2 Scheme Description

2.1 Introduction

This chapter provides a description of the proposed scheme, including information on the project background, the scheme alternatives and the layout of the proposed scheme.

2.2 Scheme Objectives

The Design of the scheme shall be in accordance with the Government's appraisal criteria for the assessment of trunk road schemes that take account of integration, economy, safety, environmental impact and accessibility. The assessment shall satisfy the following main objectives for the project:

- Remove congestion at Pulpit Rock by realigning the A82 such that free flow of traffic is permitted without the use of the existing traffic signal controls;
- Wherever practicable incorporate measures for non-motorised users. In particular, cycling proposals shall be designed in accordance with 'Trunk Road Cycling Initiative' that supports the Sustrans Millennium National Cycle Network;
- Maintain the asset value of the A82 route;
- Mitigate the environmental impact of the new works where possible; and
- Achieve good value for money for both taxpayers and transport users.

The overall objective of the scheme is therefore to remove the traffic signal controls on this trunk road route.

2.3 Scheme Selection

In September 2006, Scott Wilson Ltd was commissioned by Transport Scotland to further develop and assess improvement options within the study area and to progress a preferred scheme towards construction.

The scheme has been developed in accordance with Standard TD 37/93 *Scheme Assessment Reporting* of the Design Manual for Roads and Bridges (DMRB). Due to the extensive preliminary assessment work carried out as part of the A82 Route Action Plan (RAP) it was concluded that the RAP satisfied the requirements of the STAG process and DMRB Stage 1 Assessment. Nevertheless, the RAP findings were reviewed early in the design development process and no new major issues or constraints were identified.

Subsequently a Stage 2 Assessment was completed which considered alternative options for the scheme before recommending a Preferred Scheme for taking forward to order publication and construction. Details of the Stage 2 Assessment are presented later in this section.

2.4 Local Environment

The scheme is located in a rural location within the Loch Lomond and the Trossachs National Park. The main land use is semi-natural broad-leaved woodland, with a small area of open, rough grazing, grassland at the northern end of the scheme. The road is bordered on the eastern side by Loch Lomond, one of the five largest lochs in Scotland. The main Glasgow to Fort William railway line borders the western side of the road at the southern end of the scheme.

Loch Lomond and the Trossachs was the first National Park to be designated in Scotland, and its close proximity to Glasgow means that it has a very high amenity value, and is particularly popular for water-related recreation e.g. sailing. The West Highland Way Long Distance Route (LDR) is situated on the opposite shore of the loch to the scheme. There are no formal footpaths or cycleways along the road at this point.

The area has also been designated as a National Scenic Area, and is of high landscape value and therefore very sensitive to visual impacts. Notable features of the landscape include Loch Lomond itself and Pulpit Rock, a large rocky outcrop situated to the western side of the road at the northern end of the scheme. Ben Vorlich, the highest hill in Argyll and Bute, forms a backdrop to the scheme on the western side.

Pulpit Rock is a Scheduled Monument, which has been designated for its historic use as a preaching point and pulpit. The Tarbet to Crianlarich military road, an undesignated archaeological feature, lies within 200m of the centreline of the existing road.

In addition to Loch Lomond itself, two surface watercourses occur at the northern end of the proposed scheme. These are small and are not marked on the 1:50,000 scale maps and are culverted under the existing road. A third surface water feature is the small watercourse that flows down the steep rock slope at the southern end of the proposed scheme, this too is culverted under the road. Groundwater is also present.

Suitable otter habitat exists along the full stretch of the site in the form of the well-vegetated Loch side. During survey visits several fresh and old otter spraints were found along the Loch side, spanning from the northern stretches of the site to the south.

There are no properties within 200m of the scheme and the closest properties are to the north (Stuckendroin over 800m to the north) and south (Ardvorlich over 1400m to the south).

2.5 Consideration of Alternatives

An option assessment was carried out in accordance with the requirements for Stage 2 Assessment given in the Design Manual for Roads and Bridges, (DMRB) Standard TD 37, 'Scheme Assessment Reporting'. The Options and the methodology and findings of the Stage 2 Assessment are described in full in the Stage 2 Scheme Assessment Report. A number of consultation workshops and meetings were held

during the Stage 2 Assessment and these are summarised in Chapter 3 – Consultation. Initially, a wide range of preliminary scheme options were developed for consideration at an inception workshop. From there a number of options were brought forward for further assessment. These were:

- **Do-min** – On-line widening
    - Sub option 1 – loch edge formed from rock fill
    - Sub option 2 – loch edge supported by structure
- **Option A** – On-line widening with improved verges
    - Sub option 1 – loch edge formed from rock fill
    - Sub option 2 – loch edge supported by structure
- **Option B** – Improved highway alignment - 100 metres radius
    - Sub option 1 – loch edge formed from rock fill
    - Sub option 2 – loch edge supported by structure
- **Option C** – Tunnel

Subsequently, an Options Workshop was held in June 2008 to determine what options should be taken forward for full Stage 2 Assessment. Two preferred options emerged from the workshop findings:

- Do-minimum Sub-option 2 – Loch edge supported by a structure
- Option C – Tunnel

Following this Options Workshop, there were concerns in regard to the financial and operational implications of the emerging options. It was realised that the cost and scope of both the above options was considerably more than originally defined. At the same time, it was evident that the adoption of existing geometry standards was considered acceptable. Consequently, two further alternatives were developed for further assessment:

- Shortened do-minimum (Structure) option
- Shortened do-minimum (Retaining wall) option

Both these alternatives focused on the length of carriageway currently operating under traffic signal control and were considered to have merit. Therefore, following the introduction of the shortened options, it was concluded that four options should be subject to a full Stage 2 Assessment, These were:

- Viaduct Option
- Tunnel Option
- Shortened Option (Viaduct)
- Shortened Option (Retaining Structure)

2.5.1 Viaduct Option

The Viaduct Option provided a mainly offline structural solution with an overall length of approximately 390m. The Viaduct structure would extend for approximately 300m with an online embankment solution at the north end of the scheme for a further 60m. Tie-in works would be carried out at the start and end of the scheme covering 30m.

2.5.2 Tunnel Option

The Tunnel Option extended over a length of 340m with the central section consisting of a 150m long tunnel. Tie-in works would be carried out at the start and end of the scheme covering 85m.

2.5.3 Shortened Option (Viaduct)

This option provided improvements over a length of approximately 380m. The Shortened Option (Viaduct) is a partly offline structural solution running in parallel to the loch shoreline for approximately 180m. North of the new viaduct the existing carriageway would be widened by cutting into the existing rock headland. A steep rock cutting of 80 degrees was assumed and would require to be retained by engineering measures. The improvements to the existing road would extend 180m to the north of the new structure. Tie-in works would be carried out at the start and end of the scheme covering 20m.

2.5.4 Shortened Option (Retaining Structure)

This option provided improvements along the A82 for approximately 385m. The Shortened Option (Retaining Structure) would provide an online structural solution over a length of approximately 170m. The existing shore profile would be reinforced by installing a new backfilled retaining wall along the current narrowed section of road, thus reinstating two-way traffic. North of the new retaining wall structure the existing carriageway would be widened by cutting into the existing rock headland. The improvements to the existing road will extend 190m to the north of the new structure. Tie-in works would be carried out at the start and end of the scheme covering 25m.

2.5.5 Other Options (Do Nothing and Do Minimum)

It was considered that a Do-Nothing option would result in continued delays at Pulpit Rock and would not meet the scheme objective of realigning the A82 such that free flow of traffic is permitted without the use of the existing traffic signal controls.

No options were identified as Do-Minimum solutions as any proposals to remove the traffic lights at Pulpit Rock and increase the road standard to two-way flow would require some form of intervention.

2.6 Options Assessment

The Stage 2 Scheme Assessment took account of the environmental, engineering, economic and traffic advantages, disadvantages and constraints associated with the

four selected Options before recommending a preferred scheme for further development.

All Options achieved the main project objective of removing congestion at Pulpit Rock by realigning the A82 such that free flow of traffic is permitted without the use of the existing traffic signal controls.

In order to determine the Preferred Option, the four options were assessed against eight different aspects: Environment (landscape and visual), Environment (nature conservation), Traffic and Economics, Buildability, Maintenance, Capital Cost, Consultations and Construction Risk. No one option emerged as being preferred across all aspects.

In terms of environment impact, the assessment had concluded that the impact was broadly similar for all options for the majority of environmental topics. The two main areas where it was considered there were significant differences were landscape and visual impact, and ecology and nature conservation.

In relation to landscape and visual impact, it was clearly the case that the Tunnel option had the least impact although this was potentially diluted by the likelihood that approach lighting would be required. In contrast, the other three options all resulted in a visual impact, with the greater intrusion of the Viaduct option into the Loch resulting in it being assessed as having the greatest impact. Both the other two options would also create a prominent new feature in the landscape but were assessed as being less intrusive than the Viaduct option.

Similarly, the Tunnel option was assessed as being the least harmful in terms of nature conservation as it would avoid work along the shoreline. The other three options would all have an impact on nature conservation as the works will be disruptive to shore and littoral habitats. The impact was deemed to be broadly similar for all three options.

The Traffic and Economics appraisal indicated that all four options offered a negative Net Present Value (NPV), with the Tunnel Option offering the worst economics and the Shortened Option (Viaduct) offering the best.

Due to the physical characteristics of the site and the lack of a reasonable diversion route, buildability and hence the need for road closures was identified as an important differentiator between options with the Tunnel option resulting in the greatest length of full road closures.

The capital cost of the options varied and due to the nature of the scheme, construction risk was also identified as an important factor in considering the preferred solution. In terms of cost and risk, it was concluded that the Tunnel Option presented the largest capital cost and the highest risk. The Shortened Retaining Structure Option was calculated to have the lowest capital cost and the Viaduct Option the lowest risk.

Consideration of the summary results suggested that the main factors that should be considered in selecting a preferred option were buildability, cost and risk, albeit that these influence, or are influenced by, other categories.

A holistic assessment of the Tunnel option indicated that it should be discounted. Although it had been assessed as having the least environmental impact, it was not considered that the environmental advantages of the Tunnel Option compared to other options outbalanced the high capital cost and long road closures required. Whilst a tunnel would initially appear to be an attractive option, the difficulties encountered at the south portal, due to the proximity of the railway and the lack of working space, made this an expensive and high risk option.

The Shortened Option (Retaining Structure) option was estimated to have the lowest capital cost, however this was countered by negative findings in a number of other areas. The nature of this solution means that the construction would require lengthy full road closures. It was also assessed to be the riskiest of the non-tunnel options and it was considered that this and the lengthier road closures negated the slightly lower capital cost. The environmental impact of the two viaduct options was considered to be comparable. Buildability and risk were considered to be key factors when comparing the two viaduct options. The Shortened Option (Viaduct) had the lowest capital cost and overall offered better value for money than the Viaduct Option.

Therefore it was concluded that the Shortened Option (Viaduct) should be taken forward for further development, and full EIA and Stage 3 Scheme Assessment.

2.7 The Recommended Scheme

The Shortened Option (Viaduct) is the proposal that is being developed as the preferred scheme and is the subject of this ES.

The scheme provides improvements over a length of approximately 400m. It is a partly offline structural solution, providing 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. The improvements to the existing road will extend approximately 180m to the north of the new structure. Tie-in works will be required in advance of the start and end of the scheme covering approximately 20m at each location.

The viaduct section will consist of a 6m carriageway plus 1.2m curve widening, with a verge of 1m on the west side and 2m on the loch side. The proposed viaduct is a multi-span structure with piled foundations and typical internal spans of equal length. North of the viaduct improvements to the existing carriageway will consist of a 6m carriageway with variable curve widening and a 1.5m verge on the west side and a 1.05m verge on the east side. The preliminary layout of the scheme is shown in Figure 2.2 – The Scheme.

The scheme also includes ancillary drainage works to the south and a proposed dry drainage swale to the north along with a maintenance access track.

2.7.1 Construction Process

It is proposed to build the offline section of the viaduct first, to minimise delays and closures of the existing road. Once the offline section has been completed, the new rock cut at the north end of the scheme will be constructed. At the same time, work

can commence on construction of the tie-ins to the north and south of the new viaduct structure. Earthworks associated with widening of the existing road to the north of the scheme will also be carried out at this stage.

Consequently, 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;

- Site setup and site clearance;
- Construction of offline works;
- Construct new rock cut;
- Construction of online tie-in works to the North and South; and
- Finishing works

The works will also require the importation of construction materials and the disposal of materials off site. Although delivery of materials to and from the site will be a matter for the construction contractor, it is anticipated that the loch could be used for material haulage.

Where practical, a positive drainage system incorporating SUDS treatment and outfalling to the Loch is being provided. Further details can be found in Chapter 11 – Road Drainage and the Water Environment. Further detail on the construction of the scheme is provided in Chapter 12 – Disruption due to Construction.