

17. Material Assets and Waste

This chapter considers the potential impacts associated with the consumption and use of materials and the generation and management of waste during construction of the Proposed Scheme. Operational and maintenance impacts associated with material assets and waste generation have not been assessed as they are not expected to be significant compared to the baseline.

The consumption and use of material assets during construction has been estimated based on the likely requirements of the DMRB Stage 3 design of the Proposed Scheme. By applying key material and waste management principles, such as the 'Waste Hierarchy' and Zero Waste Scotland's 'Design for Resource Efficient Construction Principles', the impacts from material asset use and the need for disposal of waste in landfill is expected to be reduced.

Design and mitigation measures have been proposed that will reduce the use of materials, reduce waste arising and enable the reuse, recycling and recovery of materials and waste, thereby reducing waste disposal to landfill.

The assessment of effects on material assets during construction indicates that the residual impact could be slight adverse, which is not considered significant.

The assessment of the generation and management of waste during construction works indicates that the residual impact for inert and non-hazardous waste could be slight adverse, which is not considered significant. For special (hazardous) waste, the assessment indicates that the residual impact could be moderate, which is considered significant.

17.1 Introduction

17.1.1 This chapter considers the consumption and use of materials and the generation and management of waste likely to arise during construction of the A720 Sheriffhall Roundabout, hereby referred to as the 'Proposed Scheme'. It identifies measures for mitigating potential impacts and describes the significance of the residual impacts, post mitigation.

17.1.2 This chapter of the Environmental Statement (ES) has been prepared by competent experts with relevant and appropriate experience. The technical lead for the material assets and waste assessment has 25 years of relevant work experience in environmental consultancy and is a Chartered Chemist and Member of the Royal Society of Chemistry. Further details are provided in Appendix 1.2 – Table of Expert Competencies.

17.2 Approach and Methodology

17.2.1 The assessment has been undertaken in accordance with guidance in DMRB Volume 11, Section 3, Part 13 LA 110 'Material assets and waste' (Highways England, et al., 2019) ('LA 110') which considers the environmental impacts associated with:

- The use and consumption of 'material assets' from primary and recycled/secondary sources, and manufactured construction products. Much of the materials required will originate off-site or be purchased as construction products. Some materials will arise on-site such as excavated soils; and
- The production and management of 'waste'. Waste is defined by Article 1(a) of the 'European Waste Framework Directive 2008/98/EC' (European Parliament, 2008) 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".

Scope

17.2.2 The scope of this assessment focusses on the potential environmental impacts arising from the construction of the Proposed Scheme, in particular:

- The depletion of natural non-renewable resources such as primary aggregates (direct impact); and

- The generation and management of waste on-site, and the potential impact on the availability of off-site waste management infrastructure (direct impact).

17.2.3 The assessment also sets out the compliance of the Proposed Scheme with the relevant policies and plans in Section 17.9.

17.2.4 In accordance with DMRB guidance, the assessment excludes environmental effects associated with the transport of materials to/from the Proposed Scheme and it also does not consider the local environmental impacts which might occur as a result of managing waste at licensed or exempted waste management sites. Waste management site operators are required to apply for environmental permits or register exemptions with the Scottish Environmental Protection Agency (SEPA) and it is therefore assumed that any potential effects from the consented waste management activities are considered during the permitting/exemption process.

17.2.5 Operational and maintenance impacts associated with material assets and waste have not been assessed as they are not expected to be significant. It is anticipated that the operation and maintenance of the Proposed Scheme will use similar volumes of materials and produce similar amounts of waste as the current arrangements. It is therefore assumed that this is already sufficiently represented within the baseline for the study area and is unlikely to result in additional impacts.

Study Area

17.2.6 The study area for the use of materials in the construction of the Scheme and for consideration of the sterilisation of mineral safeguard sites and/or peat resources is defined by the red line boundary of the Proposed Scheme.

17.2.7 The study area for the sourcing of materials includes the whole of the UK, since the main construction materials include aggregate, concrete, asphalt and steel, which have national (and in some cases international) supply chains, rather than local. The study area for alternative materials (secondary and recycled aggregates) is also the UK.

17.2.8 The study area for waste generation is defined by the Scheme Extents of the Proposed Scheme, within which waste will be generated. This includes any enabling works and site compounds that are included within this.

17.2.9 The study area for inert and non-hazardous landfill is defined by the South East Scotland Strategic Development Plan (SDP) (SESplan) area. The SESplan area includes the following councils:

- City of Edinburgh;
- Midlothian;
- East Lothian;
- West Lothian;
- Scottish Borders; and
- Fife (south).

17.2.10 The study area for hazardous landfill is defined as the whole of Scotland, since there is only one hazardous landfill in the country.

Baseline Conditions

17.2.11 This materials assets and waste assessment, in contrast to other environmental chapters in this DMRB Stage 3 assessment, does not consider impacts in terms of changes to baseline conditions at the Proposed Scheme site. Impacts associated with material asset use and waste management arise at locations separate from the Proposed Scheme.

17.2.12 The baseline conditions have been informed by details of the waste management infrastructure likely to be available to dispose of any waste generated by the project. The most up to date information available on landfill capacity was obtained from SEPA's Waste Site and Capacity Management Tool for Scotland, 2019 (SEPA, 2019) for the SESplan area.

Impact Assessment

17.2.13 In accordance with LA 110, a detailed assessment methodology has been used to assess both material assets and waste associated with the Proposed Scheme.

17.2.14 The quantities of materials required, and waste generated from the construction of the Proposed Scheme have been estimated using design information and professional judgement.

17.2.15 The receptors for this assessment are:

- waste management infrastructure in SESplan area (specifically the landfill capacity); and
- material assets used for Scheme construction.

17.2.16 Landfill capacity rather than all waste management infrastructure capacity is considered for the following reasons:

- disposal to landfill is a permanent impact and the landfill capacity is no longer available (e.g. in most cases is irreversible).
- impacts on other types of waste management infrastructure e.g. material recovery facilities are temporary in nature. The impacts occur over a period of months or years; and
- other types of waste management infrastructure are better placed to react to waste management market demands.

17.2.17 As part of their planning function, planning authorities are required to ensure that sufficient land is available to accommodate facilities for the treatment of all waste arising in the area, either within the planning authority area, or through export to suitable facilities in other areas.

17.2.18 The magnitude of waste management impacts and the significance of effects have been assessed by:

- establishing the baseline for landfill capacity in the SESplan area;
- estimating the likely types and quantities of waste that would be generated by the Proposed Scheme; and
- comparing the likely waste arisings from the Proposed Scheme to the baseline landfill capacity and assessing the likely impact on that capacity.

17.2.19 The magnitude of material asset impacts and the significance of effects have been assessed by:

- estimating the likely types and quantities of the main construction materials that would be required by the Proposed Scheme;
- estimating the likely proportion of construction and demolition waste that would be recovered;
- estimating the proportion of secondary or recycled aggregate that would be used for construction of the Proposed Scheme; and
- comparing the likely recovery rate and proportion of recycled and secondary aggregate to the relevant national targets.

17.2.20 The criteria used for assessing the magnitudes of impacts and their significance are shown in Table 17-1 'Magnitude of Impacts and Effects Significance Criteria' below.

Table 17-1 Magnitude of Impacts and Effects Significance Criteria

| Magnitude of Impact | Significance of Effect | Material Assets | Waste |
|---------------------|------------------------|--|--|
| Neutral | Not Significant | Project achieves >99% overall material recovery / recycling (by weight) of non-hazardous construction and demolition waste (CDW) to substitute use of primary materials; and Aggregates required to be imported to site comprise >99% re-used / recycled content. | No reduction or alteration in the capacity of waste infrastructure at a regional scale (SESplan area) |
| Slight | Not Significant | Project achieves 70-99% overall material recovery / recycling (by weight) of non-hazardous CDW to substitute use of primary materials; and Aggregates required to be imported to site comprise re-used / recycled content in line with the relevant regional percentage target. | ≤1% reduction or alteration in the regional capacity of landfill; and Waste infrastructure has sufficient capacity to accommodate waste from a project, without compromising integrity of the receiving infrastructure (design life or capacity) within the region. |
| Moderate | Significant | Project achieves less than 70% overall material recovery / recycling (by weight) of non-hazardous CDW to substitute use of primary materials; and Aggregates required to be imported to site comprise re-used / recycled content below the relevant regional percentage target. | >1% reduction or alteration in the regional capacity of landfill as a result of accommodating waste from a project; and 1-50% of project waste requires disposal outside of the region. |
| Large | Significant | Project achieves <70% overall material recovery / recycling (by weight) of non-hazardous CDW to substitute use of primary materials; and Aggregates required to be imported to site comprise <1% re-used / recycled content; and Project sterilises ≥1 mineral safeguarding site and/or peat resource. | >1% reduction in the regional capacity of landfill as a result of accommodating waste from a project; and >50% of project waste requires disposal outside of the region. |
| Very Large | Significant | No additional criteria | >1% reduction or alteration in national capacity of landfill, as a result of accommodating waste from a project; or Construction of new (permanent) waste infrastructure is required to accommodate waste from a project. |

Assumptions and Limitations

- 17.2.21 It is likely that the Proposed Scheme will be procured by means of a Design and Build (D&B) type contract. Under the terms of this contract type, the Contractor will undertake both the detailed design and construction of the Proposed Scheme.
- 17.2.22 It is expected that the construction work would take place within the Scheme Extents as shown on Figure 1.2 'The Proposed Scheme'. The Scheme Extents have informed the land take calculations undertaken for assessment purposes in this ES. The land within the Scheme Extents will be purchased under a Compulsory Purchase Order (CPO).
- 17.2.23 It is possible that the Contractor may require construction compounds to be located out with land identified in the CPO. Should construction compounds be located out with the Scheme Extents it will be the responsibility of the Contractor to assess the environmental impacts of the construction compounds and seek to mitigate these where possible.

- 17.2.24 The construction assessment is based on the construction information that is currently available, with advice being provided by the Highway Design Team. As with all construction assessments, the exact details of construction activities would not be fully known before a specific contractor is appointed to complete the works who would determine their exact construction methods and programme during the detailed design stage.
- 17.2.25 As the Proposed Scheme is developed at detailed design any refinements to the design should be subject to environmental review to ensure that the residual effects would not be greater than those reported in this ES. The findings of any such review should be subject to approval by Transport Scotland and where necessary opinions should be sought from the statutory bodies.
- 17.2.26 This document provides preliminary estimate of the key materials required and waste generated during the construction of the Proposed Scheme. However, the estimated quantities presented should only be taken as approximate and indicative, based on the design information available at the time of the assessment.
- 17.2.27 Waste data was not available for the construction phase. Therefore, the quantities of waste generated during the construction of the Proposed Scheme were estimated based on the application of good practice wastage rates; taken from the Designing Out Waste Tool for Civil Engineering (WRAP, U.D). Where wastage rates are not available professional judgement has been used.
- 17.2.28 Any effects associated with transportation of materials and wastes have not been addressed in this chapter. For example, greenhouse gas emissions associated with the transportation of materials and waste is covered in Chapter 18 - Climate Change.
- 17.2.29 At this stage, there is limited information available about:
- The Principal Contractor's design and procurement decisions, particularly those involving the selection of construction materials and products, including if these will include any recycled or secondary content;
 - The exact sources of imported materials, as well as if they will be from virgin, recycled or secondary sources, and/or are from sources with existing recognised responsible sourcing certification; and
 - Selected waste management methods i.e. recycling, recovery, disposal and the precise location/waste management contractor for managing each waste stream that cannot be re-used on site.
- 17.2.30 Information on the current permitted landfill capacity is provided. There is no available information on any potential changes to this permitted capacity prior to construction of the Scheme.

17.3 Legislative and Policy Framework

Legislation

- 17.3.1 There is a range of legislation that is applicable to the management of waste from European Directives through to National Acts and Regulations.

European Waste Framework Directive (WFD) (European Parliament, 2008)

- 17.3.2 The production and management of '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". Waste can be further classified as hazardous, non-hazardous or inert waste as follows:
- Inert waste: waste that does not undergo any significant physical, chemical or biological transformations, e.g. rock, naturally occurring soils (excluding topsoil, peat and soil and stones from potentially contaminated sites), and cemented materials.

- Non-hazardous waste: waste that is not hazardous but does undergo a physical, chemical or biological transformation, e.g. topsoil, timber, metal and plastics.
- Hazardous waste: waste that contains substances or has properties that might make it harmful to human health or the environment, e.g. batteries and mineral oils.

17.3.3 The WFD sets out some basic waste management principles: it requires that waste is managed without endangering human health and harming the environment, and in particular without risk to water, air, soil, plants or animals, without causing a nuisance through noise or odours, and without adversely affecting the countryside or places of special interest.

17.3.4 Waste management is prioritised using the 'waste hierarchy' which defines the order of preference of the various waste management options as shown in Figure 17.1 'Waste Hierarchy'.

Figure 17.1 Waste Hierarchy



Source: European Waste Framework Directive 2008/98/EC

17.3.5 Generally, waste and resources management legislation and policy drivers aim to increase the efficiency of resource use, minimise waste, maximise the re-use/recycling/recovery of waste and reduce carbon emissions.

National Legislation

17.3.6 National legislation includes, but is not limited to the following:

- Environmental Protection Act 1990, Part II - This Act provides the basis for licensing controls and other provisions aimed at ensuring that waste handling, disposal and recovery options do not harm the environment
- Environmental Protection (Duty of Care) Regulations 1991, as amended - These regulations impose a duty of care on anyone who imports, produces, carries, keeps, treats or disposes of controlled waste to ensure it is not unauthorised or harmfully deposited, treated or disposed of; and if transferred, is only given to an authorised person.
- Landfill (Scotland) Regulations 2003 - The Landfill (Scotland) Regulations transpose the requirements of the Landfill Directive (Council Directive 1999/31/EC), which aims to prevent, or to reduce as far as possible, the negative environmental effects of landfill.
- Waste Management Licensing (Scotland) Regulations 2011 - These regulations implement the WFD and cover applications for waste management licences, which authorise the deposit, disposal and treatment of controlled waste. Relevant exemptions for construction, demolition and excavation (CD&E) waste as per SEPA information (2016) include:
 - Paragraph 9 – The reclamation or improvement of land;
 - Paragraph 13 – Manufacture of specified goods from specified wastes; and
 - Paragraph 19 – Waste or construction and other “relevant work”.

- Waste (Scotland) Regulations 2012 - These regulations implement part of the WFD. A number of amendments to related legislation are included, such as the Environmental Protection Act 1990, the Environment Act 1995 and the National Waste Management Plan for Scotland Regulations 2007 amongst others. The regulations include requirements for the segregation of materials such as glass, metal, plastics, paper and card for recycling, as well as a ban on the incineration or landfilling of materials that have been segregated for recycling.
- Special Waste Regulations 1996 (and their amendments) - These regulations set out procedures to be followed when disposing of, carrying and receiving special waste. Special waste has hazardous properties which may render it harmful to human health or the environment. Elsewhere in the UK, special waste is referred to as hazardous waste. All special (hazardous) waste produced in Scotland must be consigned using a SEPA-issued consignment note or code, regardless of its final destination within the UK. For consistency, special waste is referred to as hazardous waste throughout the rest of the chapter.

National Policy

National Planning Framework 3 (Scottish Government, 2014a)

- 17.3.7 The 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 (Scottish Government, 2014b)

- 17.3.8 The 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 (Scottish Government, 2010)

- 17.3.9 Scotland's Zero Waste Plan (ZWP) (2010) 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.
- 17.3.10 The Plan sets out 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 material).
- 17.3.11 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 (Scottish Government, 2015)

17.3.12 PAN 63 (Waste Management Planning) (Scottish Government, 2002) has been replaced by online Planning and Waste Management Advice from the Scottish Government. This complements NPF3, SPP and Scotland's Zero Waste Plan. The document provides advice on using resources efficiently in construction to save energy and waste. 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.

Making Things Last: a circular economy strategy for Scotland (Scottish Government, 2016)

17.3.13 The Scottish Government developed a strategy in 2016 to move the country towards a more circular economy, aligning its 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.

One Planet Prosperity – A Waste to Resources Framework (SEPA, 2016)

17.3.14 The overarching vision for SEPA's Waste to Resources Framework is that *'the sustainable use of resources creates prosperity and the management of waste does not cause environmental harm'*. Underneath this sits 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.

Regional Policy**South East Scotland Strategic Development Plan (SDP) (SESplan, 2013)**

17.3.15 Policy 4: Minerals, states that Local Development Plans will:

- a) *"Safeguard mineral resources from sterilisation where the deposits are of a sufficient scale or quality to be of potential commercial interest and their extraction is technically feasible and may be carried out in a way that is environmentally and socially acceptable. The need for safeguarding should be considered alongside the development strategy for the area;*
- b) *Identify areas of search for aggregate minerals and coal, or, where appropriate, specific sites, having regard to national guidance and other environmental objectives of the Strategic Development Plan;*
- c) *Set out the criteria to be addressed when assessing individual proposals, including restoration and enhancement; and*
- d) *Support and encourage the use of secondary and recycled aggregates"*.

Proposed South East Scotland Strategic Development Plan (SDP2) (SESplan, 2016)

17.3.16 Paragraph 4.18 states that the "SESplan will establish a Minerals Working Group. This group will review the aggregate resources of the city region (based on Scottish Government minerals survey data and relevant locally sourced information) to ensure there is a sufficient aggregate land bank of permitted reserves for construction aggregates of at least 10 years".

- 17.3.17 Paragraph 4.19 states that “Local Development Plans will use the relevant monitoring information to identify and safeguard sufficient construction aggregates to form a land bank of reserves for a minimum of 10 years. These should be in locations where there are deposits of sufficient scale and quantity for commercial extraction and which could be worked without unacceptable environmental or amenity impacts in accordance with Scottish Planning Policy”.
- 17.3.18 As discussed in Chapter 2 – Need for the Scheme, the Proposed SDP (SDP2) was rejected by the Scottish Ministers on the 16 May 2019; however, SDP2 has still been considered within this ES as a draft plan.

A Zero Waste Future for Edinburgh and Midlothian (n.d)

- 17.3.19 Zero Waste: Edinburgh and Midlothian is a major joint-project between the City of Edinburgh Council and Midlothian Council to deliver, through private sector partners, dedicated facilities for the treatment of waste under the Zero Waste Plan. The Zero Waste Plan sets a target of 70% recycling for all waste arising in Scotland, restrictions on inputs to energy from waste plants, as well as progressive bans on the types of materials permitted for landfill. The plan also sets targets, using the waste hierarchy, for prevention, reduction, recycling, other recovery (e.g. energy recovery) and finally disposal.

Local Policy

Edinburgh Local Development Plan (City of Edinburgh Council, 2016)

- 17.3.20 City of Edinburgh Council’s Local Development Plan (LDP) (Adopted November 2016) will guide the development and investment in the region over the next 20 years. The relevant policies in relation to material assets and waste in the Edinburgh LDP include:

- Policy RS 2 – Safeguarding of Existing Waste Management Facilities
“Development in the area immediately surrounding an existing or safeguarded waste management facilities (as identified on the Proposals Map) will only be allowed if it is demonstrated that there will be no adverse implications for the approved waste handling facility”.
- Policy RS 5 - Minerals
“Development which would prevent or significantly constrain the potential to extract minerals from these sites with economically viable minerals deposits will not be allowed.”
The sites identified on the proposals map are Hillwood, Bonnington Mains, Ravelrig and Craigiehall Quarry, however the sites are not within the Proposed Scheme red line boundary.

Midlothian Local Development Plan (Midlothian Council, 2017)

- 17.3.21 The relevant policies in relation to material assets and waste in the Midlothian LDP include:

- Policy DEV5 – Sustainability in New Development
“The Council will expect development proposals to have regard to the following principles of sustainability” including “e) recycling of construction materials and minimising the use of non-renewable resources”.
- Policy DEV 6 – Layout and Design of New Development
“The Council will require good design and a high quality of architecture, in both the overall layout of development proposals and their constituent parts.” One of the criteria listed for the design of development proposals is *“C. good quality materials should be used in design”.*
A waste processing site is safeguarded in the plan; however, this site is not within the Proposed Scheme Extents.
- Policy MIN 1 – Safeguarding of Mineral Resources

“Mineral resources will be safeguarded from sterilisation by other types of development, where the deposits are of sufficient scale or quality to be of commercial interest and their extraction would be environmentally acceptable and would not conflict with the development strategy for the area.”

17.3.22 There are no areas of search for surface extraction of sand and gravel and opencast coal within the Proposed Scheme red line boundary.

17.4 Consultation

17.4.1 This section provides a summary of the DMRB Stage 3 consultation responses to the Proposed Scheme in relation to issues affecting material assets and waste considered during the DMRB Stage 3 Proposed Scheme Assessment.

17.4.2 Table 17-2 ‘Summary of Consultation Responses’ summarises these 2018/2019 DMRB Stage 3 consultation responses. For ease of reference a summary of the consultee responses received during the previous DMRB Stage 2 Scheme Assessment consultation rounds undertaken between 2015 and 2017 are also included.

17.4.3 A full summary of all the DMRB Stage 3 consultation responses is provided in Chapter 7 - Consultation and Scoping and the consultation responses are provided in full in Appendix 7.1 ‘Consultation Responses’.

Table 17-2 Summary of Consultation Responses

| Consultee | Summary of Responses | Where covered in the assessment |
|---|---|--|
| Buccleuch | Buccleuch stated in their response that there appears to be a lot of fill for the new road embankment and noted that there might be a potential opportunity to offer some local materials from Shawfair (01/2019). | This would be for the appointed contractor to consider and depending on the timings of both projects. |
| Scottish Environmental Protection Agency (SEPA) | <p>In their December 2016, response SEPA noted that one of their key interests in relation to major developments is pollution prevention measures during the periods of construction, operation, maintenance, demolition and restoration. The construction phase includes construction of access roads, borrow pits and any other site infrastructure.</p> <p>They advise that the applicant should, through the EIA process or planning submission, systematically identify all aspects of site work that might impact upon the environment, potential pollution risks associated with the proposals and identify the principles of preventative measures and mitigation. This will establish a robust environmental management process for the development. A draft Schedule of Mitigation should be produced as part of this process. This should cover all the environmental sensitivities; pollution prevention and mitigation measures identified to avoid or minimise environmental effects.</p> <p>A Construction Environmental Management Document is a key management tool to implement the Schedule of Mitigation. They recommend that the principles of this document are set out in the ES outlining how the draft Schedule of Mitigation will be implemented. This document should form the basis of more detailed site specific Construction Environmental Management Plans which, along with detailed method statements, may be required by planning condition or, in certain cases, through environmental regulation (12/2016).</p> <p>SEPA's 2018 response in 2018 did not include any further comments related to material assets and waste.</p> | Mitigation measures have been provided in Section 0. A Construction Environmental Management Plan will be developed as a mitigation measure and this will include the required mitigation measures for construction waste to be applied by the appointed contractor. |

17.5 Baseline Conditions

Description of the Site and Type of Scheme

17.5.1 For details of the current site and type of construction/improvement, refer to Chapter 5 – The Proposed Scheme.

Material Assets

- 17.5.2 The baseline target within LA 110 for recovery of construction and demolition waste is 70% by weight, as set out in the EU Waste Framework Directive (European Parliament, 2008). Uncontaminated excavated soil and stones (European Waste Code 17 05 04) are specifically excluded from this target. There are no specific requirements for Transport Scotland supplementary or alternative to those given in LA 110, however Scotland's Zero Waste Plan (Scottish Government, 2010) sets out the target to recycle 70% of construction and demolition waste (CDW) by 2020.
- 17.5.3 Baseline national or regional targets for alternative aggregates (which comprise both secondary aggregates, which are by-products from industrial and mining operations, and recycled aggregates, which are produced from construction waste) are not set out for Scotland in LA 110. The national target for England is 25% by weight and has been used to inform this assessment. This is further supported by the Mineral Products Association (2018) that reported that, in 2017, the total aggregates market in Great Britain comprised 250.5 million tonnes, of which 74.4 million tonnes (30%) were recycled and secondary aggregates.
- 17.5.4 Material assets include: raw materials such as aggregates and minerals from primary, secondary or recycled sources and manufactured construction products.
- 17.5.5 Primary aggregates refer to materials extracted directly from the ground, and can be sand, gravel or hard rock. Secondary aggregates are produced as a by-product of other mining or quarrying activities or from other industrial processes. Secondary aggregates include materials such as colliery spoil and incinerator bottom ash aggregate. Recycled aggregates refer to construction, demolition and excavation (CD&E) wastes that have been treated and/or recycled to use as an alternative to primary aggregates.
- 17.5.6 Manufactured construction products are materials which have been converted from a raw material into a finished product such as concrete or steel.
- 17.5.7 The Scottish Aggregates Survey Report (Scottish Government, 2015) outlines that the most important sources for primary aggregates in Scotland are crushed rock (from igneous rock, sandstone and limestone) and sand and gravel. The report provides an estimate of the aggregate production recorded by region for 2012. The report concludes that the reserves for crushed rock, sand and gravel were *generally sufficient* to meet local development demand.
- 17.5.8 There are a number of active quarries and sand and gravel pits within the SESplan area which may be suitable for sourcing the high-quality aggregates, typically used for road pavement construction. It is expected that most of these materials will be sourced locally. The Contractor appointed to construct the Proposed Scheme will be responsible for sourcing materials for the project and it is assumed they will use local suppliers and re-use materials on site to reduce costs.
- 17.5.9 Table 17-3 'Primary Aggregate Production in the SESplan Area' shows the production of aggregate (by type) for East Central Scotland (SES plan) – East Lothian, West Lothian, Midlothian, Edinburgh, Fife (south) and Scottish Borders. The table provides the latest available data (end of 2012) for the land bank for hard rock and sand and gravel.

Table 17-3 Primary Aggregate Production in the SESplan Area

| Regions | Hard Rock | | Sand & Gravel | |
|---------|--|--|--|--|
| | Primary Aggregate Production (thousand tonnes) | Maximum Supply from Active Sites at 2012 Production Levels (years) | Primary Aggregate Production (thousand tonnes) | Maximum Supply from Active Sites at 2012 Production Levels (years) |
| SESplan | 1,489 | 15 | 520 | 32 |

Source: <https://www.gov.scot/binaries/content/documents/govscot/publications/statistics/2015/06/scottish-aggregates-survey-2012/documents/00479064-pdf/00479064-pdf/govscot%3Adocument/00479064.pdf>

17.5.10 Zero Waste Scotland has previously produced a directory of suppliers of recycled aggregates who have successfully demonstrated their compliance with the relevant national guidance for the production of aggregates from inert waste (Zero Waste Scotland, U. D.). It should be noted that it is up to the appointed contractor to source recycled materials in line with this assessment and the mitigation measures proposed. Table 17-4 'Recycled Aggregate Suppliers in the SESplan Area' provides details on the locations of suppliers, identified from the directory, that are closest to the Proposed Scheme. These suppliers could be utilised to provide recycled aggregates or potentially to process waste from the Proposed Scheme. Other potential sources of alternative aggregates may be investigated as the detailed design is progressed, including opportunities to re-use site-won materials and materials from major development sites in the area.

Table 17-4 Recycled Aggregate Suppliers in the SESplan Area

| Address of Recycled Aggregate Supplier | Products |
|--|---|
| Hillwood Recycling - Lafarge Tarmac Ltd, Hillwood Quarry, EH28 8LU | Sub-base (Type 1) Recycled sand Topblend (50/50 mix of recycled type 1 and virgin type 1) Washed 10mm, 20mm, 40mm Washed sand |
| Oakbank Recycling Facility - Buchanan Skips, EH54 8QZ | Sub-base (Type 1) Capping (6F5) Sand Sub-base (Type 1) Capping (6F5) Sand |
| West Lothian Recycling - Lafarge Tarmac Ltd, EH55 8DD | Sub-base (Type 1) Capping (6F5) |
| Grant House - Grant Construction Services Ltd, KY11 9YX | Capping (6F5) |

Source: Zero Waste Scotland – Aggregate Quality Protocol Supplier Directory Website. Accessed at: <http://zwsaggsuppliers.org.uk/>

17.5.11 A summary of the potential materials required for construction of the Proposed Scheme, along with estimated quantities, is provided in Section 17.6. Specific sources of raw materials to be used for the construction of the Proposed Scheme have not yet been identified as this decision will remain with the appointed Contractor.

17.5.12 As outlined in the Chapter 16 - Soils and Geology the main mineral resource (material asset) in the study area is coal, but this is now all extracted, and no other economically viable mineral resources will be sterilised by the scheme.

Waste

Waste Generation

17.5.13 Table 17-5 'Potential Material Asset Use and Waste Arisings – Construction' below summarises the types of materials used and wastes that may potentially be generated during construction.

Table 17-5: Potential Material Asset Use and Waste Arisings – Construction

| Project Activity | Material Asset Use | Potential Waste Arisings |
|---|--|---|
| Site remediation/ preparation/ earthworks | Fill material for construction purposes Primary aggregates for ground stabilisation | Surplus excavated materials. Stripping of topsoil and subsoil. Potential to encounter contaminated soils. |

| Demolition | Materials are not required for demolition works | Waste arisings from the demolition of any existing pavements or structures |
|-------------------|---|--|
| Site construction | Construction materials including: <ul style="list-style-type: none"> • concrete; • asphalt and bituminous material; • cement bound granular material; • well graded granular material; • precast concrete kerb; • timber; • plywood; • cementitious grout; • reinforcing steel; • reinforcing fabric; • geotextile; • geo-composite drainage system; • pipe bedding aggregate; and • filter drain material. | Packaging material. Excess construction materials and broken/damaged construction materials. Existing highway infrastructure and technology as removed by excavation works. Waste oils from construction vehicles. Construction worker generated wastes. |

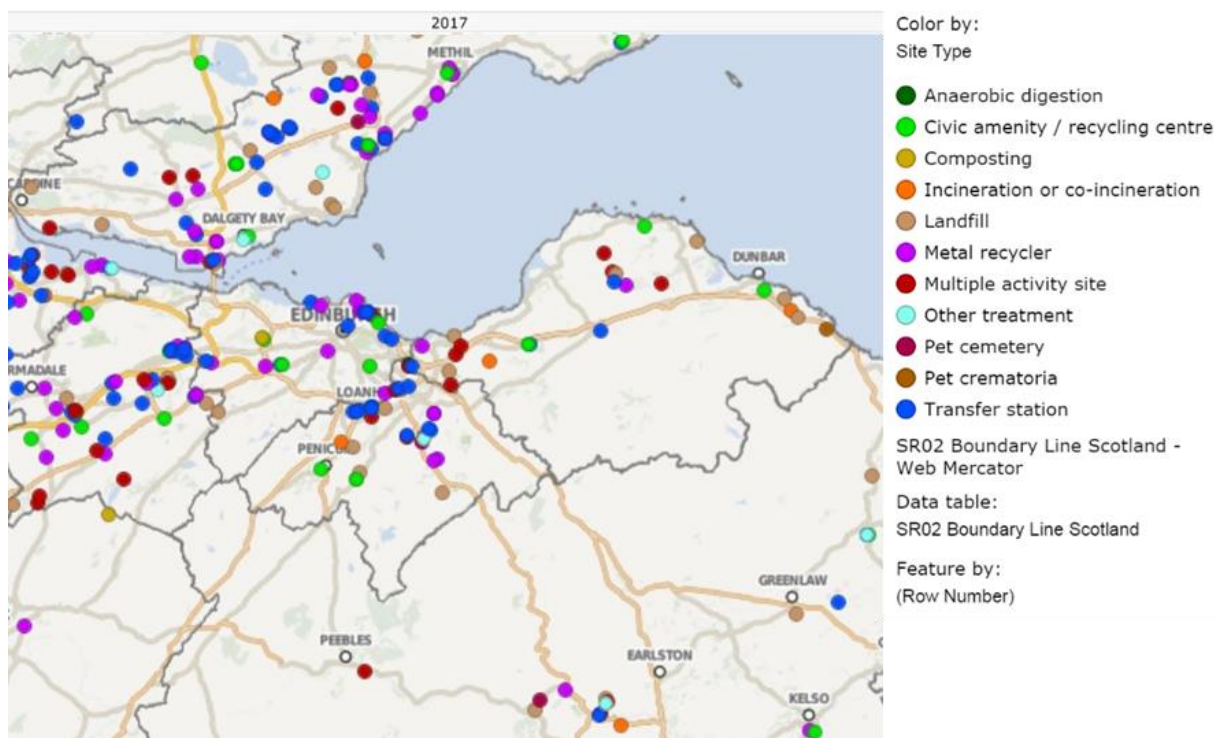
17.5.14 It is assumed that waste generated by construction workers (e.g. canteen, office and staff welfare waste) will be collected by a commercial waste management company.

17.5.15 Hazardous soils from contaminated land and limited other hazardous waste (e.g. paints and solvents, admixtures, spill absorbent materials, waste lubricants, oil filters, and waste electrical and electronic equipment) are likely to be generated.

Existing Waste Management Infrastructure

17.5.16 SEPA's Waste Site and Capacity Tool provides details of the existing waste management facilities across Scotland and was used to identify the location of suitable operational facilities in the SESplan area. Figure 17.2 'Waste Management Facilities in SESplan Area' illustrates the different types of waste management facilities across the area.

Figure 17.2 Waste Management Facilities in SESplan Area



Source: SEPA's Waste Sites and Capacity Tool. Accessed at: <http://www.sepa.org.uk/data-visualisation/waste-sites-and-capacity-tool/>

17.5.17 Table 17-6 'Annual and Remaining Capacity of Operational Landfills (Inert and Non-Hazardous) in the SESplan Area, and hazardous landfill in Scotland' provides details of the annual permit capacity, as well as the total remaining capacity as of 31 December 2018 at operational landfill sites accepting inert and non-hazardous wastes identified in the SESplan area. The table also includes the year each identified landfill site is anticipated to close.

17.5.18 The only active hazardous landfill site in Scotland is Avondale in Falkirk as detailed below in Table 17-6.

Table 17-6 Annual and remaining capacity of operational landfills (inert and non-hazardous) in the SESplan Area, and hazardous landfill in Scotland

| Site Name | Annual Capacity on Permit (tonnes) | Total Tonnes Landfilled for Year (2018) | Remaining Capacity as at 31 December 2018 (tonnes) | Estimated Year of Landfill Closure | |
|----------------------|------------------------------------|---|--|------------------------------------|------|
| SESplan Area | | | | | |
| Non-Hazardous | | | | | |
| East Lothian | Viridor Waste, Dunbar | 500,000 | 204,469 | 3,384,000 | 2020 |
| Midlothian | Drummond Moor (No2) Landfill | 250,000 | 147,854 | 1,454,256 | 2025 |
| Scottish Borders | Easter Langlee Landfill | 170,000 | 51,124 | 360,329 | 2020 |
| West Lothian | Levensat Waste Management Site | 400,000 | 65,668 | 475,000 | 2051 |
| Fife (south) | Lochhead L/F, By Wellwood | 382,500 | 126,120 | 616,350 | 2022 |
| TOTAL | | 1,702,500 | 595,235 | 6,289,935 | |

| Site Name | Annual Capacity on Permit (tonnes) | Total Tonnes Landfilled for Year (2018) | Remaining Capacity as at 31 December 2018 (tonnes) | Estimated Year of Landfill Closure | |
|--------------------------|------------------------------------|---|--|------------------------------------|------|
| Inert | | | | | |
| Midlothian | Middleton Quarry | 300,000 | 223,255 | 740000 | 2030 |
| West Lothian | Torphin Quarry | 75,000 | 12,790 | 41787 | 2021 |
| TOTAL | | 375,000 | 236,045 | 781,787 | |
| Whole of Scotland | | | | | |
| Hazardous | | | | | |
| Falkirk | Avondale Environmental, Polmont | 200,000 | 27,293 | 80,000 | 2023 |
| TOTAL | | 200,000 | 27,293 | 80,000 | |

17.5.19 Table 17-7 'Capacity of Operational Waste Management Facilities is the SESplan Area' highlights the available waste treatment infrastructure within the SESplan area. A number of these facilities operate more than one waste management activity on-site. The reported tonnages hence represent the total waste inputs into each facility type and not per activity. Activity data is not currently published by SEPA.

Table 17-7 Capacity of Operational Waste Management Facilities is the SESplan Area

| Waste Management Facility Type | Annual Waste Capacity on Permit in 2018 (tonnes) | Annual Waste Inputs in 2018 (tonnes) | Surplus Capacity (%) |
|---|--|--------------------------------------|----------------------|
| Co-incineration | 685,000 | 361,708 | 47% |
| Composting | 39,500 | 18,248 | 54% |
| Incineration | 301,592 | 41,701 | 86% |
| Incineration /Other treatment | 439,500 | 79,815 | 82% |
| Landfill /Other treatment | 75,000 | 12,790 | 83% |
| Landfill /Transfer station | 99,999 | 1,752 | 98% |
| Landfill /Transfer station /Composting /Other treatment | 400,000 | 220,139 | 45% |
| Metal recycler | 506,534 | 331,515 | 35% |
| Metal recycler /Transfer station | 1,244,048 | 195,858 | 84% |
| Other treatment | 421,003 | 107,066 | 75% |
| Transfer station | 1,714,991 | 802,111 | 53% |
| Transfer station /Anaerobic digestion | 145,000 | 133,974 | 8% |
| Transfer station /Composting | 74,999 | 31,762 | 58% |
| Transfer station /Other treatment | 377,000 | 90,095 | 76% |
| Total | 6,524,166 | 2,428,534 | 63% |

17.6 Potential Impacts

Material Assets

17.6.1 The indicative quantities of key materials required for the construction of the Proposed Scheme are shown in Table 17-8 'Estimated Material Quantities'.

Table 17-8 Estimated Material Quantities

| Project Element | Material | Unit | Approximate Estimated Material Quantity |
|------------------------------|---|----------------|---|
| Civil Engineering Structures | Steelwork | t | 3,600 |
| | In-situ concrete | m ³ | 110 |
| Safety Barrier | Steel | m | 6,405 |
| Fencing | Timber | m | 6,289 |
| Earthworks | Imported | m ³ | 339,359 |
| | Site-won | m ³ | 108,844 |
| | Pulverised Fly Ash (PFA) (within dry grout mix) | m ³ | 838 |
| | Portland Cement (within dry grout mix) | m ³ | 419 |
| Road Pavement | Sub-base | m ³ | 19,409 |
| | Base (depth 220 or 180mm) | m ² | 77,636 |
| | Binder (depth 100mm) | m ² | 77,636 |
| | Surface (depth 40mm) | m ² | 77,636 |
| | Kerbs | m | 7,213 |
| | Tack coat | m ² | 155,273 |
| | Road markings | m | 14,935 |
| | Road studs | units | 877 |
| Road Lighting | Lighting units – new | units | 30 |
| | Lighting units – reused | units | 90 |
| | Steel columns | units | 20 |
| | Passively safe columns | units | 80 |

17.6.2 The potential recycled content of the main construction materials (concrete, PFA and cement, unbound aggregate and asphalt) are presented in Table 17-9 'Potential re-used/recycled content of the main aggregate containing construction materials'.

17.6.3 The estimated recycled content for each material is based on the “standard, good and best practice” recycled content rates from WRAP’s Designing Out Waste Tool for Civil Engineering (WRAP, U.D). The total recycled content is calculated as a percentage by weight. The actual recycled content achieved during construction will depend on the technical suitability and availability of material containing recycled content.

Table 17-9 Potential re-used/recycled content of the main aggregate containing construction materials

| Project Element | Material | Estimated Material Quantity | | Potential Re-used / Recycled Content by Weight | | | | | |
|------------------------------|----------------------------|-----------------------------|----------|--|----------|---------------|----------|---------------|----------|
| | | | | Standard Practice | | Good Practice | | Best Practice | |
| | | (m ³) | (tonnes) | (%) | (tonnes) | (%) | (tonnes) | (%) | (tonnes) |
| Civil Engineering Structures | In-situ concrete | 110 | 264 | 11 | 29 | 16 | 42 | 17 | 45 |
| Materials for earthworks | PFA (within dry grout mix) | 838 | 1,508 | 100 | 1,508 | 100 | 1,508 | 100 | 1,508 |
| | Portland Cement | 419 | 1,006 | 0 | 0 | 0 | 0 | 0 | 0 |

| Project Element | Material | Estimated Material Quantity | | Potential Re-used / Recycled Content by Weight | | | | | |
|-----------------|------------------------------|-----------------------------|----------------|--|--------------|---------------|---------------|---------------|---------------|
| | | | | Standard Practice | | Good Practice | | Best Practice | |
| | | (m ³) | (tonnes) | (%) | (tonnes) | (%) | (tonnes) | (%) | (tonnes) |
| | (within dry grout mix) | | | | | | | | |
| Road Pavement | Sub-base (unbound aggregate) | 19,409 | 36,877 | 0 | 0 | 50 | 18,439 | 100 | 36,877 |
| | Base (asphalt) | 15,511 | 37,227 | 0 | 0 | 25 | 9,307 | 50 | 18,613 |
| | Binder (asphalt) | 7,764 | 18,633 | 0 | 0 | 25 | 4,658 | 50 | 9,316 |
| | Surface (asphalt) | 3,105 | 7,453 | 0 | 0 | 10 | 745 | 30 | 2,236 |
| Total | | 47,156 | 102,967 | 1 | 1,537 | 34 | 34,699 | 67 | 68,596 |

- 17.6.4 As aggregates will be required for structures, drainage and road pavement construction, this is likely to result in the depletion of local finite resources, such as sand and gravel. The choice of whether to use primary, secondary or recycled aggregates (or a combination) will be made by the Principal Contractor and they are assumed to take into account the consideration of several factors, such as materials availability, specification, production and transport.
- 17.6.5 A baseline target for alternative aggregates (which comprise both secondary aggregates, which are by-products from industrial and mining operations, and recycled aggregates, which are produced from construction waste) is not set out for Scotland in LA 110. The target for England is 25% recycled content. Table 17-9 'Potential re-used/recycled content of the main aggregate containing construction materials' indicates that if a good practice recycled content is achieved the potential overall recycled content is 34%. The effects are assessed as being **slight adverse** and not significant.
- 17.6.6 Where the choice is made to re-use site-won materials or use secondary or recycled imported sources, reference should be made to appropriate SEPA guidance, including, but not limited to '*Recycled Aggregates from Inert Waste*' and '*Reuse Activities and Waste Regulation*'.
- 17.6.7 The estimated main types and quantities of waste generated during construction and potential recovery rates are shown in Table 17-10 'Estimated construction waste quantities'.

Table 17-10 Estimated construction waste quantities

| Project Element | Material | Approximate Estimated Material Quantity (m ³) | Density (tonnes/m ³) ⁽¹⁾ | Approximate Estimated Material Quantity (tonnes) | Wastage Rate (%) ⁽²⁾ | Waste Classification | Approximate Estimated Waste (tonnes) | Potential Waste Management Route | Potential Recovery Rate (% by weight) ⁽³⁾ | Recovery (tonnes) |
|-------------------------------|--|---|---|--|---------------------------------|----------------------|--------------------------------------|--|--|-------------------|
| Civil Engineering Structures | Steelwork | n/a | n/a | 3,600 | 5.0 | Non-hazardous | 180 | Offsite recycling | 100 | 180 |
| | In-situ concrete | 110 | 2.4 | 264 | 2.5 | Non-hazardous | 7 | Offsite recycling | 95 | 6 |
| Materials for earthworks | Pulverised Fuel Ash (PFA) (within dry grout mix) | 838 | 1.8 | 1,508 | 5.0 | Non-hazardous | 75 | Offsite recycling | 95 | 72 |
| | Portland Cement (within dry grout mix) | 419 | 2.4 | 1,006 | 5.0 | Non-hazardous | 50 | Offsite recycling | 95 | 48 |
| Road Pavement | Sub-base (aggregate) | 19,409 | 1.9 | 36,877 | 5.0 | Non-hazardous | 1,844 | Offsite recycling | 95 | 1,752 |
| | Base course (asphalt) | 15,511 | 2.4 | 37,227 | 2.5 | Non-hazardous | 931 | Offsite recycling | 95 | 884 |
| | Binder course (asphalt) | 7,764 | 2.4 | 18,633 | 2.5 | Non-hazardous | 466 | Offsite recycling | 95 | 443 |
| | Surface course (asphalt) | 3,105 | 2.4 | 7,453 | 2.5 | Non-hazardous | 186 | Offsite recycling | 95 | 177 |
| Total wastage (tonnes) | | | | | | | 3,739 | Total potential non-hazardous recovery rate | 95 | 3,561 |

(1) Data on the bulk density of materials has been used to convert quantities between volume (m³) and weight (tonnes). Information on the typical bulk density of materials was sourced from WRAP's Designing Out Waste Tool for Civil Engineering (WRAP, U.D) and UK Quality Ash Association Datasheet 3.0 Grouting (UKQAA, 2006). Where a bulk density was not available professional judgement was used.

(2) Waste estimates from construction are based good practice wastage rates as outlined in the WRAP's Designing Out Waste Tool for Civil Engineering (WRAP, U.D) applied to construction material quantities.

(3) The estimated recovery rates are based on the "good practice quick win" recovery rates set out in the "Achieving Good Practice Waste Minimisation and Management" report published by WRAP (WRAP, N. D). The overall recovery rate is calculated by tonnage.

- 17.6.8 Excavated material is not included in Table 17-10 'Estimated construction waste quantities' or when calculating the overall waste recovery rate, since where possible the material would be reused on site and hence not be categorised as a waste and the UK government's recovery target of 70% recovery by weight does not include excavated material and specifically excludes uncontaminated excavated soil and stones (EWC 17 05 04). This approach is consistent with the waste hierarchy and the objectives of minimising waste generation and reusing materials.
- 17.6.9 Applying good industry practice to the management of the waste materials generated by the Proposed Scheme, it is anticipated that an overall recovery rate of 95% can be achieved. This exceeds the UK Government's 70% target for recovery of construction waste and the effects are therefore assessed as being **slight adverse** and not significant.
- 17.6.10 It should be noted that Scotland's Zero Waste Plan sets out the more ambitious target to recycle 70% of construction and demolition waste (CDW) by 2020 to contribute to the achievement of this UK target and this will be included in the contractors SWMP.
- 17.6.11 For the majority of highways schemes, the largest quantities of materials and waste are generally those associated with earthworks, especially in those cases where a balance between excavation ("cut") and material placement ("fill") cannot be achieved.
- 17.6.12 The Scheme design is currently being progressed to optimise the requirements for cut and fill and where possible this will be minimised to reduce the import and export of materials and waste. The project design team aim is to achieve a cut-fill balance, however predicted cut and fill for the Scheme is likely to be imbalanced and importation of material will be required.

Based on the DMRB Stage 3 design, the total fill required is estimated to be 448,203m³. It is estimated that 108,844m³ of excavated material will be suitable for re-use on site as engineering fill. As such, the indicative volume of material to be imported for the earthworks is approximately 339,359m³.

Waste

- 17.6.13 For wastes and surplus or damaged products and material assets, the potential impacts are primarily associated with the processing (including recycling/recovery) of wastes and if required, their disposal to landfill.
- 17.6.14 The potential wastes arising from construction, demolition and excavation activities are highlighted in Table 17-10 'Estimated construction waste quantities', Table 17-11 'Estimated excavation waste' and Table 17-12 'Estimated demolition waste'. **Error! Reference source not found.** Estimated demolition waste and excavation waste data has been provided by the design team. More information on potential hazardous wastes can be found in Chapter 16 - Geology and Soils.

Table 17-11 Estimated excavation waste

| Material | Approximate Estimated Waste Quantity (m ³) | Density (tonnes/m ³) ¹ | Approximate Estimated Waste Quantity (tonnes) | Waste Classification | Potential Waste Management Route | Potential Recovery Rate (% by Weight) ³ |
|---|--|---|---|----------------------|---|--|
| General unsuitable cut and made ground | 32,218 | 1.9 | 61,214 | Non-hazardous | Assumed landfill disposal as a worst case | 0 |
| Hazardous soils associated with contaminated land | 2,247 | 1.9 | 4,269 | Hazardous | Assumed landfill disposal as a worst case | 0 |
| Total excavation waste (tonnes) | | | 65,484 | | | |

Table 17-12 Estimated demolition waste

| Material | Approximate Estimated Waste Quantity (m ³) | Density (tonnes/m ³) ¹ | Approximate Estimated Waste Quantity (tonnes) | Waste classification | Potential waste management route | Potential recovery rate (% by weight) ³ |
|--|--|---|---|----------------------|---|--|
| Coal tar associated with existing pavement materials | 313 | 2.4 | 751 | Hazardous | Assumed landfill disposal as a worst case | 0 |
| Total demolition waste (tonnes) | | | 751 | | | |

- 17.6.15 Without mitigation, the Proposed Scheme is estimated to generate in the order of 69,974 tonnes of waste. 3,739 is anticipated to be wastage from construction materials and is assumed to be inert or non-hazardous. 61,214 tonnes is anticipated to be general unsuitable cut and made ground, assumed to be inert or non-hazardous waste, which cannot be reused by the scheme due to its engineering properties. 4,269 tonnes is anticipated to be soils associated with contaminated land, this waste is assumed to be hazardous. 751 tonnes of demolition waste is anticipated to be coal tar associated with existing pavements and is also assumed to be hazardous. In total 64,953 tonnes is anticipated to be inert or non-hazardous and 5,021 tonnes is anticipated to be hazardous.
- 17.6.16 The remaining capacity for inert and non-hazardous landfills in the study area is equivalent to 781,787 tonnes and 6,289,935 tonnes for inert and non-hazardous landfills respectively (See Table 17-6 Annual and remaining capacity of operational landfills (inert and non-hazardous) in the SESplan Area, and hazardous landfill in Scotland). This equates to a total non-hazardous and inert landfill capacity of 7,071,722 tonnes.
- 17.6.17 Based on a worst-case assumption that all waste generated from the Proposed Scheme would be disposed of to landfill (i.e. no mitigation applied), this would utilise approximately 0.92% of the regional inert and non-hazardous landfill capacity. In practice a large proportion of waste from the Proposed Scheme is likely to be recovered rather than disposed of to landfill, further reducing the overall quantities of waste for disposal.
- 17.6.18 The Proposed Scheme would result in less than 1% reduction or alteration in the regional inert and non-hazardous landfill capacity, and there is adequate disposal capacity within the region to accommodate all the waste from the Scheme. The effects are therefore assessed as being **slight adverse** and not significant.
- 17.6.19 There is significant scope for re-use and recycling of materials and waste (such as earthworks surplus, topsoil) from the Proposed Scheme but the quantity achievable will be dependent on the Contractor, and therefore cannot be determined at this stage. However, the construction sector seeks to recycle and re-use construction waste in response to legislative, fiscal and policy drivers, as well as cost minimisation, which would result in a likely reduction in the quantity of material that would leave site and require disposal to landfill. Table 17-7 'Capacity of Operational Waste Management Facilities in the SESplan Area' identifies an annual capacity at licenced treatment facilities in the study area of approximately 31.83 million tonnes, of which 60% (approximately 19.26 million tonnes) of overall capacity was unused in 2017.
- 17.6.20 An estimated 5,021 tonnes of hazardous waste has been identified and, as a worst-case scenario, this would need to be disposed of off-site at the Avondale Landfill in Falkirk, the only hazardous landfill site in Scotland. Hazardous waste generated from the Proposed Scheme would utilise 6.3% of the hazardous landfill capacity.
- 17.6.21 The Proposed Scheme would result in more than 1% reduction or alteration in the hazardous landfill capacity in Scotland. The effects are therefore assessed as being **moderate adverse** and significant.
- 17.6.22 The appointed contractor should refer to appropriate SEPA guidance on hazardous waste, including the 'Technical Guidance WM3 - Waste Classification: Guidance on the classification and assessment of waste' and 'Interim SEPA

Technical Guidance Note - Mixing and Stabilisation of Hazardous (Special) Wastes' when dealing with and disposing of hazardous wastes and seek options for the treatment of hazardous waste in preference to disposal.

Summary of Impacts Prior to Additional Mitigation

17.6.23 The potential impacts identified for both material assets and waste above, and their significance, prior to the application of additional mitigation, are summarised in Table 17-13 'Potential impacts reporting matrix prior to applying any additional mitigation' below.

Table 17-13 Potential impacts reporting matrix prior to applying any additional mitigation

| Criteria | Potential Impacts | Description of the Impacts |
|------------------------|--|---|
| Material assets | Recovery of construction and demolition waste | <p>Project achieves >70% overall material recovery / recycling (by weight) of non-hazardous construction and demolition waste to substitute use of primary materials.</p> <p>Applying good industry practice to the management of the waste materials generated by the Scheme, it is anticipated that an overall recovery rate of 95% can be achieved.</p> <ul style="list-style-type: none"> Description of impact: Adverse, short-term, temporary, direct Potential significance: Slight Adverse |
| | Use of aggregate comprising re-used/recycled content in line with the relevant regional or national target (noting no target is set for Scotland in LA110) | <p>Aggregates required to be imported to site comprise re-used/recycled content in with the relevant regional or national percentage target.</p> <p>A good practice recycled content (aggregates comprising re-used/recycled/secondary content) of 34% is potentially achievable. This is line with England's national target of 25%.</p> <ul style="list-style-type: none"> Description of impact: Adverse, long-term, permanent, direct Potential significance: Slight Adverse |
| Waste | Disposal of inert and non-hazardous waste | <p>The quantity of waste generated from earthworks in the form of general unsuitable cut and made ground is estimated to be in the order of 61,214 tonnes.</p> <p>The quantity of waste generated from the construction phase is estimated to be 3,739 tonnes.</p> <p>Therefore, the total quantity of inert and non-hazardous waste generated from the construction of the Proposed Scheme is estimated to be approximately 64,953 tonnes.</p> <p>The Scheme would result in less than 1% reduction or alteration in the regional inert and non-hazardous landfill capacity, and there is adequate disposal capacity within the region to accommodate all the waste from the Scheme.</p> <ul style="list-style-type: none"> Description of impact: Adverse, long-term, permanent, direct Potential significance: Slight Adverse |
| | Disposal of hazardous waste | <p>The Proposed Scheme is expected to generate approximately 5,021 tonnes of hazardous waste in the form of hazardous soils and coal tar contaminated material.</p> <p>The only active hazardous landfill site in Scotland is Avondale in Falkirk and has a total remaining capacity of 80,000 tonnes as of 31st December 2018 and is estimated to cease landfill in January 2023. The Scheme would result in more than 1% reduction or alteration in the hazardous landfill capacity.</p> <ul style="list-style-type: none"> Description of impact: Adverse, long-term, permanent, direct Potential significance: Moderate Adverse |

Cumulative Impacts

17.6.24 The residual impacts may be impacted by other major infrastructure projects taking place at the time of construction of the Proposed Scheme. At this stage, material use and waste generation estimates are not available for 'reasonably foreseeable' projects in proximity to the Proposed Scheme. However, allowing for re-use and recycling, and availability of material from both local and non-local sources, it is considered that impacts on waste and materials are unlikely to be significant. More information about cumulative impacts is provided in Chapter 19 - Cumulative Assessment.

17.7 Mitigation

17.7.1 Mitigation measures have been identified as EU, National and Scottish policy and legislation require the waste hierarchy to be applied to all waste arisings. Additionally, the Scottish Government aims to secure at least 70% recycling of non-hazardous construction and demolition waste by 2020 to contribute to the achievement of the overall UK target (70% recovery). Widely implemented best practice on construction and infrastructure projects is to adopt Site Waste Management Plans to reduce the amount of waste generated. Therefore, these mitigation measures are considered appropriate and form best practice for an infrastructure project of this type.

17.7.2 Measures will be implemented to reduce both the use of material assets and the generation of waste from the construction of the Proposed Scheme and to align the scheme with relevant EU and Scottish waste policy. There is significant interaction between materials re-use and minimisation of waste and consequently there is a large degree of similarity in the mitigation measures for material assets and waste.

17.7.3 Mitigation measures listed in this chapter will be specified as environmental commitments in the contract documents to ensure implementation by the appointed Contractor.

Material Assets

17.7.4 The Contractor will implement Zero Waste Scotland's Design for Resource Efficient Construction Principles to minimise the total material asset demand of the design (**Mitigation item M1**). The five key principles include:

- Design for Reuse and Recovery: through salvaging and reuse of components and materials from the site or elsewhere locally; on-site or off-site recycling of materials, and ensuring new materials brought onto site have high recycled content;
- Design for Off-site Construction: through designing in prefabricated road assets structures and components which offer reduced consumption of materials and reduced waste; and thinking about how site activities can become a process of assembly rather than construction;
- Design for Resource Optimisation: through designing road assets that can be constructed and used with reduced consumption of materials, selecting responsibly sourced materials, and producing minimal waste;
- Design for Resource Efficient Procurement: through setting resource efficiency requirements into the procurement process; working with the principal contractor throughout the design process to select resource efficient construction methods; and when waste does arise, making provision to select the waste contractor who can offer the best overall reuse and recycling performance; and
- Design for the Future: through considering the potential future uses of the roads assets and designing in flexibility and adaptability; selecting materials and components to match the intended use and durability; designing the road assets to be easy to maintain and refurbish, and taking into account future needs to update, modernise and eventually deconstruct.

17.7.5 Prior to construction a Materials and Waste Management Strategy (M&WMS) for both material procurement and waste management should be devised, including a Site Waste Management Plan (SWMP). These documents form part of the Construction Environmental Plan (CEMP). The M&WMS sets out how all construction phase materials will

be managed and identify opportunities to substitute recycled or secondary materials/products for those using virgin materials. It will be updated regularly during the construction of the Proposed Scheme (**Mitigation item M2**).

17.7.1 Alternatives to primary aggregates will be investigated, including opportunities to use recycled or secondary aggregates in the construction of the Proposed Scheme; either sourced from construction and excavation waste obtained onsite or offsite; or secondary aggregates obtained from an alternative source (**Mitigation item M3**).

17.7.2 Where feasible, key materials, such as aggregates, asphalt, cement, concrete and steel used within the Proposed Scheme shall be responsibly sourced from suppliers who have a minimum ISO 14001 certification and, if available, BES 6001 (Framework Standard for the Responsible Sourcing of Construction Products) certification for the material (**Mitigation item M4**).

Waste

17.7.3 The SWMP will identify the types and likely quantities of wastes that may be generated, and it will set out, in an auditable manner, how waste will be reduced, re-used, managed and disposed of in accordance with relevant Zero Waste Scotland Guidance (**Mitigation item M5**). The SWMP will include any appropriate waste minimisation and associated KPI targets, including 70% recycling of non-hazardous construction and demolition waste required by Scottish Policy, as well as specific materials management and soil management plans developed under voluntary and industry regulated Codes of Practice including, but not limited to:

- Construction Code of Practice for the Sustainable Use of Soils on Construction Sites (DEFRA, 2009);
- Land Remediation and Waste Management Guidelines (SEPA, 2009); and
- Promoting the Sustainable Reuse of Greenfield Soils in Construction (SEPA, 2010).

17.7.4 The Contractor will apply the principles of the 'Waste Hierarchy' (Prevention, Preparing for Re-use, Recycling, Other Recovery, Disposal) to minimise waste generation, maximise re-use of site-won materials on-site and minimise the need for disposal of waste. Where re-use is not possible within the Proposed Scheme, alternative re-use and recycling options will be sought offsite with disposal the final option. (**Mitigation item M6**).

17.7.5 Any hazardous and contaminated soils encountered during the construction works should undergo further investigation, testing and risk assessment to determine opportunities for the most appropriate waste management options. Depending on the contamination profile of the materials there are remediation technologies available, such as soil washing, which can be applied to make the materials suitable for reuse (**Mitigation item M7**).

Summary of Mitigation Measures

17.7.6 The following table, Table 17-14 'Summary of Material Assets and Waste Mitigation Measures', provides a summary of the material assets and waste mitigation measures proposed. This table is also included within Chapter 19 – Schedule of Environmental Commitments which will be used to inform the commitments in the contract document.

Table 17-14 Summary of Material Assets and Waste Mitigation Measures

| Mitigation Item | Location/ Approximate Chainage | Timing of Measure | Description | Mitigation Purpose/ Objective | Specific Consultation or Approval Required | Potential Monitoring Requirements |
|-----------------|--------------------------------|---------------------------------|--|---|--|---|
| M-1 | Throughout Proposed Scheme | Pre-Construction & Construction | The Contractor will implement Zero Waste Scotland's Design for Resource Efficient Construction Principles to reduce the total material demand of the design and enable the reduction, reuse and recycling of waste. | To use materials most efficiently throughout the Proposed Scheme. | None required. | None required. |
| M-2 | Throughout Proposed Scheme | Pre-Construction & Construction | Prior to construction a Materials and Waste Management Strategy (M&WMS) for both material procurement and waste management should be devised, including a Site Waste Management Plan (SWMP). These documents form part of the Construction Environmental Plan (CEMP). The M&WMS sets out how all construction phase materials will be managed and identify opportunities to substitute recycled or secondary materials/products for those using virgin materials. It will be updated regularly during the construction of the Proposed Scheme. | To set out how all materials and waste will be managed. | None required. | Transport Scotland approval of the M&WMS prior to implementation. Contractor recording and reporting of the M&WMS implementation (including to Transport Scotland). |
| M-3 | Throughout Proposed Scheme | Pre-Construction & Construction | Alternatives to primary aggregates will be investigated, including opportunities to use recycled or secondary aggregates in the construction of the Proposed Scheme; either sourced from construction and excavation waste obtained onsite or offsite; or secondary aggregates obtained from an alternative source. | To reduce impacts associated with the extraction, manufacture and transport of materials and to reduce waste generation, maximise re-use of site-won materials on-site and reduce the need for disposal of waste. | None required. | None required. |
| M-4 | Throughout Proposed Scheme | Pre-Construction & Construction | Where feasible, key materials, such as aggregates, asphalt, cement, concrete and steel used within the Proposed Scheme shall be responsibly sourced from suppliers who have a minimum ISO 14001 certification and, if available, BES 6001 (Framework Standard for the Responsible Sourcing of Construction Products) certification for the material. | To reduce impacts associated with the extraction and manufacture of materials. | None required. | None required. |
| M-5 | Throughout Proposed Scheme | Pre-Construction & Construction | The SWMP will identify the types and likely quantities of wastes that may be generated, and it will set out, in an auditable manner, how waste will be reduced, re-used, managed and disposed of in accordance with relevant Zero Waste Scotland guidance. | To set out how all construction wastes will be managed. | Consultation with SEPA. | Transport Scotland approval of the SWMP prior to implementation. Contractor recording and reporting of the SWMP implementation (including to Transport Scotland). |
| M-6 | Throughout Proposed Scheme | Pre-Construction & Construction | The Contractor will apply the principles of the 'waste hierarchy' (prevention, preparing for re-use, recycling, other recovery, disposal) to minimise waste generation, maximise re-use of site-won materials on-site and minimise the need for disposal of waste. Where re-use is not possible within the Proposed Scheme, alternative re-use and recycling options will be sought offsite with disposal the final option. | To reduce waste generation, maximise re-use of site-won materials on-site and reduce the need for disposal of waste. | None required. | None required. |
| M-7 | Throughout Proposed Scheme | Pre-Construction & Construction | Any hazardous and contaminated soils encountered during the construction works should undergo further investigation, testing and risk assessment to determine opportunities for the most appropriate waste management options. Depending on the contamination profile of | To reduce waste generated from the Proposed Scheme. | Consultation with SEPA. | Recording of any contaminated land encountered, and relevant investigation, testing and risk assessments carried out. |

| Mitigation Item | Location/ Approximate Chainage | Timing of Measure | Description | Mitigation Purpose/ Objective | Specific Consultation or Approval Required | Potential Monitoring Requirements |
|-----------------|--------------------------------------|----------------------|--|-------------------------------|---|--------------------------------------|
| | | | the materials there are remediation technologies available, such as soil washing, which can be applied to make the materials suitable for reuse. | | | |

17.8 Residual Effects

- 17.8.1 A summary of the predicted impacts, mitigation and residual effects of the Proposed Scheme in relation to the consumption and use of material assets and generation and management of waste are presented in Table 17-15 'Summary of Potential Effects' below.

Table 17-15 Summary of Potential Effects

| Criteria | Predicted Impacts | Significance of Effect | Mitigation Measures | Residual Effects |
|-----------------|--|------------------------|---|------------------|
| Material assets | Recovery of construction and demolition waste | Slight Adverse | <ul style="list-style-type: none"> Design out waste and facilitate the prevention, re-use, recycling and recovery of waste, including applying the waste hierarchy so that segregation of waste on-site is managed, and alternative re-use and recycling options are sought off-site with disposal as a last resort. Apply procedures included in the CEMP and SWMP. Ensure waste not used onsite is transferred by a licenced waste carrier to licenced or registered exempt waste management facilities in accordance with regulatory guidance. | Slight Adverse |
| | Use of aggregate comprising re-used/recycled content in line with the relevant regional or national target (noting no target is set for Scotland in LA110) | Slight Adverse | <ul style="list-style-type: none"> Consider alternatives to primary aggregates, including opportunities to use secondary and recycled aggregates. Procure products with high levels of recycled content. Responsibly source all construction materials and products. | Slight Adverse |
| Waste | Management and disposal of inert and non-hazardous waste | Slight Adverse | <ul style="list-style-type: none"> Apply good materials management practices to minimise the amount of materials wasted during construction. Design out waste and facilitate the prevention, re-use, recycling and recovery of waste, including applying the waste hierarchy so that segregation of waste on-site is managed, and alternative re-use and recycling options are sought off-site with disposal as a last resort. Apply procedures included in the CEMP and SWMP. Ensure waste not used on site is transferred by a licenced waste carrier to licenced or registered exempt waste management facilities in accordance with regulatory guidance. | Slight Adverse |
| | Management and disposal of hazardous waste | Moderate Adverse | <ul style="list-style-type: none"> Any hazardous and contaminated soils and other materials encountered during the construction works should undergo further investigation, testing and risk assessment to determine opportunities for the most appropriate waste management options. Depending on the contamination profile of the materials identify suitable remediation technologies available, such as soil washing, which can be applied to make the materials suitable for reuse. Design out waste and facilitate the prevention, re-use, recycling and recovery of waste, including applying the waste hierarchy so that segregation of waste on-site is managed, and alternative re-use and recycling options are sought off-site with disposal as a last resort. Apply procedures included in the CEMP and SWMP. Ensure waste not used on site is transferred by a licenced waste carrier to licenced waste management facilities in accordance with regulatory guidance, as appropriate. | Moderate Adverse |

17.9 Compliance with Policies and Plans

- 17.9.1 The use and consumption of material assets and the generation and management of waste are subject to a complex framework of legislative and policy instruments at the European, National and Local levels. In addition to material and waste-specific policies, legislation and guidance, there is also the legislative framework for sustainable development which must be considered in assessing the environmental impacts/effects of material resource use and waste management associated with constructing the Proposed Scheme.
- 17.9.2 Standard Practice requires compliance with legal requirements; Good and Best Practice goes beyond this to identify and implement ways to achieve significant reductions in waste and improvement in the materials resource efficiency of a project.
- 17.9.3 The Proposed Scheme is required to comply with all relevant material assets and waste specific legislation, policies and plans, including but not limited to those identified in Section 17.3.
- 17.9.4 The Principal Contractor shall take all such measures available and which are reasonable in the circumstances to apply the waste hierarchy (prevention; preparing for re-use; recycling; other recovery, including energy recovery; and disposal) shown in Figure 17.1 'Waste Hierarchy' in a way which delivers the best overall environmental outcome.
- 17.9.5 Mitigation measures set out in Section 17.7 are in line with national, regional and local policy and guidelines, including the Scottish Planning Policy and Midlothian proposed Local Development Plan policies Dev 5 (Sustainability in New Development) and Dev 6 (Layout and Design of New Development). With regard to sourcing material assets sustainably, with appropriate mitigation as outlined in Section 17.7, it is expected that the Proposed Scheme would comply with these policies.

17.10 Statement of Significance

- 17.10.1 This section provides a summary of the potentially significant residual impacts that may be anticipated taking into account the mitigation measures described in Section 17.7.

Material Assets

- 17.10.2 The assessment of effects on material assets during construction, taking into account mitigation measures as described in Section 17.7, indicates that the residual impact could be slight adverse, which is not considered significant.

Waste

- 17.10.3 The assessment of the generation and management of waste during construction, taking into account mitigation measures as described in Section 17.7, indicates that the residual impact for inert and non-hazardous waste could be slight adverse, which is not considered significant. For hazardous waste, the assessment indicates that the residual impact could be moderate, which is considered significant.

17.11 Monitoring

- 17.11.1 For hazardous waste, the assessment indicates that the residual impact could be moderate, which is considered significant. No other significant effects are predicted to be associated with material assets and waste during the construction of the Proposed Scheme.
- 17.11.2 The CEMP will set out monitoring to be undertaken during the Proposed Scheme construction stage to ensure that the mitigation measures embedded in the Proposed Scheme design are appropriately implemented. Monitoring of

material assets and waste will be undertaken as part of the SWMP required to be prepared and updated by the appointed contractor.

17.12 References

- City of Edinburgh Council (2016) Edinburgh Local Development Plan (Adopted November 2016)
- The Department for Environment, Food and Rural Affairs (DEFRA) (2009) Construction Code of Practice for the Sustainable Use of Soils on Construction Sites
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- The Highways Agency, et al. (2019) DMRB guidance Volume 11, Section 3, Part 13 LA 110 Material assets and waste
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- Scottish Environmental Protection Agency (SEPA) (2016) One Planet Prosperity – A Waste to Resources Framework
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- Scottish Environmental Protection Agency (SEPA) (2019) Waste Sites and Capacity Tool. Data last updated: April 2019. Available at: <http://www.sepa.org.uk/data-visualisation/waste-sites-and-capacity-tool/> [Accessed November 2019]
- Scottish Environmental Protection Agency (SEPA) (2018) Waste classification: Guidance on the classification and assessment of waste (1st Edition v1.1) Technical Guidance WM3
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- Scottish Parliament (2003) Land Reform (Scotland) Act 2003
- Scottish Parliament (1996) The Special Waste Amendment (Scotland) Regulations 1996
- Scottish Parliament (2003) The Water Environment and Water Services Act (Scotland) 2003
- Scottish Parliament (2009) Climate Change (Scotland) Act 2009
- Scottish Government (2010) Scotland's Zero Waste Plan (Adopted June 2010)
- Scottish Parliament (2011) Waste Management Licencing (Scotland) Regulations 2011, SI 2011/228.
- Scottish Parliament (2012) The Waste (Scotland) Regulations 2012, SI 2012/148
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- Scottish Government (2014b) Scottish Planning Policy (SPP) (Adopted June 2014)

Scottish Government (2015) Scottish Aggregates Survey 2012 (June 2015)

Scottish Government (2016) Making Things Last: A Circular Economy Strategy for Scotland (Adopted October 2016)

SESplan (2013) South East Scotland Strategic Development Plan (SDP) (Adopted June 2013)

SESplan (2016) Proposed South East Scotland Strategic Development Plan (SDP2) (October 2016)

UK Parliament (1990) Environmental Protection Act 1990 (EPA) Part 2

UK Parliament (1991) Environmental Protection (Duty of Care) Regulations 1991, as amended 2003

UK Quality Ash Association (2016) Datasheet 3.0 Grouting

WRAP (N.D) Achieving Good Practice Waste Minimisation and Management, Guidance for construction clients, design teams and contractors. Available online at:

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WRAP (N.D) WRAP's Designing Out Waste Tool for Civil Engineering. Available online at:

<http://dowtce.wrap.org.uk/>

Zero Waste Scotland (N.D) The Aggregate Quality Protocol Supplier Directory. Available at:

<http://zwsaggsuppliers.org.uk/> [Accessed March 2019].

Zero Waste Scotland (N.D) A Zero Waste Future for Edinburgh and Midlothian. Available at:

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