrie, due to its urban context, there are many designated residential, community and business sites. Policies HCF1, HCF2 and EDI1 promote and protect housing, community and business sites. There are also two Conservation Areas within Airdrie: Victoria and Town Centre Conservation Area and Drumgelloch Conservation Area. Under Policy NBE1 B3a only development considered consistent to the setting of the area will be considered appropriate within a designated conservation area.
- Outside the urban areas there are no residential sites designated within the current LDP that have the potential to be impacted by the Options. However, there are five relevant 'Existing Industrial and Business Areas' within the Study Area outside of Airdrie these include Stirling Road Industrial Estate, Dealership and Warehouse complex. Policy EDI 1 protects Economic Development Areas and Infrastructure and should be taken into account when considering the Scheme Options.
- Within the greenbelt to the south of Airdrie there is a designated Community Park west of Brownsburn Industrial Estate. Adjacent to this site is the North Calder Water which is a designated Canal Corridor (Policy NBE1 B 3b). Policy NBE1 Protecting the Natural and Built Environment is relevant to both of these designations ensuring such areas remain protected and any new development does not harm the character or setting of the sites. Development should enhance or preserve the character and appearance of the site.
- Large areas of land to the east of Airdrie are designated as Green Belt (Policy NBE3) or as a Rural Investment Area (Policy NBE3 B). There are also Rural Investment Areas extending north east of Airdrie towards Caldercruix. As such policies NBE3 A and NBE3 B should be followed when considering development within these areas. Design, scale, access and countryside integration should be considered for all new development in these areas.
- To the east of Airdrie within the easternmost extents of the Study Area there are large areas of designated Opencast Coal Extraction Search Areas. In these areas Policy EDI2 C should be taken into account when considering future development.

With regard to human health, LDP Development Strategy, which sets a vision for the development of land within North Lanarkshire over a 5-to-10-year period, establishes 'development quality' as a key issue to be addressed within the plan. Development quality related to the physical environment but 'also related to issues such as the correlation between poor air quality and adverse effects on human health. For example, development should take account of Air Quality Management Areas and the Council's Air Quality Action Plan. In all development the main aim should be to maintain or improve the quality of the environment for people'.

This aspiration is implemented through Policy DSP4 (Quality of Development), which requires any development proposal to be considered against a number of criteria comprising:

- The existing character of the site including contamination, amenity, connectivity, and landscape;
- The safeguarding of rights of way and natural/historic assets;
- The development proposal is supported by and is demonstrably influenced by a robust site appraisal covering various topics such as the promotion of health and wellbeing, the mitigation of noise, air quality, and pollution impacts; and,
- Provision has been made to develop and ensure linkages to green/open spaces and networks.

Population

North Lanarkshire had the 4th highest population in 2020, out of all 32 council areas in Scotland. On 30 June 2020, the population of North Lanarkshire was 341,140. This is a decrease of 0.1% from 341,370 in 2019. Over the same period, the population of Scotland increased by 0.0%.

In terms of overall size, the 45 to 64 age group was the largest in 2020, with a population of 96,570. In contrast, the 75 and over age group was the smallest, with a population of 25,448. In 2020, more females than males lived in North Lanarkshire in 4 out of 6 age groups. Between 1998 and 2020, the 25 to 44 age group saw the largest percentage decrease (-12.2%). The 75 and over age group saw the largest percentage increase (+45.1%).

The highest population density of North Lanarkshire is in the urbanised south-west, which is part of the Greater Glasgow metropolitan area. Northern and eastern areas are more rural in character, with agricultural activity such as dairy and meat farming. The largest towns in North Lanarkshire are Cumbernauld, which in mid-2016 had a population of 50,920, followed by Coatbridge (43,960), Airdrie (37,410) and Motherwell (32,590) (NRS, 2018).

Private Property and Housing

The Study Area covers areas of both urban and rural land predominantly to the east of Airdrie. The population living within the wider area is approximately 72,000 people. The following table, Table C-7 Local Centre Populations, shows the population of localities within 2km of the Scheme Options.

Table C-7 Local Centre Populations

Locality (2011)	Population
Airdrie	37,132

Locality (2011)	Population
Plains	2,696
Calderbank	1,598
Chapelhall	6,680

Source: NRS (2013) Scotland's Census 2011 Standard Outputs

As designated within the Local Development Plan (North Lanarkshire Council, 2012), there are four 'Neighbourhood and Local Centres' within 500m of the Scheme Options: Katherine Park, Petersburn Glen Road, Petersburn Four Isles, and Calderbank.

The majority of residential properties located within the Study Area are located within Airdrie, Chapelhall, and Calderbank.

There are several planning applications for housing developments that may potentially be affected (i.e. within 200m of the Scheme Options); totalling approximately 3,670 potential homes. This includes a proposed 2,600 homes as part of the EuroPark development which is currently pending consideration. Within the Study Area there are six 'Short-Term Housing Land Supply' designated areas according to the existing 2012 Local Development Plan. Within the Proposed Local Development Plan (2018), there is one 'Proposed Housing Sites' within 500m of the Scheme Options.

Community Land and Facilities

Due to the large area within the Study Area there are numerous community land and assets within the Study Area buffer. This includes four schools (including two primary schools, one high school and St. Philip's Residential and Educational Centre), one hospital (Wester Moffat Hospital), and six designated parks and greenspaces.

Development Land and Businesses

Within the Study Area there are both urban areas (including a significant number of businesses and industries) and rural areas (including industrial buildings and land identified as part of an opencast coal extraction search area within the existing LDP). Eurocentral, one of the largest industrial estates in Scotland, is situated at the southern extent of the Study Area opposite the M8.

Within the Study Area, there are three 'Existing Industrial and Business Sites' and one 'Industrial and Business Sites' as designated within the existing LDP. There are also four 'Existing Business Sites' as designated within the Proposed LDP. Three of these sites cover large areas within the Study Area; these designations are for a proposed potato processing factory (NLC00585), the proposed Drumshangie Waste Plant (NLC00519) and the proposed Greenhills (formally Drumshangie) Data Centre (NLC00520). None of the 'Proposed Business Sites' designated within the Proposed LDP are within 500m of the Options.

Agricultural Land Holdings

A large area of land within the Study Area is rural land consisting primarily of farmland with a large area of moorland to the north east. The farmland consists of land capable of supporting mixed agriculture (Class 3.2, Class 4.1 and Class 4.2) (James Hutton Institute, n.d.) with lower quality improved grassland (Class 5.3) to the north east of the Study Area.

Walking, Cycling and Horse-Riding Facilities

There are many cycle paths and core paths throughout the Study Area particularly to the north and south of Airdrie. There are also longer distance core path and cycling routes to the east of Airdrie through Plains and Wattston. National Cycle Route 75 (NCR75) cuts across the Study Area through Plains, Airdrie and Coatbridge.

Human Health

Exposure to air pollution can exacerbate health inequalities between different demographics. Air quality is explored as a standalone theme in Section C.5 'Air'. However, there are significant impacts from air quality on human health. For example, short-term increases in PM levels are associated with acute health effects:

- increased use of medication (e.g. asthma inhalers);
- days off work and days with restricted activity;
- hospital admission for lung and heart diseases; and
- risk of death from asthma, COPD, heart disease.

The long-term risks of exposure to PM_{2.5} comprise:

- increased deaths from all causes, heart attack, chronic lung disease, stroke and lung cancer; and
- estimated reduction in average life expectancy of 3-4 months in Scotland.

Reducing traffic related air pollution and environmental noise can improve peoples' sense of well-being as well as physical health and the quality of the environment. Environmental noise is defined as 'unwanted or harmful outdoor noise created by human activities, including noise emitted by means of transport, road traffic, rail traffic, and from sites of industrial activity' (Transport Scotland, 2018). Noise from transportation is the biggest source of environmental noise in Scotland, and population exposure to environmental noise have been linked to adverse health effects. Annoyance and sleep disturbance are the key direct impacts on the population.

To present a Community Health Profile Study Area, data at Local Authority Area level was used to represent the Study Area. Data at a national (Scottish) level has also been provided for comparison and to provide context more generally.

Approximately 120,959 people within North Lanarkshire are vulnerable members of society (i.e. they are aged 65 or over or less than 16). This equates to 35.56% of the total population of the Local Authority Area which is marginally lower than Scotland as a whole (35.78%).

There are more incidences of COPD in North Lanarkshire (242.34 per 100,000) than is average in Scotland (174.15 per 100,000) and greater number of COPD deaths per 100,000 population with 95.5 in North Lanarkshire compared with 75.28 in Scotland as a whole. The percentage of adults claiming incapacity benefit/severe disability allowance is also higher in North Lanarkshire (6.27%) than the percentage in Scotland (5.01%).

The average life expectancy for both males and females is lower in North Lanarkshire Local Authority Area than the Scottish average life expectancies.

Table C-8 'Summary of Community Health Profile Data' below sets out the figures used to inform the Community Health Profile and the human health assessment.

Table C-8 Summary of Community Health Profile Data

Dataset	Scotland	North Lanarkshire
Total Population	5,438,100	340,180
Vulnerable members of the community (population aged 0 to 15 and aged over 65)	1,945,616	120,959
Chronic obstructive pulmonary disease (COPD) incidence per 100,000	174.15	242.34
COPD deaths per 100,000	75.28	95.5
Adults claiming incapacity benefit/severe disability allowance	272,330	21,340
Female life expectancy between 2014 to 2018 (5-year aggregate)	81.08	79.61
Male life expectancy between 2014 to 2018 (5-year aggregate)	77.06	75.23
Population income deprived (%)	12.14	16.25

Source: Scottish Public Health Observatory (ScotPHO) (n.d.) ScotPHO Online Profiles Tool. Community Health Profiles [Online] Available at: <https://www.scotpho.org.uk/comparative-health/profiles/online-profiles-tool>

The population who are income deprived within the North Lanarkshire Local Authority Area (16.25%) is significantly higher than the percentage of the population throughout Scotland (12.14%). There are two areas within the Study Area that are considered to be part of the 10% most deprived areas in Scotland, under the Scottish Index of Multiple Deprivation (SIMD) 2020 (Scottish Government, 2020). These are Plains and North Airdrie.

According to the Improvement Service's Community Planning Outcome Profiles (CPOP), one of the five most vulnerable communities in North Lanarkshire is Airdrie North. This is due to high levels of child poverty, out of work benefits, emergency admissions, early mortality and depopulation, as well as high crime rates.

People living in deprived areas in Scotland are more likely to die early from disease and have more years of ill health (Public Health Scotland, 2019). The Scottish Burden of Disease Study (ScotPHO, 2018) Deprivation Report noted that more deprived areas have double the rate of illness or early death than less deprived areas, and that people living in Scotland's wealthiest areas are more likely to live in ill health than die prematurely due to ill health, and that the number of years of life affected by ill health are much fewer. Those living in deprived areas are also more vulnerable to the effects of environmental change due to the prevalence of pre-existing health problems and inequities amongst these communities.

Future Baseline

Between 2018 and 2028, the population of North Lanarkshire is projected to increase from 340,180 to 341,174. This is an increase of 0.3%, which compares to a projected increase of 1.8% for Scotland as a whole. North Lanarkshire is projected to have the 4th highest population out of the 32 council areas in Scotland in 2028. Between 2018 and 2028, 14 councils are projected to see a population decrease and 18 councils are projected to see a population increase.

Over the next 10 years, the population of North Lanarkshire is projected to decrease by 1.7% due to natural change (more deaths than births). Total net migration (net migration within

Scotland, from overseas and from the rest of the UK) is projected to result in a population increase of 1.9% over the same period.

The average age of the population of North Lanarkshire is projected to increase as the baby boomer generation ages and more people are expected to live longer. Between 2018 and 2028, the 0 to 15 age group is projected to see the largest percentage decrease (-9.8%) and the 75 and over age group is projected to see the largest percentage increase (+21.8%). In terms of size, however, 45 to 64 is projected to remain the largest age group.

Barriers to health equality will persist unless action to remove them is taken – for example, relating to accessing health care services or affordable public transport. Improvements to local and strategic roads, such as those proposed for the East Airdrie Link Road scheme, will be key for ensuring the future reliability of the transport network.

Transport planning will play a key role in encouraging active transport choices (e.g. walking and cycling) as well as accessibility to sports and recreation facilities.

Limitations

There are some limitations in this assessment due to a lack of detailed information available during the options assessment. These limitations are normal for an SEA stage assessment and this assessment is considered to be sufficient to provide a high-level assessment.

A number of assumptions have been made; these include:

- Referenced baseline information and data which has been accessed from a variety of publicly available sources is correct at the time of publication;
- No detailed calculation of any WCH journey length changes has been made due to a lack of design detail; therefore, a change of between 250m and 500m in journey length has been assumed;
- Detailed consultation with affected landowners would be undertaken during the DMRB Stage 3 assessment to fully assess the impacts of the scheme on future business or development viability;
- The Land Reform (Scotland) Act 2003 grants statutory rights of responsible access on and over most land. It is therefore acknowledged that additional areas of privately-owned land within the study area may be used informally as WCH routes and this would be identified through further consultation during the DMRB Stage 3 assessment with proposed additional mitigation if/as necessary;
- The nature of the scope of the chapter topic requires objective and subjective (qualitative) assessments to be made of predicted impacts although quantitative assessment methods have been used where practicable.

Assessment

This section considers the potential impacts on population and human health as a result of the Scheme Options. The Scheme Options assessment in relation to population and human health considers the SEA Objectives and guide questions presented in below. Where there are notable differences in effects between the Scheme Options, these are stated.

Table C-9 Population and Human Health Assessment against SEA Objectives and Guide Questions

SEA Objective	Assessment Questions	Scheme Options Assessment
Improve the health and wellbeing of residents within the Study Area.	Will the option/proposal help to... Avoid and minimise impacts on human health and wellbeing including increased disturbance (noise and light pollution)?	<p>A qualitative construction noise assessment has been undertaken using available information. Owing to the relatively close proximity of the nearest residential receptors to the construction works, there is potential for construction related noise and vibration to have an adverse impact at the small number of properties near the Scheme Options.</p> <p>Noise modelling has been undertaken to predict the operational road traffic noise levels for the Study area both with and without the Scheme Options in place. The potential short term and long-term operational noise impacts at properties within a 600 m study area around the combined extent of all route options has been quantitatively assessed with beneficial and adverse significant effects have been predicted as a result of all options. For the purposes of scoring this impact the worst-case scenario has been taken.</p> <p>During both daytime and night-time, Options B2, B3 and B4 are predicted to result in the least number of significant adverse effects, with Options B and E being predicted to result in a slightly greatest number. This is based upon the scheme option alignments and traffic data currently available.</p> <p>Due to the rural nature, of the Scheme options there is unlikely to be light pollution impacts on human health.</p>
	Will the option/proposal help to... protect, or minimise impacts on, existing green infrastructure and access to it?	The Scheme Options will not result in loss of community assets including parks, playing fields, etc. However, all Scheme Options would result in the loss of some woodland areas and impacts on the National Cycle Route (NCR) 75, Core Paths and Rights of Way (RoW).
	Will the option/proposal help to... deliver enhanced green network provision and access to it?	The project provides a potential opportunity for the provision of additional access (and enhanced parking facilities) to the National Cycle Route (NCR) 75, Core Paths and Rights of Way (RoW) improving access to the green infrastructure within the Study Area. This could provide enhanced access to the natural environment for those wishing to park and proceed via active modes. Improved access to the green infrastructure could potentially provide health and wellbeing benefits by encouraging local residents and visitors to the area to spend more time outdoors.
Promote sustainable transport use and reduce the need to travel.	Will the option/proposal help to... Encourage modal shift to more sustainable forms of travel?	<p>The project provides the opportunity to enhance linkages to walking and cycling routes and core paths. There also exists an opportunity, through the infrastructure provided, to positively impact on the level of active travel undertaken within the route 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, it is unlikely, however, that the future level of active travel trips within the route corridor would be significant.</p> <p>Further consideration of the inclusion of WCH facilities as part of the scheme should be considered at Stage 3. Enhanced linkages to walking and cycling routes and core paths, and the provision of WCH facilities could potentially provide health and wellbeing benefits for vulnerable groups and the local population by improving and promoting access to nature and other greenspaces</p>
	Will the option/proposal help to... Provide infrastructure to facilitate key development?	
Delivery of a transport infrastructure to meet the foreseeable needs of the varied	Will the option/proposal help to... Maintain and enhance accessibility for all people within the Study area?	Due to the rural nature of the Study Area, the distances between key towns and a lack of suitable public transport services (in some areas) will result in a current high dependency for travel by car. Therefore the scale of accessibility benefits that would be delivered to this main user group within

SEA Objective	Assessment Questions	Scheme Options Assessment
communities within the Study Area.		the Study Area includes more reliable journeys to employment opportunities, recreation, education and health services located both within and outside the region.
	<p>Will the option/proposal help to... Maintain or enhance the quality of life of residents?</p>	<p>The project provides the opportunity to enhance linkages to walking and cycling routes and core paths. Improved access to the green infrastructure could potentially provide health and wellbeing benefits by encouraging local residents and visitors to the area to spend more time outdoors.</p> <p>The Scheme Options are expected to support enhanced accessibility to and from developments but within the Study Area but also in the wider region. The project could potentially contribute to reducing economic and geographic deprivation for currently socially disadvantaged groups through the improvement of accessibility and the enhancement of business confidence driving an associated increase in inward investment and jobs.</p>
	<p>Will the option/proposal help to... Improve accessibility to employment opportunities?</p>	<p>As above, the Scheme Options are expected to support enhanced accessibility to and from developments but within the Study Area but also in the wider region.</p>

Of the five Scheme Options, Option B4 is considered the most preferable as it avoids land take of designed housing (Site 0001/07) as designated in the Proposed LDP) and business development land (Site NLC00585) and will impact the least number of core paths. Option B3 will also avoid housing and business development land; however, it will impact on an additional core path. Options B, B2 and E will all result in a loss of housing and business development land and will impact four core paths. Option B will also impact an additional two core paths, resulting in a total impact on six core paths.

The potential impacts and effect are provided in Table C-10 below. Mitigation measures should be implemented at subsequent design and assessment stages to reduce the negative effects on population and human health. Enhancement opportunities should be considered to improve accessibility through connections to existing WCH provision and meet the SEA objective. Further details are provided in Table C-12.

Table C-10 Potential Population and Human Health Impacts and Effects

Receptor	Potential Impact	Effect Scoring	Effect Duration
Private Property and Housing			
Construction	Options B, E and B2 will result in temporary land-take of designated residential land (Site 0001/07).	Minor negative effect	Short-term, temporary
Operation	Options B, E and B2 will require the partial acquisition of designated residential land (Site 0001/07).	Minor negative effect	Medium to Long-term, permanent
Development Land and Businesses			
Construction	Options B, E and B2 will result in temporary land-take of designated business land (Site NLC00585).	Significant negative effect	Short-term, temporary
Operation	Options B, E and B2 will require the partial acquisition of designated business land (Site NLC00585).	Significant negative effect	Medium to Long-term, permanent
Agricultural Land Holdings			
Construction	All Scheme Options will require temporary acquisition of agricultural land, they are primarily situated in moorland and brownfield land with sections in non-prime agricultural land (Class 4.1 and 4.2).	Neutral	n/a
Operation	All Scheme Options will require acquisition of agricultural land, they are primarily situated in moorland and brownfield land with sections in non-prime agricultural land (Class 4.1 and 4.2).	Neutral	n/a
Walking, Cycling and Horse Riding (WCH) Provision			
Construction	All Scheme Options will have temporary impacts on National Cycle Route (NCR) 75.	Significant negative effect	Short-term, temporary
	All Scheme Options will have temporary impacts on Rights of Way (RoW) in the area.	Significant negative effect	Short-term, temporary
	Option B4 will have temporary impacts on three core paths (201, 162 and 178). Options E, B2 and B3 will have temporary impacts on four core paths (201, 162, 178 and 159). Option B will have temporary impacts on six core paths (201, 162, 178, 157, 158 and 159).	Significant negative effect	Short-term, temporary
Operation	All Scheme Options will have permanent impacts on National Cycle Route (NCR) 75.	Significant negative effect	Medium to Long-term, permanent
	All Scheme Options will have permanent impacts on Rights of Way (RoW) in the area.	Significant negative effect	Medium to Long-term, permanent
	Option B4 will have permanent impacts on three core paths (201, 162 and 178). Options E, B2 and B3 will have temporary impacts on four core paths (201, 162, 178 and 159). Option B will have temporary impacts on six core paths (201, 162, 178, 157, 158 and 159).	Significant negative effect	Medium to Long-term, permanent
Human Health			
Construction	All Scheme Options will result in disruption on the transport network due to construction activity.	Minor negative effect	Short-term, temporary
	All Scheme Options will have temporary impacts on the landscape amenity.	Minor negative effect	Short-term, temporary

Receptor	Potential Impact	Effect Scoring	Effect Duration
	There is the potential for temporary short-term noise and vibration adverse impacts during construction at a number of properties in proximity to the route option.	Minor negative	Short-term, temporary
Operation	All Scheme Options will result in improvements to the transport network including the spatial characteristics and the usage of the network	Minor positive effect	Medium to Long-term, permanent
	All Scheme Options will have permanent impacts on the landscape amenity.	Minor negative effect	Medium to Long-term, permanent
	All Scheme Options will result in both increases and decreases in road traffic noise levels at various locations within the study area, with significant beneficial and adverse effects in the medium and long term.	Significant negative effect	Medium to Long-term, permanent

Inter-relationships with Other SEA Themes

Table C-11 below presents the inter-relationship identified between population and human health and the other SEA themes.

Table C-11 Inter-related SEA Themes: Population and Human Health

SEA Theme	Potential Interactions
Biodiversity, Flora and Fauna	Access to nature can provide health and wellbeing benefits with opportunities to participate in recreational activities and support social cohesion in the community.
Air	Exposure to air pollution can exacerbate health inequalities between different demographic groups, and there are significant effects from air quality on human health both in the short term and the long term.
Climatic Factors	Climate change affects many of the social and environmental determinants of health such as clean air, safe drinking water, sufficient food supplies and secure shelter (WHO 2018). In addition, people living in flood prone areas, or remote or island communities, can be particularly susceptible to extreme weather events, the severity of which is exacerbated by climate change. More frequent flood events, storms and strong winds can cause damage and disruption to such communities, limiting access to vital services and impacting on people's physical and mental health (Scottish Government 2019). The project would also improve the resilience of the route to the effects of climate change.
Material Assets	Built transport assets are used to facilitate travel and natural assets such as forestry and peat provide a range of benefits for people including as energy sources, and as carbon sequestration for mitigating against the effects of climate change. Forests also provide important health and wellbeing benefits as described below. Disruption to the transport network or loss of material assets, as a result of the project could result in effects on the population such as journey delays and removal of the benefits of carbon sequestration of forestry and peat, and of the positive effects of forests on health and wellbeing.
Cultural Heritage	Access to our cultural heritage can provide health and wellbeing benefits with opportunities to participate in recreational activities and support social cohesion in the community.
Landscape	Access to our nature and greenspaces can provide health and wellbeing benefits with opportunities to participate in recreational activities, experience the local landscape qualities of the region and support social cohesion in the community.

Design Development, Mitigation and Enhancement Recommendations

Mitigation and enhancement measures relevant to population and human health are presented in Table C-12 below.

Table C-12 Potential Population and Human Health Mitigation, Enhancement and Design Recommendations

Potential Impacts	Measure	Stage of Implementation	Responsible Party	Consultation/ Approvals Required
Options B, E and B2 will result in land-take of designated business land (Site NLC00585) and designated residential land (Site 0001/07).	Pre-construction consultation with affected landowners (designated sites) to agree temporary access arrangements and land take requirements.	<ul style="list-style-type: none"> Pre-Construction 	Designer and contractor	n/a
	Pre-construction consultations to be undertaken with affected property owners and best practice construction methods employed to minimise temporary disruption of property access and operations at the affected site.	<ul style="list-style-type: none"> Pre-construction 	Designer and contractor	n/a
	Ensure the footprint of the option minimises land take requirements at affected sites.	<ul style="list-style-type: none"> DMRB Stage 3 Pre-construction 	Designer and contractor	n/a
All Scheme Options will have temporary impacts on National Cycle Route (NCR) 75, Rights of Way (RoW) and core paths.	Implementation of a communications strategy to keep local communities informed of the progress of the project and to provide channels for input/ complaints/enquiries, (e.g. telephone helpline, website, email, postal address, etc)	<ul style="list-style-type: none"> DMRB Stage 3 Pre-construction Construction 	Designer and contractor	n/a
	Access along WCH networks should also be maintained during construction where possible and any diversions agreed with North Lanarkshire Council. Any temporary diversions should have advanced signage to minimise uncertainty of the route	<ul style="list-style-type: none"> Construction 	Contractor	North Lanarkshire Council
All Scheme Options will have permanent impacts on National Cycle Route (NCR) 75, Rights of Way (RoW) and core paths.	Design any permanent diversion in NMU routes to provide the same or improved standard of pathway.	<ul style="list-style-type: none"> DMRB Stage 3 Pre-construction 	Designer and contractor	n/a

C.3 Water

Baseline

Legislation, Policy and Plans

Two key pieces of legislation transposed from the **EU Directive 2000/60/EC Water Framework Directive** (WFD) (European Parliament, 2000) regulate the water environment aspects for development of this nature:

- The Water Environment and Water Services Act (Scotland) 2003 (Scottish Parliament, 2003); and
- The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended) (Scottish Parliament, 2011).

This legislation aims to protect and enhance the status of aquatic ecosystems, prevent further deterioration to such ecosystems, promote sustainable use of available water resources, and contribute to the mitigation of floods and droughts. In particular, the **Water Environment and Water Services Act (Scotland) 2003** places the responsibility on SEPA of designating River Basin Management Plans (RBMPs) for each river basin district in Scotland. RBMPs set out a range of actions including:

- The state of the water environment;
- Pressure affecting the quality of the water environment where it is in less than good condition;
- Actions to protect and improve the water environment; and
- A summary of outcomes following implementation.

The legislation also holds SEPA responsible to reviewing and updating each plan every 6 years from the date the RBMP was approved.

Under the **Water Environment (Controlled Activities) (Scotland) Regulations 2011** (as amended), also known as CAR, SEPA is responsible for regulating certain activities in regard to the water environment. CAR authorisation is intended to control impacts on the water environment, including mitigating the effects on other water users. Site-specific conditions would be set in any license, and will include a 'responsible person' for implementing the conditions. The activities covered by CAR include:

- Any activities liable to cause pollution of the water environment, including discharges of polluting matter and disposal of waste sheep dip and waste pesticides;
- Abstraction of water from the water environment;
- Construction, alteration or operation of impounding works (e.g. dams and weirs) in surface water of wetlands;
- Carrying out building or engineering works (a) in inland water (other than groundwater) or wetlands; or (b) in the vicinity of inland water or wetlands and having or likely to have a significant adverse effect on the water environment;
- Artificial recharge or augmentation of groundwater;

- The direct or indirect discharge, and any activity likely to cause a direct or indirect discharge, into groundwater of any hazardous substance or other pollutant; and
- Any other activity which directly or indirectly has or is likely to have a significant adverse impact on the water environment.

The **Flood Risk Management (Scotland) Act 2009** ('the Flood Risk Management Act') and the Flood Risk Management (Flood Protection Scheme, Potentially Vulnerable Areas and Local Plan Districts) (Scotland) Regulations 2010 has introduced a more sustainable and modern approach to flood risk management that is better suited to current needs and can accommodate the impacts of climate change.

A supporting policy of the regional **Glasgow and the Clyde Valley Strategic Development Plan** (Clydeplan, 2017) is improving the water quality environment and managing flood risk and drainage. To support this Vision and Spatial Development Strategy and to achieve the objectives set below, Local Development Plans and development proposals should protect and enhance the water environment by:

- Adopting a precautionary approach to the reduction of flood risk;
- Supporting the delivery of the Metropolitan Glasgow Strategic Drainage Plan;
- Supporting the delivery of the Glasgow and the Clyde Valley Green Network; and,
- Safeguarding the storage capacity of the functional floodplain and higher lying areas for attenuation.

Relevant local planning policies for North Lanarkshire Council are detailed in the **North Lanarkshire Local Development Plan** (North Lanarkshire Council, 2012) (LDP). Policies relevant to nature conservation are summarised below:

Development Strategy Policy (DSP2) – Location of Development of the LDP requires that applications for planning permission for new development may be granted if they are consistent with the following locational criteria as expanded in Supplementary Planning Guidance.

DSP4 – Quality of Development requires that the proposed development takes account of the site appraisal and any evaluation of design options, and achieves high-quality developments in terms of: "Ensuring that water body status is protected and, where possible, enhanced (status includes physical characteristics, so proposals such as culverting will only be considered where no other practical option exists). Foul water should connect to the public sewer – alternatives to this will only be permitted where no public system exists, and the alternative does not pose an environmental risk. Sustainable Urban Drainage Systems should be adopted within site design."

Relevant local planning policies for North Lanarkshire Council are detailed in the North Lanarkshire Local Development Plan – Modified Proposed Plan (North Lanarkshire Council, 2018) (LDP). Policies relevant to nature conservation are summarised below:

EDQ 1 POLICY (Site Appraisal) requires that any proposed development be appraised in terms of the site and its surroundings to ensure it will integrate successfully into the local area and avoid harm to neighbouring amenity. From a water environment perspective, this includes: Impacts associated with the holistic water environment and flood risk.

EDQ 2 POLICY (Specific Features for Consideration) states that North Lanarkshire Council will manage development in areas that are subject to hazards and other potential site considerations in accordance with plans and protocols of the relevant managing agencies. This includes, for flood-risk areas, implementing the Water Framework Directive and the Flood Risk Framework set out in Scottish Planning Policy, the Clyde and Loch Lomond Local Plan District, Local Flood Risk Management Plan and the Forth Estuary Local Flood Risk Management Plan (alongside the Flood Risk Management Strategies). SEPA's Flood Maps can be used to identify areas of functional floodplain to help ensure a precautionary approach is taken to flood-risk from all sources. SEPA is a statutory consultee in the planning process and applicants will always be advised to consult with SEPA on matters pertinent to flood risk.

EDQ 3 POLICY (Quality of Development) states that development will only be permitted where high standards of site planning and sustainable design are achieved. Planning applications will need to demonstrate that the proposed development takes account of the site appraisal carried out as a requirement of Policies EDQ1 and, if appropriate, EDQ2, assets protected under Policy PROT, any evaluation of design options, and achieves a high-quality development in terms of ensuring that any water body status is protected and, where possible, enhanced.

Status includes physical characteristics, so proposals such as culverting will only be considered where no other practical option exists. Foul water should connect to the public sewer - alternatives to this will only be permitted where no public system exists, and the alternative does not pose an environmental risk. Sustainable Urban Drainage Systems should be adopted within site design and appropriate details require to be submitted with any relevant planning application. Buffer strips may be required in respect of the water environment between a development and each watercourse.

Current Baseline

Scotland's Water Environment is essential for all life and activity, ranging from drinking water to maintaining habitats and supporting a significant part of the economy. Scotland has approximately 19,000km of coastline, incorporating 470km² of fishing zones that underpin coastal fishing communities. Water is also used for industrial processes such as whisky production, hydroelectricity generation and recreational activities. Scotland's rivers and lochs contain 90% of the entire UK's freshwater and cover 2% of the land area.

Legislation and policies relating to the Water Environment are implemented through European Union legislation, transposed into Scottish Law. The Water Framework Directive (WFD) (Directive 2000/60/EC) was transposed into Scottish law under the Water Environment Water Services (WEWS) Act 2003. Under the WFD, new activities within or near to the water environment must not cause deterioration or prevent the achievement of Good Status or Good Ecological Potential (for artificial or heavily modified water bodies). The WEWS Act is delivered through the production of River Basin Management Plans (RBMP), which detail the current condition of water bodies in the Plan area and set objectives for improvement to Good overall status or Good Ecological Potential. Surface water bodies include rivers, lochs, transitional and coastal waters.

The principal water bodies and types of watercourse within the Study Area and shown in Figure 3 'Water Environment' are described below and have been identified from publicly available resources (namely SEPA's Water Classification Hub). All watercourses in the Study Area are located in the River Clyde catchment and flow in a western direction towards the Firth of Clyde. There are also a number of named watercourses which are tributaries to the principal watercourses outlined below and are mentioned where applicable; these include: Clattering Burn; Cameron Burn; and North Burn.

Summaries of the baseline conditions and sensitivity of each receptor are provided in Table C-13 below, relying on information provided through the Water Framework Directive in 2020.

Table C-13 Water Receptors

Waterbody	Overall 2020 WFD Status	Water flows and levels	Access for fish migration	Physical Condition	Water Quality	Known pressures
Surface Waterbodies						
Luggie Water	Moderate	High	High	Good	Moderate	Point source discharge of wastewater
South Burn	Bad	High	High	Good	Bad	Point source discharge of wastewater; and Modification to hydromorphology.
Shotts Burn	Poor	Good	Good	Good	Moderate	Barriers to fish migration; and Wastewater point discharge.
Monkland Canal	Good	High	High	High	High	None
North Calder Water	Poor	Moderate	Good	Good	Moderate	Barriers to fish migration; Water abstraction; and Wastewater point discharge.
Ground Waterbodies						
Glenboig Aquifer	Good	Good	N/A	N/A	Good	None
Glasgow and Motherwell Aquifer	Poor	Poor	N/A	N/A	Poor	Water abstraction; Legacy pollution for mining, quarrying, and contaminated land; and Point source discharges.
Slamannan Aquifer	Poor	Good	N/A	N/A	Poor	Legacy pollution for mining, quarrying, and contaminated land.

The Route Options are situated within a designated 'potentially vulnerable area', in the Clyde and Loch Lomond Flood Risk Management Plan (SEPA, 2021) due to the flood risk to Airdrie, Chapelhall, Coatbridge and Plains. The main source of flooding is from surface water with some risk from river and groundwater in Plains. Across these target areas (Airdrie, Chapelhall, Coatbridge and Plains) the Flood Risk Management Plan there are 3,830 people and 2,100 homes and businesses currently at risk of flooding. The Route Options pass through a number of areas of high likelihood of flooding (10% chance of flooding annually) primarily associated with the surface waterbodies named in Table C-13 above.

Future Baseline

Ongoing key pressures on the surface water environment include urbanisation and intensive agriculture/ aquaculture. Rural and urban diffuse pollution also remains a concern for water quality, particularly in relation to agriculture, forestry, and urban development.

The Clyde and Loch Lomond Flood Risk Management Plan states that the numbers of people at risk of flooding will increase from 3,830 to 4,950 by the 2080s due to climate change. The numbers of homes and businesses will similarly increase from 2,100 to 2,710.

Limitations

This SEA Assessment was based on publicly available web-based data which have not been independently verified but is assumed to be accurate for the purposes of this assessment. The actual conditions of watercourses and ground conditions, nor the presence of any unmapped field drains or watercourses, may not be known until further assessment.

Assessment

This section considers the potential impacts on water as a result of the Scheme Options. The Scheme Options assessment in relation to water considers the SEA Objectives and guide questions presented in below. Where there are notable differences in effects between the Scheme Options, these are stated.

Table C-14 Water Assessment against SEA Objectives and Guide Questions

SEA Objective	Assessment Questions	Scheme Options Assessment
Promote the efficient and effective use of natural water resources and protect and enhance the water environment.	<p>Will the option/proposal help to... Support improvements to water quality?</p> <hr/> <p>Will the option/proposal help to... Support enhancements to the status and/or potential of waterbodies under WFD Directives and successor legislation?</p> <hr/> <p>Will the option/proposal help to... Protect groundwater resources?</p>	There is potential for the WFD classifications of the three WFD surface water bodies and two groundwater bodies (and associated receptors) in the vicinity of the route corridor to be negatively affected. However, the implementation of appropriate mitigation measures would be anticipated to minimise potential effects and there may also be opportunity to provide improvements.

In terms of a route preference, those options which minimise the hydrological pathway to surface waters and groundwater would be considered the best performing option in relation to this SEA theme. Particularly in the northern portion of the Study Area, this correlates with the shorter options such as B2, B3 and B4. In particular, these options would minimise the potential for adverse impact within the Luggie Water sub-catchment. Options B and E would be considered the worst performing option in relation to this SEA theme due to their higher number of crossings.

The potential impacts and effect are provided in Table C-15 below. Mitigation measures should be implemented at subsequent design and assessment stages to reduce the negative effects on water. Enhancement opportunities should be considered to enhance the status and/or potential of waterbodies and meet the SEA objective. Further details are provided in Table C-17.

Table C-15 Potential Water Impacts and Effects

Receptor	Potential Impact	Effect Scoring	Effect Duration
Surface Water Quality			
Construction	As a result of potential soil disturbance and contamination during construction all of the Scheme Options would result in temporary impacts on surface water quality at the Luggie Water (includes Shank Burn and Cameron Burn), the South Burn, the Shotts Burn (including the Clattering Burn), and the North Calder Water.	Minor negative effect	Short-term, temporary
Operation	As a result of outfalls from road drainage networks and road maintenance works causing a reduction in surface water quality due to the introduction of particles and pollutants all of the Scheme Options would have the potential to result in impacts on surface water quality at the Luggie Water (includes Shank Burn and Cameron Burn), the South Burn, the Shotts Burn (including the Clattering Burn), and the North Calder Water.	Minor negative effect	Medium to Long-term, temporary/reversible
Flood Risk			
Construction	All Scheme Options would result in temporary localised increases in runoff rates and volumes may be caused by excavations, exposure of bare ground, construction of less permeable surfaces and potentially by compaction of soils caused by movement of construction machinery and traffic. These increases in runoff rates and volumes can accumulate and lead to increased risk of downstream flooding.	Minor negative effect	Short-term, temporary
Operation	All Scheme Options would result in permanent increases in impermeable surface areas within river catchments can lead to increased runoff volume and rates and can cause downstream flooding. Road schemes built within the natural floodplain of a watercourse can cause downstream flooding due to loss of flood storage area. Further, the effects of climate change may lead to increased surface run off and flooding in the future. These increases in runoff rates and volumes can accumulate and lead to increased risk of downstream flooding.	Minor negative effect	Medium to Long-term, temporary/reversible
Groundwater Quality and Flow			
Construction	All Scheme Options would result in alterations in surface flow characteristics and the presence of less permeable areas have the potential to impact infiltration rates and therefore groundwater recharge rates. All options are assessed to have a temporary impact on groundwater quality and flow of the Glasgow and Motherwell Aquifer. While Options B and E are assessed to also have a temporary impact on groundwater quality and flow of the Glenboig Aquifer and the Slamannan Aquifer.	Minor negative effect	Short-term, temporary
Operation	All Scheme Options would result in alterations in surface flow characteristics and the presence of less permeable areas have the potential to impact infiltration rates and therefore groundwater recharge rates. All options are assessed to have an impact on groundwater quality and flow of the Glasgow and Motherwell Aquifer. While Options B and E are assessed to also have an impact on groundwater quality and flow of the Glenboig Aquifer and the Slamannan Aquifer.	Minor negative effect	Medium to Long-term, temporary/reversible

Inter-relationships with Other SEA Themes

Table C-35 below presents the inter-relationship identified between water and the other SEA themes.

Table C-16 Inter-related SEA Themes: Water

SEA Theme	Potential Interactions
Biodiversity, Flora and Fauna	Changes to water quality and hydromorphology may impact upon aquatic ecology within the Study Area.
Population and Human Health	Changes to flood risk may impact receptors within the Study Area including population, residential and non-residential buildings and critical and non-critical infrastructure and facilities.
Soil	Soil run-off or transportation of contaminated soils may impact upon water quality within the Study Area.
Climatic Factors	Any impacts on flooding or hydrology may exacerbate the climate change effects.
Cultural Heritage	Increases to flood risk may impact cultural heritage assets within the Study Area.
Landscape	Changes to channel morphology, additional structures, channel realignment or changes to hydrology may also result in impacts to their amenity value and have the potential to affect the integrity of a landscape area within the Study Area.

Design Development, Mitigation and Enhancement Recommendations

Mitigation and enhancement measures relevant to water are presented in Table C-17 below.

Table C-17 Potential Water Mitigation, Enhancement and Design Recommendations

Potential Impacts	Measure	Stage of Implementation	Responsible Party	Consultation/ Approvals Required
All of the Scheme Options would have the potential to result in impacts on surface water quality at the Luggie Water (includes Shank Burn and Cameron Burn), the South Burn, the Shotts Burn (including the Clattering Burn), and the North Calder Water.	The design of the project should be undertaken in line with best practice and relevant guidance, considering the requirements of The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended) (CAR) and in consultation with SEPA.	<ul style="list-style-type: none"> DMRB Stage 3 	Designer	SEPA
All Scheme Options would result in permanent increases in impermeable surface areas within river catchments can lead to increased runoff volume and rates and can cause downstream flooding. Road schemes built within the natural floodplain of a watercourse can cause downstream flooding due to loss of flood storage area. Further, the effects of climate change may lead to increased surface run off and flooding in the future. These increases in runoff rates and volumes can accumulate and lead to increased risk of downstream flooding.				
All Scheme Options would result in alterations in surface flow characteristics and the presence of less permeable areas have the potential to impact infiltration rates and therefore groundwater recharge rates. All options are assessed to have an impact on groundwater quality and flow of the Glasgow and Motherwell Aquifer. While Options B and E are assessed to also have an impact on groundwater quality and flow of the Glenboig Aquifer and the Slamannan Aquifer				
As a result of outfalls from road drainage networks and road maintenance works causing a reduction in surface water quality due to the introduction of particles and pollutants all of the Scheme Options would have the potential to result in impacts on surface water quality at the Luggie Water (includes Shank Burn and Cameron Burn), the South Burn, the Shotts Burn (including the Clattering Burn), and the North Calder Water.	Prevent deterioration of the status of surface water bodies during construction through appropriate pollution control for all potentially polluting activities.	<ul style="list-style-type: none"> Construction 	Contractor	SEPA
All Scheme Options would result in alterations in surface flow characteristics and the presence of less permeable areas have the potential to impact infiltration rates and therefore groundwater recharge rates. All options are assessed to have an impact on groundwater quality and flow of the Glasgow and Motherwell Aquifer. While Options B and E are assessed to also have an impact on groundwater quality and flow of the Glenboig Aquifer and the Slamannan Aquifer.	Incorporate effective Sustainable Drainage Systems (SuDS) to minimise impacts on water quality, informed by landscape and ecology specialists, such that SuDS features deliver other enhancement benefits where possible.	<ul style="list-style-type: none"> DMRB Stage 3 	Designer	SEPA NatureScot

C.4 Soil

Baseline

Legislation, Policy and Plan

The policy baseline for this section aligns with the policy and legislation set out in Section 3 (Legislative and Policy Context) of the SEA Report.

Soil

Soil is a key part of our environment and soil degradation can have major implications for air and water quality as well as our climate, biodiversity and economy. Sustainable management and protection of soils is key to ensuring that soils can deliver essential functions vital for the sustainability of Scotland's environment and economy (SEPA 2019e), including:

- storing carbon and maintaining the balance of gases in the air;
- biomass production (including agriculture and forestry);
- filtering and buffering pollutants;
- regulating the flow of and providing storage for water;
- providing a physical environment for human activity (including built development);
- providing habitats and supporting biodiversity;
- a source of raw materials; and
- preserving cultural and archaeological heritage.

Soil is a non-renewable resource that supports a range of natural processes as well as providing environmental, societal and economic benefits of the human population. Soil has inherent links to several SEA themes, including climatic factors, biodiversity, water and air quality.

Scotland's soils are highly variable in their presence due to the diverse geology and climate in Scotland. Soils in Scotland are rich in organic matter and account for over 50% of the UK's soil carbon (Dobbie et al. 2011). Organic soils store vast quantities of carbon dioxide (CO₂), and it is estimated that Scotland's soils store 3 billion (bn) tonnes of CO₂ (Scotland's Soils 2019a). A significant amount of Scotland's soil is comprised of peatland, which is a key part of the landscape and cultural heritage. Peatlands cover more than 20% of the country's land area, storing 1.6bn tonnes of CO₂ through carbon sequestration. It is estimated that over 80% of Scotland's peatlands are degraded, which emit more CO₂ than they sequester.

Soil survey mapping indicates that the typical soil type across the Study Area is comprised of clayey and sandy loam, the composition of this soil type likely relates to the underlying geology. Peat and locally peaty soil types are present at various points across the Study Area appearing in small deposits. Large deposition of peat and peaty soil can be found in the Drumshangie Moss area and north of Plains.

Agricultural Land

The agricultural land within the Study Area is classified by the Macaulay Institute Land Capability for Agriculture (LCA) Survey (Soil Survey of Scotland, 1981).

The majority of the soil within the Study Area is described as Mixed Agricultural land, consisting of LCA classes 3.2 and 4.2. The Mixed Agricultural class range (Class 3.2 to 4.2) is described

as land capable of being used to grow a moderate range of crops including cereals, forage crops and grass.

Areas of Improved Grassland are present in the areas surrounding Roughrigg Reservoir (classed as 5.3 and 5.2) and between Plains and Riggend (classed as 5.3). The Improved Grassland class range (Class 5.1 to 5.3) is described as land that has the potential for use as improved grassland.

Future Baseline

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 sealing, compaction, loss of organic matter, contamination or erosion and landslides. These changes can cause secondary impacts on various other SEA theme receptors, including landscape, human health, flood risk and flora and fauna.

A review of available historical maps (from the National Library of Scotland <https://maps.nls.uk/>) and current maps (from Bing maps <https://www.bing.com/maps>) has confirmed that within the Study Area, both former and present land uses may have resulted in the presence of potentially contaminated material which may in turn, pose a threat to human health, controlled waters or other sensitive receptors. These areas of potentially contaminated land may also impose constraints on the construction and operational phases of the road should it require excavation or avoidance.

The major potential contamination sources of concern at or within 250m of the various Scheme Option alignments include the following:

- Land use associated with historical mining activities;
- Quarrying activities (including ironstone pits, clay pits, sand pits and gravel pits, etc);
- Industrial developments (e.g. works/factories/mills, etc.);
- Rail network infrastructure;
- Road network infrastructure; and,
- Agricultural land.

Those potential contaminated land sources which fall on or very near to (i.e. within c.50m) the ten Scheme Options have been identified and are summarised in Table C-18 'Potential sources of contamination on or very near to (c. 50m) the Scheme Options' below.

Table C-18 Potential sources of contamination on or very near to (c.50m) the Scheme Options

Potential on-site sources	Potential contaminants
Historical and current land use as curling ponds, filtering beds and / or reservoirs.	Possible ground gas build up; possibly made ground materials with unknown contaminants.
Historical land used for mining.	Possible range of contaminants may include heavy metals, polyaromatic hydrocarbons (PAH), total petroleum hydrocarbons (TPH), asbestos, ground gases.
Historical and current land use as quarries and gravel pits; landfill / tips / refuse heaps and opencast workings.	Nature of contaminants unknown if pits backfilled. May include a range of contaminants including heavy metals, sulphides, aromatic

Potential on-site sources	Potential contaminants
	halocarbons, PAH, TPH, solvents, polychlorinated biphenyls (PCBs), dioxins & furans, asbestos, ground gases.
Activities associated with historical and current use as rail land (including railways, tramways, branches, dismantled rails, sidings, stations).	Heavy metals, sulphates, PAH, TPH, solvents, PCBs, asbestos.
Historical and current industrial developments (including works, mills, factories).	Possible range of industrial contaminants including heavy metals, PAH, TPH, solvents, phenol, PCBs, asbestos, ground gases.
Road network.	Possible contaminants include PAH and TPH.
Agricultural land.	Possible range of contaminants which may include heavy metals, pesticides/herbicides, nitrates, phosphorous, pathogens, TPH, PAH, chlorinated phenols, leaches/disinfectants, farm waste e.g. contaminants from redundant machinery, batteries, etc.

Limitations

At the time of assessment, no site-specific ground investigation has been undertaken along any Scheme Options for this SEA. Therefore, the full extents and depths of the geological deposits on site is uncertain.

Similarly, site specific ground investigation has not yet been undertaken to inform the assessment of mine working underlying the Study Area and the potential location of mine entry points. Targeted intrusive and non-intrusive investigations would be required to fully identify the areas affected by mine workings and in need of stabilisation works.

Furthermore, the assessment of contamination onsite has been based on desk study information at this stage. Site specific ground investigation with samples of soil and groundwater taken for chemical analysis will be necessary to determine the extents and severity of any contamination potentially present onsite.

At this stage the assessment has been undertaken in line with DMRB guidance for Stage 2 assessment and SEA guidance and the limitations mentioned above are typical for this stage of the project. The assessment is therefore considered robust, and the level of investigation and detail is appropriate for the purposes of a SEA.

A site-specific ground investigation will be undertaken to inform DMRB Stage 3 and a more detailed assessment of the site will be undertaken.

Assessment

This section considers the potential impacts on soil as a result of the Scheme Options. The Scheme Options assessment in relation to soil considers the SEA Objectives and guide questions presented in below. Where there are notable differences in effects between the Scheme Options, these are stated.

Table C-19 Soil Assessment against SEA Objectives and Guide Questions

SEA Objective	Assessment Questions	Scheme Options Assessment
Promote the efficient and effective use of natural soil resources.	Will the option/proposal help to... Assist in facilitating the use of previously developed land?	The stabilisation of underground mine workings, mine entries and backfilled opencast workings can be considered to have an overall positive / beneficial effect, improving land otherwise considered 'marginal' for development. Options B, B2, B3 and B4 would offer improved connectivity to the road network for future mineral extraction sites.

SEA Objective	Assessment Questions	Scheme Options Assessment
	<p>Will the option/proposal help to... Avoid the development of the best and most versatile agricultural land?</p>	<p>While all of the Scheme Options will require acquisition of agricultural land, they are primarily situated in moorland and brownfield land with sections in non-prime agricultural land (Class 4.1 and 4.2). This land can be regarded as of low value.</p>
	<p>Will the option/proposal help to... Protect, or minimise, impacts on carbon rich soils, in particular peat?</p>	<p>All Scheme Options except Option B4 (which avoids all impacts on blanket bog) pass through the Drumshangie Moss area, in which blanket bog (and associated deep peat) is the primary ecological interest. However, there appears (pending detailed Stage 3 survey) to be a potential pathway approximately 200m east of the current routing of all Scheme Options other than B3 that would minimise direct impacts on blanket bog. Option B3 takes a different north-westwards route through the Drumshangie Moss area that appears less likely to be able to avoid impacts on blanket bog to the same degree.</p> <p>There are no known active peat extraction sites within 1km of any of the Scheme Options.</p>

All Scheme Options would result in similar impacts on soil. However, Options B, B2, B3 and B4 would offer improved connectivity to the road network for future mineral extraction sites.

The potential impacts and effect are provided in Table C-20 below. Mitigation measures should be implemented at subsequent design and assessment stages to reduce the negative effects on soil. Further details are provided in Table C-22.

Table C-20 Potential Soil Impacts and Effects

Receptor	Potential Impact	Effect Scoring	Effect Duration
Soil			
Construction	All of the Scheme Options will result in the loss of Class 4.2 agricultural land (Mixed Agriculture land) across the Study Area. Compaction as a result of construction machinery activity would occur in the vicinity of the construction works. Soil compaction would result in impeded drainage and subsequent waterlogging. This, combined with the 'ploughing' effect caused by construction machinery, would inhibit vegetation growth, both during and immediately after the construction phase. However, affected land should be restored during the next ploughing season	Short-term, temporary	Short to medium-term, temporary
Superficial Geology			
Construction	All of the Scheme Options will involve construction of earthworks in the form of embankments placed on existing ground or cuttings excavated through superficial deposits (including areas of peat). During construction of embankments and cuttings, the earthworks would temporarily be exposed and vulnerable to erosion and ground movements until vegetation establishes.	Short-term, temporary	Short-term, temporary
Operation	The presence of compressible soils and soils with inadequate performance characteristics may lead to localised failure which could be possible during the operation phase of all of the Scheme Options	Minor negative	Medium to long-term, temporary/reversible
Agricultural Land Holdings			
Construction	All Scheme Options will require temporary acquisition of agricultural land, they are primarily situated in moorland and brownfield land with sections in non-prime agricultural land (Class 4.1 and 4.2).	Neutral	n/a
Operation	All Scheme Options will require acquisition of agricultural land, they are primarily situated in moorland and brownfield land with sections in non-prime agricultural land (Class 4.1 and 4.2).	Neutral	n/a
Contamination			
Construction	All scheme options have the potential for grout run off/ migration and mobilisation of mine gases and mine waters during mine working and/or mine entry stabilisation, as well as the potential for disruption of the groundwater regime as a result of mine working and / or mine entry stabilisation.	Minor negative effect	Short-term, temporary/reversible
Operation	Consolidation grouting of mine workings and mine entries has potential to cause disturbance of groundwater flow, and potential pollution of groundwater and aquifers from mine waters and mine gases.	Minor negative	Medium to long-term, temporary/reversible
Human Health			
Construction	Both former and present land uses may have resulted in the presence of potentially contaminated material which may in turn, pose a threat to human health, controlled waters of other sensitive receptors. These areas of potentially contaminated land may also impose constraints on the construction and operational phases of the road should require excavation or avoidance.	Minor negative effect	Short-term, temporary
Operation	Once the road has been constructed, the majority of the potential pollutant linkages will be broken by the road construction either acting as a barrier or due to the removal of identified contaminated materials encountered during the construction works.	Minor positive effect	Medium to long-term, permanent
Mine Workings and Minerals			
Construction	Options B, B2, B3 and B4 would have a temporary impact on any remaining mineral resources due to the localised sterilisation of potential future opencast coal workings.	Minor negative effect	Short-term, temporary

Receptor	Potential Impact	Effect Scoring	Effect Duration
	All Scheme Options have the potential for impacts associated with bulk/pressure grouting of mine workings and mine entries will require careful management through site specific method statements addressing factors such as grout run off/migration and the control of mine gases and mine waters.	Minor negative effect	Short-term, temporary/reversible
Operation	Options B, B2, B3 and B4 would offer improved connectivity to the road network for future mineral extraction sites.	Minor positive effect	Medium to long-term, permanent
	The presence of shallow underground workings and associated mine entries and backfilled opencast workings is anticipated beneath and/or within influencing distance of the Scheme Options, with all options affected to a similar degree. Construction activities associated with stabilisation of underground mine workings, mine entries and backfilled opencast workings would improving land otherwise considered 'marginal' for development.	Minor positive effect	Medium to long-term, permanent

Inter-relationships with Other SEA Themes

Table C-21 below presents the inter-relationship identified between soil and the other SEA themes.

Table C-21 Inter-related SEA Themes: Soil

SEA Theme	Potential Interactions
Biodiversity, Flora and Fauna	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 Study Area to support habitats and biodiversity and potentially affect the sustainability of species and habitats that rely on soils and soil biodiversity.
Population and Human Health	Soils and peat support the agriculture and forestry industries within the Study Area and provide resources and means of employment for the population thus also supporting human health and well-being
Water	Soil erosion and runoff from compacted/degraded soils can lead to transportation of contaminated soils which can adversely affect water quality within the Study Area as well as changing hydrological regimes which also has the potential to affect flood risk.
Climatic Factors	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 Study Area. Compaction/structural degradation and erosion can result in loss of carbon storage function and flux of greenhouse gases, thus affecting climactic factors.
Material Assets	Soils and peat are important natural assets that underpin other ecosystem services within the Study Area. 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.
Cultural Heritage	Soils and peats preserve cultural and archaeological heritage within the Study Area. Soil sealing or loss/disturbance of peat may result in loss of historical artefacts or archaeological features within the corridor.
Landscape	Soils and peat support the growth of plants and trees which provide landscape and visual value within the Study Area. Loss of organic matter or soil sealing may result in changes in habitats and land use that may affect visual amenity and landscape character.

Design Development, Mitigation and Enhancement Recommendations

Mitigation and enhancement measures relevant to soil are presented in Table C-22 below.

Table C-22 Potential Soil Mitigation, Enhancement and Design Recommendations

Potential Impacts	Measure	Stage of Implementation	Responsible Party	Consultation/ Approvals Required
All of the Scheme Options will result in the loss of Class 4.2 agricultural land (Mixed Agriculture land) across the Study Area. Compaction as a result of construction machinery activity would occur in the vicinity of the construction works. Soil compaction would result in impeded drainage and subsequent waterlogging. This, combined with the 'ploughing' effect caused by construction machinery, would inhibit vegetation growth, both during and immediately after the construction phase. However, affected land should be restored during the next ploughing season	Detailed ground investigation is recommended to determine the nature of the soils onsite and subsequent design of the Scheme to minimise impact on underlying soils.	<ul style="list-style-type: none"> DMRB Stage 3 Pre-construction 	Designer and contractor	n/a
	Implementation of standard mitigation measures during construction such as limiting soil strips in poor weather, temporary support to excavation to prevent soil slippage, limiting haul routes etc.,	<ul style="list-style-type: none"> DMRB Stage 3 Pre-construction 	Designer and contractor	n/a
	Ensure the footprint of the option minimises land take requirements of agricultural land	<ul style="list-style-type: none"> DMRB Stage 3 Pre-construction 	Designer and contractor	n/a
	Restriction of haul routes on agricultural soils and location of stockpiles/compounds away from areas of prime agricultural land	<ul style="list-style-type: none"> Construction 	Contractor	n/a
All of the Scheme Options will involve construction of earthworks in the form of embankments placed on existing ground or cuttings excavated through superficial deposits (including areas of peat). During construction of embankments and cuttings, the earthworks would temporarily be exposed and vulnerable to erosion and ground movements until vegetation establishes.	Detailed ground investigation is recommended to determine the nature of the soils onsite and subsequent design of the Scheme to minimise impact on underlying soils.	<ul style="list-style-type: none"> DMRB Stage 3 Pre-construction 	Designer and contractor	n/a
	Implementation of standard mitigation measures during construction such as limiting soil strips in poor weather, temporary support to excavation to prevent soil slippage, limiting haul routes etc.,	<ul style="list-style-type: none"> DMRB Stage 3 Pre-construction 	Designer and contractor	n/a
	Ensure the footprint of the option minimises land take requirements of peatland.	<ul style="list-style-type: none"> DMRB Stage 3 Pre-construction 	Designer and contractor	n/a
	Restriction of haul routes on agricultural soils and location of stockpiles/compounds away from areas of peatland.	<ul style="list-style-type: none"> Construction 	Contractor	n/a
The presence of compressible soils and soils with inadequate performance characteristics may lead to localised failure which could be possible during the operation phase of all of the Scheme Options.	Mechanical stabilisation measures may be required for forming of steeper slopes in superficial deposits.	<ul style="list-style-type: none"> Construction 	Contractor	n/a
All scheme options have the potential for grout run off/ migration and mobilisation of mine gases and mine waters during mine working and/or mine entry stabilisation, as	Implementation of mitigation measures such as construction controls to prevent grout run-off into watercourses or contamination of groundwater and	<ul style="list-style-type: none"> Pre-construction Construction 	Contractor	n/a

Potential Impacts	Measure	Stage of Implementation	Responsible Party	Consultation/ Approvals Required
well as the potential for disruption of the groundwater regime as a result of mine working and / or mine entry stabilisation.	control of potentially contaminated mine gases and mine waters.			
n/a	After topsoils have been excavated under the footprint of the Scheme, they would be stored in managed temporarily in appropriately located stockpiles and re-used for covering verges, earthwork slopes and landscaping wherever possible.	<ul style="list-style-type: none"> Construction 	Contractor	n/a

C.5 Air

Baseline

Legislation, Policy and Plans

The **Clean Air for Europe (CAFÉ) programme** consolidated and replaced (with the exception of the 4th Daughter Directive) preceding directives with a single legal act, the Ambient Air Quality and Cleaner Air for Europe Directive 2008/50/EC (European Parliament, Council of the European Union, 2008), (hereafter referred to as the 'EU Air Quality Framework Directive'). This directive is transcribed into Scottish legislation by the Air Quality Standards Regulations 2010 (Scottish Government, 2010) which came into force on 11th June 2010; these were amended by the Air Quality Standards Regulations 2016 (henceforth referred to as the "Air Quality (Scotland) Regulations" (Scottish Government, 2016). which came into force on 31st December 2016.

The **National Planning Framework (NPF3)** was published in 2014 by the Scottish Government **Invalid source specified.** and outlines the key principles that guide the wider planning system in Scotland. NPF 3 guides Scotland's spatial development for the next 20 to 30 years, setting out strategic development priorities to support the Scottish Government's central purpose of promoting sustainable economic growth. Plans that are beneath the NPF 3 in the planning policy hierarchy are directly influenced by the goals and themes in the document.

NPF 3 directly influences the content of Scottish Planning Policy (SPP), Circulars, Planning Advice Notes (PANs) and Development Plans produced by Local Authorities.

Within the section focussing on cities as a part of prioritising change, the framework identifies that: *"Reducing the impact of the car on city and town centres will make a significant contribution to realising their potential as sustainable places to live and invest by addressing congestion, air pollution and noise and improving the public realm."*

The **Scottish Planning Policy (SPP)** (Scottish Government, 2014) document is a statement of the Scottish Government's policy on nationally important land use matters.

SPP facilitates development while at the same time 'protecting and enhancing the natural and built environment' and is considered to be central to the Scottish Government's central purpose of achieving sustainable economic growth (Paragraph 4).

The SPP relates to air quality in the following contexts:

- Policies and decisions should be guided by *"avoiding over-development, protecting the amenity of new and existing development and considering the implications of development for water, air and soil quality"*
- Local development plans *"should set out the factors that specific proposals will need to address, including disturbance, disruption and noise, blasting and vibration, and potential pollution of land, air and water"*
- Town centre strategies should *"identify how green infrastructure can enhance air quality, open space, landscape/settings, reduce urban heat island effects, increase capacity of drainage systems, and attenuate noise"*

The Scottish Planning Policy (SPP) relates to air quality in the following contexts:

- Policies and decisions should be guided by *“avoiding over-development, protecting the amenity of new and existing development and considering the implications of development for water, air and soil quality”*
- Local development plans *“should set out the factors that specific proposals will need to address, including disturbance, disruption and noise, blasting and vibration, and potential pollution of land, air and water”*
- Town centre strategies should *“identify how green infrastructure can enhance air quality, open space, landscape/settings, reduce urban heat island effects, increase capacity or drainage systems, and attenuate noise”*

Clean Air for Scotland (CAFS) (Scottish Government, 2015) is a document set out in conjunction with Transport Scotland, Scottish Environment Protection Agency (SEPA), Health Protection Scotland and health boards as well as local authorities to provide a national framework to help improve air pollution and fulfil legal responsibilities. This document also provides a large amount of detail on air pollution in general and ways to reduce the impact of air quality.

CAFS sets out the following actions relevant to the Proposed Scheme:

- Placemaking Action P2 – *“Expect planning authorities to review the Local Development Plan and revise at the next scheduled update to ensure policies are consistent with CAFS objectives and any local authority air quality action plans.”*
- Transport Action T14 – *“Outlines plans to review “...how air quality management should be addressed” and “...how local authorities should use their transport strategies to support modal shift towards sustainable and active travel”*
- Transport Action T15 – *“Trunk road impacts on AQMAs will be reviewed and implement mitigation where trunk roads are the primary contributor to air pollutants.”*

An updated version of this document is currently at the consultation stage (Scottish Government, 2002) and includes plans to review current LAQM methodology to create “a more systematic approach to action plan production and implementation”.

The Glasgow and the Clyde Valley Strategic Development Plan (Clydeplan) Invalid source specified. sets out the vision for the Glasgow city region over 20 years following its adoption in 2017, and is intended to be a *“concise, visionary document that set out clear parameters for Local Development Plans”* in order to promote sustainable growth and land use within the region.

The plan highlights *“Pan Lanarkshire Orbital Transport Corridor”* in North Lanarkshire as a key priority to improve *“strategic connectivity”* in the region.

The North Lanarkshire Proposed Local Development Plan (NLDP) Invalid source specified. contains a number of environmental policies. Policy EDQ 2C (Management Areas) relates to air quality and the additional considerations required for declared AQMAs:

Development proposals should detail how any likely air quality, noise, or pollution impacts particularly in or adjacent to Air Quality or Noise Management areas will be mitigated”

Air quality is also discussed in Policy EDQ 3 (Quality of Development): *“Mitigating any likely air quality, noise, or pollution impacts particularly in or adjacent to Air Quality or Noise Management Areas. In some circumstances, mitigation may not always be possible, and avoidance may be required.”*

This document includes reference to AQMA locations within North Lanarkshire. These AQMA's have been declared with *“traffic congestion”* identified as the main cause of elevated pollutant concentrations within these areas.

Every local Authority in Scotland is required to submit an **Annual Progress Report (APR)** detailing actions taken by the council over the past year to improve air quality. In the 2020 APR **Invalid source specified**. NLC highlight the plan to deliver the “Pan Lanarkshire Orbital Transport Corridor” as part of the “Glasgow City Region City Deal... a £1.13 billion Infrastructure Fund to create economic growth by improving transport and regenerating or developing sites over the next 20 years”. The Pan Lanarkshire Orbital Corridor is made up of 3 projects including the Scheme.

The Scheme is expected to *“improve air quality in the Chapelhall AQMA by relieving congestion along the A73 and the Chapelhall AQMA”*.

In relation to air quality, the document discusses as part of its *“Safe and Pleasant Placemaking Principle”* that all new developments should *“maintain or improve air quality”*.

Baseline Air Quality

Poor air quality can have detrimental impacts on human health and quality of life. Air pollution stems from the release of substances into the atmosphere from a variety of sources, including organic and man-made sources. Regulations on pollutant sources and advancements in combustion technology have led to Scotland currently experiencing the best air quality since pre-industrial revolution times. Despite this, air quality is still a concern for many in the country, particularly those living in urban and industrial areas. Poor air quality can result in human health conditions such as asthma, respiratory problems and cardiovascular disease. The UK government estimates that air pollution reduces the life expectancy of every person in the UK by 7-8 months, with related costs of up to £20 billion to the economy annually (Air Quality in Scotland, 2019).

Transport is a significant contributor to nitrogen oxide (NO_x) and particulate matter (PM₁₀ and PM_{2.5}) emissions and the transport sector is the most significant source of air pollution in the UK. Transport generates just over one-sixth of Scotland's total particulate matter and over one-third of the total emissions of nitrogen oxides. The majority of these emissions are caused by road transport. Emissions of NO_x from road transport are reducing but not at the expected rate.

A set of Air Quality Standards and Objectives have been developed in Scotland for several pollutants of concern for human health (Scottish Air Quality, 2020a). Air Quality Management Areas (AQMA's) are designated by local authorities in areas where Air Quality Strategy

Objectives in relation to harmful objectives are not (or are unlikely to be) met. Henceforth, local authorities are required to develop and implement a plan to improve air quality in the AQMA (Scottish Air Quality, 2020b). There are four designated AQMAs within North Lanarkshire including one within the Study Area (Chapelhall AQMA).

Baseline air quality monitoring data for the Study Area have been gathered from North Lanarkshire Council 2019 APR (for 2018 monitoring information) APR (North Lanarkshire Council, 2018) and 2020 APR (North Lanarkshire Council, 2018).

Monitoring undertaken by North Lanarkshire Council has indicated exceedances of the annual mean PM₁₀ Air Quality Objective (AQO) within the Study Area and therefore has resulted in the declaration of the Chapelhall AQMA in 2005. North Lanarkshire Council currently have 1 continuous monitor and 3 diffusion tubes located within the Chapelhall AQMA. No exceedances of the annual mean NO₂ AQO were recorded at any of these sites between 2015 and 2019. There has been a general trend of reduction in concentrations observed in the AQMA over this 5-year period.

Across the remainder of the Study Area, 1 exceedance of the annual mean NO₂ AQO is observed in 2019 at DT61 (under bridge, Central Way Eastbound, Cumbernauld) which has seen large reductions in concentrations over the past 5 years, this represents a slight improvement on 2018 where 2 exceedances were recorded. Concentrations in the wider study area appear to vary over this 5-year period.

North Lanarkshire Council currently have one continuous monitor measuring PM₁₀ within the Chapelhall AQMA. No exceedances of the annual mean PM₁₀ AQO were recorded at this site since 2015. There has been a general trend of reduction in concentrations observed in the AQMA over this 5-year period. CM10 was installed in 2019 and has recorded annual mean PM₁₀ below the AQO.

North Lanarkshire Council also currently have one continuous monitor measuring PM_{2.5} within the Chapelhall AQMA. No exceedances of the annual mean PM_{2.5} AQO were recorded at this site in the 3 years since 2017 that data is available for. There has been a general trend of increase in concentrations observed in the AQMA over this 5-year period but they remain below the AQO.

Future Baseline

Air quality in Scotland has improved considerably over the last few decades. However, environmental trends suggest that, without mitigation, concentrations of air pollution may increase in the future, particularly in urban or industrial areas. Climate changes, such as higher humidity, could also potentially exacerbate the risks of worsening air quality to human health.

The decarbonisation of transport and reducing vehicle emissions should support wider Scottish Government objectives, particularly those seeking to improve health, through improving air quality and encouraging a modal shift away from private vehicle usage towards public transport and active travel.

Limitations

The traffic data applied to the assessment was in the form of AADT flow, rather than period flow and in addition, the speed data was not pivoted before a speed band was assigned.

Model verification has been carried out to minimise, where possible, uncertainties in the modelling and adjustment of the model output has been undertaken to account for local factors unable to be represented in the modelling.

The air quality modelling uses a traffic dataset consisting of the most likely forecast traffic flows. Uncertainty associated with traffic data has been minimised by using validated traffic models. Details regarding the traffic modelling undertaken to support the Scheme are detailed in the Transportation Chapter.

The use of the latest version of the mapped background concentrations and Defra tools available when the assessment was undertaken has also minimised the uncertainty associated with the air quality predictions presented.

The construction air quality assessments are based on the construction information that is currently available. As with all construction air quality assessments, the exact details of construction activities will not be known before a specific contractor is appointed to complete the works. Once appointed, the contractor would determine their exact construction methods and programme during the detailed design stage.

Assessment

This section considers the potential impacts on air as a result of the Scheme Options. The Scheme Options assessment in relation to air considers the SEA Objectives and guide questions presented in below. Where there are notable differences in effects between the Scheme Options, these are stated.

Table C-23 Air Assessment against SEA Objectives and Guide Questions

SEA Objective	Assessment Questions	Scheme Options Assessment
Improve air quality within the Study Area.	Will the option/proposal help to... Improve air quality within the Chapelhall Air Quality Management Area (AQMA)?	For all Scheme Options, the large decreases in annual mean PM ₁₀ and PM _{2.5} are anticipated within the Chapelhall AQMA. This is due to vehicles re-routing onto the Scheme, in preference of the A73 through Chapelhall and Airdrie, thus resulting in a decrease in vehicles using Main Road (A73) through the Chapelhall AQMA. The largest decrease in concentration was predicted at Main Street, Chapelhall, for all Options. Decreases of between 1.0µg/m ³ (Option B) and 0.9µg/m ³ (Option B2) in annual mean NO ₂ concentration were predicted. The reduction in AADT on this road due to the Scheme were predicted to be between approximately 3,500 (Option B) and 2,500 (Option B2). This leads to a reduction of annual mean PM ₁₀ and PM _{2.5} concentrations in an existing area of concern.
	Will the option/proposal help to... Promote the use of sustainable modes of transport, including walking, cycling and public transport?	The project provides the opportunity to enhance linkages to walking and cycling routes and core paths. There also exists an opportunity, through the infrastructure provided, to positively impact on the level of active travel undertaken within the route 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, it is unlikely, however, that the future

SEA Objective	Assessment Questions	Scheme Options Assessment
	<p>Will the option/proposal help to... Promote the use of low emission vehicles?</p>	<p>level of active travel trips within the route corridor would be significant.</p> <p>The Climate Change Plan Update (Scottish Government 2020) sets out that Scotland will 'phase out' the need for new petrol and diesel cars and vans by 2030 at the same time as investing in charging points for electric vehicles and engaging with industry to understand how technology and innovation can help to reduce carbon emissions from HGVs. By the time the project is operational, it is expected that there would be a reduction in the number of new petrol and diesel cars and vans on the road network.</p> <p>In line with current policy, Transport Scotland is also rolling out vehicle charging points in conjunction with Local Authorities and private developers in order to support an increase in uptake of electric vehicles, as envisaged in the Scottish Government's Climate Change Plan Update (2020).</p>

In terms of a route preference, taking into consideration the number of receptors located within 200 m of the options which have the potential to be adversely affected by dust, the options were ranked as B4 (most preferable), B3, B2, E, B (least preferable). With regards to NO₂, PM₁₀ and PM_{2.5} impacts during operation the options were ranked B (most preferable), E, B3 and B4 were similar followed by B (least preferable).

The potential impacts and effect are provided in Table C-24 below. Mitigation measures should be implemented at subsequent design and assessment stages to reduce the negative effects on air. Enhancement opportunities should be considered to promote the use of sustainable modes of transport, including walking, cycling and public transport and meet the SEA objective. Further details are provided in Table C-26.

Table C-24 Potential Air Impacts and Effects

Receptor	Potential Impact	Effect Scoring	Effect Duration
Human Receptors			
Construction	The construction dust assessment determined that there are temporary minor negative air quality effects during the short-term for human health of designated habitats during the construction of the Scheme Options with appropriate best practice mitigation measures. Taking into consideration the number of sensitive receptors located within 200m of the boundary of the Scheme Options	Minor negative effect	Short-term, temporary
Operation	The operational phase assessment determined that there is no likely significant air quality effect for human health or designated habitats during the operation of the Scheme.	Minor negative effect	Medium to long-term, permanent
Chapelhall AQMA			
Operation	For all Scheme Options, the large decreases in annual mean PM10 and PM2.5 are anticipated within the Chapelhall AQMA. This is due to vehicles re-routing onto the Scheme, in preference of the A73 through Chapelhall and Airdrie, thus resulting in a decrease in vehicles using Main Road (A73) through the Chapelhall AQMA	Minor positive effect	Medium to long-term, permanent
Designated Habitats			
Operation	Predicted NO _x concentrations and nitrogen deposition rates, and changes in NO _x concentrations and nitrogen deposition rates attributable to the Scheme Options for designated habitats has been carried out. At all sites the air quality effect is not significant because “the change in nitrogen deposition associated with the proposed scheme will not lead to the loss of one species” LA105 (Highways England, 2019). Therefore, a conclusion of no likely significant air quality effect for designated habitats sites is recorded.	Minor negative effect	Medium to long-term, permanent

Inter-relationships with Other SEA Themes

Table C-25 below presents the inter-relationship identified between air and the other SEA themes.

Table C-25 Inter-related SEA Themes: Air

SEA Theme	Potential Interactions
Biodiversity, Flora and Fauna	In relation to ecological receptors, air pollution can impact on the functioning of ecosystems; for example, the growth of trees and other fauna can be affected by acid and nitrogen deposition and sulphur dioxide.
Population and Human Health	There is potential for inter-relationships to arise with air quality and other population effects; for example, noise and vibration, visual impacts, or impacts on accessibility. A combination of impacts arising as a result of the project has the potential for cumulative effects on population receptors; such effects will be considered throughout design development, and reduced where practicable through route alignment and appropriate mitigation measures.
Climatic Factors	Extreme weather events as a result of climate change can negatively impact air quality. For example, during heat waves, areas of high pressure create stagnant air that concentrates air pollutants in one area, and dry, dusty air during hot weather periods increases the level of particulate pollution. It is not expected that the project would result in an inter-relationship between air quality and climate change that would result in significant effects.

Design Development, Mitigation and Enhancement Recommendations

Mitigation and enhancement measures relevant to air are presented in Table C-26 below.

Table C-26 Potential Air Mitigation, Enhancement and Design Recommendations

Potential Impacts	Measure	Stage of Implementation	Responsible Party	Consultation/ Approvals Required
The construction dust assessment determined that there are temporary minor negative air quality effects during the short-term for human health during the construction of the Scheme Options with appropriate best practice mitigation measures. Taking into consideration the number of sensitive receptors located within 200m of the boundary of the Scheme Options	The Scheme would be subject to measures and procedures as defined within the Construction Environmental Management Plan (CEMP) for the Scheme. These would include a range of Best Practicable Means (BPM) associated with mitigating potential environmental impacts. The measures detailed within the CEMP by the selected construction contractor which would be implemented for the duration of the Scheme construction phase.	<ul style="list-style-type: none"> • Pre-construction • Construction 	Contractor	n/a
The construction dust assessment determined that there are temporary minor negative air quality effects during the short-term for designated habitats during the construction of the Scheme Options with appropriate best practice mitigation measures. Taking into consideration the number of sensitive receptors located within 200m of the boundary of the Scheme Options	The CEMP would include a range of industry standard good practice construction phase dust mitigation measures required during all works undertaken based on the level of construction dust risk at sensitive receptors.			

C.6 Climatic Factors

Baseline

Legislation, Policy and Plans

A brief overview of the legislative and policy framework relevant to the climate change assessment have been reviewed and summarised below.

EU Directive 2014/52/EU on the assessment of the effects of certain public and private projects on the environment (European Parliament, 2014) states that's as of May 2017, an environmental impact assessment (EIA) (where relevant) must include assessment of the impact of a proposed development on climate change (for example, the nature and magnitude of GHG emissions).

The Paris Agreement under the United Nations Framework Convention on Climate Change (United Nations Framework Convention on Climate Change (UNFCCC), 2016) is an agreement within the UNFCCC requiring all signatories to strengthen their climate change mitigation efforts to keep global warming to below 2°C this century.

The **Climate Change Act 2008** (UK Parliament, 2008) applies to the whole of the United Kingdom (with specified exceptions which apply in England, Wales and/or Northern Ireland only). It set a legally binding target to reduce UK wide GHG emissions by 80% by 2050 (compared to the baseline in 1990). This target has subsequently been amended by The Climate Change Act 2008 (2050 Target Amendment) Order 2019 which requires the UK to achieve net-zero GHG emissions by 2050 (compared to 1990 baseline levels).

The territorial scope of the Act applies to emissions occurring in, above or below UK coastal waters or the UK sector of the continental shelf.

The **National Planning Framework (NPF3)** (Scottish Government, 2014) was published in 2014 by the Scottish Government and is intended to guide Scotland's spatial development priorities for the next 20 to 30 years. The vision set out in NPF3 is divided into four outcomes, one of which is 'a low carbon place – reducing our carbon emissions and adapting to climate change'.

The **Scottish Planning Policy (SPP)** (Scottish Government, 2020) document is a statement of the Scottish Government's policy on nationally important land use matters. SPP facilitates development while at the same time "protecting and enhancing the natural and built environment" and is central to the Scottish Government's purpose of achieving sustainable economic growth (para 2).

The SPP sets out how climate change should be addressed through planning, by seizing opportunities to encourage mitigation and adaptation measures, to support the transformational change required to meet emission reduction targets and reduce the vulnerability of existing and future development to climate change.

The Roads (Scotland) Act 1984 as amended by the Roads (Scotland) Act 1984 (Environmental Impact Assessment) Regulations 2017 (Scottish Parliament, 2017) provides for the preparation of Roads Orders for new trunk road schemes and provides powers to Transport

Scotland as the trunk roads authority for works relating to improvement and maintenance of the trunk roads network. It was amended in 2017 by the Roads (Scotland) Act 1984 (Environmental Impact Assessment) (Scotland) Regulations 2017, which introduced a specific requirement to include a description of the likely significant effects of the project on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project to climate change.

The **Road to Zero** (UK Government, 2018) sets out the UK's mission to put the UK at the forefront of the design and manufacturing of zero emission vehicles, and for all new cars and vans to be effectively zero emission by 2040. This includes ending the sale of new conventional petrol and diesel cars and vans by 2040. The Department for Transport is currently consulting on bringing forward the end to the sale of new petrol and diesel vehicles to 2035 (from 2040), or earlier if a faster transition appears feasible.

The Scottish Government does not have the power to ban new petrol and diesel cars but has pledged to "phase out the need" for them by 2032 with measures such as an expansion in the charging network for electric cars.

The **Climate Change Plan 3rd Report on Proposals and Policies 2018-2032** (Scottish Government, 2018) sets out Scotland's strategy for reducing GHG emissions from 2018 to 2032. Delivery actions for Scottish Government on transport include:

- Investigate potential for biofuels to be used sustainably in decarbonisation of whole transport sector;
- Enhance capacity of vehicle charging network;
- Support the public sector in leading the way in transitioning to ULEVs (ultra-low emission vehicles), in particular low carbon public transport; and
- Increased funding for active travel and programme support to encourage behaviour change.

An update to the **Climate Change Plan** was published in December 2020 (Scottish Government, 2020d) to reflect the increased ambition of the new targets set in the Climate Change (Emissions Reduction Targets) (Scotland) Act 2019 to achieve net zero GHG emissions by 2045. The update also commits to a 'green recovery' from COVID-19, one which captures the opportunities of a just transition to net zero, creating green jobs and developing sustainable skills. The approach is based on the advice and contributions received from the Climate Change Committee, Advisory Group on Economic Recovery, Climate Emergency Response Group, Scottish Science Advisory Council and the Sustainable Renewal Advisory Group.

The update to Climate Change Plan also considers the findings of the Just Transition Commission, which published its Interim Report in February 2020. This report provides information on the findings and view of the commission in respect of the need for clear transition plans for all sectors, engagement, and bringing equity to the heart of climate change action. This includes a recommendation for immediate action that the Scottish Government places the climate emergency at the heart of spending decisions, and that planning for delivering inclusive low-carbon infrastructure should begin now. The report highlights that sectors such transport

will have to see significant emissions reduction in future years leading inevitably to a boost in demand for low-carbon technologies.

The Climate Change (Emissions Reduction Targets) (Scotland) Act 2019, hereafter referred to as the 'Act' amends the Climate Change (Scotland) Act 2009, setting targets to reduce Scotland's emissions of all greenhouse gases to net-zero by 2045 at the latest. This includes interim targets for reductions of at least 56% by 2020, 75% by 2030, 90% by 2040.

Further policy and guidance on how net-zero carbon will be achieved has not been published, including amendments to the carbon budgets. The assessment therefore considers the current carbon budgets.

The **National Transport Strategy (NTS2)** (Scottish Government, 2020) was published by Transport Scotland in February 2020, sets out a vision for Scotland's transport system for the next 20 years. One of the four priorities is to take climate action, including helping deliver Scotland's GHG emissions reduction targets as set out above.

NTS2 recognises that transport is currently Scotland's largest sectoral emitter, responsible for 37% of Scotland's total greenhouse gases in 2017. Of this, the largest source of GHG emissions is from cars, accounting for 40%, with 25% of GHG emissions generated by a combination of Light Goods Vehicles (LGVs) and Heavy Goods Vehicles (HGVs). The strategy states that GHG emissions from transport will be tackled through a range of actions including the ambition to phase out the need for new petrol and diesel cars and vans by 2032, changing people's travel behaviour and managing demand.

UK government is currently developing The Transport Decarbonisation Plan (TDP) which will set out in detail what government, business and society will do to reduce emissions across all modes of transport, to achieve net zero emissions for every mode of transport by 2050. The approach will focus on six key areas, namely:

- Accelerating modal shift to public and active transport;
- Decarbonisation of road vehicles;
- Decarbonising how we get our goods;
- Place-spaced solutions;
- UK as a green transport hub for green transport technology and innovation; and
- Reducing carbon in the global economy.

The regional **Clydeplan Strategic Development Plan** (Glasgow and Clyde Valley Strategic Development Planning Authority, 2017) includes a strategic objective for 'Low Carbon Infrastructure'. This includes connected transport networks including active travel, green networks and sustainable drainage networks which contribute to a low carbon economy and lifestyles.

The **North Lanarkshire Local Plan Policy Document** (North Lanarkshire Council, 2012) states that development will only be permitted where high standards of site planning and sustainable designs are achieved. This includes measures which reduce carbon emissions and encourage low and zero-carbon approaches.

While, the **North Lanarkshire Local Development Plan, Modified Proposed Plan** (North Lanarkshire Council, 2018) highlights the importance of continuing the transition to a low-carbon economy for mitigating against climate change and the need to build resilience against the effects of climate change is equally important. It states that improved environmental performance will need to become a focus in addressing the quality & design of development.

In July 2019, North Lanarkshire Council declared a Climate Emergency. To ensure the council can protect and maintain the quality of life of its residents it's seeking realistic policy updates from both the Scottish and UK Governments, supported by extra funding resources. Furthermore, the Council are looking to bring forward plans to reduce council carbon emissions to zero by 2030 if feasible.

Climate Change Adaptation

There is consensus in the scientific community that anthropogenic climate-change poses an ongoing threat to the planet. The uninhibited consumption of fossil fuels since the industrial revolution has steadily increased the atmospheric concentration of greenhouse gases to unprecedented levels. This increasing concentration has amplified the 'greenhouse effect' where the carbon dioxide (CO₂) traps heat from the sun, resulting in higher average global temperatures. A minor increase in global temperature threatens to imbalance delicate tipping points, causing uncontrollable and irreversible changes to ecosystems, such as melting permafrost that would release significant amounts of methane and the melting of polar ice caps, causing sea-level rise.

Transport is estimated to account for 25% of all Scotland's total energy use, with the majority of this arising from road transport and fossil fuels (Scottish Government, 2017). According to the NTS2, published in 2020, the largest source of transport emissions is cars at 40%, followed by aviation and shipping which are both 15%. In addition, 25% of emissions were generated by a combination of LGVs & HGVs. The proportion of single occupancy car trips also shows an underlying increasing trend, with 66% in 2018 compared with a figure of 65% in 2013 and 60% in 2008 (Transport Scotland, 2020).

Scotland has experienced an increase in temperature of approximately 1 degree Celsius in recent decades and annual rainfall has also increased approximately 13% above the average for the early 1900s.

Historic climate data for the Study Area obtained from the Met Office website (UK Met Office, 2020) recorded by the closest meteorological station to the Scheme Options (Salsburgh Weather Station) for the 30-year climate period of 1981-2010 is summarised in Table C-27 'Historic climate data (1981-2010)'.

Table C-27 Historic climate data (1981-2010)

Climatic Factor	Month	Data
Temperature		
Average annual maximum monthly temperature	-	10.7 °C
Average annual minimum monthly temperature	-	4.4 °C
Warmest month on average – maximum temperature	July	17.5 °C
Coldest month on average – minimum temperature	February	0.1 °C

Climatic Factor	Month	Data
Rainfall		
Mean annual rainfall levels	-	1,092.7 mm
Wettest month on average	October	122.9 mm
Driest month on average	April	62.0 mm

Flood Risk

SEPA Flood Maps show areas which are likely to flood from rivers, surface water and coastal waters in Scotland (SEPA, 2019a). Flooding from the following surface waterbodies can be seen within the Study Area:

- Cameron Burn - The extent of flooding within the Cameron Burn is largely confined to the river and is designated as high risk. To the south of the Cameron Burn, there are several areas designated for surface water flooding such as the drains along B803 Greengairs Road and Drumshangie Moss. The risk ranges from Low to High.
- Shotts Burn - The extent of flooding is largely contained within the Shotts Burn, designated as a high risk. However, after the confluence with Clattering Burn, the floodplain slightly increases in area and is designated from Medium to High risk. There is an area at High risk from surface water flooding where the Shotts Burn underpasses Burniebrae Road/Bowhousebrae Road.

North Calder Water - The area is prone to flooding along the North Calder Water is mainly contained along the river alignment. Within this area, the risk is designated as High. Two floodplains are present

Future Baseline

The Climate Change (Emissions Reduction Targets) (Scotland) Act 2019 amended the greenhouse gas emissions targets in the Climate Change (Scotland) Act 2009, and set a 'net zero' target emissions year of 2045 by which time emissions are to be 100% lower than the baseline year of 1990. Various policies including the Climate Change Plan (for which an update is expected in December 2020) have since been implemented to facilitate and encourage the required reduction in emissions by 2045. Key proposals include vehicle technological improvement (increased uptake of electric and low carbon vehicles), alternative fuels, and demand management and behaviour change with a shift towards sustainable travel modes (walking, cycling and public transport); all of which will reduce emissions from the transport sector over the coming decades.

Climate change has the potential to increase the occurrence of extreme weather events in the Study Area, with increases in mean summer and winter temperatures, increases in mean precipitation in winter and decreases in mean precipitation in summer. This is likely to increase the risks associated with climate change, with an increased need for resilience and adaptation.

The future baseline for the Study Area is expected to differ from the present-day baseline described in the table above. Projections for Scotland highlight the following changes to the climate relative to the 1981-2010 baseline²:

² under the Representative Concentration Pathway (RCP) 8.5

- Mean temperatures are expected to increase in both summer and winter;
- Mean daily maximum and minimum temperatures to increase across the UK in both summer and winter;
- Winter precipitation is expected to increase, and summer precipitation decrease; and
- Increased frequency of extreme weather events.

UK Climate Projections published in 2018 (UKCP18) have been developed by the UK Climate Impacts Programme (UKCIP) (UKCP, 2018) to provide projections for future climate scenarios and trends. Research suggests the effects of climate change for a medium emissions scenario are likely to be as shown in Table C-28 and Table C-29 below.

Table C-28 Projected changes in temperature variables (°C) - probabilistic projections

Climate Variable	Time Period		
	2020-2049	2050-2079	2070-2099
Mean annual air temperature anomaly at 1.5m (°C)	+1.0	+2.2	+3.3
Mean summer air temperature anomaly at 1.5m (°C)	+1.0	+2.5	+4.0
Mean winter air temperature anomaly at 1.5m (°C)	+0.9	+2.0	+3.0
Maximum summer air temperature anomaly at 1.5m (°C)	+1.2	+2.8	+4.4
Minimum winter air temperature anomaly at 1.5m (°C)	+0.8	+1.9	+2.8

Table C-29 Projected changes in precipitation variables (%) - probabilistic projections

Climate Variable	Time Period		
	2020-2049	2050-2079	2070-2099
Annual precipitation rate anomaly (%)	+2.6	+4.6	+4.5
Summer precipitation rate anomaly (%)	-5.4	-16.3	-20.2
Winter precipitation rate anomaly (%)	+3.7	+12.3	+13.8

Climate change will exacerbate flood events, with rising sea levels increasing the risk of coastal flooding. More frequent, high-intensity rainfall will increase the risk of flash flooding from surface water or sewers for inland communities.

The predicted effects of climate change such as increased temperatures and changes to rainfall patterns could affect flows in rivers and impact on water resource availability (Scotland's Environment, 2014). Increased frequency and intensity of rainfall may result in greater risk of river flooding due to higher river flow volumes and flashier flow regimes. A changing climate is also expected to have ecological impacts, such as warmer sea temperatures and an increasing rise of non-native species spreading and becoming established in aquatic environments.

Limitations

The information presented in this assessment reflects that obtained and evaluated at the time of reporting and is based on an emerging Scheme design.

- Due to limited data at this stage, GHG emissions from the following sources have not been quantified, and therefore a qualitative assessment has been provided:
- GHG emissions from HGV movements associated with materials to site and waste disposal during construction;
- GHG emissions from onsite construction activities e.g. energy consumption during construction (i.e. electricity, fuel, LPG, etc.);
- GHG emissions from workers travelling to and from the site during construction; and
- Energy consumption for infrastructure operation and activities of organisations conducting routine maintenance.

Due to limited data available at this stage, it has not been possible to quantify the embodied carbon of the mainline structures for the Scheme Options. These structures are likely to contain large quantities of concrete and steel, meaning that the actual embodied carbon emissions would be more than reported in this assessment.

Given the level of data available at this stage, the embodied carbon associated with road lighting, markings and traffic signs has not been quantified. However, for all Scheme Options, this is likely to equate to <1% of the Proposed Scheme’s embodied carbon emissions.

Due to limited data available, GHG emissions from construction waste disposal have only considered those from excavated material unsuitable for reuse on site. It has been assumed that this will go to landfill as a worst-case scenario.

As a result of the data limitations at this stage, it is not appropriate to compare the GHG emissions from the Scheme Options to Scotland’s annual percentage reductions from the baseline, as the current level of quantification able to be completed and the construction and operational GHG emissions reported within this assessment are not a complete reflection of the final GHG emissions footprint of the Scheme.

Additionally, GHG emissions are subject to change as the Scheme design is refined through the design-development and consultation processes, as more data becomes available and as further research and investigative surveys are completed to fully understand its likely effects., GHG emissions reported in future stage reports are therefore likely to be greater than reported in this assessment. The data currently available has purely been used for optioneering purposes to determine which of the Scheme options is likely to have the least impact on climate change.

Assessment

This section considers the potential impacts on climatic factors as a result of the Scheme Options. The Scheme Options assessment in relation to climatic factors considers the SEA Objectives and guide questions presented in below. Where there are notable differences in effects between the Scheme Options, these are stated.

Table C-30 Climatic Factors Assessment against SEA Objectives and Guide Questions

SEA Objective	Assessment Questions	Scheme Options Assessment
Support climate change mitigation in the Study Area through limiting the contribution of transport	Will the option/proposal help to... Promote the use of sustainable modes of	The project will provide upgraded infrastructure within a rural region. This could improve public transport operation, making it easier for the public to choose more sustainable transport options. The

SEA Objective	Assessment Questions	Scheme Options Assessment
to greenhouse gas emissions.	<p>transport, including walking, cycling and public transport?</p> <hr/> <p>Will the option/proposal help to... Promote the use of alternative fuel and/or electric vehicles?</p>	<p>project is limited in its ability to directly influence the choice that users make with regard to their mode of transport.</p> <p>The project provides the opportunity to enhance linkages to walking and cycling routes and core paths. There also exists an opportunity, through the infrastructure provided, to positively impact on the level of active travel undertaken within the route corridor.</p> <hr/> <p>The Climate Change Plan Update (Scottish Government 2020) sets out that Scotland will 'phase out' the need for new petrol and diesel cars and vans by 2030 at the same time as investing in charging points for electric vehicles and engaging with industry to understand how technology and innovation can help to reduce carbon emissions from HGVs. By the time the project is operational, it is expected that there would be a reduction in the number of new petrol and diesel cars and vans on the road network.</p> <p>In line with current policy, Transport Scotland is also rolling out vehicle charging points in conjunction with Local Authorities and private developers in order to support an increase in uptake of electric vehicles, as envisaged in the Scottish Government's Climate Change Plan Update (2020).</p>
Support the resilience of the Study Area to the potential effects of climate change, including flooding.	<p>Will the option/proposal help to... Ensure that inappropriate development does not take place in areas at higher risk of flooding, considering the likely future effects of climate change?</p> <hr/> <p>Will the option/proposal help to... Improve and extend green infrastructure networks in the plan area to support adaptation to the potential effects of climate change?</p> <hr/> <p>Will the option/proposal help to... Sustainably manage water run-off, reducing surface water runoff (either within the Study Area or downstream)?</p> <hr/> <p>Will the option/proposal help to... Ensure the potential risks associated with climate change are considered through new development in the Study Area?</p> <hr/> <p>Will the option/proposal help to... Increase the resilience of biodiversity to the effects of climate change, including</p>	<p>Relatively small increases in usage of impermeable hard surfacing and surface gradients can increase the risk of flooding, especially under projected climate scenarios of increasing winter rainfall. The Stage 2 Options have varying road lengths and land-takes.</p> <p>There are some areas of flooding within the Study Area; however, these are primarily contained along the river alignments. Two floodplains are present between Calderbank and Brownsburn, the risk at this location ranges from Medium to High.</p> <p>Any loss of floodplain will be mitigated by the design and inclusion of compensatory storage, if required.</p> <hr/> <p>At this stage, the integrity of existing habitat connections within the road corridor cannot be confirmed based on desk-study information.</p> <p>The iterative design process provides opportunities to protect the integrity of existing habitat, green/blue networks and other wildlife corridors.</p> <p>Where appropriate, enhancement opportunities for biodiversity within the corridor should be considered at DMRB Stage 3 and developed in consultation with NatureScot and other consultees to ensure that these align with local and national biodiversity policies.</p> <hr/> <p>The project would be designed with the appropriate tolerances in relation to flood risk and rainfall and so it would have embedded adaptive capacity to future climate change projections. For example, the materials used to construct the pavements should have superior properties (such as increased tolerance to fluctuating temperatures)</p> <hr/> <p>The project would be designed with the appropriate tolerances in relation to flood risk, rainfall and landslides, so it would have embedded adaptive capacity to future climate change projections. Therefore, it is determined that the project would be expected to contribute positively to adapting the transport network to the anticipated effects of climate change.</p> <hr/> <p>Where appropriate, enhancement opportunities for biodiversity within the corridor should be considered at DMRB Stage 3 and developed in consultation with NatureScot and other consultees to ensure that</p>

SEA Objective	Assessment Questions	Scheme Options Assessment
	through enhancements to ecological networks?	these align with local and national biodiversity policies.

The impacts of climate change on all Scheme Options are likely to be similar.

The potential impacts and effect are provided in Table C-31 below. Mitigation measures should be implemented at subsequent design and assessment stages to reduce the negative effects on climatic factors. Enhancement opportunities should be considered to promote the use of sustainable modes of transport, including walking, cycling and public transport and protect the integrity of existing habitat, green/blue networks and other wildlife corridors and meet the SEA objectives. Further details are provided in Table C-33.

Table C-31 Potential Climatic Factors Impacts and Effects

Receptor	Potential Impact	Effect Scoring	Effect Duration
GHG Emissions			
Construction	When considering the greenhouse gas (GHG) emissions from construction, due to their shorter routes, Option B3 is considered the best performing option, followed by B4 and then B2. Although suggested mitigation measures will minimise GHG emissions, there will be unavoidable GHG emissions resulting from the construction of any of the Scheme Options	Minor negative effect	Short-term, temporary
Operation	When considering GHG emissions from vehicle use, Option B3 is considered the best performing option of the five options assessed and Option E is likely to generate the greatest emissions. Option E is likely to generate the greatest emissions.	Minor negative effect	Medium to long-term, permanent
	For other GHG emissions from operations and maintenance (including repair, replacement and refurbishment), Option B4 is considered the best performing option followed by B2 and B3. However, it is noted that it is likely that the majority of GHG emissions during operation will come from road users. Option E is likely to generate the greatest emissions.	Minor negative effect	Medium to long-term, permanent
Climate Change Resilience			
Construction	All Scheme Options have the potential to impact the climate and be impacted by a changing climate during construction.	Minor negative effect	Short-term, temporary
Operation	All Scheme Options have the potential to impact the climate and be impacted by a changing climate during operation. Any loss of floodplain will be mitigated by the design and inclusion of compensatory storage, if required.	Minor negative effect	Medium to long-term, permanent

Inter-relationships with Other SEA Themes

Table C-32 below presents the inter-relationship identified between climatic factors and the other SEA themes.

Table C-32 Inter-related SEA Themes: Climatic Factors

SEA Theme	Potential Interactions
Biodiversity, Flora and Fauna	Grassland habitats, forestry and peatland within the corridor have significant carbon sequestration value, any positive or negative effects of the project on these natural assets would therefore affect climatic factors.
Water	Climate Change projections indicate that this region will experience wetter winters and more regular high intensity rainfall events which could affect the resilience of the project.
Soil	Soils may be altered by changes to rainfall patterns, erosion, and increased temperatures due to climate change, while the release of CO ₂ sequestered in peat soils from development contributes to climate change. Peatland conservation is therefore essential for climate change mitigation. Climate change may result in changes to rainfall patterns which may affect frequency and severity of landslide events.
Material Assets	The materials required to construct the project have embodied carbon emissions that will be released in the manufacture of components of the infrastructure. The natural material assets within the route corridor including forestry and peat soils hold a high carbon sequestration and sink value

Design Development, Mitigation and Enhancement Recommendations

Mitigation and enhancement measures relevant to climatic factors are presented in Table C-33 below.

Table C-33 Potential Climatic Factors Mitigation, Enhancement and Design Recommendations

Potential Impacts	Measure	Stage of Implementation	Responsible Party	Consultation/ Approvals Required
When considering the greenhouse gas (GHG) emissions from construction, due to their shorter routes, Option B3 is considered the best performing option, followed by B4 and then B2. Although suggested mitigation measures will minimise GHG emissions, there will be unavoidable GHG emissions resulting from the construction of any of the Scheme Options	<p>Avoid / prevent:</p> <ul style="list-style-type: none"> Maximise potential for re-using and/or refurbishing existing assets to minimise the extent of new construction required, and/or, Explore alternative lower carbon options to deliver the project objectives (i.e. shorter route options with smaller construction footprints); and, Identify through projects and delivery programmes opportunities to influence user GHG emissions. 	<ul style="list-style-type: none"> DMRB Stage 3 Pre-construction Construction 	Designer and contractor	n/a
	<p>Reduce:</p> <ul style="list-style-type: none"> Apply low carbon and/or reduced resource consumption solutions (including technologies, materials and products) to minimise resource consumption during the construction, operation, and at end of life; and Energy efficient road lighting to minimise operational energy consumption. 	<ul style="list-style-type: none"> DMRB Stage 3 Pre-construction Construction 	Designer and contractor	n/a
	<p>Remediate:</p> <ul style="list-style-type: none"> Identify, assess and integrate measures to further reduce carbon through on or off-site offsetting or sequestration. 	<ul style="list-style-type: none"> DMRB Stage 3 Pre-construction Construction 	Designer and contractor	n/a
All Scheme Options have the potential to impact the climate and be impacted by a changing climate during construction.	Considering the dangers associated with working in more extreme weather conditions during construction	<ul style="list-style-type: none"> Construction 	Contractor	n/a
All Scheme Options have the potential to impact the climate and be impacted by a changing climate during operation. Any loss of floodplain will be mitigated by the design and inclusion of compensatory storage, if required.	The materials used to construct the pavements should have superior properties (such as increased tolerance to fluctuating temperatures)	<ul style="list-style-type: none"> DMRB Stage 3 Pre-construction Construction 	Designer and contractor	n/a
	Consider climate change projections within maintenance plans and drainage systems	<ul style="list-style-type: none"> DMRB Stage 3 Pre-construction Construction 	Designer and contractor	n/a
	Appropriate emergency systems being in place (including user communications systems such as variable messaging systems)	<ul style="list-style-type: none"> DMRB Stage 3 	Designer and contractor	n/a

Potential Impacts	Measure	Stage of Implementation	Responsible Party	Consultation/ Approvals Required
		<ul style="list-style-type: none">• Pre-construction		

C.7 Material Assets

Baseline

Legislation, Policy and Plans

Waste is defined by Article 1(a) of the **European Waste Framework Directive 2008/98/EC** as “any substance or object in the categories set out in Annex I which the holder discards or intends to discard or is required to discard”.

The Waste FD introduces the ‘waste hierarchy’, which defines the order of preference for waste management options. It prioritises waste prevention, and where waste is produced it prioritises preparing for reuse before recycling, recovery and finally disposal.

Relevant national legislation includes, but is not limited to the following:

- Environmental Protection Act 1990;
- Environmental Protection (Duty of Care) Regulations 1991, as amended;
- Landfill (Scotland) Regulations 2003 (as amended);
- Waste Management Licensing (Scotland) Regulations 2011 (as amended);
- The Pollution Prevention and Control (Scotland) Regulations 2012 (as amended);
- The Waste (Scotland) Regulations 2012;
- Special Waste Regulations 1996 (as amended) (Note: Elsewhere in the UK, special waste is referred to as hazardous waste. For consistency, special waste is referred to as hazardous waste in this chapter);
- The Waste (Meaning of Hazardous Waste and European Waste Catalogue) (Miscellaneous Amendments) (Scotland) Regulations 2015;
- The Environment (EU Exit) (Scotland) (Amendment etc.) Regulations 2019; and,
- Developing Scotland’s Circular economy: consultation on proposals for legislation. November 2019.

Scotland’s Third **National Planning Framework (NPF3)** was published in 2014 by the Scottish Government and outlines the key principles that guide the wider planning system in Scotland. NPF3 recognises that waste is a resource and an opportunity, rather than a burden, and requires sustainable management to deliver on Scotland’s climate change commitments.

Scottish Planning Policy (SPP) (Scottish Government, 2014) Scottish Planning Policy (SPP) provides national planning policy covering several themes, including; supporting sustainable development and a transition to a low carbon and circular economy; minimising the unnecessary use of primary materials and encouraging the use of secondary and recycled materials in construction; prioritising development in line with the waste hierarchy; and promoting development design that would contribute positively to the built and natural environment.

Scotland’s Zero Waste Plan (ZWP) outlines a vision for a zero-waste society where all types of waste are dealt with regardless of where they come from. The plan sets out several objectives which include:

Eliminating the unnecessary use of raw materials. This leads to further reductions in Greenhouse Gas Emissions in areas such as mining of raw materials, manufacturing and transport. There are also financial savings; and,

Producing energy savings from making products from recycled materials, rather than from virgin materials.

The ZWP sets the target to recycle 70% of construction and demolition waste (CDW) by 2020 to contribute to the achievement of the UK target (70% recovery by weight of non-hazardous construction and demolition waste excluding naturally occurring materials).

The Plan also includes:

- Landfill bans for specific waste types therefore reducing greenhouse gas emissions and capturing the value from these resources;
- Two new targets that will apply to all waste: at least 70% recycled, and maximum 5% sent to landfill, both by 2025;
- Restrictions on the input to all energy from waste facilities therefore encouraging greater waste prevention, reuse and recycling; and,
- Measuring the carbon impacts of waste to prioritise the recycling of resources which offer the greatest environmental and climate change outcomes.

Planning and Waste Management Advice from the Scottish Government (2015) complements NPF3, SPP and Scotland's Zero Waste Plan. It states that development plan policies should encourage developers to avoid waste and re-use and recycle waste generated during demolition and construction. For the successful delivery of the ZWP, sustainable waste management must be fully considered in all new development and Site Waste Management Plans (SWMPs) are useful non-statutory tools supporting such commitments.

The Scottish Government developed a strategy, **Making Things Last: A Circular Economy Strategy for Scotland** (Scottish Government, 2016), to move the country towards a more circular economy, aligning economic and environmental objectives. A priority area is construction and the built environment, as construction generates approximately 50% of all waste produced in Scotland and the sector is the biggest user of materials, so has a significant opportunity to increase resource efficiency.

The overarching vision for the Scottish Environment Protection Agency's (SEPA) **Waste to Resources Framework** is that 'the sustainable use of resources creates prosperity and the management of waste does not cause environmental harm'. This overarching vision is supported by four high-level aims:

- Businesses are realising the benefits of resource efficiency;
- Waste activities are compliant;
- Waste crime is eradicated; and,
- Maximum value is derived from resources circulating in the economy.

The **Glasgow and the Clyde Valley Strategic Development Plan (SDP)** (Clydeplan, 2017) sets the framework for Local Development Plans and addresses region-wide issues such as infrastructure and zero waste. Clydeplan recognises waste as an economic resource which can support the creation of a low carbon city region. Policy 10 supports re-use of waste heat and the co-location of uses within business environments which support the integration of efficient energy and waste innovation.

Policy 11, Planning for Zero Waste, supports the Vision and Spatial Development Strategy and delivery of the targets set out in the Zero Waste Plan by supporting development proposals for waste management facilities, subject to local considerations, in the following locations:

- Land designated for industrial, employment or storage and distribution uses;
- Degraded, contaminated or derelict land;
- Working and worked out quarries;
- Sites that have the potential to maximise the re-use of waste heat through co-location with heat users;
- Existing or redundant sites or buildings that can be easily adapted; and,
- Existing waste management sites, or sites that were previously occupied by waste management facilities.

The SDP recognises that, even with high recycling targets, there will be wastes from which no further value can be recovered and which will require to be put to landfill. A requirement for a ten-year rolling capacity for landfill has been set by the Scottish Government however, it is recognised that, this will reduce over time in order to achieve the long-term ZWP target of a maximum of 5% to landfill by 2025. The ten year rolling landfill capacity requirement for the SDP area was 10.1 million tonnes at the time of plan preparation and there was adequate capacity within existing and approved sites within the city region to satisfy this requirement. The ten-year rolling landfill capacity requirements are updated annually by SEPA (see Table 11 9) and will be kept under review by Clydeplan.

In Promoting Responsible Extraction of Resources, the SDP acknowledges that the planning system has a responsibility to safeguard workable mineral resources and facilitate their responsible use, ensuring that they are not sterilised by development. At the same time, there is a need to address restoration of past minerals extraction sites in and around the city region.

Policy 15, Natural Resource Planning: Mineral Resources Spatial Framework, states that an adequate and steady supply of minerals will be maintained. This will include a land bank for construction aggregates equivalent to at least 10 years extraction.

In terms of aggregate supply, the SDP identifies that there are sufficient hard rock operational reserves to meet demand in the city region, but consented reserves of sand and gravels are forecast to be constrained beyond 2021. As a result, additional locations will be required across the city region to ensure that distances from source to market are minimised.

Background Report 13 sets out Clydeplan's approach to sustainable minerals extraction. It states that the whole Clydeplan area should be treated as an "area of search" for mineral

resources due to the extensive range and geographical location of economically viable mineral resources, whilst acknowledging that there are areas which are either unsuitable for minerals development or suitable for only limited minerals development because of their environmental sensitivity and proximity to settlements and communities.

The **North Lanarkshire Local Plan** (adopted September 2012) sets out the policies and proposals to guide development in North Lanarkshire over a 5 to 10 year period.

Development Strategy Policy DSP4 Quality of Development applies to all applications for planning permission and requires proposals to demonstrate high quality development by addressing resources and waste issues including encouraging sustainable construction and reducing waste and resources used through effective storage collecting and composting of waste and recyclable materials.

Policy EDI1 A Protecting Economic Development Areas and Infrastructure: Industrial and Business Areas, supports the continuing industrial and business character of existing industrial and business areas, where appropriate, including existing waste management facilities.

Policy EDI1 C Protecting Economic Development Areas and Infrastructure: Mineral Resources, requires proposals for development that would potentially sterilise valuable mineral resources to be assessed against the relevant criteria of the Supplementary Planning Guidance EDI3 B. There is a presumption against proposals not justified in relation to the criteria.

Policy EDI2 C Promoting Economic Development and Infrastructure: Mineral Resources, states that the Council will seek to satisfy market demands for minerals by:

Directing proposals for extraction of all kinds of construction minerals (such as crushed rock aggregates and sand and gravel) to extension areas within or adjacent to existing operations identified on the proposals map and in schedule EDI2 C in the Area Action Plans; and,

Directing any new proposals for opencast coal extraction to the search area identified on the proposals maps.

Policy EDI3 Assessing Economic Development and Infrastructure Proposals: EDI3 B Mineral Resources and EDI3 C Waste Development set out policies for determining applications for minerals and waste development.

The Local Plan proposals map identifies existing waste management facilities, existing construction mineral extraction sites and the search area for opencast coal extraction.

The **North Lanarkshire Local Development Plan - Modified Proposed Plan** (North Lanarkshire Council, 2018) proposes new policies for determining all future planning applications and identifies how areas of land should be used. If approved, the Local Development Plan is expected to be adopted in 2021 and will replace the current Local Plan.

PROM ID2 POLICY Utilities Improvements, supports utilities development, subject to meeting certain criteria. This includes waste infrastructure development in locations at an existing / previous waste management facility licensed by SEPA, a designated Business Centre within an appropriate development site, or a site identified in the Plan.

The LDP recognises that certain coal and aggregate deposits are seen as an economic resource and are required to be protected from developments that sterilise those resources.

Unconventional Fossil Fuel search areas exist within North Lanarkshire, but the Council does not consider the exploitation of these resources to be acceptable and will abide by Scottish Government Policy and guidance on dealing with applications for such development.

PROT C POLICY Mineral Resources, states that North Lanarkshire Council will operate a presumption against proposals for development that would potentially sterilise valuable mineral resources. PROT C Guidance, identifies the categories of mineral supplies that will be safeguarded as:

Category C1 Construction Minerals (hard rock, crushed rock aggregate and sand and gravel): The Council will satisfy market demands by protecting construction mineral sites from alternative development where the loss of sites would affect the 10-year supply in the Strategic Development Plan area and directing proposals for extraction to extension areas within or adjacent to existing operational sites. All workable mineral resources which are of economic or conservation value will be safeguarded and in considering proposals for non-mineral development we will ensure that these are not sterilised by other development.

Category C2 Fossil fuels (Coal and unconventional fossil fuels): The Council will satisfy market demands by directing new proposals for opencast extraction to the identified search areas and for unconventional fossil fuels to the licence areas.

Environmental and Design Qualities Policy EDQ: EDQ 3 POLICY Quality of Development, states that development will only be permitted where high standards of site planning and sustainable design are achieved. This includes addressing resource efficiency and waste issues in order to create a sustainable development with a low ecological footprint by:

- Encouraging sustainable construction;
- Reducing waste and resources used through effective storage, collecting and composting of waste and recyclable materials, and,
- Measures that reduce CO2 emissions, where appropriate through the protection of carbon-rich soils, such as peatland.

Built Environment

The mode of travel people choose influences the number of vehicles on the road and therefore the performance and reliability of the asset (i.e. road). Car usage remains the principal mode of transport in Scotland, with 63% of adults recording a journey by car at least once a week and 70% of the adult population holding a driving licence. The Scheme Options being considered are primarily located in rural areas with the road network playing an essential role in enabling mobility in the North Lanarkshire region.

The types and quantities of material use associated with operation of the existing road network are currently unknown. Material use is expected to include materials required for routine maintenance and also for intermittent repairs and refurbishment. These quantities are expected to be small when compared to total material demand and are included within data on regional

and national material consumption and are therefore considered within this wider geographic context.

The Glasgow to Edinburgh via Bathgate railway line is located within the region, providing a rail link to Edinburgh and Glasgow with stations at settlements along the route including two stations in Airdrie (Drumgelloch and Airdrie).

There are many cycle paths and core paths throughout the Study Area particularly to the north and south of Airdrie. There are also longer distance core path and cycling routes to the east of Airdrie through Plains and Wattston. National Cycle Route 75 (NCR75) cuts across the Study Area through Plains, Airdrie and Coatbridge.

Natural Environment

The North Lanarkshire Local Plan (North Lanarkshire Council, 2012) identifies a long history of mineral extraction in North Lanarkshire. Hard rock quarrying is prevalent in the eastern part of North Lanarkshire while peat resources have also been extracted in a number of locations. None of the identified active mines, quarries or peat workings in North Lanarkshire are located within the Study Area. Observations from aerial photography also indicate the presence of cut peat bog to the west of Drumshangie Moss, although this is thought to be historic and is not known to be currently active.

Coal extraction has been extensive and includes areas of recently active and restored opencast workings, including within the Study Area.

The active mines, quarries and peat workings in North Lanarkshire are shown in Table C-34 'Active Mines and Quarries in North Lanarkshire' below.

Table C-34 Active Mines, Quarries and Peat Workings in North Lanarkshire'

Site name	Location	Status	Operator	Mineral Resource	Products
Cairneyhill Quarry (Caldercruix)	Forrestfield, Caldercruix, Airdrie, North Lanarkshire, ML6 8NX	Active	Tarmac (A CRH Company)	Igneous and Metamorphic Rock.	Crushed rock aggregate; Coated roadstone; High specification roadstone; Kerbs, setts; Armourstone
Croy Quarry	Constarry Road, Croy, Kilsyth, G65 9HY	Active	Aggregate Industries UK	Igneous and Metamorphic Rock.	Crushed rock aggregate; Roadstone; High specification roadstone;
Duntilland Quarry	Duntilland, Kirk O'Shotts, Shotts, ML7 5TN	Active	Aggregate Industries UK	Igneous and Metamorphic Rock.	Crushed rock aggregate; Coated roadstone; Concrete aggregate
Riskend Quarry	Tak-ma-Doon Road, Kilsyth, G65 9JY	Active	Riskend Aggregates Ltd	Igneous and Metamorphic Rock.	Crushed rock aggregate
				Secondary aggregates	Construction and demolition waste. Constructional fill.
Tam's Loop Quarry	Hirst Road, Harthill, ML7 5TN	Active	Tillicoultry Quarries Ltd	Igneous and Metamorphic Rock.	Crushed rock aggregate; Coated roadstone;

Site name	Location	Status	Operator	Mineral Resource	Products
					High specification roadstone; Concrete aggregate
Tam's Loop West Quarry	Harthill, ML7 5TN	Active	Tillicoultry Quarries Ltd	Igneous and Metamorphic Rock.	Crushed rock aggregate; Coated roadstone; High specification roadstone; Concrete aggregate
Beltmoss Quarry	Kilsyth	Active / closure	Patersons Quarries Ltd	Igneous and Metamorphic Rock.	Not specified
Hillend Quarry	Airdrie Road, Caldercruix, ML6 8NY	Unknown	Tillicoultry Quarries Ltd	Unknown	Unknown
Blairhill Quarry	Blackridge, EH48 3RT	Unknown	Unknown	Unknown	Unknown
Drumbow Moss Peat Workings	Longriggend	Active		Peat	Peat
Drumbreck Moss Peat Workings	Longriggend	Active		Peat	Peat

Source: North Lanarkshire Local Plan. (North Lanarkshire Council, 2012), Geoindex Onshore – Active mines and quarries. Available at: <http://mapapps2.bgs.ac.uk/geoindex/home.html> (British Geological Survey, n.d) and Sites identified in strategic planning documents for the extraction of minerals

Waste

The Glasgow & Clyde Valley area had ten landfill sites that either received waste in 2018 and/or reported remaining capacity at the end of 2018. The estimated remaining capacity of these sites at the end of 2018 was 650,000 tonnes of inert landfill and 15 million tonnes of non-hazardous landfill. Over 11 million tonnes (75%) of the non-hazardous landfill capacity is at Greengairs Landfill located to the north east of Airdrie. The only active hazardous landfill site in Scotland is Avondale in Falkirk which has an annual capacity of 200,000 tonnes an estimated year of landfill closure of 2023.

There are 79 waste management facilities in the North Lanarkshire Council area. Of these sites, there are five operational and non-operational waste management facilities (permitted/licensed), as reported by SEPA, within the Study Area. These sites are listed in Table C-35 'Operational and Non-operational Waste Management Facilities within the Study Area (2018)' below.

Table C-35 Operational and Non-operational Waste Management Facilities within the Study Area (2018)

Permit or Licence Number	Operator Organisation	Site Name / Address	Site Activity	Operational Status
WML/W/0020069	North Lanarkshire Council	Dalmacouther Landfill Site, Airdrie	Landfill (not operational)	Not operational
WML/W/0020077	North Lanarkshire Council	Dalmacouther Civic Amenity Site, Airdrie	Civic amenity	Not operational
PPC/A/1100515	FCC Recycling (UK) Limited	FCC Recycling (UK) Ltd, Greengairs, Airdrie	Anaerobic digestion / Other treatment	Not operational
WML/W/0000164	FCC Waste Services (UK) Limited	Hartloughill Landfill Site, Airdrie	Landfill (not operational)	Not operational
PPC/W/0020041	FCC Waste Services (UK) LTD	Greengairs L/F, Meikle Drumgray Rd, Airdrie	Landfill / Other treatment	Operational

Source: SEPA (2019b) Waste Sites and Capacity Tool. Available at: <http://www.sepa.org.uk/data-visualisation/waste-sites-and-capacity-tool/>

There are known to be a number of sites in proximity to the Scheme Options where additional waste treatment capacity has been proposed. Within the first study area, this includes the restored Drumshangie opencast coal site, where planning permission was granted for an energy from waste facility, and the Greengairs Landfill site, where there is ongoing major landfill and proposed waste treatment capacity including the Drumgray Energy Recovery Centre (DERC)³.

Future Baseline

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 from slope instability and resulting landslides.

Future development of land has the potential to take place on greenfield land with resulting loss of agricultural land and/or potential sterilisation of mineral resources.

Limitations

The Scheme Options design is at an early stage of development and therefore information on the types and quantities of material use and waste arising are indicative only and are not complete. The material assets assessment has therefore been based on available information, industry benchmarks and professional judgement.

Information on existing mineral sites, mineral safeguard areas, peat resources, and waste management facilities has been collated from desk-based information only. Further review of sites may be required at Stage 3 to ensure all information is up to date.

The earthworks cut and fill design for the Scheme Options is subject to further design refinement in order to optimise the earthworks material balance for the final scheme design. Earthworks design changes and the findings from further ground investigation work may result in large changes to the quantities and types of surplus earthworks materials requiring management and the resulting significance of the effect.

The estimated quantity of peat requiring removal for the Scheme Options is subject to further ground investigation, peat probing and design refinement. The outcomes of further investigation and subsequent design refinement may result in large changes to the quantity of peat that may require removal and management, understanding of the available peat resource and the resulting significance of the effect.

The Scheme Options design has not included estimation of the types and quantities of construction and demolition waste likely to be generated during construction of the Proposed Scheme. Industry benchmark data based on the Scheme Options construction cost estimate and national construction and demolition waste recycling performance data has been used to give an indication of magnitude only.

³ <https://www.sepa.org.uk/regulations/consultations/currentopen-consultations/drumgray-energy-recovery-centre-efw-application/>

The Scheme Options design has only included partial estimates of material types and quantities required for construction. Estimates of recycled content are based on information available at the time of writing this Scheme Options assessment

Assessment

This section considers the potential impacts on material assets as a result of the Scheme Options. The Scheme Options assessment in relation to material assets considers the SEA Objectives and guide questions presented in below. Where there are notable differences in effects between the Scheme Options, these are stated.

Table C-36 Material Assets Assessment against SEA Objectives and Guide Questions

SEA Objective	Assessment Questions	Scheme Options Assessment
Promote the efficient and effective use of material resources.	Will the option/proposal help to... Encourage recycling of materials and minimise consumption of resources during construction, operation and maintenance of new transport infrastructure?	Construction of the elements that make up the project such as the carriageway, viaducts and road junctions would have significant raw material and manufactured material requirements. Raw materials used in road construction include aggregates and manufactured materials including 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. However, encouraging the use of recycled and secondary aggregates would reduce waste disposal to landfill and reduce the consumption of finite primary aggregate resources.

The impacts of materials assets on all Scheme Options are likely to be similar.

The potential impacts and effect are provided in Table C-37 below. Mitigation measures should be implemented at subsequent design and assessment stages to reduce the negative effects on material assets. Further details are provided in Table C-39.

Table C-37 Potential Material Assets Impacts and Effects

Receptor	Potential Impact	Effect Scoring	Effect Duration
Built Environment			
Construction	During construction there is likely to be disruption on the existing road network due to construction activities. This would affect the operation of the route, causing delays to road users travelling in the vicinity of the scheme.	Minor negative effect	Short-term, temporary
Natural Environment			
Construction	Options B, B2, B3 and B4 would have a temporary impact on any remaining mineral resources due to the localised sterilisation of potential future opencast coal workings.	Minor negative effect	Short-term, temporary
	All Scheme Options have the potential for impacts associated with bulk/pressure grouting of mine workings and mine entries will require careful management through site specific method statements addressing factors such as grout run off/migration and the control of mine gases and mine waters.	Minor negative effect	Short-term, temporary/reversible
	All of the Scheme Options will result in the loss of Class 4.2 agricultural land (Mixed Agriculture land) across the Study Area. Compaction as a result of construction machinery activity would occur in the vicinity of the construction works. Soil compaction would result in impeded drainage and subsequent waterlogging. This, combined with the 'ploughing' effect caused by construction machinery, would inhibit vegetation growth, both during and immediately after the construction phase. However, affected land should be restored during the next ploughing season	Minor negative effect	Short to medium-term, temporary
Operation	Options B, B2, B3 and B4 would offer improved connectivity to the road network for future mineral extraction sites.	Minor positive effect	Medium to long-term, permanent
	The presence of shallow underground workings and associated mine entries and backfilled opencast workings is anticipated beneath and/or within influencing distance of the Scheme Options, with all options affected to a similar degree. Construction activities associated with stabilisation of underground mine workings, mine entries and backfilled opencast workings would improving land otherwise considered 'marginal' for development.	Minor positive effect	Medium to long-term, permanent
Materials			
Construction	Construction of the elements that make up the project such as the carriageway, viaducts and road junctions would have significant raw material and manufactured material requirements. Overall, all Scheme Options would require the consumption of finite primary aggregate resources. However, encouraging the use of recycled and secondary aggregates would reduce waste disposal to landfill and reduce the consumption of finite primary aggregate resources.	Minor negative effect	Short-term, temporary
Waste			
Construction	Landfill capacity is a finite resource and is the least preferred management option in the waste hierarchy. Scheme Options may result in significant reduction in Scottish landfill capacity if mitigation measures are not viable.	Significant negative effect	Short-term, temporary

Inter-relationships with Other SEA Themes

Table C-38 below presents the inter-relationship identified between material assets and the other SEA themes.

Table C-38 Inter-related SEA Themes: Material Assets

SEA Theme	Potential Interactions
Water	Natural material assets encompass watercourses and natural flood management. Construction of the project would create additional impermeable road surface within the Study Area and remove natural material assets that regulate the water cycle.
Soil	Natural material assets encompass agricultural land and soils. The natural capital value of the soil types within the Study Area underpins the ecosystem functions that the soils provide to several other environmental topics.
Climatic Factors	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 Study Area 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

Design Development, Mitigation and Enhancement Recommendations

Mitigation and enhancement measures relevant to material assets are presented in Table C-39 below.

Table C-39 Potential Material Assets Mitigation, Enhancement and Design Recommendations

Potential Impacts	Measure	Stage of Implementation	Responsible Party	Consultation/ Approvals Required
Landfill capacity is a finite resource and is the least preferred management option in the waste hierarchy. Scheme Options may result in significant reduction in Scottish landfill capacity if mitigation measures are not viable.	Apply waste hierarchy and Designing Out Waste principals to reduce waste arising.	<ul style="list-style-type: none"> DMRB Stage 3 Pre-construction Construction 	Designer and Contractor	n/a
	Implement Environmental Management Plan (EMP) and Site Waste Management Plan (SWMP) throughout design and construction to plan for waste management.	<ul style="list-style-type: none"> DMRB Stage 3 Pre-construction Construction 	Designer and Contractor	n/a
	Set project targets for the recycling of construction and demolition waste	<ul style="list-style-type: none"> Pre-construction Construction 	Contractor	n/a
Construction of the elements that make up the project such as the carriageway, viaducts and road junctions would have significant raw material and manufactured material requirements. Overall, all Scheme Options would require the consumption of finite primary aggregate resources. However, encouraging the use of recycled and secondary aggregates would reduce waste disposal to landfill and reduce the consumption of finite primary aggregate resources.	Identify sources / suppliers of suitable recycled and secondary aggregates.	<ul style="list-style-type: none"> Pre-construction Construction 	Contractor	n/a
	Identify suitable onsite and offsite reuse / recycling / recovery opportunities.	<ul style="list-style-type: none"> Pre-construction Construction 	Contractor	n/a
n/a	Further assessment of minerals safeguarding is likely to be required at Stage 3 in order to further inform the assessment.	<ul style="list-style-type: none"> DMRB Stage 3 	Designer and Contractor	n/a
	Further assessment will be required at Stage 3 based on construction and demolition waste forecasts.	<ul style="list-style-type: none"> DMRB Stage 3 	Designer and Contractor	n/a

C.8 Cultural Heritage

Baseline

Legislation, Policy and Plans

This chapter has been undertaken in the context of the following legislative instruments and national policy:

- Ancient Monuments and Archaeological Areas Act 1979 and subsequent amendments;
- Town and Country Planning (Scotland) 1997 Act (as amended);
- Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997 (as amended);
- Historic Environment (Amendment) (Scotland) Act 2011;
- Historic Environment Scotland Act 2014; and,
- The Roads (Scotland) Act 1984 (Environmental Impact Assessment) Regulations 2017.
- The principal elements of policy and guidance comprise:
- Historic Environment Policy for Scotland (HEPS), April 2019 (HES, 2019);
- Historic Environment Circular 1. Historic Environment Scotland, 2016 (HES, 2016a);
- Historic Environment Scotland's 'Managing Change in the Historic Environment' series of guidance notes (including HES, 2016b (Setting) and HES, 2016c (Scheduled Monuments));
- Scottish Planning Policy (SPP) Paragraphs 135-151: Valuing the Historic Environment, 2014 (Scottish Government, 2014a);
- Our Place in Time - The Historic Environment Strategy for Scotland, 2014 (Scottish Government, 2014b);
- Planning Advice Note (PAN) 2/2011 – Planning and Archaeology (Scottish Government, 2011);
- Planning Advice Note (PAN) 71 – Conservation Area Management (Scottish Government, 2004); and,
- Historic Environment Scotland Environmental Impact Assessment Handbook (2018).

There is one policy within the **North Lanarkshire Local Development Plan** (North Lanarkshire Council, 2012) which relates to cultural heritage; this is NBE1 Protecting the Natural and Built Environment.

This policy includes rules on developments affecting designated and non-designated heritage assets. It states that developments should avoid causing harm to the character or setting of heritage assets and that *“planning permission will only be granted for such sites where the character and appearance of the site and its setting is preserved or enhanced – including any special interest or features of architectural or historic interest”*. For scheduled monuments, *“any development shall preserve archaeological remains in situ and within an appropriate setting. Adverse impact on the integrity of the monument or its setting shall not be permitted unless there are exceptional circumstances”*.

Likewise, for listed buildings there is a presumption against demolition or other works that adversely affect the special interest of a listed building or its setting.

Local sites of archaeological interest should be preserved in situ where possible. For developments which would affect archaeological sites, the significance of the archaeological resources and of any impacts upon them and their setting would be weighed against one another. "Where the case for preservation does not prevail, the developer shall be required to make appropriate and satisfactory provision for archaeological excavation, recording analysis, publication and archiving in advance of development, and, at the developer's expense."

There is one policy relating to cultural heritage within the **North Lanarkshire Local Development Plan - Modified Proposed Plan** (North Lanarkshire Council, 2018); this is PROT B Policy Historic Environment Assets. "Development should avoid causing harm to the character or setting of sites protected for their historic environment value. Planning permission or any other relevant consent will only be granted for such sites where the character and appearance of the site and its setting, including any special interest or features of architectural or historic interest, is preserved and/or enhanced".

For developments affecting scheduled monuments, "developments shall preserve archaeological remains in situ and within an appropriate setting. Adverse impact on the integrity of the monument or its setting shall not be permitted unless there are exceptional circumstances. Historic Environment Scotland is responsible for granting Scheduled Monument Consent for works directly affecting a Scheduled Monument".

Designated Heritage Assets

Scotland has a unique and varied selection of irreplaceable historical sites that contribute to quality of life, the character of the country, cultural identity, education and economy. Scotland's historic assets attracted 18 million visitors in 2016. These assets provide an educational role and a significant contribution to the tourist economy (HES, 2018).

The cultural heritage baseline considered for this SEA comprises archaeological remains, historic buildings and historic landscapes within the Study area. To protect valuable cultural heritage resources, there is a process of designation, which aims to identify the significance of these resources and protect it for future generations to enjoy.

There are 12 designated assets recorded within the 1km of the Scheme Options. This includes four scheduled monuments and eight listed buildings. All of these cultural heritage resources are illustrated on Figure 4 'Designated Sites within Study Area. Although there are no conservation areas within the Study Area, there is one located just beyond it. The Drumgelloch Conservation Area (CA382) lies just to the west of Study Area in eastern Airdrie. There are no World Heritage Sites, or entries on the Inventory of Gardens and Designed Landscapes or the Inventory of Battlefields recorded within the Study Area.

Undesignated Heritage Assets

Undesignated sites account for 95% of the historic environment are important cultural heritage resources in their own right, but also provide contextual information to help better understand designated sites. There are 26 non-designated assets recorded within the Study Area.

The study area contains known archaeological remains from the Medieval and Post-Medieval periods. Much of the evidence from the Study Area is post-medieval (AD1540-1900) in date. There is also potential for undiscovered archaeological remains to be located within the Study Area.

The designated and undesignated historic landscape of the Study Area is also important. The historic landscape has developed as a result of land management, agriculture and settlement patterns. Inappropriate development is a key pressure on cultural heritage resources, and can lead to direct physical impacts on designated, undesignated and unknown resources. It can also cause impacts on the setting of these resources. Pressure also comes from visitors, land-use changes and climate change.

Future Baseline

Development will continue to be a key pressure on cultural heritage resources, requiring mitigation. The development of new transport infrastructure can also affect these resources or their setting. Increasing levels of congestion will also continue to affect historic urban areas and the countryside within the study area. Measures to reduce the need to travel, manage demand and encourage modal shift have the potential to enhance the integrity of the cultural environment in the urban and rural areas through an associated reduction in traffic levels and visitor numbers.

It is projected that Scotland will become warmer and wetter as a result of climate change, resulting in the increased weathering of stone, rotting timbers and corrosion of metals (HES, 2014). Rising sea levels and increased storm events may increase coastal erosion, endangering our historic landscapes, structures, buildings, and archaeology in the coastal zone. This threat will grow in the future given the future predictions of the likely effects of climate change for the remainder of this century.

Limitations

The HER data may not reflect the full extent of the data as it has only been compiled over the last few years. Therefore, only ‘Events’ and ‘New Sites’ since the compilation began have been recorded.

Assessment

This section considers the potential impacts on cultural heritage as a result of the Scheme Options. The Scheme Options assessment in relation to cultural heritage considers the SEA Objectives and guide questions presented in below. Where there are notable differences in effects between the Scheme Options, these are stated.

Table C-40 Cultural Heritage Assessment against SEA Objectives and Guide Questions

SEA Objective	Assessment Questions	Scheme Options Assessment
Protect and enhance the significance of the historic environment, heritage assets and their settings.	Will the option/proposal help to... Conserve and where possible, enhance buildings and structures of architectural or historic interest?	There are 12 designated assets recorded within the 1km Study Area. This includes four scheduled monuments and eight listed buildings. There are no World Heritage Sites, or entries on the Inventory of Gardens and Designed Landscapes or the Inventory of Battlefields recorded within the Study Area. Based on current evidence, there would be no physical impacts on known heritage assets from

SEA Objective	Assessment Questions	Scheme Options Assessment
		<p>these Options B, E, B2 and B3, although there may be potential to affect previously unrecorded archaeological sites.</p> <p>Option B4 will have potential physical impacts on the surviving remains of two non-designated heritage assets: the site of the former Colliery and the remains of the dismantled railway.</p>
	<p>Will the option/proposal help to... Conserve, and where possible, enhance conservation areas?</p>	<p>Although there are no conservation areas within the Study Area, there is one located just beyond it. The Drumgelloch Conservation Area (CA382) lies just to the west of Study Area in eastern Airdrie.</p> <p>Based on current evidence, there would be no physical impacts on conservation areas from the Scheme Options.</p>
	<p>Will the option/proposal help to... Conserve, and where possible, enhance Scheduled Monuments?</p>	<p>There are 12 designated assets recorded within the 1km Study Area. This includes four scheduled monuments.</p> <p>Based on current evidence, there would be no physical impacts on Scheduled Monuments from the Scheme Options.</p>
	<p>Will the option/proposal help to... Conserve, and where possible, enhance non-designated heritage assets?</p>	<p>There are 26 non-designated assets recorded within the Study Area.</p> <p>Based on current evidence, there would be no physical impacts on known heritage assets from these Options B, E, B2 and B3, although there may be potential to affect previously unrecorded archaeological sites.</p> <p>Option B4 will have potential physical impacts on the surviving remains of two non-designated heritage assets: the site of the former Colliery and the remains of the dismantled railway.</p>
	<p>Will the option/proposal help to... Support the integrity of the historic setting of key buildings of cultural heritage interest?</p>	<p>There are 12 designated assets recorded within the 1km Study Area. This includes eight listed buildings. Options B, E, B2 and B3 would run approximately 500m west of Category B listed Easter Moffat House (LB18230) and associated listed outbuildings (LB18231; LB18229). The house and surrounding land is now in use as a golf course, which is bounded by trees to the south and west which screen the area from view. Therefore, there would be no intervisibility between the listed buildings and Options B, E, B2 or B3 and the setting of the listed buildings would not be affected.</p> <p>Option B4 would run approximately 340m north-east of Clarkston Parish Church (LB20925). The church is a Category C listed building and possesses architectural significance as an example of mid-19th century plain Gothic, ecclesiastical architecture. Although the route would run near to the church, the listed building would be screened from the route by an area of thick tree planting to the north of the Church. Therefore, there would be no intervisibility between the church and the route option and the setting of the listed buildings would not be affected.</p>
	<p>Will the option/proposal help to... Conserve, and where possible, enhance local diversity and distinctiveness?</p>	<p>The project provides the opportunity to enhance linkages to walking and cycling routes and core paths. This would improve the wider access to the historic environment.</p>
	<p>Will the option/proposal help to... Support access to, interpretation and understanding of the historic environment?</p>	<p>The Scheme Options are expected to support enhanced accessibility to and from the historic environment but within the Study Area but also in the wider region.</p>

The impacts of cultural heritage on all Scheme Options are likely to be similar.

The potential impacts and effect are provided in Table C-41 below. Mitigation measures should be implemented at subsequent design and assessment stages to reduce the negative effects

on cultural heritage. Enhancement opportunities should be considered to provide wider access to the historic environment and meet the SEA objective. Further details are provided in Table C-43.

Table C-41 Potential Cultural Heritage Impacts and Effects

Receptor	Potential Impact	Effect Scoring	Effect Duration
Non-Designated Assets			
Construction	All options will have the potential to physically impact previously unrecorded archaeology temporarily.	Minor negative effect	Short-term, temporary
	Option B4 will have potential temporary physical impacts to surviving remains on the site of the former Colliery and remains of the dismantled railway	Minor negative effect	Short-term, temporary
	All options will have the potential to temporarily physically impact previously unrecorded archaeology	Minor negative effect	Short-term, temporary
Operation	All options will have the potential to physically impact previously unrecorded archaeology.	Minor negative effect	Medium to long-term, permanent
	Option B4 will have potential physical impacts to surviving remains on the site of the former Colliery and remains of the dismantled railway	Minor negative effect	Medium to long-term, permanent
	All options will have the potential to physically impact previously unrecorded archaeology	Minor negative effect	Medium to long-term, permanent

Inter-relationships with Other SEA Themes

Table C-42 below presents the inter-relationship identified between cultural heritage and the other SEA themes.

Table C-42 Inter-related SEA Themes: Cultural Heritage

SEA Theme	Potential Interactions
Population and Human Health	The long-term viability of Listed Buildings and other cultural heritage resources is very important to support social cohesion of the community and attract visitors.
Soil	The protection of peat soils, which are known to exist in the corridor, could potentially contain undiscovered archaeological remains and organic remains. These remains could provide information on the past environment.
Climatic Factors	Climate Change can threaten the cultural heritage resource through erosion, flooding and wetter, warmer conditions. Through waterlogging, climate change could also influence landslide risk, soil creep and erosion levels (e.g. gully erosion) and hence any cultural heritage resources within the soil.
Landscape	The Landscape SEA topic is relevant, as historic activities have sometimes created a landscape (e.g. historic field systems) or cultural heritage resources could form an integral part of the landscape (e.g. the undesignated Old Military Road). Cultural heritage resources are also an important visual amenity and help to create a sense of place

Design Development, Mitigation and Enhancement Recommendations

Mitigation and enhancement measures relevant to cultural heritage are presented in Table C-43 below.

Table C-43 Potential Cultural Heritage Mitigation, Enhancement and Design Recommendations

Potential Impacts	Measure	Stage of Implementation	Responsible Party	Consultation/ Approvals Required
All options will have the potential to physically impact previously unrecorded archaeology.	Given the potential for previously unrecorded archaeology and the potential to impact non-designated assets including the former colliery site and dismantled railway, a desk-based assessment and further research would be required for the final scheme design. This would be followed by geophysical survey and trial trenching as required.	<ul style="list-style-type: none"> DMRB Stage 3 Pre-construction 	Designer and contractor	n/a

C.9 Landscape

Baseline

Legislation, Policy and Plans

The following section provides an overview of national, regional and local policies and development plans that are relevant to landscape and visual aspects of the Strategies and Options.

The **National Planning Framework (NPF3)** was published in 2014 by the Scottish Government and is intended to guide Scotland's spatial development priorities for the next 20 to 30 years. NPF3 highlights the importance and value of landscape to Scotland and outlines protection for nationally important landscapes such as National Scenic Areas, National Parks and Wild Land. NPF3 also highlights the importance of landscape in place making in sustaining local distinctiveness and cultural identity, particularly closer to settlements and the urban edge.

The **Scottish Planning Policy (SPP)** (2014) document is a statement of the Scottish Government's policy on nationally important land use matters. SPP facilitates development while at the same time "protecting and enhancing the natural and built environment" and is central to the Scottish Government's purpose of achieving sustainable economic growth (Para 2).

The importance of landscape is highlighted throughout the SPP document, setting out the need to take account of local landscape character in siting and design of development with a requirement to minimise adverse impacts and maximise potential for enhancement.

The **Clydeplan Strategic Development Plan** (Glasgow and Clyde Valley Strategic Development Planning Authority Joint Committee, 2017) sets out the regional planning framework for the Glasgow and Clyde Valley area which includes North Lanarkshire Local Authority Area. Several policies within the plan are considered to be relevant to landscape and visual matters, as summarised below.

- Policy 1 Placemaking, is relevant to all development and sets out that 'new development should contribute towards the creation of high-quality places across the city region' through use of the placemaking principle. Part of the placemaking principle under the 'Distinctive' subheading is to reflect 'local character' by ensuring that development 'maintains and enhances an area's landscape character'.
- Policy 12 Green Network and Green Infrastructure defines the spatial extents of the Clydeplan Green Network and states that development proposals should integrate and prioritise the Green Network from the outset.
- Policy 13 Forestry and Woodland, states that development proposals should 'support the retention and expansion of forestry and woodland' and 'minimise the loss of existing trees and include, where appropriate, the planting of new trees, woodlands and forestry'.

North Lanarkshire Council's Local Development Plan (2012) includes a number a policy areas relevant to landscape and visual matters under the topic of 'Natural and Built Environment', including the following:

- NBE1 – this policy explains how planning applications will be considered in relation to protecting a number of designations relevant to landscape and visual assessment, including: Areas of Great Landscape Value, Country Parks, Tree Preservation Orders, The Inventory of Gardens and Designed Landscape in Scotland, wildlife corridors, trees and woodland, watercourses and wetlands, flood plains and Core Paths, Public Rights of Way, and access rights.
- NBE2 - this policy discusses how new development should promote the Green Network and advocates the retention of existing trees and the creation of woodland in support of the Central Scotland Forest Programme and Local Forestry Framework, as well as 'promoting countryside recreation and improved access'.
- NBE3 – this policy relates to development in Green Belt and sets out criteria for the assessment of applications, including the requirement that 'applications include a landscape assessment and high quality enhancement scheme which reinforces the rural character and provides a buffer to the development' and should 'be of a suitable scale and form for the location'.

This is the emerging **Modified Proposed Local Development Plan** for North Lanarkshire Council (2018) which will replace the existing plan (above) once adopted. Policies which are relevant to landscape and visual matters include the following:

- PROM LOC4 Special Landscape Areas & Green Network Improvements – 'North Lanarkshire Council will promote the designated Special Landscape Areas and the enhancement and development of Seven Lochs Wetland Park and the Green'.
- PROTA Natural Environment and Green Network Assets – 'North Lanarkshire Council will protect natural and resilient sustainable places by safeguarding natural heritage assets.'
- PP3 Purpose of Place General, Urban Area – 'North Lanarkshire Council seeks to maintain and improve the level of amenity in urban areas, by encouraging development that is in keeping with their residential character and encouraging diversity in more mixed-use areas.'
- PP4 Purpose of Place, Green Belt – 'North Lanarkshire Council will protect the setting of communities, support regeneration by directing growth to urban areas, protect natural assets and provide a high quality environment, by promoting a Green Belt as defined on the Proposals Maps.'
- PP5 Purpose of Place, Countryside – 'North Lanarkshire Council will support the Countryside, as defined on the Proposals Maps, by accommodating limited development such as Visitor Economy related development, extending existing businesses and settlements, and agricultural diversification. North Lanarkshire Council will resist pressure for sporadic and isolated development in the Countryside,

protect and enhance local landscapes and encourage the creation of jobs and services to serve Countryside communities.’

- EDQ 1 Environmental and Design Qualities Policy – ‘Any proposed development will require to be appraised in terms of the site and its surroundings to ensure it will integrate successfully into the local area and avoid harm to neighbouring amenity.’
- EDQ 3 Quality of Development – ‘Development will only be permitted where high standards of site planning and sustainable design are achieved.’

Visual Receptors

Rich in diversity, Scotland’s landscapes are internationally renowned. Landscapes are a significant part of the country’s cultural and national heritage, contributing to the economy and the wellbeing of the population. They play a key role in attracting tourism and providing opportunity for outdoor recreation.

The Study Area covers a range of urban and rural landscapes to the east edge of the settlements of Airdrie, Chapelhall and Calderbank, and includes the smaller settlements of Plains, Stand, Wattston and Riggend.

As the Study Area extends east from the main settlement edge there is transition from urban to rural and consequentially much of the Study Area has an urban fringe character with strong association to urban areas and the wider Glasgow area which is visible in views to the west and south. There is also a transition from the more settled southern section of the Study Area which encompasses the settlements of Calderbank, Chapelhall, Gartness and a large area of southeast Airdrie, to the more sparsely settled northern section, where settlement is in the form of smaller villages, hamlets and scattered properties. There is an existing presence of transport corridors, most notably the M8 to the south of the Study Area, the A73 and A89, and other secondary and minor routes.

Landscape Character

The North Lanarkshire ‘Local Landscape Character Assessment, Background Report’ (2018) notes that ‘Review of North Lanarkshire Local Landscape Character’ (URS, 2015) provides detailed classification of broad Landscape Character Types and more detailed Local Landscape Units (LLU). There are five distinct Local Landscape Units (LLUs): Incised Valley: North Calder Water; Fragmented Farmland: Area East of Airdrie; Northern Plateau Farmland; Southern Plateau Farmland; and Plateau Moorlands within the wider study area.

The landscape is formed of rolling hills with an overall gradual rise in elevation to the north and to the east, with distant views of hills and the settled Glasgow area possible to the west and north. In the south, wooded river valleys, including the North Calder Water and Shotts Burn form the settlement edges or breaks between settlements, and contribute to a locally smaller scale or more complex landscape. This gives way to a larger scale and more open landscape further north which is predominately used for farmland and includes area of restored industrial land, as well as former opencast coal mines.

Future Baseline

The two main direct pressures caused by humans that will continue to influence the character of the landscape are land use (and the intensification of land use and management) and incremental and ongoing development.

The expansion of many towns and cities and their associated infrastructure, such as roads and railways, is seen as a pressure and the distinctive landscape setting of many towns and cities is being lost as a result of settlement expansion and the need for associated infrastructure, such as roads and railways.

Climate change and climate change adaptation measures will continue to affect the Scottish landscape. The combined effects of these are generally likely to be more pronounced in coastal and lowland areas with the exception of renewable energy developments which affect upland landscapes.

Ongoing and potential biosecurity threats (pest and diseases affecting trees) are also contributing to the changing landscape character and pattern and may lead to loss of plant species from the landscape.

Legislation

The landscape and visual assessments have been undertaken under the assumption that the land take and associated vegetation removal for each option would be kept to a minimum in order to reduce potential effects.

The visual assessment is based on a series of key receptors groups established in the baseline. The visual appraisal focuses on the main visual receptors including principal settlements and long-distance recreational routes. Views from existing transport routes, such as the M8, have been excluded as they are of lower sensitivity and unlikely to influence the differentiation of options. The evaluation of magnitude of impact and significance of effects has been undertaken from the nearest publicly accessible location, and as such, assumptions as to the orientation of the main views from receptor locations have been made. The evaluation takes account of the range of views from receptors in each group and as such the magnitude of change and significance of effects on individual receptors may differ locally from that stated.

No detailed information is available on potential construction activity or requirements for each option and therefore assessment of construction effects assumes that land take will be minimised as far as possible and temporary compounds and structures carefully sited to help minimise effects. Duration of change has not been considered in determining the magnitude of change during construction. It is anticipated that this aspect of change would be considered as part of the detailed assessment of the Scheme at Stage 3.

Predictions for residual effects at the operational stage are made based on anticipated change during winter of the first year of operation. This provides a worst-case assessment of change during the operational stage which does not take account of the influence of mitigation planting on longer term impacts. It is anticipated that the detailed assessment of the scheme at Stage 3 will consider residual effects at summer year 15 of operation when mitigation planting will have matured sufficiently to reduce landscape and visual effects.

Assessment

This section considers the potential impacts on landscape as a result of the Scheme Options. The Scheme Options assessment in relation to landscape considers the SEA Objectives and guide questions presented in below. Where there are notable differences in effects between the Scheme Options, these are stated.

Table C-44 Landscape Assessment against SEA Objectives and Guide Questions

SEA Objective	Assessment Questions	Scheme Options Assessment
Protect and enhance the character and quality of the Study Area’s landscapes and townscapes.	Will the option/proposal help to... • Conserve the existing landscape and townscape features?	Each of the route options would result in both direct and indirect change to the landscape character of the Study Area. No landscape designations were identified within the Study Area and therefore the assessment of landscape character effects is based on the following five Local Landscape Units (LLUs): Incised Valley: North Calder Water; Fragmented Farmland: Area East of Airdrie; Northern Plateau Farmland; Southern Plateau Farmland; and Plateau Moorlands.
	Will the option/proposal help to... • Deliver measures which would enhance or restore the character of the existing landscape or townscape?	There is potential for both embedded and essential mitigation measures to be incorporated into the design of each of the Scheme Options in order to reduce potential effects. Careful routeing and micro siting of route alignments, junctions and structures to avoid and make use of existing landscape features, such as woodland or distinct landform would be important considerations to help reduce potential effects on the landscape character. Other measures such as minimising the length of the routes on embankments and including robust mitigation planting to provide screening and landscape enhancement would help further reduce potential residual and long-term effects on the local landscape character.

Each of the Scheme Options is anticipated to result in significant effects on one or more of the visual receptor groups and/or route receptors. Option B would result in adverse effects on four of the receptor groups, with Option E having similar, although with reduced effects on most properties in one of the receptor groups. Options B2, B3 and B4 would result in the lowest extent of visual effects, with moderate adverse effects on three of the receptor groups.

The potential impacts and effect are provided in Table C-45 below. Mitigation measures should be implemented at subsequent design and assessment stages to reduce the negative effects on landscape. Further details are provided in

Table C-47.

Table C-45 Potential Landscape Impacts and Effects

Receptor	Potential Impact	Effect Scoring	Effect Duration
Area East of Airdrie LLU			
Construction	All Scheme Options would have temporary localised direct and indirect change, loss of landscape features, increased influence of development	Minor negative effect	Short-term, temporary
Operation	All Scheme Options would have localised direct and indirect change, loss of landscape features, increased influence of development	Minor negative effect	Medium to long-term, permanent
Incised Valleys: North Calder Water LLU			
Construction	All Scheme Options may result in indirect change on the landscape character.	Uncertain	Short-term, temporary
Operation	All Scheme Options may result in indirect change on the landscape character.	Uncertain	Medium to long-term, permanent
Northern Plateau Farmlands LLU			
Construction	All Scheme Options would have temporary localised limited direct and/ or indirect change, with little or no influence on the impression of the landscape	Minor negative effect	Short-term, temporary
Operation	All Scheme Options would have localised limited direct and/ or indirect change, with little or no influence on the impression of the landscape features, increased influence of development	Minor negative effect	Medium to long-term, permanent
Southern Plateau Farmlands LLU			
Construction	All Scheme Options would have temporary localised direct and indirect change, localised loss of woodland or forestry.	Minor negative effect	Short-term, temporary
Operation	All Scheme Options would have localised direct and indirect change, localised loss of woodland or forestry.	Minor negative effect	Medium to long-term, permanent
Plateau Moorlands LLU			
Construction	Options B, E, B2 and B3 would have temporary localised direct and indirect change on the landscape character. Option B4 would have temporary localised and limited direct and indirect change on the landscape character	Minor negative effect	Short-term, temporary
Operation	Options B, E, B2 and B3 would have localised direct and indirect change on the landscape character. Option B4 would have localised and limited direct and indirect change on the landscape character	Minor negative effect	Medium to long-term, permanent
Riggend			
Construction	Option B has the potential for noticeable change to visual amenity due to the introduction of a road corridor and traffic in the foreground of views.	Significant negative effect	Short-term, temporary
	Option E has the potential for limited change to visual amenity from most properties due to screening by existing woodland. Potential for greater change locally. <i>Although Option E variations (Options E1, G and H) would result in reduced negative effects on the receptor groups at Riggend there would be increased effects on receptor groups at Brankenhirst Road (Mosshouse) and properties in the south of this group, including Rigghead.</i>	Minor negative effect	Short-term, temporary
Operation	Option B has the potential for noticeable change to visual amenity due to the introduction of a road corridor and traffic in the foreground of views.	Significant negative effect	Medium to long-term, permanent

Receptor	Potential Impact	Effect Scoring	Effect Duration
	Option E has the potential for limited change to visual amenity from most properties due to screening by existing woodland. Potential for greater change locally. <i>Although Option E variations (Options E1, G and H) would result in reduced negative effects on the receptor groups at Riggend there would be increased effects on receptor groups at Brankenhirst Road (Mosshouse) and properties in the south of this group, including Rigghead.</i>	Minor negative effect	Medium to long-term, permanent
Northeast Airdrie			
Construction	Option B4 will have close range views from many properties in this receptor group, particularly along the settlement edge.	Significant negative effect	Short-term, temporary
Operation	Option B4 will have close range views from many properties in this receptor group, particularly along the settlement edge.	Significant negative effect	Medium to long-term, permanent
Rural Properties east of Airdrie			
Construction	All Scheme Options would have potential for construction activity and associated traffic to occupy the foreground or wide extent of views from select receptors in this group	Significant negative effect	Short-term, temporary
Operation	All Scheme Options would have potential for road corridor and associated traffic to occupy the foreground or wide extent of views from select receptors in this group	Significant negative effect	Medium to long-term, permanent
Plains			
Construction	Options B, E, B2 and B3 have the potential for midrange views of construction activity across a wide extent of the view from properties on the settlement edge.	Significant negative effect	Short-term, temporary
	Option B4 would have limited visibility of construction activity from the settlement edge.	Minor negative effect	Short-term, temporary
Operation	Options B, E, B2 and B3 have the potential for midrange views of operational stage traffic across a wide extent of the view from properties on the settlement edge.	Significant negative effect	Medium to long-term, permanent
	Option B4 would have limited visibility of operational traffic from the settlement edge.	Minor negative effect	Medium to long-term, permanent
Easter Moffat			
Construction	All Scheme Options would have potential for limited change to visual amenity due to the introduction of a road corridor and associated traffic within the distance. Intervening woodland and landform would limit change from many locations.	Minor negative effect	Short-term, temporary
Operation	All Scheme Options would have potential for limited change to visual amenity due to the introduction of a road corridor and associated traffic within the distance. Intervening woodland and landform would limit change from many locations.	Minor negative effect	Medium to long-term, permanent
Gartness			
Construction	All Scheme Options would have potential limited change to visual amenity due to the introduction of a new road corridor and associated traffic within distant elevated views to the southeast of Gartness.	Minor negative effect	Short-term, temporary
Operation	All Scheme Options would have potential limited change to visual amenity due to the introduction of a new road corridor and associated traffic within distant elevated views to the southeast of Gartness.	Minor negative effect	Medium to long-term, permanent
Chapelhall			
Construction	All Scheme Options would have potential for very limited visibility of sections of these options from select locations.	Minor negative effect	Short-term, temporary

Receptor	Potential Impact	Effect Scoring	Effect Duration
Operation	All Scheme Options would have potential for very limited visibility of sections of these options from select locations.	Minor negative effect	Medium to long-term, permanent
Rural properties east of Chapelhall			
Construction	All Scheme Options would have potential noticeable change to visual amenity due to the introduction of a new road corridor and associated traffic across a relatively wide extent of the view.	Significant negative effect	Medium to long-term, permanent
Operation	All Scheme Options would have potential noticeable change to visual amenity due to the introduction of a new road corridor and associated traffic across a relatively wide extent of the view.	Significant negative effect	Medium to long-term, permanent

Inter-relationships with Other SEA Themes

Table C-46 below presents the inter-relationship identified between landscape and the other SEA themes.

Table C-46 Inter-related SEA Themes: Landscape

SEA Theme	Potential Interactions
Biodiversity, Flora and Fauna	The Biodiversity SEA topic is relevant to landscape, as landscape provides creating habitat for wildlife. Changes to the landscape resource can alter habitats and their connectivity, which can result in both positive and negative effects on biodiversity, flora and fauna. Conversely, any mitigation and enhancement measures relevant to biodiversity can have an impact on the landscape and visual amenity. For these reasons, any landscape or planting proposals put forward as part of mitigation are normally prepared in consultation with Biodiversity specialists. Biodiversity Net Gain assessment results can be factored into landscape design considerations to deliver more environmentally sustainable designs.
Population and Human Health	The Population and Human Health SEA topic is relevant as green and open spaces in the landscapes provides opportunities for people to exercise as well as enjoy and experience nature, enhancing their quality of life and improving their physical and mental health and wellbeing. Residential properties, core paths and cycling routes and roads all serve as locations from which people (i.e. visual receptors) experience views and any changes to them.
Water	The Water Environment SEA topic is relevant to landscape as landscape elements and features rely on the water environment and can be damaged by flooding or being subjected to prolonged waterlogging. Conversely, landscape elements such as woodland intercept rainfall, increase transpiration, increase the filtration of surface water and slow the flow of water.
Soil	Soil supports the growth of plants and trees which constitute part of the landscape resource.
Climatic Factors	Climate change affects landscape directly and indirectly through coastal erosion, flooding, wetter, warmer conditions, as well as droughts and more frequent storm events. In the long term it can alter landform, landscape pattern and character of the area, influence the plant species composition and distribution within land cover or damage existing landscape elements and features. Climate change can contribute to the spread of pests and diseases, which in turn affects the landscape resource as well as visual amenity (e.g. when a large number of trees dies off as a result of pest or disease and needs to be felled). Furthermore, climate change adaptation measures affect the landscape and visual receptors through the increasing introduction of renewable energy infrastructure into previously remote landscapes with few signs of human activity. Landscape elements, such as trees, woodlands and moorlands, act as 'carbon sinks' (i.e. absorb and lock away more carbon from the atmosphere than they release) making a useful contribution to mitigating climate change. Conversely, any deforestation (i.e. overall loss in the total area of woodland) equates to the carbon being released back into the atmosphere which fuels further climate change.
Material Assets	Landscape elements (e.g. trees and woodland) provide numerous ecosystem services (i.e. processes by which the environment produces natural resources utilised by us all, such as clean air, water, food and raw materials). These are increasingly recognised and accounted for as Scottish natural capital (i.e. natural assets that humans derive a wide range of services from) and as such comprise Material Assets.
Cultural Heritage	Landscape incorporates cultural heritage resources (assets), which help to shape the historic landscape character. Cultural heritage and landscape both contribute to a sense of place. Cultural heritage assets include inventory gardens and designed landscapes. Some cultural heritage resources also act as landmarks or key viewpoints in the landscape, influence cultural associations of a place and affect the sensitivity of landscape receptors. Cultural heritage assets can also contribute to the visual amenity of the area. Landscape and visual mitigation and enhancement measures can have an effect on cultural heritage assets so should be prepared in consultation with cultural heritage specialists.

Design Development, Mitigation and Enhancement Recommendations

Mitigation and enhancement measures relevant to landscape are presented in

Table C-47 below.

Table C-47 Potential Landscape Mitigation, Enhancement and Design Recommendations

Potential Impacts	Measure	Stage of Implementation	Responsible Party	Consultation/ Approvals Required
All Scheme Options would have localised direct and indirect change on the following LLUs during construction and operation: <ul style="list-style-type: none"> Area East of Airdrie; Northern Plateau Farmlands; and, Southern Plateau Farmlands. 	Detailed survey and assessment will be required to inform both the design of the preferred option and to identify any additional mitigation measures required for significant effects which avoided by design.	• DMRB Stage 3	Designer	n/a
	Careful consideration of the alignment of new roads and the junction arrangements is required to help achieve the “best fit” with the existing landscape characteristics and forms that are present within the Study Area. Adjusting alignments to follow the existing field boundaries and other landscape elements and therefore avoiding fragmentation of the existing pattern would help to minimise landscape effects	• DMRB Stage 3	Designer	n/a
Options B, E, B2 and B3 would have localised direct and indirect change on the Plateau Moorlands LLU during construction and operation.	Minimise the need for removal of trees, woodland and other key landscape features through careful routeing, including consideration of the full extent of potential land take. Key areas of existing native woodland include along the wooded river corridors of the North Calder Water, Clattering Burn and Shotts Burn and other larger areas associated with the restoration of former opencast coal mining, to the northeast of Airdrie.	• DMRB Stage 3	Designer	n/a
All Scheme Options would have impacts on visual receptors during construction and operation.	Avoid an overall net loss of trees and woodland through firstly reducing the number that require to be removed (as above), and where unavoidable replacing with a like for like quantity of locally native tree/woodland planting, which may be either on or off site. It is important that the retention of existing mature and semi-mature vegetation is addressed at an early stage of route refinement and should be considered as a key mitigation resource; Make use of existing topographical features, landform and woodland to help restrict the visual envelope, and where appropriate use landform manipulation, such as false cuttings, to minimise landscape and visual effects, particularly in close proximity to sensitive receptors or the settlement edge.	• DMRB Stage 3	Designer	n/a
	Minimise the need for structures and road furniture elements, such as signs or barriers as far as practical, and where possible rationalise existing elements. Lighting of proposed road corridors should be limited, particularly in more rural areas. Adjust alignment of all Scheme Options to ensure secondary structures and road furniture elements are taken into account in defining the corridor and associated offsets for protection of existing trees and woodland	• DMRB Stage 3	Designer	n/a
	Including planting typologies which are in keeping with the surrounding landscape, for example hedgerows and tree lines along boundaries in areas with a smaller scale landscape pattern such as areas within the Southern Plateau Farmland and the Fragmented Farmland: Area East of Airdrie LLUs	• DMRB Stage 3	Designer	n/a
	Construction programme to be kept to the minimum practicable time to reduce the duration of any landscape and visual impacts, with clearance of existing vegetation undertaken as close as possible to works commencing, and top-soiling, reseeding and planting undertaken as soon as practicable after sections of work are complete.	• DMRB Stage 3	Designer	n/a
	A landscape mitigation design should be prepared by a Landscape Architect with input from an Ecologist and should follow guidance set out in Standards for Highways DMRB guidance LD 117 Landscape Design (Highways England, et al., 2020)	• DMRB Stage 3 • Pre-construction • Construction	Designer and contractor	n/a

Potential Impacts	Measure	Stage of Implementation	Responsible Party	Consultation/ Approvals Required
	Restoration of all areas temporarily disturbed by construction and not forming part of the permanent scheme	<ul style="list-style-type: none"> • Construction 	Contractor	n/a
	The placement of mitigation tree and woodland planting should be sensitively located to tie-in with the existing landscape framework and may also be strategically located to provide screening. For example, it may be possible to strengthen, and join-up existing areas of fragmented woodland associated with areas of former opencast coal mining to the northeast of Airdrie to create a more robust landscape framework	<ul style="list-style-type: none"> • DMRB Stage 3 • Pre-construction • Construction 	Designer and contractor	n/a
	Soft landscaping should include UK native species and aim to support an overall Biodiversity Net Gain	<ul style="list-style-type: none"> • DMRB Stage 3 • Pre-construction • Construction 	Designer and contractor	n/a
	The design and finish of various structures and elements of the Proposed Scheme should be of a high quality and be sympathetic to the existing landform and surrounding context	<ul style="list-style-type: none"> • DMRB Stage 3 • Pre-construction • Construction 	Designer and contractor	n/a
	Consider opportunities for landscape, placemaking and public realm improvements to help the scheme tie into the surrounding landscape, urban realm and visual context. This is likely to be most applicable to locations close-by to settlement and along settlement edges or in locations which are used for recreation	<ul style="list-style-type: none"> • DMRB Stage 3 • Pre-construction • Construction 	Designer and contractor	n/a

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