

## 12 Disruption due to Construction

### 12.1 Introduction

This Chapter describes the effect of construction of the scheme on the built and natural environment.

Traffic delays for the scheme construction will be associated with the realignment of the existing road. In general, traffic will be controlled by an extension of the one-way system already in place over this section of the A82. It is expected that traffic lights and a one-way working system will be installed for the full length of the site, a total length of some 400 metres. The existing road will form the main route for through traffic while the offline parts of the new alignment are being constructed. A mandatory speed limit restriction, potentially of 20 or 30 mph, is expected over the whole length of the works.

Full closures of approximately 14 weeks will be required for construction of the tie-ins for the new viaduct to the existing road. During full closures, traffic will be diverted from Crianlarich through the A85-A819-A83 route via Inveraray to Tarbet. Further details can be found in Appendix 5 – A82 Full Road Closure – Assessment Report.

A likely overall construction period of up to 12 months is expected, with temporary traffic management measures in place for the full period.

The scheme intrudes into the Loch and it is envisaged that the viaduct construction could be assisted by the use of floating platforms on the loch. Use of such floating platforms should also minimise disruption to road users. Careful control measures and site management will be required. The scheme also requires some construction works along the line of the existing road adjacent to Pulpit Rock.

The principal source of material to be disposed off site will arise from the viaduct sub-structure construction and the rock cut. It is estimated that approximately 9,000 tonnes of material (6,000 hard and 3,000 soft) will be excavated and approximately 2,000 tonnes of fill material will be required. Therefore, dependent on the properties of the materials, it is anticipated that the soft material can be re-used as fill material. Given the small volumes involved, any subsequent surplus or unsuitable soft material should then be able to be deposited within the site, potentially as landscape fill. The re-use of hard material arisings on-site is more problematic as any re-use would require material processing on site and/or their incorporation within other materials e.g. pavement materials. On-site processing is unlikely to be economic given the relatively small volumes involved and the difficulties of finding space on site for processing machinery.

Delivery of materials to the site will be a matter for the construction contractor, however it is anticipated that the loch could be used for material haulage. In particular, using the loch may be of benefit for the transport of bridge deck beams, which could be difficult to deliver to site along the final twisting stretch of road.

The construction of the works is expected to be undertaken via a 'Design & Build' engineering contract with the works being won in competitive tender and constructed

by the successful contractor to DMRB and SHW standards and specification. The programme and method of construction of the works and the plant and equipment needed for construction will be determined by the Contractor, subject to any contractual requirements placed upon the Contractor regarding, for example, road closures, restrictions on working hours, noise and vibration limitations, etc.

In the expectation that the works are undertaken in accordance with the specification, any defective works that might arise after completion of the works should be relatively small in scale. Any such remedial works will be carried out during a maintenance period defined in the Contract.

Thus the comments in this Chapter relate primarily to the construction period.

## 12.2 Methodology

Disruption due to construction is assessed in accordance with DMRB Volume 11, Section 3, Part 3. Effects of the operation of the scheme are not considered in this Chapter, which deals only with construction effects.

It is recognised that the environmental effects of the construction of the works will feature in other chapters, for example, the effects of construction noise and dust on ecological receptors. For the avoidance of doubt, the effects of construction are also considered in the following chapters:

- Chapter 6 – Landscape and Visual Effects,
- Chapter 7 – Land Use,
- Chapter 8 – Cultural Heritage,
- Chapter 9 – Ecology and Nature Conservation,
- Chapter 10 – Pedestrians, Cyclists, Equestrians and Community Effects,
- Chapter 11 – Road Drainage and the Water Environment,
- Chapter 13 – Cumulative Impact Assessment

Although the construction contract will include requirements and restraints to minimise construction impacts, some adverse effects are unavoidable. Assessment of these effects is not precise because their extent, severity and duration will depend on the Contractor's programme, methods of working and external factors, such as weather conditions, that cannot be predicted with certainty, and commercial factors, such as sources of material, that limit the Contractor's choice of supply.

As noted in Chapter 4 – Assessment Methodology, operational air quality and traffic noise and vibration were both scoped out of the Environmental Impact Assessment. However, the scoping study stated that noise and air would both be a consideration during the construction period and are therefore assessed within this chapter.

## 12.3 Consultations

Consultations were undertaken with a range of organisations and individuals. These consultations were carried out, in part, to gather baseline information on the existing community facilities, activities and characteristics in the study area as well as seeking opinions on the scheme proposals. For the complete Consultee Response Schedule see Chapter 3 – Consultation, section 1.8. Further consultation will be undertaken in the preparation of the contract documents to ensure that appropriate mitigation measures are enshrined as contractual requirements.

To control the potential nuisance associated with construction noise and vibration, the Contract will include restrictions on noise and vibration levels as well as working hours where applicable. These restrictions will be agreed with Loch Lomond and the Trossachs National Park Authority and monitored as required throughout the construction period.

Similarly, the Contract will include restrictions on disruption to traffic flows on the A82 and the acceptable periods for temporary traffic signals and full road closures. Consultations with the respective roads authorities for the A82 and route diversion (A85-A819-A83) (Transport Scotland) and the local roads (LLTNPA and Argyll and Bute Council) will be required.

## 12.4 Baseline

The baseline conditions are largely those described in other environmental topic chapters.

The scheme provides improvements over a length of approximately 380m. This is a partly offline structural solution, provided by a new viaduct, which runs in parallel to the loch shoreline for approximately 180m. North of the new viaduct the existing carriageway is widened by cutting into the existing rock headland and provision of an embankment structure. The improvements to the existing road will extend approximately 200m to the north of the new structure. Resurfacing tie-in works with the existing road will be required at the start and end of the scheme.

Table 12.1 below outlines the main receptors located within 100m of the scheme and the associated issues.

**Table 12.1** Main receptors located within 100m of the Scheme

Receptor	Issues
Pulpit Rock Scheduled Monument	Contextually sensitive in relation to potential construction activity.
Breeding bird habitat	Potential removal of trees and scrub, which may form part of the local breeding bird habitat.
Otter holts	Removal of otter holts in the scheme footprint
Watercourses	Potential for pollution due to contamination run-off at Loch Lomond and its tributaries.
Watercourses	Potential for direct impacts on the local Loch Lomond and its tributaries as a result of construction activity.
Residential Properties	There are no residential properties within 100m

All users of the A82 (pedestrians, equestrians, cyclists, vehicle travellers etc.)	Potential impacts on movements along the A82 at Pulpit Rock.
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## 12.5 Construction Activities

The construction of the scheme will consist of several stages which will be programmed to ensure disruption and road closures are kept to a minimum. The proposed stages are as follows:

### 12.5.1 Site Setup and Site Clearance

During this stage of the works the site compound will be located and setup, floating working platforms will be established and traffic management will be put in place. Site clearance will also be undertaken at this stage. It is envisaged that closures during the site setup will be short term and should be in place for less than 1 hour at any one time.

### 12.5.2 Construction of Offline Works

It is proposed to build the offline section first. To minimise delays and closures of the existing road it has been assumed that works will be undertaken utilising floating working platforms. The first stage of the offline works entails installing temporary works such as cofferdams and access measures. Once the cofferdams have been put in place, excavation of the material within the cofferdam is required. Following excavation to the appropriate depth the piles will be installed and the pile caps constructed. The columns can then be formed, deck beams placed and the deck structure constructed. Although these works will be undertaken utilising the working platforms in the Loch, it is anticipated that there will still be times when short term road closures will be required, particularly when plant or equipment is being repositioned in close proximity to the road.

### 12.5.3 Construct New Rock Cut

Once the offline section of the works is complete, a full road closure will be established. Construction of the new rock cut can then commence. It is likely that the rock cut will be fully reinforced, utilising a combination of rock bolts, sprayed concrete and wire mesh placement to provide a hard faced finish with minimal maintenance requirements.

### 12.5.4 Construction of Online Tie-in Works to the North and South

Construction of the online tie-in sections will require similar works to the offline section. There will be some differences, however, dependent upon the form of abutment chosen.

Associated earthworks are likely to be required, along with the installation of new safety barriers.

Construction of the online tie-ins will require to be completed during the full road closure.

### 12.5.5 Finishing Works

The finishing works will consist of fixing parapets, expansion joints, safety fencing and other required elements. Road surfacing and waterproofing will be carried out along with landscaping works. During this time, it is anticipated that traffic management will consist of one way traffic flow. Once the finishing works are completed, all traffic management will be removed.

## 12.6 Effects of Construction

### 12.6.1 General

Specific construction related impacts on receptors are discussed in detail within each chapter, as noted in Section 12.2.

There will be a loss of tree and scrub areas in the short to medium term as a consequence of construction, which may currently afford nesting habitat to birds as well as other forms of wildlife. This is discussed in Chapter 9 - Ecology and Nature Conservation.

The temporary site compound will have an impact primarily where it is located. This may include loss of agricultural land, additional traffic at the locality, localised construction noise due to vehicle and plant movements, surface water run off into local watercourses and leaching of fuel stores, and possibly litter and other nuisances. These could be moderately adverse to severe impacts if a site is badly chosen and not operated and managed in a sympathetic manner in accordance with best practice.

Site compounds can be a sensitive issue of moderate significance. Accordingly, the location and operation of the site compound will be subject to the approval of the planning and roads authorities.

The importance of this section of the A82 in providing a route for local traffic is significant. The full severance of this route during the construction period is a major significant impact. There will be disruption to vehicle travellers as a result of speed restrictions and works on the existing carriageway throughout the construction period. Typical average daily traffic flows on the A82 are approximately 5,500 vehicles per day at the height of the summer season dropping to less than 3,000 per day during the winter. It is considered that the magnitude of impact will be severe and the sensitivity is very high, therefore the significance will be substantial adverse. These impacts are assessed further in Chapter 10 - Pedestrians, equestrians, cyclists and community effects.

Pedestrians, equestrians and cyclists will generally experience impacts similar to those expected for vehicle travellers, in as much as that they could expect to experience periods during construction where access restrictions and/or diversions are imposed as part of a traffic management plan. These impacts are assessed fully in Chapter 10 - Pedestrians, equestrians, cyclists and community effects.

The route of any haul roads from outside the study area is unknown, and will be the responsibility of the Contractor to ensure compliance with any statutory requirements.

One effect associated with the construction works is likely to be due to air quality and noise and vibration impacts on the local environment. A qualitative assessment of these impacts is considered below.

## 12.6.2 Air Quality

Fugitive emissions of airborne particulate matter are readily produced through the action of abrasive forces on materials, and therefore a wide range of site preparation and construction activities have the potential to generate emissions of this type, including the handling, working and storage of materials and the movement of vehicles on unsurfaced areas.

Particulate matter (PM<sub>10</sub>) is composed of particles with an aerodynamic diameter of less than 10 micrometers (µm), and includes the size fractions of greatest concern to impacts on human health. The majority of construction dust is larger than 10 µm in diameter and, therefore, increased levels of dust in the air do not necessarily equate to an increase in levels of PM<sub>10</sub>. In general construction dust rarely represents an adverse risk to human health and is more typically associated with causing annoyance to the public through the visible deposits soiling property.

A number of the required construction activities are a potentially significant source of dust, in particular the excavation of material required during the construction of offline works, rock cutting and earthworks. Works such as site setup, piling, road surfacing and finishing works have less potential to be a significant source of dust.

Any dust incidents are highly dependent upon local weather, with extended periods of dry weather combined with winds blowing from the source of dust to the receptor being the conditions in which significant dust related impacts are most likely to occur. These conditions would need to be combined with an activity creating dust close enough to the receptor for increases in dust soiling rates to be perceptible.

The risk of dust affecting a sensitive location will also depend on distance. Concentrations and deposition rates decline rapidly on moving away from the source. Considering the type and duration of the construction works, it is likely that dust emissions may be visible on an infrequent basis if standard mitigation is employed. Therefore potentially significant dust impacts are likely to be limited to receptors within around 50 metres of the works.

For significant effects to occur there must be a potentially sensitive receptor in the vicinity of the works. Commercial/industrial premises at which an increase in dust soiling rates would have a high economic cost are classed as having the greatest sensitivity to dust impacts; no such premises have been identified in the vicinity of the Scheme. Residential receptors are classed as having a medium sensitivity to dust impacts, and ecological sites are generally classed as having a low sensitivity. Very high dust deposition rates are required for even sensitive species of vegetation to be affected by dust deposition.

The closest residential properties to the scheme are at Stuckendroin over 800m to the north, and Ardvorlich over 1400m to the south. At such distances the magnitude of construction dust impacts is likely to be negligible.

An SAC and SSSI are located along the eastern shore of the Loch approximately 500m east of the scheme. At such distances the magnitude of construction dust impacts is likely to be negligible.

Overall, based on the type and proximity of receptors to the scheme and the nature and duration of the construction works the significance of the construction dust effects is considered to be negligible.

### 12.6.3 Noise and Vibration

The noise levels generated by construction activities and experienced by sensitive receptors depends upon a number of variables, the most significant of which are:

- a) the noise generated by plant or equipment used on site, generally expressed as a sound power level;
- b) the periods of operation of the plant on the site, known as its 'on-time';
- c) the distance between the noise source and the receptor; and
- d) the attenuation due to ground absorption and barrier effects.

Vibration impacts are generally limited to impacts on buildings in terms of cosmetic damage or nuisance to occupiers.

A number of the required construction activities are a potentially significant source of noise, in particular the construction of offline works (cofferdam installation, excavation and piling), rock cutting and earthworks. Works such as site setup, road surfacing and finishing works have less potential to be a significant source of noise. Piling of the foundations for the offline section is a potential source of noise and vibration though impacts would be limited to the immediate vicinity of the works.

For significant effects to occur there must be a potentially sensitive receptor in the vicinity of the works. Residential receptors are classed as having the highest sensitivity to noise impacts, receptors such as footpaths, designated ecological sites and historical sites are classed as having a lower sensitivity to noise and vibration impacts.

The closest residential properties to the scheme are at Stuckendroin over 800m to the north, and Ardvorlich over 1400m to the south. At such distances the magnitude of construction noise impacts is likely to be very low. Vibration from piling will have no effect at such distances.

The West Highland Way footpath runs north-south along the eastern shore of the Loch approximately 500m east of the scheme, a SAC and SSSI are also located along the eastern shore of the Loch. At such distances the magnitude of construction noise impacts is likely to be low. Vibration from piling will have no effect.

The Pulpit Rock Scheduled Monument is located over 50m from the A82, although it is shielded from the works by the topography of the ground. At this location the magnitude of construction noise impacts is likely to be medium. The magnitude of any vibration impacts due to piling are likely to be low.

Overall, based on the type and proximity of receptors to the scheme and the nature and duration of the construction works the significance of the construction noise effects is considered to be minor at most. Construction vibration effects are considered to be negligible.

## 12.7 Mitigation

Mitigation is described below though reference should also be made to the other relevant chapters as noted above.

Liaison with Transport Scotland and other local transport authorities to ensure that road closures are outside of the tourist season and therefore have the least possible impact on users of the A82. A strategy should be devised in association with the emergency services to ensure contingency plans are in place during the construction period.

Timely consultation should be conducted with communities between Tarbet and Crianlarich to alleviate as far as possible disruption during the construction period to these communities. Furthermore, every effort should be made to ensure that a coordinated approach is taken with regards to any planned roadworks / maintenance schemes along the A82, A85 and the A83 during the construction period.

Approval for site compounds should only be granted through discussions with Loch Lomond and the Trossachs National Park.

The contractor will provide a detailed Traffic Management Plan to detail how traffic will be managed during construction. Consultation with relevant authorities will be required. In addition a strategy should be developed with the Emergency Service providers for the area – this is addressed as a mitigation measure in Chapter 10 – Pedestrians, Cyclists, Equestrians and Community Effects.

The impacts on the local environment will be mitigated by ensuring best practice is adopted wherever possible for all construction activities. Restrictions on the Contractor will be agreed with the relevant departments of Loch Lomond and the Trossachs National Park Authority and should be enshrined in the Contract documents. A Code of Construction Practice should be produced to accompany the contract documents. The purpose of the Code of Construction Practice is to define the Project Management, Design and Construction arrangements to control the material impact of project construction in respect of the environment, amenity and safety of local residents, businesses, the general public and the surroundings in the vicinity of the proposed works. In addition, the Contractor will be required to implement an Environmental Management Plan (EMP) in order to evaluate the impact of the construction works on the environment and to monitor measures put in place to ensure their effectiveness.



Current best-practice mitigation and abatement measures should be applied to minimise impacts on air quality. This includes the use of the measures outlined in the “Control of Dust from Construction and Demolition Activities” report produced by BRE in 2003. The use of the standard dust control measures it discusses are normal working practice on all well managed construction sites in the UK. Furthermore, the contractor should follow best practicable means to minimise the generation of noise and vibration at the source.

Instructions will be included within contract documents to require the Contractor to install appropriate measures such as wheel washing facilities to avoid the deposit of mud on the road as far as is reasonably possible and to remove any deposits that do occasionally arise. It is expected that with such measures impacts as a result of the transfer of dirt from onsite to the road network, will be reduced to negligible significance.

It should be noted that mitigation measures for the construction period are also addressed in other ES chapters, for example Chapter 10 proposes mitigation to minimise the impacts on users of the A82 and Chapter 9 - Ecology and Nature Conservation proposed mitigation to minimise the impacts on ecological receptors.

## 12.8 Residual Impacts

It will not be possible to construct the scheme without some adverse impact arising temporarily during the construction of the works. With the proposed mitigation measures, those adverse impacts will be reduced to acceptable levels. The residual impacts will include:

- The provision of a site compound, minor to negligible adverse,
- The transport of materials and equipment to the site, minor adverse,
- The possibility of mud on the roads during wet weather, negligible adverse,
- The disruption to traffic on the existing A82 carriageways and route diversion (A85-A819-A83), substantial adverse,
- The disruption to cyclists, equestrians and pedestrians, minor adverse.

Other possible residual impacts that are fully discussed in other chapters include:

- Ecology and nature conservation issues, for example during site clearance,
- Effect on soils and water quality, for example from site compounds,

## 12.9 Summary

The scheme will result in a number of impacts as a result of construction activity.

The main impact relates to disruption to traffic and local communities along the A82 and the route diversion (A85-A819-A83). Mitigation measures can reduce this impact but there will still be major disruption during the construction phase. Consequently the significance of this impact is substantial adverse.

Impacts on the local environment will also be associated with the provision and operation of a construction compound during the entire construction period. Furthermore, the construction works will also lead to noise intrusion and there will be a risk of dust in the air and mud on the road. There is a risk of construction operations to cause localised damage to the watercourse, if appropriate mitigation measures are not adhered to.

However, measures can be put in place to minimise the impacts and it is considered that with careful management the significance of impacts can be reduced. To achieve this, discussions with Loch Lomond and the Trossachs National Park will be essential in order to ensure acceptable levels are agreed and implemented. These will be reinforced by requirements in the Contract for construction of the works.