A9 Dualling Programme: Pass of Birnam to Tay Crossing

DMRB Stage 2 Scheme Assessment Report

Volume 1: Main Report and Appendices

Part 5 - Assessment Summary

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List of Abbreviations

AWI	-	Ancient Woodland Inventory
CPO	-	Compulsory Purchase Order
DMRB	-	Design Manual for Roads and Bridges
D2AP	-	Dual 2-lane All-purpose
GDL	-	Garden and Designed Landscape
GHG	-	Green House Gas
HES	-	Historic Environment Scotland
HGV	-	Heavy Goods Vehicle
kph	-	Kilometres per hour
LBCA	-	Listed Building and Conservation Areas
mph	-	Miles per hours
NCN	-	National Cycle Network
NMU	-	Non-Motorised User
NSA	-	National Scenic Area
PES	-	Preliminary Engineering Services
PKC	-	Perth & Kinross Council
SAC	-	Special Area of Conservation
SEA	-	Strategic Environmental Assessment
SEPA	-	Scottish Environment Protection Agency
WCH	-	Walkers, Cyclists and Horse-riders

25. Conclusions & Recommendations

25.1 Introduction

25.1.1 As part of the Design Manual for Roads and Bridges (DMRB) Stage 2 assessment, multiple options have been considered and assessed. These options are listed below and described in Volume 1, Part 1 - The Scheme, Chapter 4 (Description of Route Options).

- Community's Preferred Route Option (Option ST2A);
- Additional Whole Route Option 1 (Option ST2B);
- Additional Whole Route Option 2 (Option ST2C); and
- Additional Whole Route Option 3 (Option ST2D).

25.1.2 The DMRB Stage 2 assessment has assessed the options, taking account of constraints, potential environmental (including community and individual human impacts), engineering and traffic and economic effects to identify an Emerging Preferred Route Option. Transport Scotland's and the community's objectives have also been considered, as well as feedback from the public and other stakeholders, including that obtained through the A9 Co-Creative Process.

25.1.3 As agreed, as part of the A9 Co-Creative Process, the Emerging Preferred Route Option from the DMRB Stage 2 assessment will be presented to Scottish Ministers for consideration. Should the assessment identify an Emerging Preferred Route Option that is different to the Community's Preferred Route Option (Option ST2A), both options will be presented to Scottish Ministers for consideration. Scottish Ministers will then confirm a Preferred Route Option for the Pass of Birnam to Tay Crossing section of the A9 Dualling Programme.

25.2 Preferred Route Option Assessment

Key Benefits and Disbenefits

25.2.1 A summary of the key findings of the DMRB Stage 2 assessment are provided in Table 25.1. These are expressed as Benefits and Disbenefits for each proposed route option where the assessments have indicated a variation or difference between route options that has been sufficient to be considered a differentiator. In the case of Benefits, these are where the assessment has identified an aspect of the assessment that can be considered to have the lowest overall effects. Conversely, a disbenefit is reported where the assessment has identified an aspect of the assessment that can be considered to have the highest overall effect. Full details of the assessment are included in Volume 1, Part 2 - Engineering Assessment, Part 3 - Environmental Assessment and Part 4 - Traffic and Economic Assessment.

Table 25.1: Route Options, Key Benefits and Disbenefits

Route Option	Benefits	Disbenefits
Option ST2A	Engineering, Traffic and Economics	
	• Reduced traffic flows on Perth Road (between Murthly Junction and Station Road) compared to the Do-Minimum scenario.	• A Design Speed of 85 kilometres per hour (kph) has been assumed through the cut and cover tunnel, and a speed limit of 50 miles per hour (mph) proposed for safety between the southern extent of the scheme and the proposed Dunkeld Junction, resulting in reduced travel time benefits. • Requires significant excavation to form the 1.5 kilometres cut and cover tunnel

Route Option	Benefits	Disbenefits
		(approximately 535,000m^3), with approximately 698,000m^3 of material to be disposed for the scheme as a whole. This results in approximately 118,000 lorry movements to dispose of excess material. • Complex road drainage required, primarily due to the lowered road alignment, existing corridor topography and narrow corridor, with potential difficulty achieving the necessary levels of treatment prior to discharge. • Construction of the 1.5 kilometre cut and cover tunnel in such a constrained and sensitive corridor will be complex. The walls for the cut and cover tunnel would be constructed using approximately 3,700 large diameter bored piles (1.2 metres diameter) to retain a height of approximately 10 metres. Installation will require heavy plant in close proximity to residential properties, Dunkeld & Birnam Station and the Highland Main Line railway. Construction will generate noise and vibration, with the potential to affect residential properties immediately adjacent to the cut and cover tunnel as bored piles are formed over a significant length. It is noted however, that structural damage to residential properties is not envisaged. • Includes an at-grade roundabout at Dunkeld, which is a Deviation from recommendations for a Dual 2-lane All-Purpose Road (D2AP) (sub-category c) (formerly Category 7A) standard. Possibility of queuing within the cut and cover tunnel in the event of an accident occurring on the roundabout. • Lowest level of economic benefits at the highest cost.
	Environment	
	• The joint least overall adverse effect on cultural heritage and includes a significant beneficial effect on the setting of the Category A Listed Dunkeld & Birnam Station from re-establishing the physical connection between the station and Birnam via Station Road. • Direct vehicular and pedestrian connection provides opportunities for the sustainable re-use of the station building. Potential for providing Equality Act 2010 compliant access between station platforms can be investigated in conjunction with Network Rail and Transport Scotland (Rail). • Provides the potential for creation of additional undesignated open space on top of the cut and cover tunnel, which could provide amenity space for the community, offsetting	• The construction duration and requirement for extensive piling results in the greatest overall effect on noise and vibration and human health during construction. • The scale and nature of the construction required for the cut and cover tunnel results in the highest overall effect on material assets and waste, and climate. • Inchewan Burn would require to be lowered by approximately 8 metres, resulting in significant changes to its form and function, impeding fish passage and fragmenting habitat. Modifications to the watercourse are likely to extend downstream. • Potential for direct and indirect impacts on businesses and community assets during

Route Option	Benefits	Disbenefits
	for loss of community land and open space. This additional open space contributes to this option having the lowest overall effect on landscape and visual receptors. • Results in the fewest significant adverse effects and greatest number of significant beneficial effects in relation to noise, particularly for noise sensitive receptors in Birnam, when compared with the at-grade options (Options ST2C and ST2D). • The combination of the provision of additional open space and the beneficial effects in relation to noise results in the lowest overall effect on human health and wellbeing.	construction, given the 4 ½ to 5 year expected construction duration. • Acquisition of Birnam Industrial Estate, which requires demolition of commercial properties. • Significant effect on View from the Road and the Special Qualities of the National Scenic Area (NSA) as a result of the Murthly Junction and the tunnelled section leading to curtailment of views of the surrounding landscape, including the 'Gateway to the Highlands' experience. • Although assessed as having the least overall effect on Cultural Heritage, there is a significant adverse effect on the setting of the Category A Listed Dunkeld & Birnam Station resulting from the loss of the station forecourt.
Option ST2B	Engineering, Traffic and Economics	
	• Includes a 70mph speed limit throughout, consistent with the overall A9 Dualling Programme.	• Requires significant excavation to form the underpass structure (approximately 168,000m^3), with approximately 350,000m^3 of material to be disposed for the scheme as a whole. This results in approximately 59,000 lorry movements to dispose of excess material. • Complex road drainage required, primarily due to the lowered road alignment, existing corridor topography and narrow corridor, with potential difficulty achieving the necessary levels of treatment prior to discharge. • Construction of the 150 metre long underpass in such a constrained and sensitive corridor will be complex. The walls for the underpass would be constructed using large diameter bored piles (1.2 metres diameter) to retain a height of approximately 10 metres. Approximately 860 piles would be required. Installation will require heavy plant in close proximity to residential properties, Dunkeld & Birnam Station and the Highland Main Line railway. Construction will generate noise and vibration, with the potential to affect residential properties immediately adjacent to the underpass as bored piles are formed. It is noted however, that structural damage to residential properties is not envisaged. • Increases traffic flows on Perth Road (north and south of Station Road) through the omission of a southbound diverge slip road at Birnam Junction. The increase in traffic on Perth Road is expected to be between 200 and 400 vehicles per day, which is not considered to be significant. (Note: All options result in an increase in traffic on Perth Road to the north of Station Road.)

Route Option	Benefits	Disbenefits
		• Includes an at-grade roundabout at Dunkeld, which is a Deviation from recommendations for a D2AP (sub-category c) standard.
	Environment	
	• The joint least overall adverse effect on cultural heritage and includes a significant beneficial effect on the setting of the Category A Listed Dunkeld & Birnam Station from re-establishing the physical connection between the station and Birnam via Station Road. • Direct vehicular and pedestrian connection provides opportunities for the sustainable re-use of the station building. Potential for providing Equality Act 2010 compliant access between station platforms can be investigated in conjunction with Network Rail and Transport Scotland (Rail). • Results in significant beneficial effects in relation to noise, particularly for noise sensitive receptors in Birnam with fewer significant adverse effects when compared with the at-grade options (Options ST2C and ST2D). • Does not require the acquisition of Birnam Industrial Estate, eliminating the need for demolition of business properties.	• Due to the scale and nature of the construction required for the underpass, there is an intermediate overall effect on material assets and waste, and climate. • Inchewan Burn requires to be lowered by approximately 6 metres, resulting in significant changes to its form and function, impeding fish passage and fragmenting habitat. Modifications to the watercourse are likely to extend downstream. • Potential for direct and indirect impacts on businesses and community assets during construction, given the 4 to 4 ½ year expected construction duration. • The highest overall effect on landscape as there is lesser scope to integrate the underpass into the surrounding landscape and effects on the NSA 'Gateway to the Highlands' experience. • Although it has the joint least overall effect on cultural heritage, there would be a significant adverse effect on the setting of the Category A Listed Dunkeld & Birnam Station resulting from loss of the station forecourt.
Option ST2C	Engineering, Traffic and Economics	
	• Includes a 70mph speed limit throughout, consistent with the overall A9 Dualling Programme. • Incorporates grade separated junctions throughout, fully compliant with recommendations for a D2AP (sub-category c) standard. • Provides the greatest travel time benefits for road users, due to the inclusion of grade separated junctions throughout. • No significant drainage issues anticipated, achieving the necessary levels of treatment.	• Requires import (approximately 300,000m^3) of acceptable fill material. • Requires construction of low-height retaining walls (up to 2 metres in height) on the east side of the A9 to the immediate south of Dunkeld Junction, alongside the southbound merge slip road. A further retaining wall (up to 14 metres in height) required in the locality of the River Braan crossing due to the raised A9 carriageway. • Increases traffic flows on Perth Road (north and south of Station Road) through the omission of a southbound diverge slip road at Birnam Junction. The increase in traffic on Perth Road is expected to be between 200 and 400 vehicles per day, which is not considered to be significant. (Note: All options result in an increase in traffic on Perth Road to the north of Station Road.) • No direct vehicular access to Dunkeld & Birnam Station, with parking provided on the site of Birnam Industrial Estate.

Route Option	Benefits	Disbenefits
	Environment	
	• Although assessed as having an overall intermediate effect on cultural heritage, there would be a Slight beneficial effect from the improved physical connection between the Category A Listed Dunkeld & Birnam Station and Birnam. • The replacement car park and pedestrian underpass would provide some opportunities for the sustainable re-use of the station building. However, direct vehicular access from the A9 would be limited to maintenance and emergency purposes only. • No direct impact on Inchewan Burn or fish passage. • Reduced direct and indirect impacts on businesses and community assets during construction, given the less complex nature of construction and shorter duration (2 ½ to 3 years). • Fewer significant adverse noise and vibration effects during construction than the lowered route options (Options ST2A and ST2B). • Equality Act 2010 compliant access to Dunkeld & Birnam Station and southbound platform through provision of a new underpass structure, with potential for providing compliant access to northbound platform through development of the DMRB Stage 3 design in conjunction with Network Rail and Transport Scotland (Rail).	• Due to the scale and nature of the construction required for the grade separated Dunkeld Junction, Option ST2C has an intermediate overall effect on material assets and waste, and climate. • Acquisition of Birnam Industrial Estate, which requires demolition of commercial properties. • Significant adverse impact on visual receptors and landscape character as a result of the vertical alignment to accommodate the grade separated Dunkeld Junction, increasing the prominence of the road with little means to mitigate. • Significant adverse effect on the setting of the Category A Listed Dunkeld & Birnam Station from the permanent loss of the forecourt and the visible presence of the carriageway and associated infrastructure. • Results in a reduced number of beneficial noise effects and increased number of adverse effects, particularly in Birnam when compared to the lowered route options (Options ST2A and ST2B).
Option ST2D	Engineering, Traffic and Economics	
	• Includes a 70mph speed limit throughout, consistent with the overall A9 Dualling Programme. • Provides comparable operational benefits to the other options but at a lower cost, therefore performing better in economic terms. • No significant structures required. • No significant drainage issues anticipated, achieving the necessary levels of treatment. • Largely at-grade, therefore no significant excavations or embankments necessary. • No substantial piling activity.	• Increases traffic flows on Perth Road (north and south of Station Road) through the omission of a southbound diverge slip road at Birnam Junction. The increase in traffic on Perth Road is expected to be between 200 and 400 vehicles per day, which is not considered to be significant. (Note: All options result in an increase in traffic on Perth Road to the north of Station Road.) • Includes an at-grade roundabout at Dunkeld, which is a Deviation from recommendations for a D2AP (sub-category c) standard. • No direct vehicular access to Dunkeld & Birnam Station, with parking provided on the site of Birnam Industrial Estate.
	Environment	
	• The scale and nature of the construction required results in the lowest overall effect on material assets and waste, and climate.	• Acquisition of Birnam Industrial Estate, which requires demolition of commercial properties. • Significant adverse effect on the setting of the Category A Listed Dunkeld & Birnam Station

Route Option	Benefits	Disbenefits
	• Although assessed as having an overall intermediate effect on cultural heritage, there would be a slight beneficial effect from the improved physical connection between the Category A Listed Dunkeld & Birnam Station and Birnam. • The replacement car park and pedestrian underpass would provide some opportunities for the sustainable re-use of the station building. However, direct vehicular access from the A9 would be limited to maintenance and emergency purposes only. • No direct impact on Inchewan Burn or fish passage. • Reduced direct and indirect impacts on businesses and community assets during construction, given the less complex nature of construction and shorter duration (2 ½ to 3 years). • Fewer significant adverse noise and vibration effects during construction than the lowered route options (Options ST2A and ST2B). • Equality Act 2010 compliant access to Dunkeld & Birnam Station and southbound platform through provision of a new underpass structure, with potential for providing compliant access to northbound platform through development of the DMRB Stage 3 design in conjunction with Network Rail and Transport Scotland (Rail). • Lowest overall effect on the River Tay (Dunkeld) NSA and its Special Qualities, largely retaining the existing experience of passage through the glen, including that of the 'Gateway to the Highlands'. • Lowest overall effect on visual amenity as much of the existing roadside vegetation would likely be maintained and views from adjacent visual receptors would be relatively unchanged.	from the permanent loss of the forecourt and the visible presence of the carriageway and associated infrastructure. • Results in a reduced number of beneficial noise effects and increased number of adverse effects, particularly in Birnam when compared to the lowered route options (Options ST2A and ST2B).

Listed Building Consultation

25.2.2 Volume 1, Part 3 - Environmental Assessment identifies the legislation and regulations that have informed the methodology and assessment of environmental impacts and effects. Further information can be found in each topic chapter. It is relevant to highlight the statutory context, which is relevant to the identification of the Preferred Route Option, in relation to the impacts on the setting of the Category A Listed Dunkeld & Birnam Station.

25.2.3 The principal consenting legislation for the proposed scheme is the Roads (Scotland) Act 1984 (as amended) (the Roads Act 1984). The proposed scheme, if consented, will be via the confirmation of draft Roads Orders and Compulsory Purchase Orders (CPO) by the Scottish Ministers under the provisions of this Act, and the Acquisition of Land (Authorisation Procedure) (Scotland) Act 1947.

25.2.4 Volume 1, Part 3, Chapters 14 (Cultural Heritage) and 19 (Policies and Plans) make reference to Section 59 of the Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997 (the LBCA Act 1997) which requires that in considering whether to grant planning permission for development that affects a listed building or its setting, a planning authority or the Secretary of State, as the case may be, shall have special regard to the desirability of preserving the building or its setting or any features of special architectural or historic interest that it possesses.

25.2.5 Section 59 of the LBCA Act 1997 is applicable to decisions on planning applications made under the provisions of the Town and Country Planning (Scotland) Act 1997 as amended (the Planning Act 1997) and is not a statutory requirement for decisions made under other principal Acts, including the Roads Act 1984. The proposed scheme will not be subject to a requirement for planning permission under the Planning Act 1997.

25.2.6 However, it is explained in Volume 1, Part 3 - Environmental Assessment, Chapter 19 (Policies and Plans) that the intent of Section 59 of the LBCA Act 1997 is to regulate development and the use of land that affects a listed building or its setting, and that this is an objective in Scottish Planning Policy (Scottish Government, 2014). Therefore, whilst Section 59 of the LBCA Act 1997 is not directly applicable, it is appropriate for Scottish Ministers to give consideration to its provisions in making decisions on developments that are being promoted under other legislation, such as the Roads Act 1984.

25.2.7 All route options would have a significant impact on the Category A Listed Dunkeld & Birnam Station. This significant impact is not considered to be commensurate with preservation, as identified in Section 59(3) of the LBCA Act 1997, and therefore it is considered that in the assessment of proposed route options it is appropriate that special regard to the desirability of the Category A Listed Dunkeld & Birnam Station and its setting is given. As the impacts on other listed buildings have not been assessed to be significant (i.e., the significance of impact is less than moderate) it is not considered that these impacts breach this threshold and therefore there is no requirement for special regard to be applied.

25.2.8 The LBCA Act 1997 is identified in Appendix A of the '*Strategic Environmental Assessment (SEA) Environmental Report (Transport Scotland, 2013)*', which informed the preparation of the Strategic Environmental Design Principles for the A9 Dualling Programme. These were in turn used to inform the development of proposed route options at DMRB Stage 2. In addition, and as identified in Volume 1, Part 3 - Environmental Assessment, Chapter 14 (Cultural Heritage), the designation of listed buildings is one of the criteria used to inform professional judgement in the assessment of the value of historic buildings identified in the baseline which, in combination with the magnitude of change, informs the assessment of the significance of effect. In addition, the approach to assessing impacts and effects on the setting of the Category A Listed Dunkeld & Birnam Station has been undertaken using the staged process identified in the *'Managing Change in the Historic Environment: Setting'* guidance, and this has informed the assessment and comparison of proposed route options. As such, it is considered that in the development of the proposed route options special regard has been given to the desirability of preserving the Category A Listed Dunkeld & Birnam Station and its setting. However, it is found that there will still be a significant change to its setting as no proposed route options have been identified which could avoid impacts of this nature.

Wellbeing Assessment

25.2.9 The potential effects on wellbeing, both during construction and operation, has been considered as part of the DMRB Stage 2 assessment and is documented in Volume 1, Part 3 – Environmental Assessment, Chapter 20 (Human Health). Although there is no statutory requirement for wellbeing to be assessed, this aspect has been included in the scope of the human health assessment in response to concerns raised by the Birnam to Ballinluig A9 Community Group during the A9 Co-Creative Process.

25.2.10 The assessment follows DMRB guidance of the effects of proposed trunk road schemes on human health, following publication of DMRB LA 112: Population and human health (hereafter referred to as

DMRB LA 112). The community objectives, established through the A9 Co-Creative Process, that directly relate to wellbeing have been utilised to inform the assessment. Therefore, the human health assessment is developed further beyond that outlined in DMRB LA 112, in order to also consider the potential impacts and effects on wellbeing.

25.2.11 All proposed route options are assessed to have overall likely negative health and wellbeing outcomes during construction, with Options ST2A and ST2C likely having the highest overall negative outcome. For Option ST2A, this is due to the nature and duration of the required construction activities, which would include extensive piling and excavation. For Option ST2C, this is due to the severance/separation from healthcare and recreation facilities during construction, which may have a disproportionate effect on the young and the elderly.

25.2.12 As Option ST2D has the least intrusive construction activities and the shortest construction period of 2½ to 3 years, it would likely have the lowest overall negative outcome on health and wellbeing and was also therefore considered a differentiator. Option ST2B would likely have an intermediate overall negative outcome on health and wellbeing.

25.2.13 During operation, Option ST2A is assessed to have the lowest overall likely outcomes (positive) on health and wellbeing due to the potential opportunities for additional green space and landscape amenity, as well as improved amenity for National Cycle Network (NCN) Route 77, which are considered to be differentiators. Options ST2B, ST2C and ST2D are assessed to have intermediate overall likely outcomes (neutral).

Local Economy Assessment

25.2.14 As part of the DMRB Stage 2 assessment, a local business assessment, to consider the potential impacts on local businesses, tourist attractions and the local economy as a result of A9 dualling, was completed. This assessment was completed by Professor J John Lennon, Dean of Glasgow School for Business and Society, Glasgow Caledonian University and is reported in Appendix A7.2: Perceived Tourism and Business Impacts of the A9 Dualling between the Pass of Birnam and Tay Crossing Report, included in Volume 1, Part 6 - Appendices. The local business assessment concluded that extensive engineering works are unlikely to significantly impact tourism and local economy, with the majority of the local businesses consulted suggesting that they were not overly concerned by construction measures. Post construction, the majority of local businesses consulted were positive about the possibilities that A9 Dualling Programme may bring, including easier access to Dunkeld, Birnam and the surrounding area. The local economy assessment also concluded that the option delivered was unlikely to have an impact on visitor numbers to Dunkeld and Birnam. Instead, improvements in signage and marketing are most likely to encourage visitation, with a focus on utilising social and digital media to improve awareness of the visitor attractions within the locality.

Local Community and Key Stakeholder Feedback

25.2.15 A summary of the feedback from the local community and key stakeholders is included in Table 25.2.

Table 25.2: Summary of Public and Stakeholder Feedback

Stakeholder	Summary of Comments
A9 Co-Creative Process Consultation Feedback	The wider local community has expressed a preference for the 1.5 kilometre cut and cover tunnel (Option ST2A), with the option obtaining 37% of the vote at Stage 5 of the A9 Co-Creative Process. It is assumed that the wider community prefer this option as it has noise and visual benefits and allows the reconnection of Station Road. The wider local community has also expressed a clear preference for an at-grade roundabout at Dunkeld. It is assumed this is due to the easier construction and possible reduced noise and visual impacts of a grade separated junction. At Stage 4 of the A9 Co-Creative Process, the at-grade roundabout obtained a score of 709, which represented approximately 40% of the total scoring (second place had a score of 199, representing 11% of the vote). A small

Stakeholder	Summary of Comments
	number of local residents that live directly alongside the A9 have expressed concerns with the roundabout, noting a preference for a grade separated junction (Option ST2C). At Stage 5 of the of the A9 Co-Creative Process the public were invited to vote for their preference for the Community's Preferred Route Option. The Community's Preferred Route Option (Option ST2A) obtained 37% of the total vote, which equates to around 266 people.
Local Community Consultation Feedback	While the wider community through the A9 Co-Creative Process expressed a preference for the cut and cover tunnel, those residents that live directly alongside the A9 have expressed significant concerns for the construction phase. The main concerns being noise and vibration impacts, and potential structural damage to properties. Several residents living directly adjacent to the A9 have suggested that an option with an at-grade dual carriageway should be progressed. A public consultation event was held in late March 2019 to present the options to the public. The feedback forms suggest that community preference is mixed, with a number supporting the Community's Preferred Route Option (Option ST2A) and some favouring other options. A summary of the consultation process and feedback received from the community is documented in the *'A9 Dualling Programme: Pass of Birnam to Tay Crossing, Public Consultation Report (Jacobs, 2019)'*, which is available on the Transport Scotland website.
NatureScot (formerly known as Scottish Natural Heritage)	While acknowledging all options impact the NSA, NatureScot has noted that Option ST2A would have a significant adverse impact on the 'Gateway to the Highlands' Special Quality of the NSA, largely due to the scale of structures and ground modelling required, increasing the scale and perception of the road corridor dissecting the NSA. NatureScot highlighted that the cut and cover tunnel incorporated within Option ST2A is a significant departure from the rest of the route character, with a highly engineered feature within a largely rural and highly scenic landscape. However, NatureScot stated that Option ST2A also offers the greatest opportunity to incorporate the most significant and meaningful level of mitigation, establishing landscape links, both visual and physical to the north and south. Option ST2B also has significant adverse impacts on the Special Qualities of the NSA, with little opportunity for mitigation. Option ST2A includes a junction at the private access to Murthly Castle, with substantial embankments and an overbridge within a more unaltered section of the Murthly Castle Gardens and Designed Landscape (GDL). Options ST2B, ST2C and ST2D include a junction in the locality of the existing Birnam Junction, which is more compact and closer to the edge of the GDL. SNH stated that Option ST2C, due to the proposed grade separated junction at Dunkeld, significantly increases the severity of effect on several of the Special Qualities of the NSA, in particular related to woodland loss, balance of open to enclosed space and the setting of Dunkeld, with limited opportunities for mitigation. NatureScot noted this as a concern. The roundabout (Options ST2A, ST2B and ST2D) has a reduced footprint, which limits impacts and provides greater opportunities for mitigation. NatureScot suggested there may be merit in exploring a reduced length of cut and cover tunnel, which may balance the impacts on the Special Qualities of the NSA with the ability to provide appropriate mitigation.
Historic Environment Scotland (HES)	HES stated a preference for an option that reconnects the Category A Listed Dunkeld & Birnam Station with Station Road, securing the long-term viability of the Category A Listed station building and potentially allowing its re-use. As such, while acknowledging the constructability issues, HES has stated that Options ST2A or ST2B would be their preference. While acknowledging the improved pedestrian access to the station for Options ST2C and ST2D, HES noted concerns over the lack of vehicular access direct to the Category A Listed station building.
Scottish Environment Protection Agency (SEPA)	SEPA noted that from a groundwater perspective, Options ST2A and ST2B have the most significant impact, due to the lowering of Inchewan Burn. SEPA has also noted that from a flood risk perspective, Options ST2A and ST2B are considered to have greater potential to significantly increase the risk of flooding both during construction and operation stages, compared to Options ST2C and ST2D. There are significant risks attached to the construction period when the drop structure is being erected and the Inchewan Burn is diverted around the works in a temporary box culvert. SEPA notes that the duration of the construction works is important to consider in terms of the exposure to particular flood risks, therefore Options ST2A

Stakeholder	Summary of Comments
	and ST2B introduce more risk than Options ST2C and ST2D. As such, from a flood risk perspective, SEPA has noted a preference of Option ST2C or ST2D. SEPA is concerned on the impact on the Ladywell Landfill site, given the site was functioning prior to the Landfill Directive and potentially may contain special or hazardous waste. Options ST2A and ST2B include an access road to properties on Birnam Glen to the west of Dunkeld & Birnam Station that circumnavigates the landfill site. SEPA has stated that further study and consideration of the risks associated with the site would need to be considered.
Perth & Kinross Council (PKC)	PKC noted that Options ST2A and ST2B will have a significant impact on fish species of conservation interest due to the permanent changes to Inchewan Burn. PKC stated that salmon are experiencing a population decline and therefore any options that do not result in loss of habitat for salmon is preferable. However, the council noted that if this was not possible, they would like to see installation of fish passes to retain a degree of functionality within the burn. Ancient Woodland is a priority habitat of the Tayside Local Biodiversity Plan and PKC has stated that Ancient Woodland cannot be replaced. The council has acknowledged that Option ST2A would result in 4 hectares of woodland cover (on top of the cut and cover tunnel), however they note that compensatory planting of the same is unacceptable compensation. PKC acknowledge the construction complexities associated with Options ST2A and ST2B, and the anticipated noise and vibration impacts over a considerable period of time, noting concerns on the impacts on sensitive receptors and the need for mitigation. They also acknowledge that construction complexity is lessened by Options ST2C and ST2D. From a traffic perspective, PKC has stated concerns on the construction of Dunkeld Junction and the disruption on traffic entering and exiting Dunkeld. They have suggested that consideration should be given to utilising the C504 as a diversion route during construction, utilising a temporary roundabout on the A9. PKC has noted the potential benefits of the reconnection of Station Road to Dunkeld & Birnam Station (Options ST2A and ST2B), which re-establishes the historic physical and visual connection to Birnam and Dunkeld. The council has suggested that this reconnection may encourage use of the station building.
Police Scotland	Police Scotland highlighted concerns with the Community's Preferred Route Option (Option ST2A). Their principal concern was how they would deal with a road traffic accident within the tunnel, especially since the A9 is a major artery for road traffic. If traffic is queued within the cut and cover tunnel, it may be difficult for Police Scotland to gain access to the incident. Police Scotland stated that the lower speed limit proposed (50mph) would require strict enforcement, otherwise it would be ignored, leading to safety issues. Police Scotland noted concerns with the safe operation of the cut and cover tunnel and roundabout in unison. The greatest concern is that an incident on the roundabout would very quickly escalate affecting the cut and cover tunnel, or vice versa. A relatively minor accident, therefore, has the potential to delay the A9 for a considerable period of time. Police Scotland noted that the proposed at-grade roundabout at Dunkeld (Options ST2A, ST2B and ST2D) has the potential to have a greater number of road traffic accidents compared to a grade separated junction (Option ST2C), which is a concern. There is a higher proportion of slight and damage only incidents and whilst these are not formally recorded, they can have a significant operational impact. It was also noted that many road accidents on the existing A9 involve tourists who are unfamiliar with the road layout or Heavy Goods Vehicles (HGVs) that require larger areas to manoeuvre. Police Scotland suggested that, based on experience, full grade separated junctions were much better in reducing accident occurrence rates.
Scottish Ambulance Service	The Scottish Ambulance Service suggested that a prolonged construction period (Options ST2A and ST2B) would impact response times and transportation of patients. As a result, they may need to consider re-locating resources to mitigate the impacts. The Scottish Ambulance Service noted that a tunnel represents a particular concern because of its potential to increase journey times, responding to call-outs and transporting patients to hospital. It would be more difficult for ambulances to pass queueing traffic in a tunnel as there would be less space to allow vehicles to pull over on to a verge to allow an ambulance to pass. An open road (Options ST2B, ST2C and ST2D) would be preferable.

Stakeholder	Summary of Comments
	The Scottish Ambulance Service noted that the proposed at-grade roundabout (Options ST2A, ST2B and ST2D) has the potential to increase road traffic accidents, which is a concern. They noted that Broxden Roundabout is susceptible to HGVs overturning due to an adverse camber and that motorcyclists can be more vulnerable at roundabouts. Whilst most of the road traffic accidents are damage only or minor injury accidents, they are numerous and impact ambulance response times, and stretch their resources.
Scottish Fire & Rescue Service	The Scottish Fire & Rescue Service noted that, while they have no significant concerns with the 1.5 kilometre cut and cover tunnel (Option ST2A), they will need to re-train their staff to deal with incidents in the tunnel. They also noted concerns regarding the construction of the project. A prolonged construction period would impact response times. The Scottish Fire & Rescue Service noted that the at-grade roundabout at Dunkeld has the potential to increase road traffic accidents, which is a concern. While these road traffic accidents may be minor, it could lead to queueing on the A9, which would likely extend to the cut and cover tunnel. This could increase the time taken by the Scottish Fire & Rescue Service to attend incidents.
Logistics UK (formerly the Freight Transport Association)	Logistics UK noted that when driving at a constant speed, HGVs did not emit a significant volume of pollutants, in some cases less than cars. However, under acceleration, HGVs emit much more significant concentrations of pollutants. As a result, inclusion of an at-grade roundabout, which interrupts free flowing traffic may affect air quality. Logistics UK highlighted concerns regarding at-grade roundabouts, particularly for the movements of HGVs. Logistics UK suggested that a high number of accidents involving HGVs occur on roundabouts as they require larger areas to manoeuvre. Logistics UK noted advancements in technology and the possibility of driverless vehicles in the future. They suggested that inclusion at an at-grade roundabout and cut and cover tunnel for Option ST2A may impede the advancement of driverless vehicles on the A9. Logistics UK noted concerns about a prolonged construction period and the impact this would have on A9 traffic, which may lead to congestion and delay.
Road Haulage Association	The Road Haulage Association suggested that a roundabout (Options ST2A, ST2B and ST2D) may impact fuel economy, which would be a concern to its members. However, they noted that, as only one roundabout is included, this may not be a significant issue.
Transport Scotland (Roads)	Transport Scotland (Roads) stated that stationery traffic in tunnels, as a result of incident or breakdown, is a significant risk and should be avoided. Transport Scotland (Roads) noted that tunnels require ongoing maintenance that will incur significant additional costs. A control room will be required that will need full-time staff to monitor the tunnel. In addition, the tunnel equipment will need to be checked and maintained regularly, which will likely need to be done under tunnel closures. One direction of the tunnel could be closed to allow for maintenance, however bi-directional traffic in a tunnel is not desirable. Should any maintenance, or incident, require the complete closure of the tunnel, the only alternative is through Birnam and Little Dunkeld, which is not suitable for the volume of traffic and high proportion of HGVs. As a comparison, it was noted that the Clyde Tunnel is closed two nights a week to carry out essential maintenance. As the tunnel requires constant lighting, possible pumps for drainage and other machinery, the sustainability of the proposal was queried. Issues with noise and air quality at tunnel portals was also highlighted. Transport Scotland (Roads) noted a major concern with the safe operation of the cut and cover tunnel and roundabout in unison (Option ST2A). The greatest concern is that an incident on the roundabout would very quickly escalate affecting the cut and cover tunnel. A relatively minor incident has the potential to delay the A9 for a considerable period of time and has the potential to escalate to a more serious incident relatively quickly. A grade separated junction, that permits free flowing traffic, would be more suitable. Transport Scotland (Roads) noted that the proposed at-grade roundabout at Dunkeld (Options ST2A, ST2B and ST2D) has the potential to have a greater number of road traffic accidents compared to a grade separated junction. They also noted concerns that a roundabout may be subject to queuing, particularly during the summer peak, which would impact the safe operation of the A9.

25.3 Consideration of Reduced Cut and Cover Tunnel Length

Introduction

25.3.1 As detailed in Part 1 - The Scheme, Chapter 1.9 (A9 Co-Creative Process (2016 to 2018)), four Whole Route Options were considered at Stage 5 of the A9 Co-Creative Process. One of the options considered included a lowered A9 dual carriageway in the locality of Dunkeld & Birnam Station with a 450 metre long cut and cover tunnel. This option facilitated the reconnection of Station Road and, as the tunnel section had no restrictions on forward visibility, provided a 70mph speed limit throughout. It should be noted that this option finished 2nd in the voting at Stage 5 of the A9 Co-Creative Process, receiving a total score of 1,090 (23%). A description of the option is given below.

- On-line route largely following the horizontal alignment of the existing A9 single carriageway.
- A9 dual carriageway in a cut and cover tunnel for approximately 450 metres, commencing at the southern extent south of Dunkeld & Birnam Station and terminating approximately 450 metres south of the existing Dunkeld Junction.
- Dunkeld & Birnam Station retained in its current position with Station Road reconnected to the station. Parking on top of the cut and cover tunnel.
- Speed limit of 70mph throughout.
- Murthly/Birnam Junction:
  - Grade separated junction in the locality of the existing Birnam Junction.
  - Half-diamond layout, with a northbound diverge slip road and a southbound merge slip road.
  - B867 and Perth Road connected, crossing the A9 via an overbridge.
- Dunkeld Junction:
  - At-grade roundabout in the locality of the existing junction at Dunkeld, including a segregated left lane between the A923 and A9 south.
  - Provides connections to the A9 (north and south), A923, A822 and road to Inver.
- The Hermitage:
  - Left-in left-out junction on the northbound carriageway.
- Dalguise Junction:
  - Grade separated junction south of the existing junction with the B898.
  - Loops in the northbound direction and slip roads in the southbound direction, facilitating all vehicle movements.
  - Realigned B898 crosses the A9 on an underbridge, connecting to a roundabout on the east of the A9, which also connects to the southbound slip roads.

25.3.2 This option was not included as an Additional Whole Route Option within the DMRB Stage 2 assessment. However, at a meeting on 30th May 2019, the Birnam to Ballinluig A9 Community Group, proposed that further consideration should be given to an option with a 450 metre long cut and cover tunnel, as they felt it would address many of the challenges of the Community's Preferred Route Option (Option ST2A), while delivering key advantages. As a result, initial assessment of an option with a 450 metre long cut and cover tunnel has been undertaken, which is detailed in the following pages.

25.3.3 To ensure a fair comparison with the Community's Preferred Route Option (Option ST2A) the assessment considered a grade separated, diamond layout junction that facilitates all vehicle movements in the locality of the existing private access to Murthly Castle. A connection of the B867 and Perth Road was included in the locality of the existing Birnam Junction, crossing over the proposed A9 dual carriageway.

Initial Assessment of 450 metre long Cut and Cover Tunnel

Engineering

25.3.4 The Community's Preferred Route Option (Option ST2A) incorporates a 50mph speed limit between its southern extent and the proposed Dunkeld Junction due to forward visibility constraints within the 1.5 kilometre cut and cover tunnel. A shorter length tunnel, with the southern extent moved to the north, eliminates the need for a 50mph speed limit. As such, a 450 metre long cut and cover tunnel would incorporate a 70mph speed limit throughout. This would result in lengthened slip roads at the Murthly/Birnam Junction in the locality of the existing private access to Murthly Castle. To accommodate the necessary forward visibility for an increased speed limit through the junction, central reserve and verge widening would be required. To maintain a smooth alignment through the widened section, the southern extent of the scheme would be lengthened by approximately 270 metres.

25.3.5 Construction of a 450 metre long cut and cover tunnel in such a constrained and sensitive corridor would be complex. As insufficient space exists for an open excavation, the walls that form part of the cut and cover tunnel would be constructed using large diameter (1.2 metres diameter) bored piles to retain a height of approximately 10 metres. To avoid encroachment towards adjacent constraints, including the Highland Main Line railway to the west and residential properties to the east, bored piled walls are required on approach to the northern and southern tunnel portals, outwith the extent of the 450 metre long cut and cover tunnel. The bored piles themselves would be approximately 15 metres long and approximately 1,600 piles would be required in total. Installation would require heavy plant in close proximity to residential properties, Dunkeld & Birnam Station, the Highland Main Line railway and the Category A Listed station building. A total of approximately 100,000 tonnes (42,000m^3) of concrete would be required to construct the cut and cover tunnel. At the most intense period of construction, it is anticipated that approximately 125 tonnes (52m^3) of concrete would be produced each day, requiring an on-site concrete batching plant. Additional areas for processing and storing materials and plant would also be required, in addition to site offices and car parking.

25.3.6 As ground conditions are dense granular deposits with significant boulder obstructions, each bored pile would require the use of polymer mud support to maintain the structural integrity of the bored hole, prior to concrete pumping. As such, an on-site polymer mud and concrete batching plant is required. The requirement for an on-site polymer mud and concrete batching plant further increases the land required to construct the scheme.

25.3.7 It is not anticipated that the works will have a structural impact on residential properties. However, before commencement of piling works, pre-construction condition surveys may be undertaken to inspect the existing condition. This would be used as a baseline to monitor impacts of construction works and would highlight any structural issues that may be caused by the works. In the event of any damage, the successful contractor would be liable and therefore responsible for any remediation works.

25.3.8 Construction works would be undertaken approximately 2.5 metres from the Category A Listed station building. As a result, there is a risk of accidental damage. Sufficient monitoring works would also be required to ensure the Highland Main Line railway is not adversely impacted during construction. If the construction works were to impact the Highland Main Line railway, the railway would be closed, possibly for a considerable period of time, while remedial works were carried out.

25.3.9 Road drainage for the proposed cut and cover tunnel is complex, primarily due to the lowered road alignment, existing topography and narrow corridor. A combination of filter drains, attenuation ponds, geocellular storage systems, sumps and hydrodynamic vortex separators would be used to collect and treat road surface run-off in the locality of the tunnel portals. Back-up pumps, to prevent ponding during flood events would also be required. Given the constraints, it is more difficult to achieve the necessary two levels of treatment, in accordance with the SEA environmental principles. However, a possible solution that includes suitable treatment has been developed.

25.3.10 At this stage, it is anticipated that construction of the 450 metre long cut and cover tunnel option would be between 4 and 4 ½ years. This assumes a 6-day working week (Monday to Friday, 7am to 7pm, Saturday, 8am to 1pm, with no night-time, Sunday and Bank Holiday working) with 2 piling rigs in operation, completing a total of approximately 4 piles per day. Piling works is expected to be between 10 to 12 months. However, it should be noted that PKC (Environmental Health) would decide permissible working days and hours, likely in consultation with the local community.

25.3.11 The cut and cover tunnel would require a control room, likely located on top of the tunnel near the southern portal, that will need full-time staff to monitor the tunnel. The requirement for a tunnel control room, in addition to the proposed station car park, means there is limited space on top of the cut and cover tunnel for new planting/green space. In addition, the tunnel equipment, such as the fire safety apparatus and ventilation equipment, will need to be checked and maintained regularly. As such, one direction of the tunnel would need to be closed for this operation, utilising bi-directional traffic in the other half of the tunnel.

25.3.12 Works to lower Inchewan Burn by approximately 8 metres to accommodate the cut and cover tunnel would be complex and would require permanent and temporary bored piled and sheet piling works, as well as the erection of temporary structures and culverts.

25.3.13 Provision of an at-grade roundabout conflicts with the A9 Dualling Programme aim that the route should be a D2AP (sub-category c) with grade separated junctions.

Environment

25.3.14 The initial environmental assessment is provided below.

- Geology and Soils
  - A new access road would be required for properties on Birnam Glen. This access road would be located within Ladywell Landfill site, a historic landfill site operated by PKC and governed under a Waste Management License. This direct disturbance would require full or partial surrender of the Waste Management Licence and would require agreement by PKC and SEPA.

    There is a risk that contaminated soils and groundwater and elevated concentrations of ground gasses, such as methane and carbon dioxide, would be encountered during construction in the vicinity of Ladywell Landfill site. In addition, there is potential for permanent changes to established groundwater flow patterns with subsequent effects on groundwater quality and quantity. It is anticipated that these risks would be mitigated during construction.
- Water Environment
  - The 450 metre long cut and cover tunnel would involve lowering the A9 dual carriageway in the locality of Dunkeld & Birnam Station and Inchewan Burn, a tributary of the River Tay (the River Tay is designated as a Special Area of Conservation (SAC)). As a result, Inchewan Burn would need to be lowered by approximately 8 metres to accommodate the lowered A9. The lowering works would necessitate a drop structure, largely as a result of space constraints, and the watercourse would pass below the A9 in a culvert. Lowering the burn would have the potential to result in significant permanent changes to its geomorphology, including modifications to its banks and bed,

		alterations to the burn's flow characteristics and sediment regime. Fish passage would be permanently impeded. Modifications to the watercourse, which would include the banks and bed, would extend downstream, affecting a previously restored section and would require removal of a partly vegetated riparian zone. Work to the watercourse, over a long duration, would also increase the delivery of fine sediment to the downstream reach of the watercourse, increasing the potential siltation risk.
▪ Biodiversity	-	Murthly/Birnam Junction would result in the loss of woodland on the Ancient Woodland Inventory (AWI). The permanent reduction in Ancient Woodland habitat and associated plant communities would have a negative impact on the populations of protected species that rely on it for food, shelter and breeding. Compensatory planting would require to be provided to offset for the loss of Ancient Woodland habitat and to maintain connections or reconnect these areas with existing AWI sites. The works to Inchewan Burn would result in the permanent loss of passage for all migratory fish species. The proposed culvert and regrading works would also result in geomorphological changes, therefore habitats currently utilised by Atlantic salmon and European eels, although still available, would be altered. In the lower reaches, it is expected that suitable habitat for juvenile Atlantic salmon and European eels would re-establish. Spawning potential within the Inchewan Burn would, however, remain limited. The works to Inchewan Burn would also impact otters due to the fragmentation of habitat and the creation of a barrier to movement. However, during operation, the habitat created on top of the 450 metre long cut and cover tunnel adjacent to the car park would have the potential to act as a green bridge, potentially facilitating otter movements along Inchewan Burn. The additional habitat on top of the 450 metre long cut and cover tunnel would also potentially provide increased connectivity for bats and reptiles and additional bird breeding habitat. However, as the top of the cut and cover tunnel would also accommodate a replacement station car park and tunnel control room, not all of its 450 metre length would be available as a green bridge. It should also be noted that there are limited benefits for other species of conservation interest due to the constrained nature of the site, bounded by the Highland Main Line railway to the west and Birnam to the east.
▪ Landscape and Visual	-	The Murthly/Birnam Junction, near to the existing private access to Murthly Castle, is within the River Tay (Dunkeld) NSA and would have an impact on the

		'Gateway to the Highlands' Special Quality of the designation for road users. The junction would also impact on other Special Qualities of the NSA, including the 'Exceptionally Rich, Varied and Beautiful Woodland' and the 'Beauty of Cultural Landscapes Accompanying Natural Grandeur', as a consequence of the loss of areas of mature woodland. The proposed cut and cover tunnel would reduce the opportunity for views of the valley from the A9, further affecting the 'Gateway to the Highlands' Special Quality of the NSA. Construction related activities, over a prolonged duration, would also have a significant effect on the NSA, as well as affecting the visual amenity for local residents and those utilising Walkers, Cyclists and Horse-riders (WCH) routes and the Highland Main Line railway. During operation, the 450 metre long cut and cover tunnel would largely remove visibility of the A9 from parts of Birnam, resulting in beneficial effects on the character of the landscape and visual amenity. However, there would be adverse effects on the visual amenity of residents on Station Road and Telford Gardens due to the replacement station car park and the northern tunnel portal respectively. There would also be an opportunity to establish new planting or possible green space on top of the 450 metre long cut and cover tunnel, with potential benefits to the NSA. It should be noted however, that as the top of the cut and cover tunnel would also accommodate a replacement station car park and tunnel control room, not all of its 450 metre length would be available for new planting/green space.
▪ Cultural Heritage	-	Murthly/Birnam Junction would result in land-take from the Murthly Castle GDL and would have a direct significant effect on the GDL, which is of national importance. The junction would also reinforce the existing severance with the western end of Birnam. Murthly Castle GDL is an outstanding landscape, which significantly contributes to the surrounding Tay Valley scenery and provides an attractive setting for several Category A Listed buildings. The junction would also impact any surviving archaeological remains of the enclosures and gardens of Dalpowie Lodge, which is a site recorded on the Perth & Kinross Historic Environment Record. The effect would be significant, however any remains are unlikely to be complex and their loss would be mitigated by recording works in advance of, or during, construction. The cut and cover tunnel would have a significant beneficial effect on the setting of the Dunkeld & Birnam Station building, which is Category A Listed, as the connection with Station Road is restored. Improved

		access may also give greater potential for the sustainable re-use of the building, which is currently unoccupied. Construction of retaining walls for the cut and cover tunnel would be within 2.5 metres of the station building, with potential for accidental damage to the station building during construction. Additional mitigation would require to be developed.
▪ Noise and Vibration	-	There is the potential for significant adverse construction noise and vibration effects on noise sensitive receptors near to the A9 during construction. Potential for significant beneficial effects on noise sensitive receptors, particularly in Birnam, during operation with a small number of significant adverse effects expected.
▪ Population and Human Health	-	Significant effects on businesses and community assets would be expected and would likely be for a prolonged period. These would include change in accessibility to private property and housing, businesses, and community land and assets. Business properties at the Birnam Industrial Estate, would be demolished to accommodate the scheme. The reconnection of Station Road to Dunkeld & Birnam Station would potentially have a beneficial effect for businesses and community assets and there would also be an opportunity for limited community/recreational use of the land above the tunnel in areas not accommodating the replacement car park and control buildings. Overall likely negative health and wellbeing outcomes would be expected during construction. During operation, overall likely positive health and wellbeing outcomes would be expected.
▪ Material Assets and Waste		Construction of new structures, including the 450-metre-length cut and cover tunnel would be required, necessitating materials import for pavement and structures. Imported earthworks materials are unlikely to be required but overall earthworks surplus/disposal would be expected to arise. Demolitions at Birnam Industrial Estate would be required.
▪ Climate		Use of pavement aggregates, materials import for new structures and earthworks export would result in Green House Gas (GHG) emissions.
▪ Policies and Plans		There would likely be areas of policy non-compliance, including with respect to road drainage and the water environment, biodiversity, land use and cultural heritage.

Traffic & Economics

25.3.15 As the 450 metre long cut and cover tunnel incorporates a 70mph speed limit throughout, journey times between the project extents are anticipated to be comparable to Option ST2D and would be approximately 50 to 70 seconds quicker than the Do-Minimum scenario (depending on direction of travel) and approximately 35 seconds quicker than the Community's Preferred Route Option (Option ST2A) in 2041.

25.3.16 As the proposed junction at Murthly facilitates all vehicle movements, it is not likely to have any significant traffic impacts. A slight increase on traffic on the B867 is expected between the proposed junction and Perth Road due to the location of the junction.

25.3.17 There are concerns that minor accidents on the roundabout may result in queueing on the northbound approach to the roundabout, which may extend within the tunnel, generating a safety issue.

25.3.18 The estimated cost of the 450 metre long cut and cover tunnel option is between £545 and £877 million. This cost estimate includes pre-construction costs (design and preparation costs, advanced works costs and land costs) and construction costs (preliminary and indirect costs and direct construction costs, including structures, road pavement, earthworks, risks and opportunities and inflation).

Conclusion

25.3.19 As noted, a 450 metre long cut and cover tunnel would include many of the challenges of the Community's Preferred Route Option (Option ST2A). While the construction complexity would be reduced, largely as a result of the shorter length of tunnel, it would still require a significant number of bored piles to form the tunnel walls. As such, additional land to accommodate specialist plant would be necessary, as would additional land to accommodate the increased tunnel cross-section. Similarly, the construction duration is unlikely to be significantly shortened. Construction and ongoing maintenance costs are also unlikely to be considerably lower than that considered for the Community's Preferred Route Option (Option ST2A). A shorter tunnel length would require Inchewan Burn to be lowered and would not fully address concerns noted from some local residents and key stakeholders.

25.3.20 It is noted that Additional Whole Route Option 1 (Option ST2B) includes a lowered A9 in the locality of Dunkeld & Birnam Station, which allows the direct reconnection of Station Road to the station, via a 150 metre long underpass. While this option impacts Inchewan Burn and requires a significant number of bored piles to form retaining walls, it removes the issues associated with tunnel provision, including increased carriageway cross-section and land required for specialist plant and ongoing maintenance costs. This option also addresses concerns from key stakeholders over tunnel provision.

25.3.21 Taking account of the initial assessment detailed above, and the challenges identified, which are broadly similar to the Community's Preferred Route Option (Option ST2A), it was concluded that an option with a 450 metre long cut and cover tunnel should not be developed further.

25.4 Community Workshops

25.4.1 At a meeting on 1st October 2019, the Birnam to Ballinluig A9 Community Group suggested that they were not clear why additional options to the Community's Preferred Route Option (Option ST2A) had been considered, stating that the majority of the community supported the Community's Preferred Route Option (Option ST2A) that had been identified through the A9 Co-Creative Process. In addition, the community group stated that it was unclear how the three Additional Whole Route Options had been constructed and how the DMRB Stage 2 assessment would identify an Emerging Preferred Route Option. The Birnam to Ballinluig A9 Community Group also suggested that other junction options were available that had not previously been considered.

25.4.2 In order to clarify the position, Transport Scotland agreed to hold a series of workshops with the Birnam to Ballinluig A9 Community Group. The purpose of these workshops was to allow better understanding of the challenges of the Community's Preferred Route Option (Option ST2A) and mitigation possibilities. The workshops were also an opportunity to discuss the reasons and rationale for the Additional Whole Route Options being assessed in the DMRB Stage 2 assessment and any potential refinements or alternative options the Birnam to Ballinluig A9 Community Group may wish to discuss. Six workshops were held, which are summarised below.

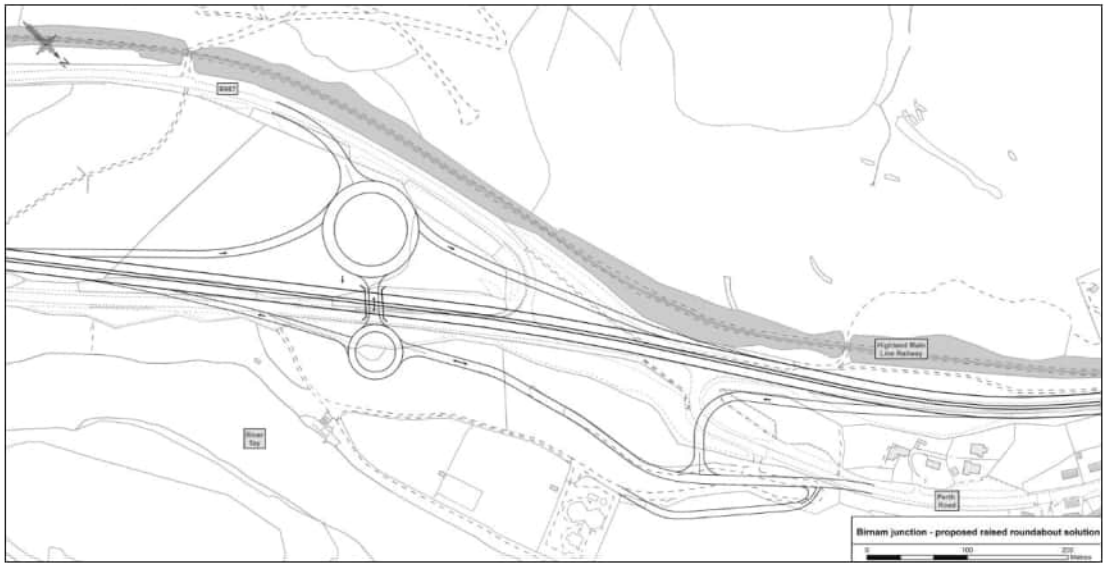
Community Workshop 1

25.4.3 Community Workshop 1 was held on 31st October 2019 at the Birnam Hotel, Perth Road, Birnam. The workshop was attended by eight members of the community group, along with representatives from Transport Scotland and Jacobs.

25.4.4 The topic for the first workshop was Murthly/Birnam Junction. At the workshop, Transport Scotland and Jacobs staff explained the challenges with the grade separated junction incorporated within the Community's Preferred Route Option (Option ST2A), which includes impacts on the Murthly Castle GDL, the River Tay (Dunkeld) NSA and Ancient Woodland. As such, two alternative options were considered, which are described in Volume 1, Part 1 - The Scheme, Chapter 3 (Murthly/Birnam Junction DMRB Stage 2 Assessment). Jacobs explained how the first additional option considered was based on the principles of the community's second preference for a junction at this location, as voted for at Stage 4 of the A9 Co-Creative Process. The second additional option was identified through previous assessment undertaken on various grade separated solutions and provided a full movement junction.

25.4.5 At the workshop, the Birnam to Ballinluig A9 Community Group submitted a proposal for an alternative grade separated junction layout, which Jacobs committed to investigate. This additional option, shown in Figure 25.1, is in the locality of the existing right/left staggered priority junction with the B867 and Perth Road, and facilitates all vehicle movements. The layout incorporates roundabouts on either side of the proposed A9 dual carriageway with northbound and southbound slip roads. An overbridge is proposed to link the roundabouts.

Figure 25.1: Alternative Junction at Murthly/Birnam



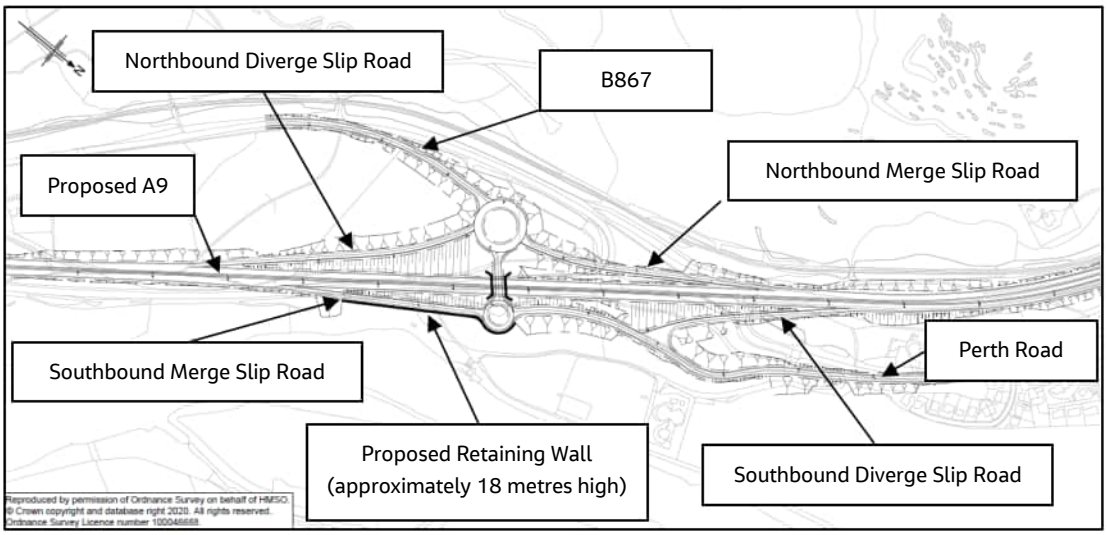
25.4.6 The Birnam to Ballinluig A9 Community Group accepted the rationale for including the two additional options and agreed that, subject to feedback on the alternative junction option suggested, there were no further options that should be considered or included in the DMRB Stage 2 assessment for Murthly/Birnam Junction.

Community Workshop 2

25.4.7 Community Workshop 2 was held on 7th November 2019 at the Birnam Hotel, Perth Road, Birnam. The workshop was attended by ten members of the community group, along with representatives from Transport Scotland and Jacobs.

25.4.8 While the topic for the second workshop was Dunkeld Junction, Transport Scotland and Jacobs staff provided feedback on the alternative grade separated junction layout proposed at Murthly/Birnam, proposed by the Birnam to Ballinluig A9 Community Group. Based on initial assessment work, shown in Figure 25.2, it was confirmed that the option would not be taken forward for further consideration at this time. This was largely due to the impacts on adjacent residential properties, potentially requiring acquisition of privately owned land, safety concerns with the proposed geometrical layout and encroachment within the River Tay floodplain (1 in 200 year). The Birnam to Ballinluig A9 Community Group accepted the findings of the initial assessment and stated their agreement that the option should not be progressed.

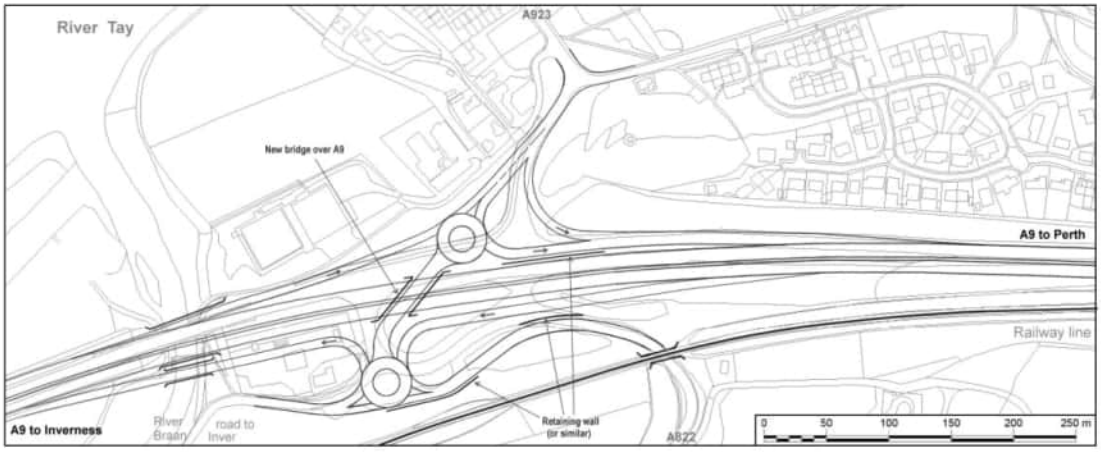
Figure 25.2: Modelled Alternative Junction at Murthly/Birnam



25.4.9 Noting the constraints and issues with an at-grade roundabout, which is included in the Community's Preferred Route Option (Option ST2A) at Dunkeld Junction, Transport Scotland and Jacobs staff explained why an alternative grade separated junction had been included in the DMRB Stage 2 assessment. It was noted that to ensure a robust DMRB Stage 2 assessment, and as the remainder of the A9 Dualling Programme is to D2AP (sub-category c) standards, it was essential that a grade separated option is assessed. The Birnam to Ballinluig A9 Community Group stated that they fully understood and accepted the explanation as to why a grade separated junction had been included in the process. The grade separated junction option included was selected considering previous assessment undertaken on various different grade separated junction options.

25.4.10 The Birnam to Ballinluig A9 Community Group noted some concerns with the proposed grade separated junction at Dunkeld, most notably the visual impact of a raised A9 dual carriageway. As such, the community group submitted a proposal for an alternative grade separated junction layout for Transport Scotland and Jacobs to consider, which is shown in Figure 25.3. The proposed alternative junction incorporated roundabouts on either side of the A9 dual carriageway, with northbound and southbound slip roads. An overbridge is included to link the roundabouts with connections included to the A923, A822 and road to Inver. The design suggested the proposed A9 dual carriageway should be lowered by approximately 2 metres, from existing levels. The Birnam to Ballinluig A9 Community Group felt this option may have lesser visual impacts. Subject to feedback on the proposed alternative grade separated junction, the Birnam to Ballinluig A9 Community Group stated that there were no further options that should be investigated.

Figure 25.3: Alternative Junction at Dunkeld



Community Workshop 3

25.4.11 Community Workshop 3 was held on 13th November 2019 at the Birnam Hotel, Perth Road, Birnam. The workshop was attended by sixteen members of the community group, along with representatives from Transport Scotland and Jacobs.

25.4.12 The topic for the third workshop was Dunkeld & Birnam Station. However, prior to discussing the impact on the station, initial feedback was provided on the alternative grade separated junction at Dunkeld, proposed by the Birnam to Ballinluig A9 Community Group at the previous workshop. The initial assessment indicated that the realigned side roads would contain geometry below desirable standards, including steep vertical gradients, which would introduce safety implications. Large scale retaining structures would also be required to avoid encroachment towards the Highland Main Line railway. The Birnam to Ballinluig A9 Community Group suggested that the roundabout on the east side of the proposed A9 dual carriageway should be eliminated to mitigate the suggested impacts. Transport Scotland and Jacobs committed to investigate further.

25.4.13 The challenges with the Community's Preferred Route Option (Option ST2A) in the locality of Dunkeld & Birnam Station, which includes constructability complexity and impacts on Inchewan Burn, were explained to the Birnam to Ballinluig A9 Community Group. The group queried the degree of lowering required for the burn and Transport Scotland committed to provide cross-sections highlighting the required works.

25.4.14 The Birnam to Ballinluig A9 Community Group did not present any additional options for consideration.

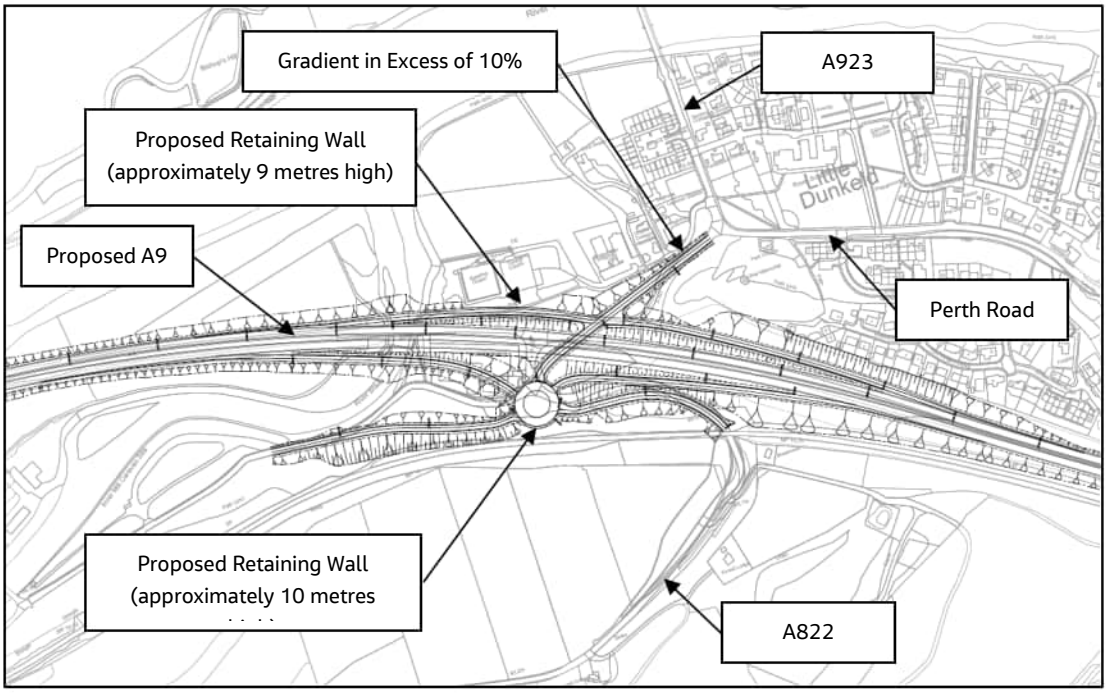
Community Workshop 4

25.4.15 Community Workshop 4 was held on 26th November 2019 at Birnam Hotel, Perth Road, Birnam. The workshop was attended by twelve members of the local community along with representatives from Transport Scotland and Jacobs.

25.4.16 Following on from the previous workshop, further feedback was provided on the alternative grade separated junction at Dunkeld, proposed by the Birnam to Ballinluig A9 Community Group. It was noted that the assessment undertaken had confirmed that the alternative junction proposed was not better than the options included in the DMRB Stage 2 assessment. As such, the option would not be taken forward for further consideration, primarily due to the geometrical layout, which would introduce safety issues, the requirement for retaining walls to avoid encroachment towards the Highland Main Line railway and Dunkeld & Birnam Recreation Club and the likely road drainage issues associated with

a lowered A9 dual carriageway. The Birnam to Ballinluig A9 Community Group accepted the findings of the assessment and agreed that the option, shown in Figure 25.4, should not be considered further.

Figure 25.4: Modelled Alternative Junction at Dunkeld



25.4.17 Further detail as to the extent of lowering works for the Inchewan Burn was provided at the workshop, along with an explanation of alternatives considered and discounted, which included diverting the burn. The community group accepted the findings presented in relation to Inchewan Burn.

25.4.18 At the fourth workshop, Transport Scotland and Jacobs provided a summary of the environmental assessment undertaken as part of the DMRB Stage 2 assessment, detailing the various topic areas considered. A summary of the 450 metre cut and cover tunnel, considered as part of the DMRB Stage 2 assessment, was also provided. The Birnam to Ballinluig A9 Community Group were content with the explanations provided and had no further suggestions or proposed options.

Community Workshop 5

25.4.19 Community Workshop 5 was held on 11th December 2019 at the Birnam Hotel, Perth Road, Birnam. The workshop was attended by nine members of the community group, along with representatives from Transport Scotland and Jacobs.

25.4.20 At the fourth workshop, Transport Scotland and Jacobs provided a summary of the environmental assessment undertaken as part of the DMRB Stage 2 assessment. At workshop 5, further discussions were undertaken on the environmental assessment. The Birnam to Ballinluig A9 Community Group noted concerns around the impacts on woodland, and the habitat and wildlife they support, and air quality, noise and visual impacts. Jacobs reassured the Birnam to Ballinluig A9 Community Group that these impacts and their effects are fully considered in the DMRB Stage 2 assessment, both during construction and operation, and taken into account in identifying a Preferred Route Option. Jacobs also explained that mitigation measures, that may include compensatory planting, low noise road surfacing, acoustic barriers and soft landscaping will be considered as part of the DMRB Stage 3 assessment for the Preferred Route Option to mitigate impacts.

25.4.21 The Birnam to Ballinluig A9 Community Group also noted concerns regarding the proposed drainage design for the A9 dual carriageway, which they felt may lead to water quality and flooding impacts.

Jacobs confirmed that as part of the DMRB Stage 2 assessment, a drainage design had been developed for the route options. This drainage design considers current, relevant design standards and legislation and seeks to treat and control surface run-off prior to discharge in adjacent watercourses. An appropriate flood risk assessment has also been completed at DMRB Stage 2.

25.4.22 The '*A9 Dualling Programme: Pass of Birnam to Tay Crossing, Identification of DMRB Stage 2 Whole Route Options Report (October 2019)*' documents the initial assessment undertaken on the Community's Preferred Route Option (Option ST2A) following the A9 Co-Creative Process. The report also details the additional options to the Community's Preferred Route Option (Option ST2A) that were developed. This report was discussed with the Birnam to Ballinluig A9 Community Group at the workshop. While the community group provided some comments for consideration, they stated that the report was well written and easily understood.

25.4.23 To conclude Community Workshop 5, Transport Scotland and Jacobs provided a further overview of the engineering issues discussed at previous workshops. The Birnam to Ballinluig A9 Community Group stated their acceptance of the description provided and confirmed that they had no further alternative options or refinements for consideration.

Community Workshop 6

25.4.24 Community Workshop 6 was held on 8th January 2020 at the Birnam Hotel, Perth Road, Birnam. The workshop was attended by twelve members of the community group, along with representatives from Transport Scotland and Jacobs.

25.4.25 The focus of the sixth, and final, workshop was to consider how the options included in the DMRB Stage 2 assessment satisfy the community's objectives, Transport Scotland's objectives and National Transport Strategy priorities. As such, Transport Scotland and Jacobs provided the Birnam to Ballinluig A9 Community Group with a summary of the various topics included within the DMRB Stage 2 environmental assessment and how they address items raised in their objectives. In discussions, the community group noted their concerns over the construction duration and the associated noise and vibration that may result. The community group also noted the accessibility issues with the current Dunkeld & Birnam Station, expressing their desire that this be improved. The community group stated that they felt the Community's Preferred Route Option (Option ST2A) provided the greatest benefit for station accessibility and would help to facilitate future use of the Category A Listed station building, which is currently unused.

25.4.26 Transport Scotland's objectives were discussed at Community Workshop 6 with Jacobs confirming that all route options under consideration meet the objectives. The Birnam to Ballinluig A9 Community Group sought clarity as to how the route options met the National Transport Strategy in terms of equality and climate change. Transport Scotland and Jacobs stated improved mobility, connectivity, journey time and reliability and improved integration with public transport facilities as key factors in addressing the National Transport Strategy. It was also noted that sustainability is embedded throughout the design and construction of the A9 Dualling Programme.

25.4.27 The Birnam to Ballinluig A9 Community Group stated that following the six workshops, they now had a greater understanding of the DMRB Stage 2 assessment process and how the Additional Whole Route Options had been generated. The community group confirmed that they had no further alternative options for consideration as part of the DMRB Stage 2 assessment process.

25.5 Emerging Preferred Route Option

25.5.1 Based on the findings of the DMRB Stage 2 assessment, summarised in Table 25.1, and considering feedback from the public and other stakeholders, the Emerging Preferred Route Option for the Pass of Birnam to Tay Crossing section of the A9 Dualling Programme is **Additional Whole Route Option 3 (Option ST2D)**.

25.5.2 It is noted that the Emerging Preferred Route Option (Option ST2D) includes the community's favoured options, as voted at Stage 4 of the A9 Co-Creative Process, at Dunkeld, The Hermitage and Dalguise. In addition, the junction option at Birnam is based on the principles of the community's second preference for a junction, which was a grade separated junction, restricted movements junction with a northbound diverge slip road and a southbound merge slip road only. However, to partly address traffic increases on Perth Road with such an option, a northbound merge slip road has been added. The Emerging Preferred Route Option (Option ST2D) also incorporates improved access to the station, with the opportunity to enhance further, which was noted as important to the local community.

25.5.3 As identified in Paragraph 25.2.8, in the development of all route options special regard has been given to the to the desirability of preserving the Category A Listed Dunkeld & Birnam Station and its setting, as required by Section 59 of the LBCA Act 1997. As identified in Paragraph 25.2.6, while not directly applicable, it is appropriate for Scottish Ministers to give consideration to the provisions of the LBCA Act 1997 in making decisions on schemes that are being promoted under the Roads Act 1984. The identification of the Emerging Preferred Route Option (Option ST2D) has taken cognisance of the significant residual impact on the Category A Listed Dunkeld & Birnam Station and that this impact is not considered to be commensurate with preservation, as identified in Section 59(3) of the LBCA Act 1997. However, it is considered that this impact is required in order to realise the benefits of this option.

25.5.4 As identified in paragraph 14.5.1 of Volume 1, Part 3 – Environmental Assessment, Chapters 14 (Cultural Heritage) as part of the DMRB Stage 3 Assessment opportunities for sustainable re-use of Dunkeld and Birnam Station including Footbridge (Asset 26) will be explored. The need for Listed Building Consent under the Listed Buildings and Conservation Areas (Scotland) Act 1997 will also be confirmed with PKC.

25.5.5 The Emerging Preferred Route Option (Option ST2D) will be presented to Scottish Ministers for consideration along with the Community's Preferred Route Option (Option ST2A). Scottish Ministers will also be presented with the complete DMRB Stage 2 Scheme Assessment Report for information and consideration. Scottish Ministers will be responsible for confirming the Preferred Route Option.

25.6 Project Objectives

25.6.1 Scheme objectives were identified for the A9 Dualling Programme through the Preliminary Engineering Services (PES) commission, which was equivalent to a DMRB Stage 1 assessment. Prior to the commencement of the A9 Co-Creative Process, the Birnam to Ballinluig A9 Community Group generated community objectives. These objectives have been considered throughout the DMRB Stage 2 assessment process. A summary of the objectives is given in Tables 25.3 and 25.4, along with details as to how the Community's Preferred Route Option (Option ST2A) and the Emerging Preferred Route Option (Option ST2D) meets the objectives.

Table 25.3: Summary of Transport Scotland Objectives

Scheme Objectives	Delivered Through Options
Improve the operational performance of the A9 by: ▪ Reducing journey times; and ▪ Improving journey time reliability.	Dualling the A9 between the Pass of Birnam to Tay Crossing will reduce journey time, compared to the Do-Minimum scenario, and improve journey time reliability. Option ST2D provides greater journey time savings, largely as it incorporates a 70mph speed limit throughout. Option ST2A includes a 50mph speed limit from the southern extent of the scheme to Dunkeld Junction. The A9 dual carriageway will allow vehicles to overtake slower moving vehicles, such as farm machinery and HGVs, contributing to journey time reliability and facilitating increased traffic and change in traffic patterns during summer months. The dual carriageway will also provide greater opportunity to maintain traffic movements in the event of an incident. However, it should be noted that any incident

Scheme Objectives	Delivered Through Options
	within the cut and cover tunnel for Option ST2A may require remedial works prior to the carriageway reopening. It is noted that there may be a delay at Dunkeld Junction, as a result of the roundabout, on the A923 and A822 approaches under peak traffic conditions in the summer. This is applicable to Options ST2A and ST2D.
Improve safety for motorised and NMUs by: ▪ Reducing accident severity; and ▪ Reducing driver stress.	Options ST2A and ST2D will provide a continuous overtaking opportunity along the route, which will reduce driver frustration and stress. It is also forecast that instances of fatal and serious accidents will reduce with the completion of the dual carriageway. While Options ST2A and ST2D include an at-grade roundabout, which is a Deviation from recommendations for a D2AP (sub-category c) standard, it is considered a safety benefit over the existing layout, which incorporates at-grade junctions and right-turn manoeuvres. There is a possibility of queuing within the cut and cover tunnel in the event of an accident occurring on the roundabout for Option ST2A, however this could be mitigated by stopping northbound traffic prior to the tunnel entrance.
To facilitate active travel within the corridor.	Options ST2A and ST2D will allow opportunities for providing safe, segregated routes for WCHs. The at-grade roundabout at Dunkeld Junction for both options would introduce a barrier to safe WCH passage, however it is noted that there are currently no official routes in that locality, with segregated routes to the north in the proximity of the River Braan crossing being provided/maintained. It should be noted that for safety reasons, pedestrians and cyclists would not be permitted to use the cut and cover tunnel within Option ST2A.
To improve integration with Public Transport facilities.	Options ST2A and ST2D improve access to Dunkeld & Birnam Station for WCH. Option ST2A reconnects Station Road and provides direct vehicular and WCH access to the station. Option ST2D includes a pedestrian underpass to provide access. Both options include car parking provision, which will include accessible parking spaces. Improvements to the operational performance of the A9 will assist Public Transport operators to achieve higher levels of service.

Table 25.4: Summary of Community Objectives

Community Objectives	Delivered Through Options
Reduce current levels of noise and pollution in the villages of Dunkeld, Birnam and Inver to protect human health and wellbeing of residents and visitors and to enable them to peacefully enjoy their properties and amenity spaces.	Both options increase traffic on Perth Road to the north of Station Road. Option ST2D, due to the omission of a southbound diverge slip road at Birnam Junction, introduces an additional 200 to 400 vehicles per day to Perth Road, south of Station Road, resulting in significant adverse effects at 10 properties in the short-term (daytime). No significant long-term (daytime) adverse effects are predicted for either of the route options. Adverse short-term (daytime) effects would be able to be mitigated and mitigation will be developed as part of the DMRB Stage 3. Option ST2A decreases traffic flows on Perth Road to the south of Station Road, largely as the proposed Murthly Junction is further south than the existing junction and the A9 dual carriageway will provide greater opportunities for overtaking. As such, traffic is more inclined to remain on the A9 and utilise the Dunkeld Junction instead. Option ST2A is predicted to have the fewest significant adverse effects (three) and the most significant beneficial effects (234) in the short-term (daytime) for noise sensitive receptors in Birnam.

Community Objectives	Delivered Through Options
	Option ST2A also provides the opportunity to create new open space on top of the cut and cover tunnel, contributing to a likely positive health and wellbeing outcome. Option ST2D does not provide opportunity for any additional open space.
Protect and enhance the scenic beauty and natural heritage of the area and its distinctive character and quality.	Both options would have a significant adverse effect on woodland on the AWI, with Option ST2A resulting in a larger loss (20.58 hectares) than Option ST2D (16.56 hectares). Option ST2A involves significant engineering works to Inchewan Burn, adversely impacting fish species of conservation interest due to habitat fragmentation. Option ST2A would have the potential to provide a degree of landscape enhancement along the tunnelled section, assuming a high-quality landscape is provided. Both options would result in the potential for adverse impacts and effects to the visual qualities of the area.
Provide better, safer access on and off the A9 from both sides of the road while ensuring easy, safe movement of vehicular traffic and Non-Motorised Users (NMUs) through the villages, helping to reduce stress and anxiety and support the local community.	While Option ST2A has potential for greater impacts during construction due to its prolonged and complex nature, post construction both options provide safe access to the A9 for vehicle users. WCH routes will be maintained, albeit some will be diverted as a result of the options.
Promote long-term and sustainable economic growth within Dunkeld and Birnam and the surrounding communities.	Construction has the potential to create disruption to the local communities, particularly for Option ST2A given the duration and nature of the construction activities. Construction of both options would also require the demolition of properties on the Birnam Industrial Estate. Both options are expected to benefit economic growth in the area during operation, with traffic predicted to increase on the A9, increasing the number of visitors to the local area, potentially positively affecting the local economy.
Examine and identify opportunities to enhance the levels of cycling and walking for transport and leisure, including the improvement of existing footpaths and cycle ways, to promote positive mental health and wellbeing.	Option ST2A provides the opportunity to create a new open space on top of the cut and cover tunnel, which could incorporate a WCH route which, if high-quality landscaped as an amenity/recreation space, would also enhance the landscape and improve the visual amenity around the tunnel section. Both options remove at-grade crossings of the A9, which will have a beneficial impact on safety for WCHs.
Ensure that all local bus, intercity bus services and train services are maintained and improved.	Both options improve WCH accessibility to the station, compared to the existing conditions, with opportunities to integrate the various forms of public transport. Option ST2A provides vehicular access direct to the station. Bus services would benefit from both options, reducing journey times and increasing journey time reliability.
Preserve and enhance the integrity of the unique and rich historical and cultural features of the Dunkeld, Birnam and Inver communities, thereby supporting wellbeing and the local economy.	During construction, both options would impact the setting of Dunkeld & Birnam Station, reinforcing the existing severance of the station from Birnam. Option ST2A would significantly improve the physical connection between the station and Birnam and would provide better opportunities for sustainable re-use of the Category A Listed station building. Changes to the setting arising from Option ST2D would continue into operation but connectivity to Birnam would also be improved, compared to the existing layout, and provide opportunity for the sustainable re-use of the station building.

Community Objectives	Delivered Through Options
	Both options require land-take from Murthly Castle GDL, reinforcing existing severance and potentially impacting on the landscape's setting.

25.7 DMRB Stage 3 Assessment

25.7.1 The Preferred Route Option will be taken forward to undergo a DMRB Stage 3 assessment. As part of this assessment, the Preferred Route Option will be refined, developed and assessed, taking account of public and stakeholder feedback as necessary and appropriate. The DMRB Stage 3 assessment will focus on key areas for development to reduce risk and uncertainty.

25.7.2 Key issues that will be more fully considered as part of the assessment include:

- Design refinement (including consideration of Deviations from recommendations, Relaxations and Departures from requirements), particularly at junctions to ensure adherence to current standards and to reduce overall land-take where possible;
- More detailed design of major structures;
- Provision of private means of access;
- Consideration of constructability;
- Proposals for lay-bys;
- Refinement of proposals for WCH and consideration of accessibility throughout the scheme;
- The location and layout of road drainage infrastructure, including detention basins and treatment ponds;
- Impacts on watercourses, including the River Tay and River Braan and its tributaries and associated floodplain;
- Impacts on Dunkeld & Birnam Station and the Highland Main Line railway;
- Environmental mitigation, such as mammal underpasses, biodiversity and landscape planting, and measures to reduce noise effects; and
- Additional community engagement and stakeholder consultation focused on those directly impacted by the Preferred Route Option.