

58 Sustainability Appraisal

This chapter provides an appraisal of whole scheme impacts on sustainability issues of particular relevance to the AWPR proposals. It addresses issues of greenhouse gas emissions, materials transportation and resource use and identifies measures which can be taken to improve the sustainability of the proposal.

Through implementation of appropriate environmental strategies, including an environmental management system, the construction of the AWPR will assist in meeting sustainability targets of UK and local government policy and guidance. The potential reuse of 18 million tonnes of earthworks material and 1.4 million tonnes of aggregate will reduce potential pressure on landfill sites during the construction of the proposed scheme and assist in meeting WRAPs targets for waste minimisation and recycling.

58.1 Introduction

- 58.1.1 Sustainable development is a key focus in current UK policy and legislation. Within the consideration of whole scheme impacts on the AWPR, it is useful to undertake an assessment of sustainability issues.
- 58.1.2 Sustainable development is defined as 'development which meets the needs of the present without compromising the ability of future generations to meet their own needs' (Brundtland Commission 1987).
- 58.1.3 Worldwide awareness of the concept of sustainable development was first demonstrated at the 1992 United Nations Conference on Environment and Development (UNCED or the 'Earth Summit' in Rio). The Summit promoted Agenda 21, a comprehensive plan of action, to be taken globally, nationally and locally by organisations of the United Nations System and governments to address human impacts on the environment. The Agenda largely focuses on addressing impacts at the local scale through local councils. Local authorities throughout the UK have drawn up and implemented Local Agenda 21 (LA21) strategies specific to their environment.
- 58.1.4 In 2005 the Scottish Executive signed up to a new UK-framework for sustainable development, One Future – Different Paths, which identifies a powerful set of principles to help achieve goals identified in LA21 strategies. The Scottish Sustainable Development Strategy 2005 focuses on:
- Sustainable consumption and production
 - Climate change and energy
 - Natural resource protection and environmental enhancement
 - Sustainable communities
- 58.1.5 The 32 local authorities in Scotland work together through the Sustainable Scotland Network (SSN) which brings together practitioners from each local authority. They share experience and take action on sustainable development at annual and quarterly meetings. They contribute to the development of policy on sustainable development in Scotland, through its engagement with the Scottish Executive and the Scottish Parliament.
- 58.1.6 Aberdeen City Council published its LA21 Strategy in 2000, which forms part of their Community Plan. In 1996 and 2004 respectively, they signed the Aalborg Charter and Aalborg Commitments for sustainable development. As one of the first authorities to sign up to the Commitments, Aberdeen City Council showed its dedication to implementing the actions necessary to tackle sustainable development at local authority level.
- 58.1.7 Aberdeenshire Council's first step towards LA21 and commitment to sustainable development was identified through its Sustainable Development Charter, launched in 2004. The work carried out under the Sustainability Charter is monitored by a policy and resources committee, the

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Sustainability Working Group. Current working plans which implement Aberdeenshire Council's dedication to sustainable development in Aberdeenshire are:

- The revised Community Plan, 2006 – which incorporates themes of sustainable development focusing on working together to achieve sustainability by reducing resource use, protecting the environment, combating climate change and conserving and enhancing biodiversity.
- The Aberdeen and Aberdeenshire Structure Plan (NEST) 2001 – broad guidance for future development in Aberdeenshire.
- The Aberdeenshire Local Plan (2006) – specific guidance for future development in Aberdeenshire.
- The Local Plan and Structure Plan together form the Development Plan which highlights Aberdeenshire Council's objective for all future development to be sustainable.

58.2 Approach and Methods

58.2.1 The appraisal addresses sustainability issues most pertinent to the entire proposed road scheme development, and identifies measures which can be taken to improve the sustainability of the proposal. The approach to the assessment is necessarily qualitative and generalised, given that the detailed design and construction, including construction materials and processes, will be undertaken and developed by the Contractor. The focus and approach for the sustainability appraisal has been developed in discussion with SEPA.

58.2.2 Liaison with SEPA has identified the following topic areas as being of particular value in a discussion on sustainable development in this Environmental Statement:

- Greenhouse gases (construction and operation)
- Materials transportation
- Resource use

58.2.3 These topics also fall within the key themes of the Scottish Sustainable Development Strategy 2005 as identified above. The three topics are discussed in more detail below.

58.3 Appraisal

Greenhouse gases

58.3.1 The Kyoto Protocol recognises six greenhouse gases but carbon dioxide is the main greenhouse gas in the UK (UKCCP, 2006) and is used as the key indicator for assessing the impacts of transport options on climate change.

58.3.2 The transport sector currently accounts for 17% of Scotland's greenhouse gas emissions (SCCP 2006) and 27% of climate changing carbon dioxide (CO₂) emissions. Emissions from the transport sector in the UK as a whole increased by 8% between 1990 and 2000 and are expected to rise by a further 8% between 2000 and 2010 (UKCCP, 2006). Road traffic is the second fastest growing source of greenhouse gas emissions.

58.3.3 The Scottish Executive's Transport Delivery Report produced in March 2002 acknowledges that 'action is required now to prevent rising carbon dioxide emissions from road transport.' Aberdeen City Councils Climate Change Action Plan (2002) also states that it is imperative to 'look at how we can reduce the emissions from fossil fuels that are causing climate change'.

58.3.4 The UK Climate Change Strategy requires that the transport sector delivers 40% of the UK's proposed reduction of CO₂ levels by 2010.

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58.3.5 The construction and operation of the AWPR will inevitably produce greenhouse gases, including carbon dioxide. Potential CO₂ emissions are discussed below.

Construction

58.3.6 Carbon dioxide will be produced through a number of activities related to the construction process, including:

- Production of materials required for construction.
- Transportation of materials and labour to, from and around the site.
- Use of machinery for construction activities including excavation, cement mixing, earthworks, road base and surfacing, construction of pathways, structures, landscaping and temporary works.
- Electricity usage from site compounds.

58.3.7 The amount of carbon dioxide which could potentially be produced from the construction of the scheme is currently unknown, and will vary greatly depending upon a number of factors including:

- Sourcing of materials – type (primary, secondary, recycled), distance from site
- Method of transportation of materials and resources
- Types, age and efficiency of machinery used

58.3.8 To date there is no known information publicly available on the how much CO₂ will be produced from the construction of a typical road scheme.

Operation

58.3.9 Levels of greenhouse gas emissions as a result of the operation of the proposed scheme are presented in Chapter 55: Air Quality Cumulative Impact Assessment. The assessment took into account the total emissions of carbon dioxide from all roads included in the traffic model within 10km of the proposed scheme. It shows that the proposed scheme is expected to bring about a small (9%) increase in emissions of carbon dioxide by 2026. The UK Climate Change Programme (2006) predicts that total carbon dioxide emissions are falling nationally and are expected to continue to fall, though emissions from the transport sector have been rising and are expected to continue to rise. The proposed scheme is likely to cause a 0.02% increase in the UK's total transport emissions in 2010 compared with the projected emissions for the do-minimum scenario for the same year.

Materials transportation

58.3.10 The Sustainable Scotland Network cites the local sourcing of goods and services as being vital to sustainable development (SSN 2005). The Scottish Sustainable Development Strategy 2005 and Scotland National Transport Strategy (2006) promote energy-efficient transport methods and encourage the movement of freight by routes other than road.

58.3.11 A significant amount of material will be required to be transported to and/or within the construction site, and includes:

Road and pathway construction materials:

- Road pavement materials including sub-base (crushed rock) or bituminous materials for the road pavement layers.
- Earthworks materials including topsoil, material excavated for reuse within the works and potentially unsuitable or contaminated material which is excavated and will have to be disposed off in appropriate tips, crushed rock for use as a special base layer for embankments if

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required, capping layer at the base of the road pavement if required or special fill materials at structures.

- Drainage apparatus including plastic and concrete pipes, manhole rings and covers, gullies, bedding and filter material (crushed aggregate) and concrete for pipe surrounds and manhole bases.
- Communications apparatus including plastic pipes, pipe bedding and surrounds (crushed aggregate), bricks for chambers, concrete for chamber bases or pipe surrounds.
- Materials for structures including concrete, piles, steel reinforcement, precast concrete or steel beams, steel bridge parapets and road pavement materials.
- Concrete kerbs and concrete or bituminous materials for footpaths.
- Safety barriers including posts, barrier and concrete for footings.
- Materials for temporary works, possible including temporary bridges, steel and timber supports (shuttering and formwork) for structures, timber to be used in setting out for the main road construction

Landscaping materials:

- Fencing materials including posts, rails, wire, mesh and concrete for footings.
- Drystone wall materials.
- Plants and grass seed for landscaping.

Road furniture and ancillary items:

- Special equipment such as traffic counters, CCTV cameras and variable message signs if required, together with posts or supports and concrete for these.
- Traffic signs, posts and concrete for post footings.
- Lighting columns, cabling and concrete for footings.

Resources required for construction:

- Labour
- Plant, machinery and vehicles
- Offices (portable units) and office materials

58.3.12 Material that can be sourced or manufactured within the site and reused in the works is described below under 'Resource Use'.

58.3.13 Transportation of materials can be categorised in two areas:

- Transport to the site
- Transport within the site

Transport to the Site

58.3.14 Rail is generally considered to be a more sustainable method of transport than road since it produces between five and ten times less emissions than road transport per tonne carried (EWS March 2007), and requires between four to seven times less energy per tonne (The case for rail, Railfuture 2004).

58.3.15 Transport to the AWPR site is however anticipated to be predominantly by road. This is due to the fact that there are good links to the trunk road network, particularly to the south, and it is unlikely that the significant quantity of materials required can be manufactured in the Aberdeen area. Due

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to European Union competition regulations, it is not possible to prescribe materials sources. As such, it is possible that materials will have to be transported from areas further afield than Aberdeenshire.

58.3.16 It should be noted that the choice of transport mode remains with the Contractor and it is possible that rail or sea transport could be used, however there are certain difficulties associated with this, namely:

- Currently there are no rail freight transfer depots in the area and this may make it difficult to use this method of transportation.
- Suitable suppliers of materials are likely to be widely distributed, easy access to ports for shipping materials to Aberdeen may not be available and time issues may make it more feasible to transport material by road.
- Rail or port deliveries have the potential to increase material delivery times when compared with road delivery, due to additional loading and unloading requirements, and haulage to the site from railway or ports.

58.3.17 It is not possible to determine the likely number of loads and distances that materials will be transported for the following reasons:

- The choice of suppliers will be made by the Contractor and as such the locations of suppliers cannot therefore be determined.
- The number of loads will depend on the size of vehicles used to transport materials and the mode of transportation adopted.

58.3.18 As described above, final transportation to the site will be by road irrespective of the mode selected to transport materials to the Aberdeen area. It is noted that the River Dee and River Don are not navigable waters and therefore could not be used for transportation of materials. The contract documents will include restrictions with regard to the roads that can be used by the contractor and suppliers. This normally restricts access to main routes and roads which can accommodate heavy goods vehicles and prevents use of roads which are unsuitable for HGV traffic. The restrictions will be set in consultation with the local authorities.

58.3.19 Access to the works will be at clearly identified site access points on permitted roads. The Contractor will have to agree the number and location of site accesses with Transport Scotland and/or the local authorities, depending on whether they are proposed to be provided connecting to the trunk or side road network.

Transport within the Site

58.3.20 Materials will be transported to site compounds or in some instances to the specific location in which they are to be used. The location of site compounds will be determined by the Contractor but due to the length of the scheme it is considered likely that there will be at least one main compound and several smaller satellite compounds along the route.

58.3.21 As described above, final access to the site will be by road and will be gained at specific site access points. Once delivery vehicles have accessed the site at an appropriate location, transport within the site will generally be along a haul road. Haul roads are constructed within the site boundary and are used to reduce the requirement for transport along the local road network and also, as described above, because access along certain roads will not be permitted.

58.3.22 Vehicles used to transport materials within the site will be road haulage vehicles for material transported to the site but is likely to be construction dump trucks for earthworks or aggregate materials sourced within the site.

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Resource Use

- 58.3.23 The UK Strategy for Sustainable Development (2005) and NPPG4: Land for Mineral Working highlight government support for increasing the amount of recycled and secondary aggregates used in construction to minimise the consumption of primary resources and the environmental impacts associated with primary extraction and waste disposal.
- 58.3.24 Recycled aggregates refer to aggregates that have been used previously in construction (construction and demolition wastes, asphalt road planings and used railway ballast), while secondary aggregates are by-products of other processes and will not have been used previously as aggregates (e.g. colliery spoil, power station and incinerator ashes).
- 58.3.25 The National Waste Strategy for Scotland (1999) published by SEPA provides guidance on how waste should be managed in Scotland in order to 'deal with waste in a more sustainable way'. The strategy promotes the waste hierarchy, encouraging waste reduction, re-use and recovery, making landfill the last option if none of the above can be achieved.
- 58.3.26 The WRAP Aggregates Programme was launched UK-wide in 2002 (2003 in Scotland) to promote the use of recycled and secondary aggregates. Through Scottish Executive funding via the Aggregates Levy, the programme sets annual targets for local authorities and other users for the increased usage of secondary and recycled materials. The aim for 2006 was 20% of aggregate used in local authority contracts to be recycled or secondary. Recycled and secondary aggregates have the potential to meet 25% of Scotland's needs for construction aggregates within the built environment (Scottish Executive 2006). The WRAP Business Plan for 2006-2008 sets the following targets for the construction industry in the UK:
- £10 billion worth of construction projects to set requirements for waste minimisation, recycling and recycled content.
 - 1.7 million tonnes of material to be diverted from landfill or avoided from being extracted from primary resources.
 - £50 million savings to the construction sector from minimising site waste and recycling more.

Recycling within the scheme

- 58.3.27 Although details cannot be determined at this stage, materials that would typically be sourced and reused within the works include:
- Earthworks materials including topsoil, material excavated in cuttings for reuse within the works in embankments, rock excavated in cuttings and processed for use as a special base layer for embankments, if required, or capping layer at the base of the road pavement, if required.
 - Rock excavated in cuttings and processed for use as aggregates for drainage filter material, concrete, road pavement materials and special fill materials at structures.
 - Materials for drystone walls.

Earthworks

- 58.3.28 Efficiencies and economies in earthworks construction are generally gained through sourcing significant quantities of materials from within the site and reusing them within the works. In addition, economies are generally achieved through minimising the transport distance for materials to be reused in the works, which will require fewer haulage vehicles to be used. The outline design has been developed to try and achieve an earthworks balance as far as practicable and it is anticipated that the Contractor will aim to develop the outline design further within the constraints of the Environmental Statement to achieve this.
- 58.3.29 Material excavated can generally be classed as four types:

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- Topsoil – will be stripped and stored adjacent to the works. This will be reused on cutting and embankment side slopes.
- Class 1 or 2 fill – material is an engineering soil suitable for constructing embankments and material excavated will be transported from cuttings to embankment locations to be reused.
- Class 4 fill – a soil which is less suitable for use as engineering fill but is suitable for using as a landscaping fill and can be used in flatter embankment slopes or to construct bunds. It should also be noted, however, that the Contractor may choose to improve a Class 4 material so that it can be reused in engineering embankments to improve the overall earthworks balance and reduce the amount of material that may have to be disposed of off-site.
- Rock – can be reused both as an engineering fill and, depending on its chemical composition and material properties, as an aggregate in other areas of the works.

58.3.30 It is estimated that approximately 8,000,000m³ (18,000,000 tonnes) of material will be excavated and reused within the works. Transporting this material could result in approximately 800,000 vehicle trips within the site.

Aggregate

58.3.31 Aggregates are required in various elements of the works including:

- Concrete
- Road pavement materials
- Pipe bedding and filter material for communications ducts and drainage trenches
- Special fills for structures

58.3.32 Aggregates can be sourced from quarries which would involve them being transported to the site. As an element of compliance to current UK legislation on the use of recycled and secondary aggregate, many suppliers of aggregate and concrete have environmental policies in place which follow current legislation and seek to recycle materials and reduce carbon emissions in every aspect of their procedures and products. If the aggregate requirement for the scheme cannot be met from materials excavated within the scheme boundary, by sourcing material from a supplier with sustainability policies in place, the impact on the environment can be minimised at source. Sourcing of material will however be the decision of the Contractor so specific supplier details are unknown at this stage.

58.3.33 Alternatively, if there are sufficient quantities of rock available and it is suitable in terms of its chemical composition and material properties, it can be processed on site for reuse as aggregate. In addition, for major projects, it may prove economical to open a concrete batching plant and/or blacktop batching plant on site. All of these are possibilities on AWPR and could result in shorter distances for transport of materials.

58.3.34 In terms of sustainability, reuse of aggregate on site is the preferred option, if practicable, which would assist in achieving WRAP and government targets of 25% recycled and secondary aggregate use in the construction industry in Scotland.

58.3.35 It is estimated that approximately 670,000m³ (1,400,000 tonnes) of aggregate is required within the works and this could be provided by processing rock excavated within the site. Transporting this material could result in approximately 70,000 vehicle trips within the site.

Landscaping

58.3.36 In conjunction with the National Waste Strategy for Scotland (1999) the landscaping plans for the AWPR will promote the recovery and reuse of potential waste by utilising existing soils. It is anticipated that all soils will be sourced from within the scheme boundary and will meet the demand

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of the proposed scheme landscaping. Soil import is not thought to be required. Should there be a small surplus of material, this may be used for additional grading out of embankments.

58.3.37 Planting will typically be from local species stock suited to the local soils and landscape character area. Plant suppliers should be encouraged to use peat free compost. There may be an opportunity for natural regeneration on some areas of proposed grassland rather than seeding.

58.3.38 Felled timber will be recycled for use in habitat creation and also turned into mulch or compost for use in the scheme.

Drystone Walls

58.3.39 The route crosses the line of many existing drystone walls and the landscape mitigation design includes construction of new drystone walls. It is envisaged that the material from existing walls that are removed will be stored on site and reused to construct the new walls. Drystone can also be stored and reused in the construction of bridge aprons to fit in with existing structures in the landscape.

58.3.40 The total length of wall to be removed is 35,000m comprising approximately 12600m³ (25000 tonnes) of stone. The total length of new wall to be provided is 26,500m, comprising approximately 9500m³ (19000 tonnes) of stone. The remaining 3100m³ or 6000 tonnes will be used as aesthetic treatments for structures. Therefore all drystone wall material being removed will be reused within the works.

Compliance

58.3.41 The Contractor will require to be accredited in accordance with BS EN ISO 14001 Environmental Management Systems and be committed to measures including reducing waste, recycling materials and reusing materials within the works where practicable.

58.3.42 The Environmental Management Plan which will ensure that mitigation measures are implemented in accordance with the EIA documents should also incorporate a Waste Management Plan in accordance with "Waste Management – A Duty of Care – A Code of Practice" – HMSO 1991.

Summary

58.3.43 Sustainability practices can be incorporated into the construction of the proposed scheme as identified above. By implementation of appropriate environmental strategies including an environmental management system, and the re-use of materials where practicable, the construction of the AWPR would assist in meeting sustainability targets of UK and local government policy and guidance. The potential reuse of 18 million tonnes of earthworks material and 1.4 million tonnes of aggregate will reduce potential pressure on landfill sites during the construction of the proposed scheme and assist in meeting WRAPs targets for waste minimisation and recycling. It is noted, however, that the Contractor will ultimately decide where and how material will be sourced and transported, although he should be encouraged to follow sustainable practices...

58.4 Conclusions

58.4.1 Conclusions and recommendations in relation to this Sustainability Appraisal are provided within Chapter 59 (Conclusions), whilst a summary of the key scheme impacts is provided within Chapter 53 (Summary of Key Scheme Impacts).

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58.5 References

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