15 Disruption Due to Construction

15.1 Introduction

This section presents the assessment undertaken to determine the potential disruption to the environmental parameters discussed in Chapters 5 to 14 as a result of construction activities. The assessment uses the guidelines set out in Volume 11 of the DMRB (1993 and amendments).

'Disruption due to construction' is a term that refers to the effects on people and the natural environment that can occur between the commencement of pre-construction works and the end of the contract maintenance period. Disruption due to construction is usually a localised phenomenon; however, some impacts can create effects over a wider area.

At this stage in the road design process the construction period is estimated at twelve months (December 2009 – December 2010) and the maintenance period is likely to be at least five year for the landscape aspects.

This assessment takes into account potential nuisance to local residents, workers, vehicle and non-vehicle travellers arising from noise, vibration, dust, visual intrusion and changes in journey times and loss of amenity associated with the operation of equipment or from the movement of heavy construction traffic. Construction activities can impact on routes utilised by different types of user including pedestrians and cyclist. The assessment also considers the potential impacts on the natural environment associated with drainage, accidental spillage and dust generation as well as ecology and cultural heritage.

In addition to the specific mitigation measures outlined below, the potential impacts of the proposed scheme will be controlled through the development and implementation of an Environmental Management Plan (EMP) and appropriate Method Statements. The contractor will be required to develop the EMP prior to the commencement of work on site.

Methods to be implemented during the construction phase are outlined in Chapter 2 and will be further developed during the detailed design stage. The assessment of disruption due to construction is based on a specimen design.

15.2 Methods

This assessment has been carried out using the guidelines set out in Volume 11, Section 3, Part 3 of the DMRB (1993 and amendments). Site visits were conducted to verify the location of properties and features, which may be sensitive to disruption.

The assessment methodology follows that outlined in Chapter 3 (Approach and Methods) along with the specific assessment methodology for sensitivity/value of

features and magnitude criteria identified within the corresponding environmental topic chapter (Chapters 5 to 14).

15.3 Baseline Conditions

In accordance with the DMRB, the study area for the assessment of disruption due to construction comprises a corridor 100m either side of the proposed A68 scheme improvement and associated side roads. Within this corridor there are only two properties, Marldene and Haugh Head House, which are both accessed from the U77 Fala Dam road. The U77 is to re-aligned as part of this scheme.

Other sensitive sites are the watercourse and these include the Fala Dam Burn, situated in a gorge at the southern end of the scheme limits, Salters Burn over which the A68 crosses and the other unnamed watercourses, spring and drainage ditches, which emanate from the south of the A68 and outfall in to Salters Burn north-west of Haugh Head House.

Baseline conditions for all of the aspects considered in section 15.4 below are discussed in the relevant chapters of this report (Chapters 5 to 14).

Chapter 2 (The Proposed Scheme) describes the key elements of the scheme. It is anticipated that conventional methods of construction will be used for the scheme (section 2.8), although particular attention will be given to prevention of pollution to watercourses / groundwater and their subsequent discharge into adjacent streams and rivers. Sections 2.7 and 2.8 have provided preliminary information on the likely programme of works, the type of plant and operations required, the traffic management of the scheme and general environmental protection measures including site drainage (as best as can be identified at this time). The precise nature of works involved with the construction of the scheme will be determined as part of the detailed design developed by the Contractor commissioned to complete the works and agreed with the appropriate authorities.

15.4 Assessment of Impacts and Mitigation

15.4.1 Air Quality

Construction works associated with the road improvement scheme have the potential to impact on air quality through dust and increased air pollutants. DMRB, May 2007, requires that the location of any sensitive receptors within 200 metres of the proposed construction site should be identified so that mitigation measures to reduce dust emissions can be applied. Mitigation measures should be incorporated into the Construction Environmental Management Plan (CEMP) reflecting the requirements of best practicable means (BPM).

Dust

Earthworks and construction works have the potential to generate significant quantities of dust. The earthworks may include topsoil and subsoil stripping, and movement and stockpiling of the materials. Construction works would include installation of utilities and the proposed roadway itself. Dust also has the potential to be generated by vehicle movements bringing material to site and by site plant.

At present there are no standards for acceptable concentrations of dust. Legislation on dust resides under The Environmental Protection Act 1990 which lists the emission of dust from industrial, trade or business premises in sufficient quantity to be prejudicial to health or a nuisance as a statutory nuisance. The Local Authority is placed under a duty to inspect, to detect any nuisance and to serve abatement notices where necessary. Whether or not a nuisance exists is determined in the first instance by the professional judgement of the Environmental Health Officer.

Air Pollutants

There is the potential for an increase in air pollutants due to emissions from the vehicles bringing construction materials to site, and movement of site plant. Additional vehicle emissions will potentially contribute to existing local air pollutant concentrations.

Potential Impacts

Dust

Dust generated by construction activities may drift beyond the site if uncontrolled. If present in sufficient quantities, dust has the potential to cause a nuisance by settling on clean surfaces. Concerns have also been raised about the possible health effects of inhaling dust particles.

The DETR document 'Environmental Effects of Dust from Surface Mineral Workings' 1995 suggests that large sized particles will largely deposit within 100m of sources and intermediate sized particles are likely to deposit within 250-500m. However, any impact on air quality from dust generated during construction is likely to be short-term and mitigation measures can be implemented to prevent any fugitive dust emissions.

Air Pollutants

Air pollutants will be generated by HGVs making deliveries to the site and by site plant, which will be in operation for periods during the construction phase.

However, the results of the DMRB assessment have shown that the air pollutants for the future years (do-min and do-som) within 200m of the original and proposed

alignment are well below the Air Quality Objectives. Although specific details of the construction phase and the numbers and types of vehicles in operation are currently not available, the number of site plant and vehicles present will not be significant compared to the number of vehicles using the affected routes once operational.

Any impact on air quality from construction derived vehicle emissions is likely therefore to be insignificant.

Mitigation Measures

Dust

It is unlikely that the construction phase will significantly affect atmospheric dust concentrations and dust deposition, however, the following mitigation measures can substantially reduce the potential for dust to be generated.

Dust from general traffic at the site during earthworks, and construction works could be controlled by regular damping down of public roads/footpaths and by the use of a wheel wash.

In addition, other practical measures that could be incorporated as part of a best working practice scheme are detailed in BRE document 'Control of dust from construction and demolition activities'. These include:

- The restriction of site traffic to watered or treated haul roads,
- Minimisation of vehicle movements and limitation of vehicle speeds – the slower the vehicle speeds the lower the dust generation,
- Static and mobile combustion plant engines and exhaust systems should be maintained so that exhaust emissions do not breach statutory emission limits set for the vehicle/equipment type and mode of operation. Plant should be regularly serviced and not left running unnecessarily,
- Minimisation of the duration of the material handling activity and the amount of handling. Material handling methods should also aim to minimise the generation of airborne dust,
- When transporting dusty materials and aggregates, enclosed or sheeted vehicles should be used,
- Protecting surfaces and exposed material from winds until disturbed areas are sealed and stable,

- Exposed stored materials should be damped down and stored as far from sensitive receptors as possible, and

- Activities that generate large amounts of dust should be avoided during windy conditions.

The details of the proposed construction activities and mitigation measures would ideally be discussed in some detail with the Local Authority, once a contractor for the works, has been appointed. Mitigation measures to control dust should be incorporated into the Construction Environmental Management Plan (CEMP), reflecting the requirements of best practicable means (BPM).

Air Pollutants

No significant impacts on air quality will occur during the construction phase of the development, therefore no mitigation measures are proposed.

15.4.2 Cultural Heritage

Effects on known cultural heritage features (applicable to both the construction and operational phases of the scheme as these are potentially permanent) are described in Chapter 6 (Cultural Heritage).

As areas of new land take will be required or disturbance from construction vehicle / site compounds and storage may occur and as these may potentially include areas where buried or unmapped archaeological features may remain undetected, the impact magnitude for disturbance to cultural heritage features is considered to be slight adverse with overall impact of **negligible** (local site value).

In the best interest of cultural heritage, Historic Scotland will be contacted with a view to confirming whether or not any initial site evaluation (and possibly archaeological sampling) should be carried out along areas of new land take prior to road construction activities taking place. Previous consultation in 2005 suggested that archaeological field evaluation would not be required but this will be confirmed by the contractor prior to construction works.

Should unanticipated artefacts/remains be encountered during construction these will be dealt with in accordance with current procedures, and within Historic Scotland's Special Requirements. The methods used will be agreed with Historic Scotland and Transport Scotland.

In addition, the following measures should also be adopted:

- The prevention of access to cultural heritage areas through their identification within the Contract documentation and fencing off of these sites prior to construction activity;
- Archaeological monitoring of any works that may cause subsurface disturbance and the excavation and recording of any archaeological features discovered;
- Inclusion within and implementation of Historic Scotland's 'Special Requirements' through contract documentation.

15.4.3 Land Use

As indicated within Chapter 7 (Land Use), there are six residential properties within close proximity of the proposed road scheme. Although not directly impacted upon during construction, access to these properties and also to the adjacent farming interests (Whitburgh, Longfaugh and Saughland Farms) will be temporarily disturbed as a result of construction.

Access to farms, farmland and private properties will change at differing periods during construction, depending on processes such as widening, culvert upgrade, side road closure and traffic management. As access to these areas is of key importance, valued at a site level as high, it is anticipated that without appropriate measures construction disturbance could potentially have a major magnitude of effect on access, resulting in severance to the adjacent properties and fields. The temporary impact is assessed as of **major adverse significance** and mitigation to minimise such an outcome is required.

In accordance with standard practice, access to all properties and fields will be maintained at all times. This will be carried out by re-routing or installing replacement accesses in advance of any form of disturbance to existing accesses. The re-routing of any access roads have been agreed with land agents / property owners and designed as part of the overall scheme design process to date and this approach will continue through detailed design and construction. Other actions that will be implemented are similar to those identified within Chapter 7 such as minimising the amount of disturbance, but will also involve using construction programming sensitive to the needs of farming activity and completing disruptive works within the shortest timescales possible.

By adopting these mitigatory measures, temporary significant impacts upon access during construction can be reduced to a negligible magnitude with **slight adverse** residual impact.

15.4.4 Ecology and Nature Conservation

As most impacts on ecological resources occurring during the operation of the scheme are inextricably linked to effects arising at the construction period, only those impacts

arising solely during construction are addressed within this chapter. The remainder are addressed in detail in Chapter 8 (Ecology and Nature Conservation) for completeness.

The following short-term impacts to ecology are unavoidable during construction:

Disturbance due to human activity, noise, dust and light during the construction period.

The presence of humans and vehicular activity within and adjacent to the construction working corridor can have the effect of deterring use of the area by certain species, particularly during working hours. The main species likely to be affected are breeding birds, particularly passerine species using the hedgerows / trees and any ground-nesting species on surrounding fields. Birds are likely to be deterred from establishing nest sites close to the main centres of human presence and construction activity, although not always, while away from these disturbance sources they will often become habituated to movements such as construction vehicles. The behaviour of common songbirds will already be adjusted to background noise because of proximity to the existing A68. Additional noise resulting from site clearance and construction will be limited to the times of the day when the construction site is active (i.e. during daylight hours), which means that they will not coincide with main periods of dawn and dusk singing activity. The medium magnitude impact of temporary disturbance on what is considered to be a common breeding bird assemblage along the road alignment of low value is an impact of medium magnitude and therefore considered to be of **negligible** adverse significance.

Mammals, such as otters and badgers, will be less affected by the daytime presence of people and machinery than breeding birds, as they are largely nocturnal. In addition, there are alternative places for resting and shelter within a short distance for both these species.

Although the road widening will not directly affect the holt identified on the Cakemuir Burn, (TN 43, Figure 8.3) it is possible that in the absence of mitigation, otters that may otherwise use it will be deterred by human presence during construction activity. As the holt is located approximately 200 m from road widening works, and given that otters range over large areas and maintain a number of alternative holt sites, this is assessed as an impact of imperceptible magnitude on a receptor of national value. Consequently the impact is predicted to be of **minor** adverse significance and therefore not significant in terms of this EcIA.

Badgers are unlikely to be affected by the daytime presence of people and machinery, as their setts are sufficiently distant from the proposed works. Any indirect temporary effect on badger foraging activity in the area due to increases in noise and dust emissions and the movement of construction vehicles is predicted to be of no more than low magnitude and therefore of **minor adverse** significance; being of short-term duration and of no long-term significance.

There is the potential for the lime kiln within Magazine Wood, assessed as being of moderate to high potential for roosting bats during the Stage 3 dusk and dawn survey, to be affected during the construction stage whilst the felling of an area of woodland at the western edge of Magazine Wood is carried out. Bats are assessed to be of regional nature conservation value, although the magnitude impact of disturbance should bats be roosting within the lime kiln is assessed as low due to the fact that there will be no direct affect on the kiln but there could be noise disturbance during tree felling. This has the potential to result in a **minor adverse** and not significant impact.

There is a possibility that trees at Magazine Wood, and other scattered trees along the extent of the scheme during the construction phase of the project, could potentially be used by roosting bats, at present or at some point in the future. There is a risk that the felling of these trees may result in harm to, or mortality of, roosting bats. As the potential for bats within trees is assessed to be of low to local value for the survey area, the magnitude impact of disturbance to bats could potentially be high resulting in a **minor to moderate adverse** and significant impact if bat mortality occurs.

During dry weather, wind and / or the use of vehicles on exposed substrates may cause dust to become airborne, with settlement on adjacent vegetation. Measures to suppress dust generation for the benefit of the construction site and other workers / residents / motorists are addressed in Chapter 5 (Air Quality) and will be addressed as part of the construction Environmental Management Plan (EMP). These measures will also have an incidental effect of providing a degree of protection for the ecology of the site. However, even in the absence of such mitigation, due to the kind of habitats present in the vicinity of the works, dust deposition will represent an impact of low magnitude and **negligible** to **minor** significance.

Fauna present within the survey area, such as bats, otters and badgers, may not be affected by the daytime presence of people and machinery. These species move mainly at dawn and dusk or under darkness. Bats could be affected by disturbance due to the possibility of extra lighting required for traffic control purposes at night, in particular foraging / feeding behaviour. However, there are alternative places for foraging / feeding bats within a short distance for these species (e.g. the woodland edge habitat throughout the survey area), which are not affected by the scheme. Lighting will not be located over or close to watercourses as far as possible in order to minimise lighting pollution of these features. Specific measures could be employed to minimise any disturbance caused by light emissions, for example the use of directional lighting at a limited number of locations along the scheme length to illuminate the construction site only. The magnitude of impact on nocturnal fauna caused by temporary lighting is considered to be of imperceptible magnitude and **minor** significance.

Upon application of the best practice measures described within Chapter 8 (Ecology and Nature Conservation), such as clear definitionof working areas, planning of storage and compound areas, good construction site management and minimisation of potential for construction impacts, in terms of overall disturbance by human activity,

noise, dust and light, the residual impact is assessed to be of imperceptible magnitude and **negligible** significance.

15.4.5 Landscape and Visual Effects

Excavation and construction processes, temporary accommodation works and the use of vehicles and machinery will result in some temporary visual impacts on the occupiers of nearby properties/ and on the road users who would normally experience some open views of the surrounding landscape. It is anticipated that the most visually intrusive activities will relate to the creation of earthworks. The use of temporary lighting (typically associated with traffic management or for safety and security reasons) may also cause visual intrusion, particularly at night (if required).

Adverse visual impact is largely unavoidable during the construction phase. Due to the identical alignment of the road improvement options in relation to the existing A68, it has been assessed as **negligible** with regard to temporary visual intrusion on road users and **slight / moderate adverse** for the residential properties of Marldene, Old Crichton Dean, Haugh Head House and to a lesser extent Routhenhill.

The appointed contractor will be required to implement the following mitigation measures in accordance with an agreed Method Statement to minimise these potential visual impacts:

- Retain existing vegetation where appropriate.
- Limit the size and extent of working and storage areas. Use fencing to define the working areas.
- Ensure good housekeeping of the construction site and storage areas, keeping the site tidy and free of litter and debris so far as is possible.
- Use of temporary floodlighting should be used only when necessary and the lights orientated away from receptors where possible.

Taking into account the above mitigation measures, landscape and visual impacts during the construction phase are anticipated to remain in the range between **slight to moderately adverse,** but will be temporary in nature and potentially lessened throughout the construction period by the phasing of activities.

15.4.6 Noise and Vibration

It is recognised that during the construction works associated with the road improvement scheme there will be the potential for any work to generate noise which may propagate away from the site. The level of noise received at sensitive receptors nearest to the A68 would depend on the sound power levels of machines used, the distance to the properties, the presence of screening or reflecting surfaces and the ability of intervening ground to absorb propagating noise.

The types of activities that could generate noise and give rise to potential impacts could include:

- Levelling ground and earth removal;
- Breaking out of the existing road surface;
- Removing the road surface and broken road surface using a excavator/lorry;
- Road planning;
- Placing of sub-base layers; and
- Road surfacing, for example using a road roller and lorry.

The above activities would have the potential to generate short-term increases in noise levels at nearby sensitive receptor locations. The DMRB Stage 3 assessment has confirmed that there are five noise sensitive receptors within approximately 300 metres of the chosen scheme alignment.

There would be the potential for construction noise to be significant at each of these five receptors and to ensure that the noise generated is minimised; it would be appropriate to implement best practice measures to mitigate noise.

To ensure that the noise generated is minimised; it would be appropriate to implement best practice measures to mitigate noise. The Contractor should employ best practice to minimise noise (and vibration) produced by his operations and it would be advisable to have regard to various published recommendations, for example, those in BS5228, Part 1: Noise Control on Construction and Open sites 1997.

In addition, other controls, which might be implemented, include:

- All vehicles and mechanical plant used for the purpose of the Works shall be fitted with effective exhaust silencers and shall be maintained in good and efficient order.
- All generators and compressors shall be ‘sound reduced’ models fitted with properly lined and sealed acoustic covers which shall be kept closed whenever machines are in use, and all pneumatic tools shall be fitted with mufflers or silencers of the type recommended by the manufacturers.
- Machines in intermittent use shall be shut down in the intervening period between work or throttled down to a minimum.
- All pumps shall be fitted with effective exhaust silencers and shall be maintained in good and efficient working order.
- All stationary plant will be covered where possible.

The incorporation of best practice measures should ensure that the potential noise impact is minimised.

15.4.7 Pedestrians, Cyclists, Equestrians and Community Effects

There are unavoidable impacts upon pedestrians, cyclists, equestrians and community effects as a result of most construction activities. For this scheme, these impacts will be related to the disturbance of pedestrians, cyclists and other path users during the construction of the new combined facility along the line of the existing footpath. The path is currently underused partly due to the position of a road barrier located on the path. It is therefore considered to be of low value with a slight adverse magnitude impact, resulting in a **negligible and insignificant overall impact**. However, by maintaining a throughfare throughout the construction corridor by means of an alternative facility or arrangement, any impact on passage will be minimised. A similar outcome will be applicable to any disruption caused to pedestrians, cyclists and equestrians due to the closure of the U77 and U78 side roads.

There will also be unavoidable disturbance to vehicle journeys during construction due to traffic management measures being in place while certain aspects of construction are underway. With a low sensitivity and impact magnitude assessed as moderate, there will potentially be a **slight adverse impact** upon vehicle travellers. Although no specific mitigation is required, appropriate measures to minimise this impact will include the installation of temporary or permanent new side roads prior to the closure of existing roads and routes and advanced notice / appropriate signage of any expected major delays. These measures can help reduce unavoidable delays. Construction activities that may significantly impact upon vehicle travellers will be programmed to take place during off-peak travelling periods rather than rush hour where possible. These measures will result in a residual impact of **negligible impact**.

15.4.8 Vehicle Travellers

Both driver views and driver stress will be altered by construction in the following ways:

A change in driver views will be experienced as a direct result from the fill activities involved with the creation of a new U77 / U78 side road. In addition, the removal of hedge lines adjacent to the A68 will open up the drivers view until the establishment of newly planted landscape. Although in the long term, the view are assessed to be improved (slight beneficial impact) during construction, views are temporarily assessed as of slight adverse impact due to earthworks, plant and presence of construction works. The overall impact is therefore considered to be **slight adverse** in the short term (for medium value land), but returning to slight beneficial once the construction stage has finished and the new improvement scheme established (from landscaping / reinstatement and improved sight lines). No specific mitigation can be applied to reduce this unavoidable impact related to earthworks and the presence of essential works machinery.

Driver stress may potentially increase as a result of construction activity and this may then increase driver frustration due to delays, the uncertainty caused by traffic management and changing junction / road layouts. The potential magnitude impact for

this is considered to be slight adverse and with a high stress value, the overall impact is therefore described as **moderate adverse**. Again, this type of impact is unavoidable during construction of road schemes / improvements, albeit it is short-term and will reduce to slight beneficial on completion of the scheme (Chapter 12 Vehicle Travellers). Mitigation to assist in reducing driver stress will include prior warning of changes in road layout / access and exit to side roads via appropriate signage along with sensitive timing of key events such as traffic management. In addition, reduced speed limits through the road construction corridor will help to reduce stress levels. It may be possible to reduce the impact slightly but in residual terms it is likely to remain as slight adverse during construction.

There may also be a potential increase in the risk of accidents occurring during the construction phase due to slightly higher driver stress and unfamiliarity with the road layout while the road is being widened / improved. The overall impact is predicted to be **moderate adverse** (medium value with moderate magnitude). However, as there will be a formal traffic management system in place and clear signage of any changes to the layout along with reduced speed limits, it is likely that the residual impact will be reduced as a result of mitigation, however for the time being it is considered more appropriate to consider this to remain as **moderate adverse**.

15.4.9 Road Drainage and the Water Environment

There will be impacts on the hydrological characteristics and water quality of Salters Burn and Cakemuir Burn, the two other minor drainage ditches and their associated catchment areas during the construction phase (Figures 13.4 – 13.7). These may occur due to the following construction elements:

- Extension of three existing A68 culverts, located on / at Salters Burn, the spring and the other minor watercourse flowing into Salters Burn (from the B6458), in order to accommodate road widening;
- Two new crossings of the watercourse flowing into Salters Burn (from the B6458) to accommodate the new U77 Fala Dam side road;
- Temporary disruption to hydrological flows during construction (i.e. through proposed culverting works and altered drainage patterns);
- Ground disturbance, soil excavation, stockpiling and deposition activities resulting in the mobilisation of sediments into local watercourses and groundwater;
- Accidental spillage/mobilisation of sediments into local watercourses;
- Accidental spillage of liquid contaminants into local watercourses; and
- Inputs of leachate derived from on-site stored construction materials.

Certain aspects of these impacts are also applicable to the operational stage of the scheme and these have been discussed in Chapter 13 (Road Drainage and the Water Environment).

Overall the risk of construction phase impacts upon surface water resources are assessed as potentially of **moderate adverse** magnitude and significance, although there is always a risk of major adverse impacts associated with serious spillages. This is based on the proximity of the Salters Burn and the Cakemuir Burn/Fala Dam Burn to construction activity where potentially contaminative materials will be used. Potential impacts upon groundwater are anticipated to be negligible.

In order to safeguard against potentially adverse impacts on water quality and drainage, all works during the construction phase will be carried out in line with best practice guidelines, including SEPA's Special Requirements and Pollution Prevention Guidelines (PPG1, PPG2, PPG3, PPG5, PPG6, PPG8 and PPG21) and the Controlled Activity Regulations. SEPA will be consulted to determine the number, type and scale of prevention measures required. Appropriate British Standard guidelines will be referenced, such as BS6031: Code of Practice for Earthworks, together with guidance contained in CIRIA (C532) Control of water pollution from construction sites. Development of procedures as part of the EMP will provide a mechanism to control potential impacts.

An appropriate drainage system will be implemented during the construction phase to deal with run-off from the construction site. This will include the use of temporary swales/settlement facilities or other measures of best practice, as appropriate. These will be discussed in advance of works with SEPA and the number/location/type/size of measures agreed. Other facilities will also be made available to deal with any pollution arising before it reaches a receiving watercourse.

In addition, good practice should include measures such as:

- Appropriate handling and storage of on-site materials to prevent potentially contaminating spillage events.
- The provision of temporary silt traps, containment bunds and storage reservoirs of adequate size, in order to prevent sediments entering local watercourses and to minimise soil erosion.
- The provision of clearly defined 'no access' areas indicated on site plans and on site adjacent to sensitive watercourses, and the installation of protective fencing to prevent unauthorised staff, plant and machinery access.
- Inspection of the construction of the temporary settlement facilities/permanent drainage system to ensure that the system is being constructed correctly and the design detail is incorporated to ensure appropriate functioning.
- Contingency procedures in case of emergencies.

Without mitigation, impacts on water resources within the study area could be of moderate adverse significance, with a risk of major adverse impacts. However, adherence to SEPA guidelines and application of the above mitigation measures, supplemented by a detailed pollution prevention strategy and water quality monitoring procedure developed by the Contractor in discussion with SEPA, is predicted to result in no more than a **slight adverse** residual impact on water quality and groundwater aspects during the construction phase (a slight level is given in terms of the criteria provided in Table 13.3, based on high water quality, however the actual impact is anticipated to be negligible).

15.4.10 Geology and Soils

The proposed scheme will require approximately 16,694 cubic metres of cut and 41,613 cubic metres of fill material. These estimates are indicative and earthwork volumes are currently being considered in more detail as the proposed scheme design develops. Within this scheme it is not going to be possible to achieve an earthwork balance and imported acceptable material will have to be brought to site. In terms of disruption due to construction, the 27,800 cubic metres deficit in material required to construct the scheme will equate to approximately 3000 lorry loads of material delivered to site. This will have an impact magnitude of moderate, resulting in a **moderate adverse** impact, affecting driver frustration with the increase of slower vehicles to the A68. This effect could be significantly minimised if a local material supply source was used as an alternative to the established quarries at Edinburgh, 15 miles from the site.

The impacts on geology and soils during the construction phase are very similar to the overall scheme impacts and relate to the cut and fill balance. Disturbance to the geological and soil attributes of the construction area will be minimised through the adoption of the following mitigation measures:

- Limitations on the extent and location of working and storage areas.
- Implementation of erosion and sediment controls.
- Appropriate handling and storage of spoil.
- Re-use of excavated materials in the landscaping of road verges wherever possible.
- Import of material from local sources where required.
- Appropriate removal of unsuitable surplus material on or off-site to a suitable receptor point.

With mitigation the residual impacts on geology and soils can be assessed as **moderate** adverse.

15.5 Residual Impacts

Impacts occurring during the construction phase of the proposed scheme are typically short-term or temporary in nature, but may also continue into the post-construction operational phase. When coupled with the implementation of mitigation measures specified in the contract and the development of an EMS by the Contractor prior to commencement of works on site, many of these impacts can be successfully avoided or reduced as described above.

As such, residual construction phase impacts are assessed as being **slight adverse** with the exception of landscape impacts and impacts upon driver views and driver stress which are assessed as **moderate adverse** during the construction period.

Temporary residual adverse effects on landscape (**moderate/slight**) and in terms of importation of fill material for embankments to site will, however, remain for the duration of the construction period.