# 3. Alternatives Considered

## 3.1. Introduction

3.1.1. This chapter provides a summary of the main alternatives evaluated during the development of a preferred design for the Proposed Scheme. It outlines the key aspects taken into account that informed the decision-making process with respect to both the mainline route alignment and junction options.

3.1.2. This chapter focusses on the main alternatives considered post DMRB Stage 1, i.e. with the defined route corridor identified in the A9 Dualling Preliminary Engineering Support Services (PES) [i] commission and A9 Dualling Strategic Environmental Assessment (SEA).

3.1.3. As outlined in Chapter 1, the need for a Category 7A All Purpose Dual Carriageway road standard was identified from previous studies and therefore this was set as a requirement.

3.1.4. The term 'chainage' refers to the distance (in metres) of any point along the Proposed Scheme measured along the road centre line from the start point of the Scheme (this being chainage 0).

## 3.2. Route Corridor Options

3.2.1. In September 2012, Transport Scotland commissioned the A9 Dualling:PES. This comprised an engineering assessment of the A9 Perth to Inverness route and output included engineering constraints mapping, route options work and other design strategies such as junction and access strategy, lay-by and rest area strategy and NMU strategies. Other activities undertaken as part of the PES commission included geotechnical desk studies, topographical survey work, land referencing and stakeholder engagement. The principal output of the PES Commission was the Design Manual for Roads and Bridges (DMRB) Stage 1 Assessment.

3.2.2. Concurrent with PES, Transport Scotland also commissioned the A9 Dualling Strategic Environmental Assessment (SEA)[ii]. The SEA identified the key environmental and landscape issues along the length of the A9 route between Perth and Inverness and assessed the potential environmental impacts associated with the proposed works.

3.2.3. The PES and the SEA together were considered equivalent to a DMRB Stage 1 assessment and the outcome was a recommendation of dualling within an online corridor, broadly 200m width (i.e. 100m either side of the existing A9 trunk road carriageway), with localised offline sections where topographical, environmental and physical constraints were present. This online corridor was identified as a 'soft' boundary for further, more detailed study at DMRB Stage 2. The SEA recommended that offline corridors were sifted out due to the potential for greater environmental impacts when compared with the relevant online corridor sections.

3.2.4. The Junction and Accesses Strategy developed as part of the PES/SEA identified proposed Grade Separated Junction (GSJ) locations within the Dalraddy to Slochd section as follows:

- Aviemore South
- Granish Junction; and
- Bogroy Junction (now referred to as Black Mount).

## 3.3. Route Alignment Options

3.3.1. Following selection of a preferred route corridor, from the PES and SEA studies, a DMRB Stage 2 assessment was undertaken to develop and assess route alignment options and to identify a preferred alignment for the Dalraddy to Slochd scheme.

### Initial Options Development

3.3.2. During the initial stages, a number of different options for mainline widening, junction locations and junction layouts were identified. Individual sifting exercises were then undertaken for both the mainline widening and the junctions in order to identify viable options to be taken forward into the Stage 2 assessment process. The sifting processes considered engineering impacts, environmental impacts and operational performance.

### Sifting of Mainline Alignment Options

3.3.3. Three initial mainline options were developed for the purposes of mainline sifting:

- Option A – Northbound Widening
- Option B- Southbound Widening
- Option C – Symmetrical Widening

3.3.4. The sifting process concluded that there would be 3No. mainline widening options (these were all within a 200m wide corridor of the A9 carriageway, as identified during the PES study and are shown in Figure 3.1 DMRB Stage 2 Options) to be evaluated as part of the Stage 2 assessment as follows:

- Option 1: predominantly southbound widening;
- Option 1A: predominantly southbound widening as per Option 1 but with a short section of symmetrical widening in the vicinity of Aviemore; and
- Option 2: predominantly northbound widening.

3.3.5. Mainline Option 1 consists of fully southbound widening with localised adjustments at the northern end of the scheme to minimise rock cuts in the area of Slochd summit.

3.3.6. Mainline Option 1A replicates Option 1 with the exception of a hybrid section between chainages 2,500m to 6,700m to minimise impacts to all properties in this area.

3.3.7. Mainline Option 2 consists of northbound widening with four deviations to southbound through the following chainages; 2,500m to 3,500m (to avoid a direct impact on private property), 10,400m to 11,700m (to avoid a direct impact on a scheduled monument and reduce ancient woodland loss) and 20,900m to 25,030m (to reduce ancient woodland loss and minimise impacts on National Cycle Network (NCN) Route 7 and private properties). As with Option 1, there will be localised adjustments at the northern end of the scheme to minimise rock cuts in area of Slochd summit.

### Sifting of Junction Options

3.3.8. Four locations for grade separated junctions were considered during the initial stages of option development, however, a central Aviemore option (Aviemore Central) was discounted due to factors including encroachment into the Craigellachie National Nature Reserve (NNR) / Site of Special Scientific Interest (SSSI), impact on ancient woodland, impact on NMU routes including Aviemore Orbital, earthworks / constructability issues and public opposition.

3.3.9. The sifting process concluded that there would be 3No. junction locations to be considered as part of the Stage 2 options assessment comprising the following:

- Aviemore South;
- Granish; and
- Black Mount (identified as Bogroy in the PES report).

3.3.10. A total of 7No. junction layouts were evaluated for Aviemore South as part of the sifting exercise and subsequently 3No. junction layouts were taken forward as Stage 2 options (see Figure 3.1 DMRB Stage 2 Options). Layout options which required an underbridge (bridge under the A9) were discounted, as the A9 alignment would have to be raised significantly to achieve the required headroom within the underpass.

3.3.11. 10No. junction layouts were evaluated for Granish with 4No. junction layouts selected as Stage 2 options (see Figure 3.1 DMRB Stage 2 Options). Options which utilised an overbridge (bridge over the A9) were sifted out, as the existing A95 alignment is currently below that of the A9 and so it would be impractical for the A95 geometry to comply with design standards with respect to vertical gradients if raised to the required level for an overbridge.

3.3.12. 12No. junction layouts were considered in relation to Black Mount and 6No. of the layouts progressed to Stage 2 options assessment (see Figure 3.1 DMRB Stage 2 Options). Options which required an underbridge were discounted, as the A9 alignment would have to be raised substantially to achieve the required headroom within the underpass resulting in increased mainline earthworks and footprint. In addition, the poor ground conditions in this area and the difficulty with draining an underpass structure made this structural solution prohibitive.

3.3.13. Given that 13 junction layout options were identified (through the sifting evaluation) to be taken forward into the DMRB Stage 2 Assessment, together with three mainline options, it was not considered feasible to combine the mainline alignment options and junction options into assimilated route options given the large number of possible permutations. As such the initial assessment of mainline alignment options and junction options was carried out separately.

## DMRB Stage 2 Assessment of Options

3.3.14. The aim of the DMRB Stage 2 assessment process was to identify environmental, engineering and economic factors associated with the route options and to consider the advantages and disadvantages of each option with regard to these factors. The process included desk studies, field surveys and ongoing consultation with stakeholders. Public consultation was also undertaken and included community Drop-In events on 23rd and 24th September 2016, and Public Exhibitions held on 2nd and 3rd of February 2016 and the 16th and 17th June 2016.

## DMRB Stage 2 Preferred Option

3.3.15. The DMRB Stage 2 assessment concluded that mainline Option 1A, incorporating two localised variations, was the preferred option. The assessment also allowed consideration of whether combinations of parts of the Options 1, 1A and 2 would provide benefits. Consequently, the preferred route includes two localised northbound widening variations on the Option 1A alignment in the vicinity of Loch Alvie at the southern end of the scheme (between the southern tie-in (chainage 0m) to beyond the Druim Mhor property at chainage 2,500m and at Avielochan (between chainage 10,200m and 10,300m) to the north of Granish.

3.3.16. At Loch Alvie it was identified that a mainline alignment following a predominantly northbound alignment would reduce encroachment into the Alvie Site of Special Scientific Interest (SSSI).

3.3.17. A localised northbound variation at Druim Mhor results in the mainline carriageway alignment being further displaced from the residential property, thereby reducing visual impacts.

3.3.18. A localised northbound variation at Avielochan reduces impacts on Avielochan Farm. The realignment at this location is to be centred on the property to facilitate a cross-over back to predominantly southbound widening at the earliest opportunity to minimise loss of ancient woodland and agricultural land.

3.3.19. The junction options identified and taken forward in the preferred option were as follows:

- A half-cloverleaf junction at Aviemore South (Option A02);
- A half-dumbbell and cloverleaf junction at Granish (Option C34); and
- A diamond junction at Black Mount (Option D12).

3.3.20. The key issues justifying the preferred option taken forward into the Stage 3 assessment can be summarised as follows:

- The mainline option taken forward has the least overall impact on environmental constraints within the corridor. It avoids several residential properties to the south of Aviemore; avoids direct impacts on Loch Puladdern and Tor Beag Fort Scheduled Monument (in contrast to the northbound widening option); and involves least land-take within designated sites, areas of ancient woodland and notable habitats;
- The half-cloverleaf layout at Aviemore South was assessed as having the least impact on agricultural land, no impact on residential properties in contrast to the other options, less impact on visual receptors including the Duke of Gordon's Monument and Druim Mhor, the most favourable earthworks balance and lowest overall construction cost.
- The half-dumbbell and cloverleaf option at Granish was assessed as having the least loss of ancient woodland and Annex 1/other habitats, lower potential for impacts on groundwater and the lowest earthworks cut volumes;
- Of the full movement junctions considered at Black Mount, a diamond layout was considered the most preferable, on the basis of a better landscape fit, lesser impacts on views from the road; and lower potential for groundwater pollution during construction. (The restricted movement option at Black Mount was discounted for operational and winter resilience reasons).

3.3.21. As part of the recommendations of the Stage 2 Assessment, it was identified that the grade separated junctions could be further refined and have been subject to design development as part of the Stage 3 Assessment. This has involved investigating the benefits of promoting compact grade separated junctions to DMRB TD40/94 standard at all three of the identified junction locations.

3.3.22. It is noted that although compact junctions are a departure from the requirements of TD9/93 (category 7A dual carriageway standard), they offer significant benefits across all the assessment criteria by consisting of a smaller overall layout and allowing connection for minor accesses.

3.3.23. The design and development of the proposed scheme through DMRB Stage 3 is described in Chapter 4 (Design Development) and Chapter 5 (The Proposed Scheme).

[i] Jacobs (2014); A9 Dualling Preliminary Engineering Support Services – DMRB Stage 1 Assessment.
[ii] Transport Scotland (2013); A9 Dualling Programme – Strategic Environmental Assessment, Environmental Report.