

33 Disruption Due to Construction

This chapter considers the likely impacts of construction works for the Southern Leg of the proposed scheme on people and the natural environment. The operation of equipment and/or the movement of heavy construction traffic can create nuisance including noise, vibration, dust and loss of amenity. Construction activities can potentially impact upon pedestrian access routes, and on the natural environment through disturbance to wildlife, pollution of watercourses or by storage of materials on ecologically valuable land.

Subject to the implementation of the necessary mitigation measures, it is considered that most construction impacts on people and on features of environmental interest could be suitably reduced or avoided. The main impacts during construction would be those relating to noise, dust, the water environment and ecology. Changes to traffic flows and pedestrian access would also be likely to result in impacts, and will require careful management. With mitigation, dust-soiling effects are reduced to within a 100m corridor at approximately 170 properties, while risk of enhanced PM₁₀ concentrations at 50m from the scheme would be likely to result at 65 properties. Adverse noise impacts would be likely on several properties in close proximity to the proposed scheme.

33.1 Introduction

- 33.1.1 This chapter assesses impacts that are generally temporary and occur prior to (e.g. diversion of utilities) or during construction. Nuisance can arise due to a range of issues including noise, vibration, dust and loss of amenity caused by the operation of equipment or from the movement of heavy construction traffic. Construction activities can impact routes utilised by different types of user including vehicular, pedestrian and cyclist. There is also the potential for impacts on the natural environment through disturbance to wildlife, pollution of watercourses or by storage of materials on ecologically valuable land.
- 33.1.2 Impacts may be related to the construction programme, methods of working and numbers and types of plant. This assessment considers the types of activities that may give rise to significant effects and makes recommendations as to how these can be avoided or mitigated to minimise the risk of impacts. These mitigation measures will form part of the Employers Requirements and the Contractor will therefore be obligated to ensure that these are implemented.
- 33.1.3 The indicative construction programme comprises a start date in Spring 2010 with an approximate duration of 34 months including completion of the new road, construction of river crossings, bridges, underpasses, and culverts. Further details of the works required are provided in Chapter 4 (The Proposed Scheme).

33.2 Approach and Methods

- 33.2.1 The assessment of the potential impacts of the proposed scheme during construction was undertaken in accordance with the Design Manual for Roads and Bridges (DMRB) Volume 11, Section 3, Part 3 (The Highways Agency et. al., 1993).

Scope of Assessment

- 33.2.2 Where the assessment of construction impacts on an environmental parameter requires interpretation of detailed and/or technical baseline or impact data, or where construction impacts and operational impacts are interlinked, these impacts are reported within the relevant chapter. This applies to Chapter 23 (Geology, Contaminated Land and Groundwater), Chapter 24 (Water Environment), Chapter 25 (Ecology and Nature Conservation) and Chapter 28 (Cultural Heritage). However, Section 33.9 of this chapter summarises construction impacts for these environmental parameters.

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- 33.2.3 Compliance with policies and plans (see Chapter 34: Policies and Plans) is not considered likely to be affected by construction works and is therefore omitted from this assessment.
- 33.2.4 Potential temporary construction impacts and proposed mitigation measures for all remaining environmental parameters assessed in this ES are considered within this chapter. These are:
- Land Use;
 - Landscape and Visual;
 - Air Quality;
 - Noise and Vibration;
 - Pedestrians, Cyclists, Equestrians and Community Effects; and
 - Vehicle Travellers.
- 33.2.5 It should be noted that the application of 100m and 50m distance bands to identify numbers of receptors which may be affected by different forms and sources of disruption impacts, such as dust and noise, is used flexibly to reflect the particular sensitivities of receptors and the location of the construction activity.
- 33.2.6 Other issues relevant to disruption due to construction are considered in section 33.10.

Limitations to Assessment

- 33.2.7 As the precise details of the construction programme and approach have not yet been determined, the assessment of disruption due to construction has generally been made qualitatively, except where reliable quantitative data were available.

33.3 Land Use

Introduction

- 33.3.1 Land use issues involve the temporary change in use of land or viability of land use (including farms and other business) as a consequence of construction activities.
- 33.3.2 The land necessary to construct the proposed road scheme will generally be acquired by Compulsory Purchase Order (CPO), with some additional land acquired by agreement with landowners. This land would be used for:
- the provision of a working corridor; construction of the road, bridges and associated earthworks;
 - temporary river or stream diversions and ponds;
 - storage of materials and necessary construction plant; and
 - the implementation of mitigation measures e.g. landscape.
- 33.3.3 The change in land use for the majority of the area required for the scheme would therefore be a permanent one, the implications of which are assessed in Chapter 22 (Land Use). However, areas of land where embankments have been graded to a slope which is suitable for agricultural production may be returned to agricultural use.

Potential Impacts

- 33.3.4 The principal land use in the Southern Leg study area is agriculture (arable and grazing). The key potential temporary impacts are those that may affect farming practices such as arable crop production, although there may be more localised potential for impacts on other land uses, such as

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commercial and residential areas (e.g. Charlestown, Milltimber and Kingswells), businesses, community land and sporting interests.

33.3.5 The following potential impacts have been identified:

- damage to land (e.g. movement of machinery, storage of materials, access routes);
- reduced soil quality (including organic process, structural and chemical damage and erosion), which can cause long term damage including reduced agricultural capability of the soils;
- dust and emission impacts on arable crop production (e.g. dust covering plant leaves and reducing photosynthesis);
- temporary restriction of access to farm buildings;
- temporary severance of land causing disruption to farming practices, including preventing movement of machinery or livestock; and
- temporary restriction of access to local business premises and community land.

Mitigation

33.3.6 The following measures are proposed to mitigate construction impacts on land use:

- restriction of construction activities to a working corridor, defined by or within the CPO together with additional areas purchased by agreement, where possible;
- reduction of temporary land loss to agriculture and forestry during construction through construction programming, consultation with land interests and reinstatement of agricultural land, post construction;
- maintenance of agricultural land capability and avoidance of flood issues through pre-construction drainage works where required and reinstatement/provision of new drainage as required;
- maintenance of vehicular access to all farm buildings. This should be sufficient to enable normal practices to be carried out e.g. arrival/departure of lorries. Where access will require to be altered either temporarily or permanently as a result of construction, alternative access for stock and machinery will be provided as appropriate in consultation with the land owner/occupier. Recessed access to be provided off main and side roads as appropriate with loading/unloading area if required.
- maintenance of access to other business premises (e.g. arrival/departure of customers);
- avoidance of severance of farm land, where possible; and
- adherence to best practice through adoption of procedures relating to soil stripping, handling and storage during construction and reinstatement, limiting damage to agricultural capability of soils and to control dust generation and dispersal.

33.3.7 Claims for reasonable financial compensation can be made for areas of agriculture land, woodland or forestry lost as a result of the proposed scheme and appropriate compensation provided following consideration by the District Valuer.

33.3.8 Provided that the above mitigation measures are implemented, it is considered that no significant disruption due to construction will occur in relation to land use.

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33.4 Landscape and Visual

Introduction

33.4.1 This section identifies the potential impacts of construction activities on the landscape and on the visual amenity of the Southern Leg study area, and proposes appropriate mitigation measures. Landscape and visual issues are particularly important due to the scale of construction of the proposed scheme. The study area is predominantly rural landscape characterised by rolling hills, areas of woodland and open farmland. A notable feature in the landscape is the Dee Valley, which meanders in a northeast/southwest direction across the area. Settlements have developed along the northern slopes of the Dee valley and in the rolling landscape west of Aberdeen city boundaries.

Potential Impacts

33.4.2 The construction activities associated with road schemes generally cause temporary adverse landscape and visual impacts typically resulting from:

- vehicles moving machinery and materials to and from the site;
- machinery including heavy excavators, earth moving plant, concrete batching plant, pile drivers, cranes etc;
- exposed bare earth over the extent of the proposed works;
- structures, earthworks, road surfacing and ancillary works during construction;
- temporary site compound areas including site accommodation and parking;
- temporary soil storage heaps and construction material stockpiles;
- lighting associated with night-time working and site accommodation;
- traffic congestion and queuing during work to tie new road with existing road;
- demolition operations; and
- temporary works associated with bridge construction operations.

33.4.3 The most significant adverse landscape and visual impacts would be likely to occur in the vicinity of construction compounds and where major structures and/or earthworks are being erected or carried out. Noise and dust impacts resulting from these works could reduce the enjoyment of the landscape and dust could reduce the visual amenity of the area. The locations where these impacts would be likely to occur are as follows:

- West of Charleston Junction (major junction construction; traffic disruption/congestion; cutting and embankment earthworks; overbridge construction);
- Between Duff's Hill, passing to the south of Hare Moss (embankment earthworks; overbridge; culvert and pond construction);
- South of Hill of Blairs (traffic disruption/cutting; cutting earthworks; overbridge);
- Cleanhill Junction (roundabout construction; traffic disruption/cutting; culvert and pond construction);
- Blaikiewell Burn (embankment earthworks; underbridge; track construction);
- Cleanhill Wood (cutting earthworks; Kingcausie/Eastland underpass construction; culvert construction);
- River Dee (bridge construction);
- North of the River Dee (embankment earthworks; underpass, culvert and track construction);

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- Milltimber to Beanshill (major junction and roundabout construction; traffic disruption/congestion; cutting earthworks; overbridges; NMU track and pond construction);
- Silverburn (traffic disruption/congestion; embankment earthworks; underpasses; culvert and pond construction);
- West of Moss of Auchlea (embankment earthworks; underpass and culvert construction);
- A944 (South Kingwells junction and roundabout construction; traffic disruption/congestion; cutting earthworks; pond construction);
- North of the A944 (cutting earthworks);
- Cloghill (cutting earthworks; overbridge and track construction);
- Between Cloghill and Fairley (embankment earthworks); and
- Derbeth Farm (cutting earthworks; overbridge).

33.4.4 Night-time construction activities may also be required, particularly to minimise disruption to traffic. This would involve the use of lighting equipment, which could cause glare potentially affecting residents in the immediate vicinity during this period.

Mitigation

33.4.5 The following mitigation measures are proposed to avoid or reduce landscape and visual impacts. This is particularly important in close proximity to residential receptors and in areas where the landscape is very open:

- programming of works to minimise disruption including keeping the construction programme to the minimum practicable time and clearing areas for construction as close as possible to works commencing;
- careful selection of plant and machinery;
avoidance of night-time working where possible. Where necessary, directed lighting will be used to minimise light pollution/glare. In addition to specific approval from the relevant road authority, the Contractor may be required to comply with the specific requirements of the Local Authority, which may include providing advice to potentially affected residents,
- sensitive locating of site compounds to minimise their landscape and visual impact. Where possible existing features such as trees should be used to screen from sensitive visual receptors. Where this is not possible, screening can be achieved using bunds or embankments which become part of the permanent works. Alternatively, temporary screens can be erected, designed and painted to be as inconspicuous in their surroundings as possible; and
- construction sites to be kept tidy (e.g. free of litter and debris);

33.4.6 Traffic congestion is a major source of landscape and visual impact during the construction period and consequently, this should also be minimised. Further information is provided in section 33.8;

33.4.7 Measures to control dust and noise impacts are provided in sections 33.5 and 33.6, respectively.

33.4.8 The above measures will help to reduce the landscape and visual impacts during construction. However, due to the extensive construction works necessary, these can not be completely mitigated.

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33.5 Air Quality

Introduction

33.5.1 Site preparation and construction works would have the potential to generate dust. The main sources of dust would be earth movement during site preparation and vehicles travelling over unpaved ground during dry weather. There would also be the potential for some dust generation from construction activities such as handling of dusty materials and cutting of stone/concrete. In addition, local air quality may be influenced by exhaust emissions from construction plant and site vehicles. All construction related emissions would be temporary and would vary daily, depending on the type of work being undertaken.

Sources of Dust

33.5.2 Dust emissions during construction could give rise to increased dust deposition and elevated airborne particulate matter (PM₁₀) concentrations. The potential effects that arise from these impacts are:

- soiling of cars, windows, painted surfaces etc. by deposited dust;
- damage to vegetation from deposited dust;
- damage to crops or commercial operations from deposited dust; and
- health effects from exposure to PM₁₀.

33.5.3 Dust levels and, more importantly, particle concentrations decline rapidly moving away from the source due to dispersion and dilution.

33.5.4 The effects of construction may be experienced at different locations during the construction process, depending on the areas under construction at any one time and the distance to likely receptors. As a result of the changing nature and location of the construction activity, an estimate of the 'total' construction emissions is not possible.

33.5.5 The potential for dust emissions depends on meteorological conditions; in particular whether the ground is damp. The risk of an impact would also depend on whether the source were upwind of a receptor at the time of the emission (Table 33.1).

Table 33.1 - Potential Sources of Air Pollution During Construction

Source	Comments
Direct mechanical disturbance of soil, aggregate, sand, stone-fill, cement and other similar materials during site works.	Disturbance of dry granular materials would lead to the generation of airborne dust.
Disturbance of mud and other deposits on paved and unpaved roadways by vehicle movements.	The mechanical disturbance of dried mud by vehicle movements combined with the grinding of mud into finer particles contributes to potential dust emissions during periods of dry weather, particularly in summer.
Wind-blow affecting surface layers of stockpiled materials, stripped soil or dirt on roadways or other surfaces, and uncovered loads in trucks.	More likely to occur between May and August, when average rates of evaporation in central Scotland exceed those of precipitation and un-vegetated soils and other bulk materials are likely to be subject to wind-blow during periods of dry weather. Wind speeds have to be gusting above about 5 m/s to raise dust.
Vehicle and plant emissions.	Vehicle and plant emissions would be essentially the same as those from the exhausts of existing lorries and buses on the local roads. These would contribute to PM ₁₀ and nitrogen dioxide concentrations.

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- 33.5.6 The main issue relating to airborne dust during construction is the potential for nuisance impacts on local residents, pedestrians and cyclists. There is no current statutory requirement relating to the control of dust except that of nuisance, under The Environment Protection Act 1990.

Assessment Criteria

- 33.5.7 There are no nationally recognised assessment criteria for construction dust. It is therefore, common practice to employ indirect assessment criteria, based on the distance within which there is a risk of significant impacts and to focus on mitigating any potential dust impacts wherever possible. The distance criteria used are set out in Table 33.2. They are based on the professional judgment from involvement with assessments of many different types of project, discussions with many practitioners in the field and from published reports.

Table 33.2 - Assessment Criteria for Dust from Construction Activities

Source		Potential Distance for Significant Effects (Distance from source of dust)		
Description	Scale of Activity	Soiling	PM ₁₀ ^a	Vegetation effects
No Mitigation				
Large sites, with high use of haul routes	Major	500 m	200 m	100 m
Moderate sized sites, with moderate use of haul routes	Moderate	200 m	100 m	50 m
Minor sites, with limited use of haul routes	Minor	100 m	50 m	25 m
With Mitigation				
Large sites, with high use of haul routes	Major	100 m	50 m	25 m
Moderate sized sites, with moderate use of haul routes	Moderate	50 m	30 m	15 m
Minor sites, with limited use of haul routes	Minor	25 m	20 m	10 m

^a Significance is based on the 2010 objective, as defined in the Air Quality (Scotland) Regulations 2000 and Amendment Regulations 2002, which allows 7 exceedences/year of 50 µg/m³.

Potential Impacts

- 33.5.8 The overall construction programme is expected to be phased over approximately three years and it is likely that sections would be built concurrently. In most instances, the work would only take place close to a specific location for a relatively short period of time. The scale of activities on the Southern Leg is judged to be major in terms of the criteria set out in Table 33.2.
- 33.5.9 Most or all of the construction works, road laying, and haul routes are expected to be contained within the land acquired for the scheme, the majority of which is intended to be purchased through CPO. It has thus been assumed that major dust raising activities might occur anywhere within this area.
- 33.5.10 As detailed in Table 33.3, the potential distance for significant dust impacts from source would vary according to the mitigation measures applied. In terms of the criteria set out, with no appropriate mitigation measures in place, there is the possibility of increased soiling out to around 500m from the edge of the construction works. There would thus be a risk of dust-soiling effects due to construction of the Southern Leg at approximately 1270 properties. With the appropriate mitigation measures in place (see below), fewer properties would likely be affected. The distance at which there would be risk of dust soiling is reduced to 100m. At this distance, 170 properties may experience some significant dust soiling.

Table 33.3 - Number of Properties that may experience Significant Dust Effects

Source		Potential Distance for Significant Effects (Distance from source of dust)	
Description	Scale of Activity	Soiling	PM ₁₀ ^a
No Mitigation			
Large sites, with high use of haul routes	Major	500 m	200 m
Number of Properties Affected		1270	320
With Mitigation			
Large sites, with high use of haul routes	Major	100 m	50 m
Number of Properties Affected		170^b	65^b

^a Significance is based on the 2010 Air Quality (Scotland) Regulations objective, which allows 7 exceedences/year of 50 µg/m³. ^b Numbers take account of those properties that are due to be demolished- i.e. these are not counted.

- 33.5.11 Overbridges and a number of culverts would be demolished and/or constructed. There would be a risk of dust impacts during the demolition, although this would occur over a short period. There would likely be limited opportunity for dust to be created during the construction period. There are however, residential properties close to these bridges, which may be at slightly greater risk of being affected by dust soiling and PM₁₀ than that from the rest of the scheme works alone.
- 33.5.12 It is estimated that without appropriate mitigation, there are approximately 320 properties within 200m of the proposed construction works that may be at risk of significant PM₁₀ impacts. With the implementation of mitigation, PM₁₀ impacts may occur within 50m of the proposed scheme during major construction activities. It is therefore estimated that 65 properties may experience significant PM₁₀ impacts.
- 33.5.13 Construction activities would occur close to the River Dee SAC and it may therefore experience a certain amount of deposited dust. The amount of dust deposited would likely be inconsequential in relation to the naturally present suspended solids load of the river.
- 33.5.14 The southern section of the AWPR would cross two land interests of organically farmed land: Craiglug and Auchlea. With no mitigation, there is the potential for significant vegetation effects within 100m of the proposed works. With mitigation, this distance would be reduced to 25m and thus effects would be confined within the immediate vicinity of the proposed works.
- 33.5.15 Any dust incidents would be highly dependent on the weather, requiring dry conditions and winds blowing towards a receptor. This would also need to be combined with an activity creating dust close to the receptor. The combination of conditions to allow significant dust soiling or enhancement of PM₁₀ concentrations at any off-site location would be expected to be very infrequent, with the application of mitigation measures. It is unlikely that any properties would be affected by dust-soiling or enhanced PM₁₀ concentrations for the full duration of the construction period.
- 33.5.16 The number of construction vehicles on the local roads would vary over time, depending on the works activities taking place. The impact of construction traffic would be insignificant as it would be minor and temporary, in comparison with emissions from the vehicles on the local roads.

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Mitigation

- 33.5.17 During construction, it will be necessary to apply mitigation measures to minimise dust impacts. These measures are standard practice on construction sites that are generally aimed at preventing dust generation at source, and include:
- use of pumped spray water-bowsers to ensure that unsealed routes used by construction vehicles are maintained in a damp condition when in use;
 - imposition and enforcement of a speed limit of no greater than 15mph on unsealed ground;
 - location of stockpiles of potentially dusty material as far from sensitive off-site locations as possible;
 - stockpiles to be covered to minimise dust generation;
 - stabilisation of finished embankments by seeding as soon as possible;
 - regular use of water assisted dust sweepers on local roads if necessary, to remove any material tracked off site;
 - regular cleaning of sealed areas on-site;
 - use of water suppression during any cutting of stone or concrete; and
 - regular maintenance of site plant and vehicles to minimise emissions.
- 33.5.18 During all stages of construction, there will be liaison with residents and commercial operators in the area, which may include establishing a well-publicised hotline, together with a rapid response procedure to address concerns that may arise.
- 33.5.19 The construction works plan would contain specific restrictions regarding traffic management and routing of vehicles to and from the site. The programme for the construction of the works will require approval by the client's representative on site.
- 33.5.20 There remains a risk even with mitigation in place, that the following residual temporary impacts of moderate significance may occur, depending on meteorological conditions during construction:
- risk of occasional dust soiling for properties within approximately 100m of the proposed works; and
 - risk of occasional increases of PM₁₀ concentrations for some properties within approximately 25m of the works.

33.6 Noise and Vibration

Introduction

- 33.6.1 Noise and vibration are key issues associated with construction works and typically originate from plant and machinery. The extent of noise and vibration impacts would vary throughout the construction period and would depend on the Contractor's chosen methods of working, as well as the timing and phasing of certain operations.
- 33.6.2 Guidance on the prediction and control of construction site noise is provided in 'The Code of Practice BS 5228 (1997): Noise and Vibration Control on Construction and Open Sites'. BS 5228 notes that 'Good relations with people living and working in the vicinity of site operations are of paramount importance' and suggests that the early establishment and maintenance of these relations throughout the contract is important. It also suggests that the formation of liaison groups with members of the public can be considered for longer term projects where relatively large numbers of people are involved.

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- 33.6.3 Construction works are covered by statutory controls afforded by the Control of Pollution Act 1974. The provisions of sections 60 and 61 of this Act are of particular relevance. Section 60 enables a local authority to serve a notice specifying its noise control requirements covering plant or machinery that is or is not to be used, hours of working and levels of noise or vibration that can be emitted. Section 61 relates to prior consent, and provides for developers to approach the authority to agree control measures prior to commencement of work.
- 33.6.4 Permitted noise levels will be agreed with the local authorities and included in the Contract Documents. Guidance for typically acceptable levels of noise from construction sites used elsewhere in the country are provided in Table 33.4

Table 33.4 - Guidance on Construction Noise Limits

Pre-Contract Ambient Noise Levels $L_{Aeq,2h}$ (08.00-10.00 19.00-21.00 or as appropriate) (Façade)	Time Periods						
	Weekday working Monday to Friday					Weekends/Public Holidays	
	Day (07h00-19h00) <small>*$L_{Aeq,12hr}$</small>	L_{Amax} (Fast)	Evening (19h00-22h00) <small>*$L_{Aeq,3hr}$</small>	L_{Amax} (Fast)	Night Hours (22h00-07h00)	Saturday	Sunday/Public Holidays
35	65	86	55	65	Permission and guidance may be provided by local authorities on request	As week-day	Permission and guidance may be provided by local authorities on request
40	65	86	55	65			
45	65	86	60	70			
50	70	92	60	70			
55	75	96	65	75			
60	75	96	65	75			
65	75	96	65	75			
70	80	101	80	90			
75	80	101	80	90			

Note: L_{Amax} (Fast): Maximum A weighted sound pressure level on fast time weighting.

- 33.6.5 The Noise Insulation (Scotland) Regulations 1975 (NSR) make provision for roads authorities to carry out or make payable a grant to insulate an eligible building where noise levels are predicted to seriously affect the enjoyment of a building for a substantial period of time. The information regarding eligibility under NISR is provided in paragraph 15.2.29 of Chapter 15 (Traffic Noise and Vibration).

Potential Impacts

Noise Nuisance.

- 33.6.6 The main impacts during construction are expected to occur through earthmoving, piling and roadwork operations. The effects of nearby construction activity on the existing noise climate of adjacent properties would depend largely on the proximity of plant and nature of works undertaken and a quantitative assessment of construction noise is therefore not possible at this stage.
- 33.6.7 Piling works would be required for the construction of piers for the new bridge of the River Dee and potentially during embankment works. The method of piling proposed would involve using diesel-powered hammers to drive the piles. Noise levels can therefore be predicted for this particular operation, although such predictions are liable to change should the method for piling works be amended by the Contractor.

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- 33.6.8 If rock is encountered during works, a bulldozer may be required for excavating the rock or blasting may be necessary in order to excavate. Blasting is typically used for the removal of large quantities of rock or for harder rock which cannot be excavated by mechanical means. Blasting would involve drilling holes to the required depth in the rock, placing charges and detonators and would result in increased noise levels. It should also be noted that alternatives to mechanical excavation or blasting do exist and may be employed by the contractor.

Vibration Nuisance

- 33.6.9 The sensitivity of humans to vibration is low, with the threshold of perception being typically as low as 0.15mm/s PPV (peak particle velocity). Vibration nuisance is frequently associated with the assumption that if vibrations can be felt, then damage is inevitable. However considerably greater levels of vibration are required to cause damage to buildings (>15mm/s). There is potential therefore that vibrations transmitted from site activities to cause anxiety as well as nuisance and could disturb sleep, work or leisure activities, although not being great enough to cause structural damage.
- 33.6.10 It is likely that although residents of nearby properties may perceive occasional, temporary periods of vibration due to operations such as piling. Piling has the potential to cause vibration that may affect buildings and people in the vicinity. Typical vibration levels can be predicted at nearby properties using methods provided by BS5228 Part 4: 'Code of Practice for Noise and Vibration Control Applicable to Piling Operations' though this has not been undertaken for the River Dee at present since exact piling operations are unknown. It is likely that, although residents of nearby properties may perceive vibration due to operations such as piling, levels would be below that to cause building damage.

Mitigation

- 33.6.11 The Contractor will be required to adopt best practicable means. The term 'Best Practicable Means' is defined in Section 72 of the Control of Pollution Act as those which are 'reasonably practicable having regard among other things to local conditions and circumstances, to the current state of technical knowledge and to the financial implications'.
- 33.6.12 Mitigation measures to avoid or reduce noise and vibration impacts will include the following as appropriate:
- use of noise barriers to reduce noise levels (from machinery) at receptor locations;
 - ensure that piling works are kept to a practicable minimum;
 - ensuring that all equipment is maintained according to manufacturer specification;
 - suitable distancing of any noisy plant from sensitive locations;
 - switching off machinery and vehicles not in use, particularly close to properties;
 - noise monitoring, with recorded data made available to local Council Environmental Health Departments;
 - compliance with BS 5228:1997 Part 1, Code of Practice for basic information and procedures for noise control, so that best practicable means for minimising noise and vibration at the site are employed;
 - threshold limits for noise and vibration, to be agreed with Aberdeen City and Aberdeenshire Councils, will be stated within the contract documents;
 - vibration monitoring; and
 - undertaking dilapidation surveys of selected properties.

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- 33.6.13 It is proposed that a liaison group is established to inform the local community in advance of particularly noisy periods of daytime and night time working. In addition the Contractor will be required to:
- provide local residents with a named contact to respond to any noise/vibration concerns or nuisance; and
 - keep a record of any concerns and the remedial actions taken.
- 33.6.14 However, to minimise noise and vibration disruption due to the construction of the scheme, noise and vibration. Controls and any monitoring will be agreed between the Contractor and the Environmental Health Departments of Aberdeen City and Aberdeenshire Councils. These will define noise limits for general works and for piling works during weekday (Monday-Friday) and weekend (Saturday) periods.
- 33.6.15 The above mitigation measures will significantly reduce the incidences of noise and vibration nuisance.

33.7 Pedestrians, Cyclists, Equestrians and Community Effects

Introduction

- 33.7.1 The study area is characterised by rural fields and woodlands with scattered farms connected to small settlements via a network of minor roads and tracks. It is therefore well established as a recreational resource for pedestrians, cyclists and equestrians with many routes identified in the Scottish Paths Record, the proposed core path network being developed by the Local Authorities, and a number of pedestrian Right of Ways (ROWs). Routes are also used to gain access to community facilities such as schools, churches, libraries, doctors and hospitals in the main settlements of Peterculter, Milltimber, Westhill and Kingswells.
- 33.7.2 The proposed scheme would bisect several of these routes and access may therefore be affected during construction. The key long distance route that would potentially be affected by the proposed scheme is the National Cycle Route 1, which uses the network of minor roads in the area to allow cyclists to travel from Aberdeen to Stonehaven.

Potential Impacts

- 33.7.3 During construction of the proposed scheme, restriction of access such as temporary footpath closures or diversions may be necessary. This may temporarily increase journey lengths and routes for pedestrians and others, with consequent adverse impacts on commuting and/or recreational journeys. There is also the potential for access limitations at businesses and private property.
- 33.7.4 To restrict potential for disruption and to avoid health and safety hazards, the construction site will be fenced and access by pedestrians and others will generally not be permitted. Diversion routes and controlled access across the site will be provided during works.
- 33.7.5 The closure of recreational routes will be avoided where possible. However, during construction and modification of routes, including construction of underpasses and overbridges, short-term temporary closure may be required.
- 33.7.6 Construction works may also affect amenity value through the creation of noise, dust and reduction in visual amenity. These issues are discussed in the corresponding sections of this chapter.

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Mitigation

- 33.7.7 The following measures are proposed to mitigate effects on pedestrians and others:
- the construction works will be programmed to be as short a duration as possible to reduce the length of access closures and restrictions;
 - the Contractor will be required to ensure that adequate access to businesses and properties is maintained throughout construction works;
 - other routes used by pedestrians and others will be maintained or re-routed where possible;
 - any closure or re-routing of routes used by pedestrians and others will require to be agreed in advance with the local Councils;
 - security measures, such as fencing, shall be put in place by the Contractor to prevent unauthorised access to the construction site (refer to Section 18.10);
 - minimise air quality and noise impacts where possible (refer to Sections 33.6 and 33.7); and
 - minimise the visual impact of the construction works (refer to Section 33.5).
- 33.7.8 The above mitigation measures will reduce impacts on pedestrians and others, although adverse disruption to journeys is still likely to be experienced during the construction period.

33.8 Vehicle Travellers

Introduction

- 33.8.1 Construction impacts on vehicle travellers were considered in terms of driver stress (such as from traffic congestion or driver uncertainty) and view from the road.
- 33.8.2 As the proposed Southern Leg would be an entirely new route, a detailed comparison of the baseline conditions with the proposed scheme has not been possible. However, the existing A90(T) journey from Charleston to the end of the Northern Leg at Blackdog has been assessed for comparison in Chapter 32 (Vehicle Travellers).

Potential Impacts

- 33.8.3 Impacts are most likely to occur at periods of peak flow. The majority of road works would occur during the hours of 07:00-19:00 (Monday to Friday) and 07:00-13:00 (Saturday). Occasionally, night-time working may be required such as during tie-in of the new road with existing minor roads.
- 33.8.4 It is anticipated that driver stress is likely to be increased during construction works that directly affect existing minor roads during road diversions and other temporary measures. This for example would be caused by increases in journey times and increased delays caused by temporary traffic lights, diversions, queuing traffic and construction traffic.
- 33.8.5 Negative impacts on drivers' view from the existing minor roads are predicted due to the visual impact of construction works. Mitigation to address visual impacts during both construction and operation are provided in Section 33.4.

Mitigation

- 33.8.6 To minimise impacts on vehicle travellers the following mitigation measures are proposed:
- works will be scheduled where possible to minimise disruption to the road traffic, including the timing of works vehicles using public roads and delivery/removal of site materials;

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- minimise import/export of material, for example by balancing sections of cut and fill where possible. Excavated material will be reused within the site either as structural fill material to construct road embankments or as landscape fill material, depending on its properties;
- road closures will be avoided where possible. No lane closures will be permitted during peak hours except in exceptional circumstances. Normally, temporary lanes will be required if existing lanes are to be closed, although this may not be possible in all cases;
- temporary traffic management will be designed to minimise disruption and delays;
- road diversions will be clearly indicated with road markings and signage as appropriate; and
- if contraflows are required overnight or structures are to be constructed over moving traffic overnight then appropriate lighting will be provided.

33.8.7 Provided that the above measures are implemented, it is considered that driver stress and drivers' view from the road would be managed to the extent that they would not cause significant impact. Traffic flows will be maintained in all but occasional circumstances, and these will be scheduled to occur when they will have least impact (e.g. night-time) where possible.

33.9 Summary of Construction Impacts on Other Environmental Parameters

Geology, Contaminated Land and Groundwater

33.9.1 The construction phase has particular potential to impact on groundwater, and monitoring of groundwater levels and quality is proposed during construction to identify any potential issues. Where possible, temporary site drainage features will not be located close to groundwaters used for drinking water abstraction, and if this can not be achieved then lining of drainage features may be required to prevent contamination. Any contaminated land identified during construction will also need to be treated and remediated or disposed off-site in accordance with regulatory requirements.

33.9.2 Measures to control the impacts associated with rock blasting on groundwater are detailed in Appendix A8.2 (Blasting Assessment). Geology, Contaminated Land and Groundwater issues during construction are considered in Chapter 23 (Geology, Contaminated Land and Groundwater).

Water Environment

33.9.3 The construction phase has considerable potential to impact on the water environment. The River Dee, approximately 19 other watercourses or field ditches, one loch, several small ponds and two moss features were identified within the study area. Throughout the construction phase, there is the potential to cause long-term or permanent effects on surface water hydrology, water quality, and geomorphology through increased flow, pollution of waters and increased sediment loading.

33.9.4 Construction impacts on the water environment are assessed fully in Chapter 24 (Water Environment), with mitigation proposed to avoid or reduce impacts.

Ecology and Nature Conservation

33.9.5 The construction phase has considerable potential to impact on ecology and nature conservation interests. Potential impacts include displacement due to noise or ground disturbance, pollution, severance of migratory or foraging routes, and loss of habitat. Appropriate mitigation will be required to avoid long-term or permanent ecological changes.

33.9.6 Construction impacts on ecology and nature conservation are assessed in Chapter 25 (Ecology and Nature Conservation).

Cultural Heritage

- 33.9.7 The majority of impacts on cultural heritage would occur during construction, with only limited impacts occurring during scheme operation (e.g. on the value of the setting of cultural heritage sites). However, these impacts would usually be permanent (e.g. loss or severance of sites). Impacts on features of cultural heritage and mitigation measures associated with construction activities are therefore addressed in Chapter 28 (Cultural Heritage).

33.10 Other Issues of Relevance to Construction Works

Site Safety and Security

- 33.10.1 Safety and security issues associated with the construction of the Southern Leg of the proposed scheme include potential disruption of traffic movements, including potential for obstruction of access to local properties by emergency service vehicles. Heavy vehicle movements, possible contaminated soils excavation and transport, and construction site activity could also create potential safety concerns.
- 33.10.2 Best construction management practices will be in place to ensure the safety of construction workers and residents and other members of the public during construction of the scheme. Fencing and lighting of construction works, and recognised safety practices for the utilisation of heavy equipment and the movement of construction materials will be implemented to avoid accidents. During construction, the project contractor will be responsible for job-site safety and security. Diversions, lane closures, and vehicle entrance locations will be well signed and managed appropriately to minimise disruption.
- 33.10.3 The Contractor will be required to advise police, fire, and other emergency response agencies of construction activities, diversions and road closures throughout the construction process. The public will also be alerted about diversions, lane and road closures, and site vehicle entrances.

Contractor Site Compounds

- 33.10.4 Details and location of the contractor site compounds are not currently known. The Contractor would require a secure area for site offices and related facilities and to store materials and machinery. Contractor compounds require lighting and provision of utilities including water, foul drainage/septic tanks and electricity. The Contractor will make the necessary arrangements with local landowners and comply with the relevant regulatory authority requirements for this purpose. It will be important to ensure that no areas are used that could significantly adversely impact on sites or features identified within this ES as requiring protection.
- 33.10.5 The following measures will therefore be implemented to avoid significant adverse impacts on important environmental attributes:
- areas will not be used that are located within or over sites or features of interest as identified within this environmental statement;
 - areas will not be used that are adjacent to sites or features of interest if such use could result in a significant adverse impact(s); and
 - areas will not be used if provision of any utilities will result in a significant adverse impact on any sites or features of interest.

Materials Balance

- 33.10.6 Details with regard to balancing cut and fill material, where possible, to reduce the requirement for material transportation, are contained in Chapter 58 (Sustainability Appraisal).

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- 33.10.7 Any borrow pit locations will be discussed with the relevant local planning authority and would likely to require planning permission.

33.11 Summary of Residual Impacts

- 33.11.1 Subject to the implementation of the necessary mitigation measures, it is considered that most construction impacts on people and on features of environmental interest could be suitably reduced or avoided. Haul routes to and from the site have not yet been identified, and the potential impacts of these can therefore not be assessed at this stage.
- 33.11.2 The main potential impacts during construction are those relating to noise, dust, the water environment and ecology. Adverse noise impacts would be likely on several properties in close proximity to the proposed scheme, although these cannot be assessed quantitatively at this stage.
- 33.11.3 Air quality in close vicinity to construction works would likely be affected during certain works even with the appropriate mitigation measures in place, risking occasional soiling and increases in PM₁₀ concentrations in the vicinity of the proposed scheme.
- 33.11.4 Construction impacts on the water environment and ecology are assessed in detail in Chapters 24 (Water Environment) and 25 (Ecology and Nature Conservation).
- 33.11.5 Changes to traffic flows and pedestrian access will require careful management to avoid or reduce impacts.
- 33.11.6 In order to minimise residual impacts, best practice should always be implemented, machinery and equipment will be correctly maintained and operated, and construction materials will be handled appropriately. Communities likely to be affected will also be notified of works and potential disruption.

33.12 References

Baughan, C. J. (1980). Nuisance from Road Construction - A Study at the A31 Poulner Lane Diversion, Ringwood'. TRRL SR562.