A9 Dualling Programme: Pass of Birnam to Tay Crossing

DMRB Stage 2 Scheme Assessment Report

Volume 1: Main Report and Appendices

Part 1 - The Scheme

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AADT	-	Annual Average Daily Traffic
AOD	-	Above Ordnance Datum
ATC	-	Automatic Traffic Counter
CBM	-	Cement Bound Material
CNPA	-	Cairngorms National Park Authority
DMRB	-	Design Manual for Roads and Bridges
D2AP	-	Dual 2-lane All-purpose
GDL	-	Gardens and Designed Landscape
GI	-	Ground Investigation
HES	-	Historic Environment Scotland
HGV	-	Heavy Goods Vehicle
IIP	-	Infrastructure Investment Plan
IRIS	-	Integrated Road Information System
LDP	-	Local Development Plan
LLCA	-	Local Landscape Character Area
mph	-	Miles per hour
NCN	-	National Cycle Network
NMU	-	Non-Motorised User
NSA	-	National Scenic Area
NTS	-	National Trust for Scotland
PES	-	Preliminary Engineering Services
PIA	-	Personal Injury Accidents
PIA/MVkm	-	Personal Injury Accidents per Million Vehicle Kilometres
PKC	-	Perth & Kinross Council
RCN	-	Regional Cycle Network
RISS	-	Route Improvement Strategy Study
RRS	-	Road Restraint System
SAC	-	Special Area of Conservation
SEA	-	Strategic Environmental Assessment
SEPA	-	Scottish Environment Protection Agency
SGN	-	Scottish Gas Networks
SSD	-	Stopping Sight Distance
SSE	-	Scottish and Southern Energy
STPR	-	Strategic Transport Projects Review
SuDS	-	Sustainable Drainage System
SRTDb	-	Scottish Road Traffic Database
UK	-	United Kingdom
VAT	-	Value Added Tax
WCH	-	Walkers, Cyclists and Horse-riders

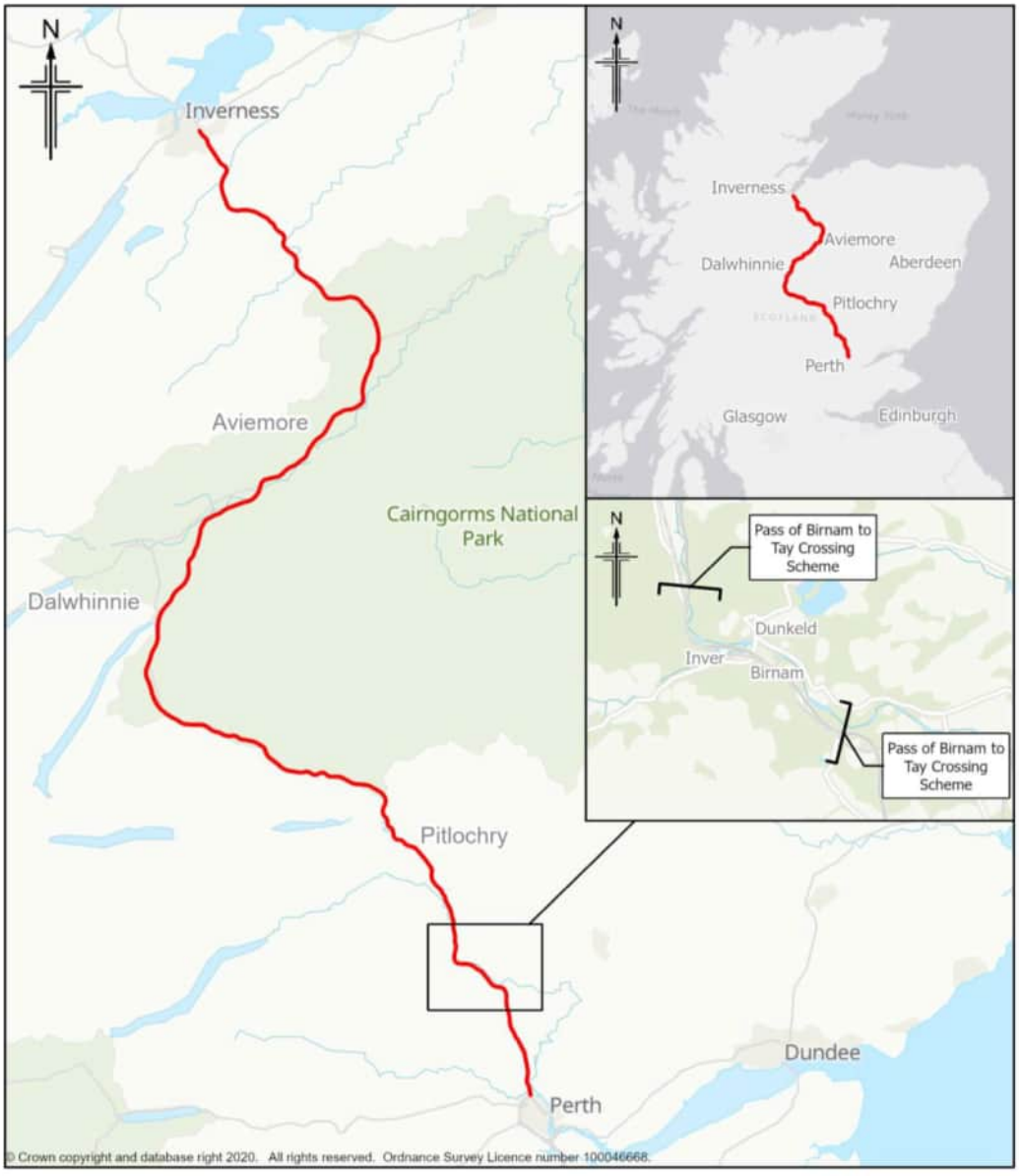
1. Scheme Background

1.1 Background to Dualling the A9

1.1.1 The Cabinet Secretary for Infrastructure and Capital Investment launched an Infrastructure Investment Plan (IIP) on 6 December 2011, which provided an overview of the Scottish Government's plans for infrastructure investment over the future decades. Contained within the plan was a commitment to complete the dualling of the A9 between Perth and Inverness by 2025.

1.1.2 The A9 corridor forms a strategic link between Central Scotland and the Scottish Highlands and is shown in Figure 1.1. The 177 kilometre route between Perth and Inverness consists of seven single carriageway sections interspersed between eight existing dual carriageway sections. Approximately 129 kilometres of these single carriageway sections are proposed to be dualled in order to complete the overall dualling of the A9.

Figure 1.1: A9 Perth to Inverness Location Plan



1.2 A9 Dualling Programme

1.2.1 The overall A9 Dualling Programme has been divided into 11 discrete projects for design and development purposes. In August 2014 Jacobs UK Limited (Jacobs) was awarded the commission to progress the southern section of A9 dualling, between the Pass of Birnam to Glen Garry, as shown in Table 1.1. This Design Manual for Roads and Bridges (DMRB) Stage 2 Scheme Assessment Report relates to Project 2: Pass of Birnam to Tay Crossing, which is shown in Figure 1.1.

1.2.2 It should be noted that the Luncarty to Pass of Birnam and Kincraig to Dalraddy schemes were progressed under separate commissions. The Luncarty to Pass of Birnam scheme was opened to traffic in summer 2021 and the Kincraig to Dalraddy scheme was completed in autumn 2017.

Table 1.1: A9 Dualling Programme Projects

Commission Title	Section Title	Project Title		Length (km)	Current Stage of Development
A9 Dualling Programme	N/A	1	Luncarty to Pass of Birnam	9.5	Construction Completed
	A9 Dualling, Perth to Inverness: Southern Section	**2**	**Pass of Birnam to Tay Crossing**	**8.4**	**DMRB Stage 2**
		3	Tay Crossing to Ballinluig	8.2	Made Orders Published
		4	Pitlochry to Killiecrankie	6.4	Made Orders Published
		5	Killiecrankie to Glen Garry	22.2	Draft Orders Published
	A9 Dualling, Perth to Inverness: Central Section	7	Glen Garry to Dalwhinnie	9.5	Made Orders Published
		8	Dalwhinnie to Crubenmore	11.0	Made Orders Published
		9	Crubenmore to Kincraig	16.5	Draft Orders Published
	N/A	10	Kincraig to Dalraddy	7.5	Construction Completed
	A9 Dualling, Perth to Inverness: Northern Section	11	Dalraddy to Slochd	25.0	Draft Orders Published
		12	Tomatin to Moy	9.6	Made Orders Published

1.3 Project 2: Pass of Birnam to Tay Crossing

1.3.1 Design and assessment work has been ongoing for the Pass of Birnam to Tay Crossing section of A9 dualling since 2004, as detailed in Chapters 1.4 to 1.10. The timeline of the process, the assessment undertaken, and the key outputs at each stage is summarised in Figure 1.2.

Figure 1.2: Scheme Development Timeline

Initial Scheme Assessment (2004 to 2009)

Key Processes and Outputs:

Route Improvement Strategy Study (RISS) Report (Scott Wilson, 2006)	-	Study to identify a medium to long-term improvements strategy for the A9 trunk road from Perth to Blair Atholl, which recommended upgrading of the A9 between Perth and Pitlochry to dual carriageway standard.
Strategic Transport Projects Review (STPR) Report (Transport Scotland, 2008)	-	Supports the Scottish Government's purpose of promoting sustainable economic growth by planning the next 20 years of transport investment for Scotland's rail and trunk road networks. Sets out the Scottish Government's 29 transport investment priorities over the period to 2032.
Strategic Environmental Assessment Report (Transport Scotland, 2008)	-	Strategic Environmental Assessment (SEA) undertaken as part of the STPR to consider the likely environmental effects of the programme.

AECOM Assessment (2009 to 2012)

Key Processes and Outputs:

DMRB Stage 2 Assessment	-	Options assessment to improve the existing section of single carriageway between the Pass of Birnam and the River Tay crossing to dual carriageway standard.

Further Scheme Assessment (2012 to 2014)

Key Processes and Outputs:

Strategic Environmental Assessment Statement (CH2M Hill, 2014)	-	Published in accordance with the Environmental Assessment (Scotland) Act 2005. The SEA Statement developed a range of design principles in relation to landscape, biodiversity, flora and fauna, woodland, soils and geodiversity, historic environment, water, flooding and Sustainable Drainage Systems (SuDS), material assets, population and human health, and cycling principles.
Strategic Environmental Assessment Report Addendum (CH2M Hill, 2014)	-	Responds to issues raised in the consultation responses to the SEA Statement and considers issues such as the potential impact of the dualling on flood risk and sites designated under the European Habitats Directive.
Preliminary Engineering Services (PES) Report / DMRB Stage 1 Assessment Report (Jacobs, 2014)	-	Preliminary engineering assessment equivalent to a DMRB Stage 1 assessment for the initial development and assessment of proposed corridor options and strategies for the improvement of the A9 to dual carriageway standards.

AECOM Assessment (2012 to 2014)

Key Processes and Outputs:

DMRB Stage 2 Assessment	-	Options assessment to improve the existing section of single carriageway between the Pass of Birnam and the River Tay crossing to dual carriageway standard, developing on previous work undertaken between 2009 and 2012.

Jacobs Assessment (2014 to 2016)

Key Processes and Outputs:

Stage 2 Preliminary Options Review Report (Jacobs, 2016)	-	Scheme development undertaken, considering previous development and rationalisation of options. Detail's refinement of previously developed options and the generation of an additional option to be considered as part of the DMRB Stage 2 assessment process.

A9 Co-Creative Process (2016 to 2018)

Key Processes and Outputs:

Community's Preferred Route Option (2018)	-	The A9 Co-Creative Process, which included community involvement to suggest and develop ideas for A9 dualling, which culminated in the identification of the Community's Preferred Route Option.

Jacobs Assessment (2018 to 2022)	**Key Processes and Outputs:**		
	Identification of Whole Route Options (Jacobs, 2019)	-	Documents initial assessment work completed on the Community's Preferred Route Option, considering environmental, constructability and economic impacts and identifies key challenges and stakeholder feedback. Identifies how additional options to be considered in the DMRB Stage 2 assessment alongside the Community's Preferred Route Option, have been developed.
	DMRB Stage 2 Scheme Assessment Report (Jacobs, 2021)	-	Assessment of route options, identifying the environmental, engineering, traffic and economic advantages, disadvantages and constraints associated with each route option.

1.4 Initial Scheme Assessment (2004 to 2009)

1.4.1 In July 2004, Transport Scotland commissioned AECOM (formerly URS/Scott Wilson) to undertake a RISS for the new A9 trunk road between Perth and Blair Atholl. This study identified Pitlochry as a definitive split in the character of the route, primarily due to the reduction in traffic volumes north of the town. The study therefore recommended upgrading of the A9 between Perth and Pitlochry to dual carriageway standard and provision of a WS2+1 layout between Pitlochry and Blair Atholl.

1.4.2 In 2006, the Scottish Executive published its National Transport Strategy. The strategy outlined the vision for the country's transport network and the context for transport policy for the next 20 years. One of the mechanisms for delivering the National Transport Strategy was the STPR, which outlined a programme of transport interventions for the period 2012 to 2022 and beyond.

1.4.3 The STPR recommended upgrading of the A9 from Dunblane to Inverness and confirmed that dualling the A9 would be expected to provide a significant contribution to the Scottish Government's purpose of:

- Increasing sustainable economic growth;
- Delivering on the national objectives of promoting journey time reductions between the Central Belt and Inverness and reducing accident rates; and
- Addressing the A9 corridor specific objectives of improving the operational effectiveness of the A9 on approach to Perth and Inverness and addressing issues of driver frustration.

1.4.4 The STPR also noted the following:

- Grade separation of Kier, Broxden and Inveralmond Roundabouts would remove congestion at these locations contributing to reduced journey times and improved journey time reliability and road safety;
- Dualling the A9 between Perth and Blair Atholl would have the most significant impact on reducing journey times and improving journey time reliability and would contribute to a consistent carriageway standard along this section of the route; and
- Dualling the A9 between Blair Atholl and Inverness would further reduce journey times and improve journey time reliability between Perth and Inverness, as well as provide a consistent carriageway standard along the whole of the A9 between Perth and Inverness.

1.5 AECOM Assessment (2009 to 2012)

1.5.1 The Pass of Birnam to Tay Crossing project commences at the northern extent of the current section of existing dual carriageway that extends from Perth to the Pass of Birnam. It extends approximately 8.4 kilometres, bypassing the towns of Birnam, Little Dunkeld and Dunkeld to the east and Inver and The

Hermitage, which is a National Trust for Scotland (NTS) protected site, to the west. The tie-in point with the following scheme, Tay Crossing to Ballinluig, is approximately 0.75 kilometres north of the current River Tay crossing.

1.5.2 In 2009 Transport Scotland commissioned AECOM to progress the development of the Pass of Birnam to Tay Crossing section of A9 dualling, considering the engineering, environmental and economic impacts of dualling options through further study, design and assessment work. The commission brief identified the main objectives for the scheme:

- Improve the operational performance and level of service and road safety on the A9 by reducing the effects of driver stress and journey times;
- Examine opportunities for integration of Non-Motorised Users (NMUs) (referred to as Walkers, Cyclists and Horse-riders (WCHs) within the DMRB Stage 2 assessment) and public transport facilities into the solution;
- Mitigate the environmental impact of the new works and, where possible, examine opportunities for enhancing the environment;
- Achieve good value for money for both taxpayers and transport users;
- Design for ease of practical and safe maintenance;
- Minimise disruption/impact to road users, stakeholders, local community and environment during construction; and
- Be promotable/deliverable through the statutory processes.

1.5.3 AECOM considered an on-line corridor for a dual carriageway. Off-line corridors, both to the east and the west, were considered, however they were discounted, primarily due to the existing topography within the study area and the resultant environmental impact. It was concluded that an off-line route to the east would involve significant tunnelling works through Craig-a-Barns, and an off-line route to the west would involve significant tunnelling through Birnam Hill.

1.5.4 The AECOM assessment considered five alternative scheme options. Each option was based on the same A9 horizontal geometry, with differing mainline vertical profile and junction layouts at three locations (Birnam, Dunkeld and Dalguise) to facilitate turning movements and provide access to Birnam, Little Dunkeld and Dunkeld. The five scheme options considered a reduced standard left-in left-out junction at Dunkeld & Birnam Station, with no car parking facilities. A left-in left-out junction was also provided at The Hermitage.

1.5.5 The five options considered are summarised in Table 1.2. Birnam Junction is located at the site of the existing left/right staggered priority junction with the B867 and Perth Road. Dunkeld Junction is located at the site of the existing right/left staggered priority junction with the A923 and A822. Dalguise Junction is located to the south of the existing priority junction with the B898.

Table 1.2: DMRB Stage 2 Assessment Options Summary 2012 (AECOM)

Scheme Options	Birnam Junction	Dunkeld Junction	Dalguise Junction
1	Compact grade separated junction, underbridge - full movements	Grade separated junction, northbound compact loop and southbound slip roads, overbridge - full movements	Grade separated junction, northbound compact loop and southbound slip roads, underbridge - full movements
2	Straight across underbridge - restricted movements	Grade separated junction, northbound compact loop and southbound slip roads, overbridge - full movements	Grade separated junction, northbound compact loop and southbound slip roads, underbridge - full movements

Scheme Options	Birnam Junction	Dunkeld Junction	Dalguise Junction
3	Compact grade separated junction, underbridge - full movements	At-grade roundabout	Grade-separated junction, northbound compact loop and southbound slip roads, underbridge – full movements
4	Compact grade separated junction, underbridge - full movements	Grade separated junction, northbound compact loop and southbound slip roads, overbridge - full movements	Grade separated junction, northbound compact loop and southbound merge slip road (no southbound diverge slip road), underbridge - restricted movements
5	Compact grade separated junction, underbridge - full movements	Grade separated junction, northbound compact loop and southbound slip roads, underbridge - full movements	Grade separated junction, northbound compact loop and southbound slip roads, underbridge - full movements

1.5.6 The assessment of the five options was not concluded and no recommendations were provided due to the need to undertake further consultation.

1.6 Further Scheme Development (2012 to 2014)

1.6.1 In 2011 the Cabinet Secretary announced full dualling of the A9 between Perth and Inverness by 2025. In response, in September 2012, Transport Scotland commissioned an SEA and a PES study for the dualling of the A9 between Perth and Inverness. These commissions delivered a route-wide assessment, identifying and collating environmental and engineering constraints, issues, risks and opportunities to inform later, more detailed design. Furthermore, the SEA and PES commissions assisted in the identification of a preferred corridor and strategies to be adopted in future development work.

1.6.2 The SEA and a sifting process carried out as part of the PES study both recommended that off-line options were significantly less advantageous than the on-line option and should not be taken forward for further consideration, which supported earlier work.

SEA

1.6.3 The SEA for the A9 Dualling Programme was published in accordance with the Environmental Assessment (Scotland) Act 2005, which requires an SEA to be prepared for all public-sector plans, programmes and strategies with the potential to present significant effects on the environment. The SEA developed a range of Strategic Environmental Design Principles to be used throughout the A9 Dualling Programme and were developed in collaboration with the Scottish Environment Protection Agency (SEPA), Scottish Natural Heritage (now NatureScot), Historic Scotland (now Historic Environment Scotland (HES)), the Cairngorms National Park Authority (CNPA), Perth & Kinross Council (PKC) and The Highland Council. These design principles are not intended to replace existing requirements in relation to standards, however they are to be considered throughout the design and assessment and are embedded within the A9 Dualling Programme Environmental Design Guide (Transport Scotland, 2015). The Environmental Design Guide principles considered during design and environmental assessment process comprise of the items listed below.

- Landscape;
- Biodiversity, Flora and Fauna;
- Woodland;
- Soils and Geodiversity;

- Historic Environment;
- Water, Flooding and SuDS;
- Material Assets;
- Population and Human Health; and
- Cycling Principles.

PES

1.6.4 The PES commission undertook a preliminary engineering assessment, equivalent to a DMRB Stage 1 assessment, for the initial development and assessment of proposed corridor options and strategies for the improvement of the entire A9 to dual carriageway standards between Perth and Inverness.

1.6.5 The scheme objectives established by the PES commission for the A9 Dualling Programme are as follows:

- To improve the operational performance of the A9 by:
  - Reducing journey times; and
  - Improving journey time reliability.
- To improve safety for motorised and NMUs by:
  - Reducing accident severity; and
  - Reducing driver stress.
- To facilitate active travel within the corridor; and
- To improve integration with Public Transport facilities.

1.6.6 The PES commission concluded that the proposed A9 dual carriageway will be a Dual 2-lane All-purpose (D2AP) road (sub-category c) (formerly Category 7A), in accordance with the DMRB (CD109: Highway link design). The standard requires that there will be no gaps in the central reserve and no at-grade minor junctions. It is also recommended that only grade separated junctions are provided on the route for safe access and egress to the A9. Isolated left-in left-out accesses may be provided in exceptional circumstances. Compact grade separated junctions and at-grade roundabouts should not be provided.

1.6.7 The PES commission developed a broad strategy for the treatment of existing junctions and accesses along the A9. The strategy states that A and B class roads that currently have direct access to the A9 will remain open, either through provision of a grade separated junction or realignment to connect to another junction, and that C class, unclassified, private and agricultural accesses will be closed unless suitable justification is provided.

1.6.8 In accordance with the A9 Junctions and Accesses Strategy, grade separated junctions should be provided at:

- Birnam, where the A9 meets the B867 and Perth Road;
- Dunkeld, where the A9 has existing junctions with the A923 and A822; and
- Dalguise where there is an existing junction with the B898.

1.6.9 Previous work undertaken by AECOM, assessed alternative arrangements at Birnam where an underbridge connecting the B867 and Perth Road was provided, with no access to the dual carriageway. This was not taken forward due to the reduction in economic benefits associated with the arrangement and the negative feedback received from the public, primarily as a result of increased

traffic on Perth Road. Similarly, at Dalguise, a restricted movement option removing the southbound diverge slip road was considered but eliminated following public consultation.

1.7 AECOM Assessment (2012 to 2014)

1.7.1 Further assessment work was undertaken by AECOM to refine the previous options and take account of the route wide assessment, strategies and advice emerging from the SEA and PES commissions. This assessment developed an at-grade option, Option 6, which was a development of Option 1 from the original assessment, against a lowered alternative, Option 7, as detailed in Table 1.3. Option 6 removed the left-in left-out junction at Dunkeld & Birnam Station, with access to the station to the west of the railway tracks from the A822 via Dunkeld Junction. This option incorporated only a limited number of car parking spaces and no vehicular access to the station building. Access to the building was only via a pedestrian overbridge.

1.7.2 Option 7 was developed following public and stakeholder consultation in early 2012. This option involved lowering the A9 dual carriageway and a structure proposed over the A9 at ground level to link Station Road with the railway station. This option allows direct access to the station from Birnam and provides a parking facility on top of the structure.

1.7.3 Options 6 and 7 incorporated compact grade separated junctions, as defined in the DMRB (CD122: Geometric design of grade separated junctions), at Birnam, Dunkeld and Dalguise. Furthermore, the junctions proposed at Birnam and Dunkeld had junctions on the compact loops, which can generate safety concerns.

Table 1.3: DMRB Stage 2 Assessment Options Summary 2014 (AECOM)

Scheme Options	Birnam Junction	Dunkeld Junction	Dalguise Junction
6	Compact grade separated junction, underbridge - full movements	Grade separated junction, northbound compact loop and southbound slip roads, overbridge - full movements	Grade separated junction, northbound compact loop and southbound slip roads, underbridge - full movements
7	Compact grade separated junction, underbridge - full movements	Grade separated junction, northbound compact loop and southbound slip roads, overbridge - full movements	Grade separated junction, northbound compact loop and southbound slip roads, underbridge - full movements

1.7.4 Options 6 and 7 incorporated a left-in left-out junction at The Hermitage.

1.7.5 The assessment of the two options was not concluded and no recommendations were provided.

1.8 Jacobs Assessment (2014 to 2016)

1.8.1 In August 2014, Jacobs was awarded the commission to progress the Pass of Birnam to Tay Crossing section of the A9 Dualling Programme. On appointment, Jacobs further considered Options 6 and 7, taking into account the following:

- Access to Dunkeld & Birnam Station for vehicular traffic (Option 6);
- Consideration of the final outputs, strategies and conclusions of the SEA and PES commissions;
- Landscape and visual impacts of the options (Option 7); and
- Constructability concerns within a constrained corridor (Option 7).

1.8.2 To address these issues, Jacobs undertook further assessment of options, which is detailed in the '*A9 Dualling Programme, Pass of Birnam to Tay Crossing, Stage 2 Preliminary Options Review Report*

(Jacobs, 2016)'. This led to refinements to the previously considered options and the generation of an additional option for assessment.

1.8.3 The three options assessed by Jacobs, Options A, B and C, are summarised in Table 1.4. The options followed the same horizontal alignment and differed only in vertical alignment within the central section of the route, in the locality of Dunkeld & Birnam Station.

Table 1.4: DMRB Stage 2 Assessment Options Summary (Jacobs)

Scheme Options	Birnam Junction	Dunkeld Junction	Dalguise Junction
A	Grade separated junction, northbound and southbound loops. Connection of the B867 and Perth Road, crossing the A9 on an underbridge.	Grade separated junction, variation of diamond layout. Connection of the A822 and A923, crossing the A9 on an underbridge. Connection to Inver and northbound and southbound merge and diverge slip roads.	Grade separated junction with roundabout on the east of the A9, connected to the B898, crossing the A9 via an underbridge. Northbound loop with merge and diverge southbound slip roads.
B	Grade separated junction, northbound and southbound loops. Connection of the B867 and Perth Road, crossing the A9 on an underbridge.	Grade separated junction, variation of diamond layout. Connection of the A822 and A923, crossing the A9 on an overbridge. Connection to Inver and northbound and southbound merge and diverge slip roads.	Grade separated junction with roundabout on the east of the A9, connected to the B898, crossing the A9 via an underbridge. Northbound loop with merge and diverge southbound slip roads.
C	Grade separated junction, northbound and southbound loops. Connection of the B867 and Perth Road, crossing the A9 on an underbridge.	Grade separated junction, variation of diamond layout. Connection of the A822 and A923, crossing the A9 on an underbridge. Connection to Inver and northbound and southbound merge and diverge slip roads.	Grade separated junction with roundabout on the east of the A9, connected to the B898, crossing the A9 via an underbridge. Northbound loop with merge and diverge southbound slip roads.

1.8.4 To address accessibility issues with Dunkeld & Birnam Station within a narrow corridor, Options A and C proposed to relocate the station north of the Inchewan Burn, with access provided via the A822 to the west of the Highland Main Line railway.

1.8.5 For Option B, the A9 is approximately 8 metres below existing ground level in the locality of Dunkeld & Birnam Station and a 150 metre long structure proposed over the A9 at-grade. This arrangement allows Station Road to be extended across the structure providing direct access from the communities of Birnam, Little Dunkeld and Dunkeld to the station. A replacement car park is provided on the structure.

1.8.6 Options A, B and C incorporated a left-in left-out junction at The Hermitage.

1.9 A9 Co-Creative Process (2016 to 2018)

1.9.1 The three options considered by Jacobs were presented to the public at an exhibition in January 2016 and discussed at a public meeting in February 2016. Feedback was requested from the community and concerns were raised as to the scale of the proposals, particularly the grade separated junction layouts. Dunkeld & Birnam Community Council requested more detailed consultation be undertaken with the local community to review the options and investigate if other suitable alternative options, that address community concerns, were available. As a result, Transport Scotland agreed to a co-creative process. Significant planning for the process was undertaken throughout 2016 and 2017, which involved

appointing PAS (formerly Planning Aid Scotland), to facilitate the process. The Birnam to Ballinluig A9 Community Group was formed to represent the community during the A9 Co-Creative Process.

1.9.2 Following a series of community workshops in October and November 2017, the Birnam to Ballinluig A9 Community Group generated community objectives. The community's objectives are detailed below.

- Reduce current levels of noise and pollution in the villages of Dunkeld, Birnam and Inver to protect human health and well-being of residents and visitors and to enable them to peacefully enjoy their properties and amenity spaces.
- Protect and enhance the scenic beauty and natural heritage of the area and its distinctive character and quality.
- Provide better, safer access on and off the A9 from both sides of the road while ensuring easy, safe movement of vehicular traffic and NMUs through the villages, helping to reduce stress and anxiety and support the local community.
- Promote long-term and sustainable economic growth within Dunkeld and Birnam and the surrounding communities.
- 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 well-being.
- Ensure that all local bus, intercity bus services and train services are maintained and improved.
- Preserve and enhance the integrity of the unique and rich historical and cultural features of the Dunkeld, Birnam and Inver communities, thereby supporting well-being and the local economy.

1.9.3 The A9 Co-Creative Process consisted of five stages, beginning in January 2018 and concluding in June 2018. An outline of the process is given in Table 1.5.

Table 1.5: A9 Co-Creative Process Summary

Stage	Description
Stage 1, Community Options Gathering	Encouraging and facilitating the gathering of options and ideas from the community.
Stage 2, Developing an All-Candidate Option List	Reviewing options gathered, grouping and sorting where necessary and progressing all those that meet the progression criteria (i.e., option is a dual carriageway for the A9 and option is safe in terms of geometric standards, based on professional engineering assessment).
Stage 3, Creating a Long List	Reviewing those options progressed from Stage 2, considering, to a greater degree, safety implications of the options and the early identification of mitigation issues of concern to the community.
Stage 4, Selecting a Short List	Assessing the options against community and Transport Scotland objectives to allow the identification of a Short List of options to progress to Stage 5.
Stage 5, Agreeing a Preferred Option	Conducting appropriate environmental, engineering and traffic and economic analysis to provide factual information to allow further assessment and identification of the Community's Preferred Route Option.

1.9.4 At Stage 1 of the process, the community was invited to submit ideas for A9 dualling. A total of 167 submissions were received, which included a wide range of ideas and options. At Stage 2 of the process, ideas were divided into constituent parts for assessment (i.e., Mainline On-line, Mainline Off-line, Murthly/Birnam Junction, Dunkeld Junction, Dalguise Junction, Dunkeld & Birnam Station and The Hermitage). Options that were single carriageway or that which were deemed unsafe, based on the level of assessment undertaken, were eliminated, creating a long list of options to be assessed in greater detail at Stage 3. Stages 4 and 5 included a public vote to determine the Community's

Preferred Route Option. A summary of the options progressed through to Stage 4 of the A9 Co-Creative Process is given in Table 1.6.

Table 1.6: A9 Co-Creative Process Options Progression

Category	Options at Stage 2	Options Eliminated at Stage 2	Options Progressed to Stage 3	Options Eliminated at Stage 3	Options Progressed to Stage 4
Mainline On-line	13	1	12	0	12
Mainline Off-line	12	2	10	1	9
Birnam/Murthly Junction	27	3	24	1	23
Dunkeld Junction	21	6	15	2	13
Dalguise Junction	12	3	9	0	9
Dunkeld & Birnam Station	18	7	11	0	11
The Hermitage	9	4	5	0	5
Total	**112**	**26**	**86**	**4**	**82**

1.9.5 Stage 4 included a community vote to determine a shortlist of options to be progressed to Stage 5. The results of the community vote are given in Table 1.7 to 1.13.

Table 1.7: A9 Co-Creative Process Stage 4 Results (Mainline On-line)

Option	Summary Description	Total Score	Percentage
MO_0004	On-line tunnel, approximately between Birnam Junction and Dunkeld Junction.	374	26.9
MO_0013	On-line tunnel, in the locality of Dunkeld & Birnam Station.	274	19.7
MO_0002	Lowered A9 in vicinity of Dunkeld & Birnam Station, structure utilised for car park.	201	14.5
MO_0006	On-line tunnel, approximately between Birnam Junction and The Hermitage.	172	12.4
MO_0005	On-line tunnel, approximately between the southern and northern scheme extents.	86	6.2
MO_0008	On-line tunnel, between Birnam and Dunkeld, northbound carriageway above southbound carriageway.	84	6.0
MO_0001	On-line and at-grade with a combination of northbound and southbound widening.	82	5.9
MO_0007	On-line route with southbound widening south of Birnam Junction.	77	5.5
MO_0012	On-line route, southbound widening only.	13	0.9
MO_0010	On-line route, northbound carriageway in structure above southbound carriageway.	11	0.8
MO_0009	On-line tunnel for southbound carriageway, northbound carriageway at ground level.	8	0.6
MO_0011	On-line route, raised in locality of Dunked & Birnam Station.	7	0.5
	Total Number of Ranking Cards Submitted: 139		

Table 1.8: A9 Co-Creative Process Stage 4 Results (Mainline Off-line)

Option	Summary Description	Total Score	Percentage
MF_0003	Off-line tunnel to the west, approximately between Birnam Junction and Dunkeld Junction.	207	22.1

Option	Summary Description	Total Score	Percentage
MF_0002	Off-line tunnel to the west, approximately between Birnam Junction and north of The Hermitage.	199	21.2
MF_0012	Off-line route to the west following existing topography, approximately between southern and northern extents.	129	13.8
MF_0001	Off-line tunnel to the west, approximately between southern and northern extents.	107	11.4
MF_0005	Off-line tunnel to the east, approximately between southern and northern extents.	84	9.0
MF_0006	Off-line route below the Highland Main Line railway.	79	8.4
MF_0009	Off-line route to the west following the Highland Main Line railway, railway realigned to follow the route of the existing A9.	53	5.7
MF_0007	Off-line tunnel to the west for northbound carriageway, approximately between Birnam Junction and north of The Hermitage, southbound carriageway utilising the existing A9.	48	5.1
MF_0004	Off-line tunnel to the west, approximately between Dunkeld Junction and north of The Hermitage.	31	3.3
	Total Number of Ranking Cards Submitted: 131		

Table 1.9: A9 Co-Creative Process Stage 4 Results (Murthly/Birnam Junction)

Option	Summary Description	Total Score	Percentage
MU_0002	Grade separated junction, diamond layout. Connection of the B867 and Murthly Estate, crossing the A9 on an overbridge structure. Northbound and southbound slip roads, incorporating taper merge and diverge, linking to the new overbridge structure.	189	11.1
BN_0003	Grade separated junction, half diamond layout. Connection of the B867 and Perth Road, crossing the A9 on an underbridge structure. Northbound slip roads, incorporating taper diverge, linking to the realigned B867/Perth Road. Southbound slip roads, incorporating taper merge, linking to the realigned B867/Perth Road. No provision of northbound merge or southbound diverge movements.	185	10.8
BN_0001	At-grade roundabout at Birnam.	177	10.4
BN_0018	Grade separated junction, half diamond layout. Connection of the B867 and Perth Road, crossing the A9 on an overbridge structure. Northbound slip roads, incorporating taper diverge, linking to the realigned B867/Perth Road. Southbound slip roads, incorporating taper merge, linking to the realigned B867/Perth Road. No provision of northbound merge or southbound diverge movements.	138	8.1
BN_0004	Grade separated junction, half diamond layout. Connection of the B867 and Perth Road, crossing the A9 on an underbridge structure. Northbound slip roads, incorporating taper merge and diverge, linking to the realigned B867/Perth Road.	133	7.8

Option	Summary Description	Total Score	Percentage
	Southbound slip roads, incorporating taper merge, linking to the realigned B867/Perth Road. No provision of northbound merge or southbound diverge movements.		
BN_0016	Grade separated junction, bridge roundabout. Skewed elongated roundabout, crossing the A9 on underbridge structure. B867 and Perth Road realigned to join the roundabout. Northbound slip roads, incorporating taper merge and diverge. Northbound merge and diverge slip roads linking to the roundabout. Southbound slip roads, incorporating taper merge and diverge. Southbound merge and diverge slip roads linking to the roundabout.	111	6.5
MU_0001	At-grade elongated roundabout at Murthly Estate access.	104	6.1
BN_0008	Grade separated junction, half cloverleaf layout. Connection of the B867 and Perth Road, crossing the A9 on an overbridge structure. Northbound loop, 50 metres radius, basic merge plus hook diverge, incorporating taper merge and diverge, linking to the realigned B867/Perth Road. Southbound loop, 50 metres radius, basic diverge plus hook merge, incorporating taper merge and diverge, linking to the realigned B867/Perth Road. For off-line A9 route.	77	4.5
BN_0005	Compact grade separated junction, compact loops, underbridge, full movements.	76	4.4
BN_0021	Grade separated junction, diamond layout. Connection of the B867 and Perth Road, crossing the A9 on an underbridge structure. Northbound slip roads, incorporating taper merge and diverge, linking to the realigned B867/Perth Road. Southbound slip roads, incorporating taper merge and diverge, linking to the realigned B867/Perth Road.	61	3.6
BN_0010	Grade separated junction, half cloverleaf layout. Connection of the B867 and Perth Road, crossing the A9 on an underbridge structure. Northbound loop, 50 metres radius, basic merge plus hook diverge, incorporating taper merge and diverge, linking to the realigned B867/Perth Road. Southbound loop, 50 metres radius, basic diverge plus hook merge, incorporating taper merge and diverge, linking to the realigned B867/Perth Road.	59	3.5
BN_0025	Grade separated junction, diamond layout. Connection of the B867 and Perth Road, crossing the A9 on an overbridge structure. Northbound slip roads, incorporating taper merge and diverge, linking to the roundabout located to the west of the A9. Southbound slip roads, incorporating taper merge and diverge, linking to the roundabout located to the east of the A9. For on-line route MO.ST4.0013.	58	3.4
BN_0013	Grade separated junction, diamond layout. Connection of the B867 and Perth Road, crossing the A9 on an underbridge structure. Northbound slip roads, incorporating taper merge and diverge, linking to the roundabout located to the west of the A9. Southbound slip roads, incorporating taper merge and diverge, linking to the roundabout located to the east of the A9.	58	3.4

Option	Summary Description	Total Score	Percentage
BN_0006	Local grade separated junction, underbridge, full movements.	56	3.3
BN_0024	Grade separated junction, half diamond layout. Connection of the B867 and Perth Road, crossing the A9 on an underbridge structure. Northbound slip roads, incorporating taper diverge, linking to the realigned B867/Perth Road. Southbound slip roads, incorporating taper merge, linking to the realigned B867/Perth Road. No provision of northbound merge or southbound diverge movements. For off-line A9 route.	44	2.6
BN_0022	Grade separated junction, diamond layout. Connection of the B867 and Perth Road, crossing the A9 on an underbridge structure. Northbound slip roads, incorporating taper merge and diverge, linking to the realigned B867/Perth Road. Southbound slip roads, incorporating taper merge and diverge, linking to the realigned B867/Perth Road. A9 northbound and southbound carriageway one above the other.	38	2.2
BN_0014	Grade separated junction, half diamond layout. Connection of the B867 and Perth Road, crossing the A9 on an underbridge structure. Northbound slip roads, incorporating taper merge, linking to the realigned B867/Perth Road. Southbound slip roads, incorporating taper merge, linking to the realigned B867/Perth Road. No provision of northbound or southbound diverge movements.	35	2.0
BN_0017	No Junction. Connection of the B867 and Perth Road, crossing the A9 on an underbridge.	35	2.0
BN_0019	Grade separated junction, half diamond layout. Northbound slip roads, incorporating taper merge, linking to the realigned B867/Perth Road. Southbound slip roads, incorporating taper merge, linking to the realigned B867/Perth Road. No provision of northbound or southbound diverge movements. No connection of B867 and Perth Road.	24	1.4
BN_0007	Local grade separated junction, overbridge, full movements.	22	1.3
BN_0009	Grade separated junction, half diamond layout. Connection of the B867 and Perth Road, crossing the A9 on an underbridge structure. Northbound slip roads, incorporating taper merge and diverge, linking to the realigned B867/Perth Road. Southbound slip roads, incorporating taper merge and diverge, linking to the realigned B867/Perth Road. For off-line A9 route.	11	0.6
BN_0020	Grade separated junction, half diamond layout. Connection of the B867 and Perth Road, crossing the A9 on an underbridge structure.	11	0.6

Option	Summary Description	Total Score	Percentage
	Northbound slip roads, incorporating taper diverge, linking to the realigned B867/Perth Road. Southbound slip roads, incorporating taper merge and diverge, linking to the realigned B867/Perth Road. No provision of northbound merge movement.		
BN_0023	Grade separated junction, half diamond layout. Connection of the B867 and Perth Road, crossing the A9 on an underbridge structure. Southbound slip roads, incorporating taper merge and diverge, linking to the realigned B867/Perth Road. No provision of northbound merge or diverge movements.	6	0.4
	Total Number of Ranking Cards Submitted: 162		

Table 1.10: A9 Co-Creative Process Stage 4 Results (Dunkeld Junction)

Option	Summary Description	Total Score	Percentage
DN_0002	At-grade elongated roundabout at Little Dunkeld.	709	39.8
DN_0016	Grade separated junction, variation of diamond layout. Roundabout on the west of the A9, connected to the realigned A923, which crosses the A9 on an underbridge. Northbound slip roads, incorporating taper merge and diverge, linking to the roundabout. Northbound slip roads, incorporating taper merge and diverge, linking to the realigned A923.	199	11.2
DN_0015	Grade separated junction, diamond layout. Connection of the road to Inver and A923, crossing the A9 on an underbridge structure. Priority junction connecting the road to Inver with the realigned A822/A923. Northbound slip roads, incorporating taper merge and diverge. Northbound diverge slip road linking to the realigned road to Inver/A923. Northbound merge slip road linking to the road to Inver. Southbound slip roads, incorporating taper merge and diverge, linking to the realigned road to Inver/A923.	141	7.9
DN_0006	Local grade separated junction, underbridge, full movements.	137	7.7
DN_0004	Grade separated junction, variation of diamond layout. Designed for a 50 miles per hour (mph) speed limit. Connection of the A822 and A923, crossing the A9 on an underbridge structure. Priority junction connecting the road to Inver with the realigned A822/A923. Northbound slip roads, incorporating taper merge and diverge. Northbound diverge slip road linking to the realigned A822/A923. Northbound merge slip road linking to the road to Inver. Southbound slip roads, incorporating taper merge and diverge, linking to the realigned A822/A923.	136	7.6
DN_0018	Grade separated junction, two bridge roundabout. Roundabout crossing the A9 on two underbridge structures. A822, A923 and road to Inver realigned to join the roundabout. Northbound slip roads, incorporating taper merge and diverge. Northbound diverge and merge slip roads linking to the roundabout.	122	6.9

Option	Summary Description	Total Score	Percentage
	Southbound slip roads, incorporating taper merge and diverge, linking to the roundabout.		
DN_0019	Grade separated junction, variation of diamond layout. Connection of the A822 and A923, crossing the A9 on an underbridge structure. Priority junction connecting the road to Inver with the realigned A822/A923. Northbound slip roads, incorporating taper merge and diverge. Northbound diverge slip road linking to the realigned A822/A923. Northbound merge slip road linking to the road to Inver. Southbound slip roads, incorporating taper merge and diverge, linking to the realigned A822/A923. A9 northbound and southbound carriageway one above the other.	112	6.3
DN_0013	Grade separated junction, northbound slip roads only. Roundabout on the west of the A9, connected to the realigned A923, which crosses the A9 on an underbridge. Northbound slip roads, incorporating taper merge and diverge, linking to the roundabout. No provision of southbound merge or diverge movements.	82	4.6
DN_0003	At-grade elongated roundabout north of Dunkeld.	40	2.2
DN_0012	No junction. Connection of the A822 and A923, crossing the A9 on an underbridge structure. No provision of northbound or southbound merge or diverge movements.	39	2.2
DN_0017	Grade separated junction. Connection of the A822 and A923, crossing the A9 on an underbridge structure. Northbound slip roads, incorporating taper merge, linking to the realigned A822/A923. Southbound slip roads, incorporating taper merge, linking to the realigned A822/A923. No provision of northbound or southbound diverge movements.	28	1.6
DN_0011	Grade separated junction. Connection of the A822 and A923, crossing the A9 on an underbridge structure. Southbound slip roads, incorporating taper merge and diverge, linking to the realigned A822/A923. No provision of northbound merge or diverge movements.	22	1.2
DN_0009	Grade separated junction, half diamond layout. Connection of the A822 and A923, crossing the A9 on an underbridge structure. Northbound slip roads, incorporating taper merge, linking to the realigned A822/A923. Southbound slip roads, incorporating taper diverge, linking to the realigned A822/A923. No provision of northbound diverge or southbound merge movements.	14	0.8
	Total Number of Ranking Cards Submitted: 217		

Table 1.11: A9 Co-Creative Process Stage 4 Results (Dalguise Junction)

Option	Summary Description	Total Score	Percentage
DG_0002	Grade separated junction, northbound loop arrangement and southbound slip roads.	195	18.7

Option	Summary Description	Total Score	Percentage
	Roundabout on the east of the A9, connected to the realigned B898, which crosses the A9 on an underbridge. An alternative means of access from the B898 to existing forestry tracks would be required. Southbound slip roads, incorporating taper merge and diverge, linking to the roundabout. Northbound loop, 50 metres radius, basic merge plus hook diverge, incorporating taper merge and diverge, linking to the realigned B898.		
DG_0005	Grade separated junction, variation of diamond layout. Connection of the B898 and southbound merge slip road, crossing the A9 on an underbridge structure. An alternative means of access from the B898 to existing forestry tracks would be required. Northbound slip roads, incorporating taper merge and diverge, linking to the realigned B898. Southbound slip roads, incorporating taper merge and diverge. Southbound diverge slip road linking to the realigned B898/southbound merge slip road.	184	17.7
DG_0003	Grade separated junction, diamond layout. Roundabout on the east and west of the A9, connected to a new road, crossing the A9 on an underbridge structure, which links to the realigned B898. The realigned B898 continues, providing access to adjacent land. An alternative means of access from the B898 to existing forestry tracks would be required. Northbound slip roads, incorporating taper merge and diverge, linking to the roundabout on the west of the A9. Southbound slip roads, incorporating taper merge and diverge, linking to the roundabout on the east of the A9.	176	16.9
DG_0006	Grade separated junction, northbound hybrid arrangement and southbound slip roads. Roundabout on the east of the A9, connected to the realigned B898, which crosses the A9 on an underbridge. An alternative means of access from the B898 to existing forestry tracks would be required. Southbound slip roads, incorporating taper merge and diverge, linking to the roundabout. Northbound slip roads, incorporating taper merge and diverge, linking to the realigned B898.	124	11.9
DG_0001	At-grade roundabout.	110	10.6
DG_0012	Grade separated junction, half diamond layout. Connection of the B898 and southbound merge slip road, crossing the A9 on an underbridge structure. An alternative means of access from the B898 to existing forestry tracks would be required. Northbound slip road, incorporating taper diverge, linking to the realigned B898. Southbound slip road, incorporating taper merge, linking to the realigned B898. No provision of northbound merge or southbound diverge movements.	98	9.4
DG_0007	Grade separated junction, two bridge roundabout. Junction located to north of River Tay crossing. Roundabout crossing the A9 on two underbridge structures. B898 realigned to join the roundabout.	66	6.3

Option	Summary Description	Total Score	Percentage
	Northbound slip roads, incorporating taper merge and diverge. Northbound diverge and merge slip roads linking to the roundabout. Southbound slip roads, incorporating taper merge and diverge, linking to the roundabout.		
DG_0010	Grade separated junction, variation of diamond layout. Connection of the B898 and southbound merge slip road, crossing the A9 on an underbridge structure. An alternative means of access from the B898 to existing forestry tracks would be required. Northbound slip road, incorporating taper merge and diverge, linking to the realigned B898. Southbound slip road, incorporating taper merge and diverge, linking to the realigned B898.	55	5.3
DG_0009	Grade separated junction, half diamond layout. Connection of the B898 and southbound merge slip road, crossing the A9 on an underbridge structure. An alternative means of access from the B898 to existing forestry tracks would be required. Northbound slip road, incorporating taper merge, linking to the realigned B898. Southbound slip road, incorporating taper merge, linking to the realigned B898. No provision of northbound or southbound diverge movements.	32	3.1
	Total Number of Ranking Cards Submitted: 117		

Table 1.12: A9 Co-Creative Process Stage 4 Results (Dunkeld & Birnam Station)

Option	Summary Description	Total Score	Percentage
DS_0001	Station Road extended across the A9 on structure, structure utilised for car park.	561	34.0
DS_0003	Station Road extended across the A9, A9 removed (for off-line A9 route).	177	10.7
DS_0009	Station Road extended across the A9 on structure, structure utilised for pick-up/drop-off point, new parking facility north of Inchewan Burn.	169	10.2
DS_0012	New access road from the A822 to properties on Birnam Glen.	168	10.2
DS_0006	Birnam Industrial Estate utilised for station car park, underpass under A9 to station.	148	9.0
DS_0004	Relocated Dunkeld & Birnam Station to the north of the Inchewan Burn.	128	7.8
DS_0008	New parking facility north of Inchewan Burn.	83	5.0
DS_0016	Station Road extended across the A9 on structure, structure utilised for car park (for on-line route MO.ST4.0007).	72	4.4
DS_0011	Birnam Industrial Estate utilised for station car park, existing pedestrian access maintained.	71	4.3
DS_0015	Vehicular access to west of Dunkeld & Birnam Station from A822 with new parking.	38	2.3
DS_0014	Station Road extended below A9 (for raised A9 route).	34	2.1
	Total Number of Ranking Cards Submitted: 171		

Table 1.13: A9 Co-Creative Process Stage 4 Results (The Hermitage)

Option	Summary Description	Total Score	Percentage
HT_0005	Northbound left-in left-out junction.	402	40.9
HT_0001	At-grade roundabout.	216	22.0
HT_0007	No junction, connection alongside A9 between A822 and The Hermitage.	155	15.8
HT_0008	No junction, connection alongside A9 between Inver and The Hermitage.	109	11.1
HT_0003	Grade separated junction, diamond layout. Connection of The Hermitage and land to the west of the River Tay, crossing the A9 via an underbridge structure. Northbound slip road, incorporating taper merge and diverge, linking to the realigned access road. Southbound slip road, incorporating taper merge and diverge, linking to the realigned access road.	100	10.2
	Total Number of Ranking Cards Submitted: 134		

1.9.6 As part of the A9 Co-Creative Process, a number of ideas submitted were either non-spatial or out of scope of the A9 Dualling Programme. Non-spatial ideas were those that did not relate to a specific element of geometric design and out of scope ideas were those that were considered outwith the remit of the A9 Dualling Programme. In total 37 non-spatial ideas were submitted and 40 out of scope ideas. A number of the non-spatial ideas will automatically be considered in later stages of scheme development. Other non-spatial ideas, which are important to the community, will be retained and considered as appropriate in later stages of scheme development, subject to programme, budget, deliverability and other constraints. A list of the non-spatial ideas submitted is included in Table 1.14.

Table 1.14: A9 Co-Creative Process Non-Spatial Ideas

Unique Reference (Stage 2)	Summary Description
NS ST2 0001	Enhanced NMU routes, including: • Between The Hermitage and Dalguise; • Between Dunkeld and the River Tay crossing; • Across the A9 between Little Dunkeld and The Hermitage; • Underpass across the River Tay at the northern extent of the scheme; and • Adjacent to the A9.
NS ST2 0002	Reduced design standards.
NS ST2 0003	Reduced speed limit.
NS ST2 0004	Introduction of cameras to monitor speed.
NS ST2 0005	Utilise recycled materials (plastics) in road surfacing.
NS ST2 0006	Provision of Heavy Goods Vehicle (HGV) parking facilities on the A9.
NS ST2 0007	Sensitive and appropriate signage and street lighting, including a new sign at the southern extent.
NS ST2 0008	Create new floodplain alongside River Tay to increase wildlife habitat, landscape interest and amenity facilities.
NS ST2 0009	Provision of deer fencing throughout the extents of the scheme.
NS ST2 0010	Introduce wildlife crossings and corridors where possible.
NS ST2 0011	Relocation of Dunkeld & Birnam Station building, to accompany any relocation of the station.
NS ST2 0012	At-grade cycle facility between Dunkeld and the River Tay crossing.

Unique Reference (Stage 2)	Summary Description
NS ST2 0013	Impact on local residents (Station Road, Birnam Terrace & Gladstone Terrace) to be considered in any works undertaken in the vicinity of Dunkeld & Birnam Station, including provision of a replacement car parking facility. Consideration of Birnam Industrial Estate, which provides a means of vehicular access to residential properties on Birnam Terrace.
NS ST2 0014	Low-noise road surfacing to be utilised on A9 carriageway.
NS ST2 0015	Elimination of central reserve on A9 dual carriageway to reduce land-take (with Road Restraint System (RRS)).
NS ST2 0016	Provision of electric vehicle charging equipment within replacement car parking facility at Dunkeld & Birnam Station.
NS ST2 0017	Implementation of noise, visual, air and water quality mitigation if necessary, including acoustic barriers and landscape planting.
NS ST2 0018	A9 dual carriageway to be Category 7A standard (in accordance with the DMRB).
NS ST2 0019	During construction, all A9 and construction traffic prohibited from travelling through Dunkeld and Birnam.
NS ST2 0020	A9 dual carriageway to be Category 6 standard (in accordance with the DMRB).
NS ST2 0021	Increased roadside planting to prevent wildlife from encroaching within the extents of the A9.
NS ST2 0022	Anti-glare screens to be considered between adjacent carriageways.
NS ST2 0023	Overhead gantries to be constructed on the A9 to display current speed requirements.
NS ST2 0024	At-grade cycle facility over the length of the scheme.
NS ST2 0025	Appropriate measures to segregate vehicular and pedestrian traffic at The Hermitage.
NS ST2 0026	Provision of new bus lay-by in the locality of the existing priority junction with the B898 at Dalguise.
NS ST2 0027	Replacement woodland to be planted to replace that lost as a result of the A9 dualling.
NS ST2 0028	Aesthetic appearance of bridge structures to be considered.
NS ST2 0029	Alert systems for traffic issues.
NS ST2 0030	Transport hub (train, car, bus and NMUs) created at the existing Dunkeld & Birnam Station.
NS ST2 0031	Solar panels to generate electricity provided on top of the cut and cover tunnel.
NS ST2 0032	Top of cut and cover tunnel to be made available for parking, play areas, wildlife and biodiversity.
NS ST2 0033	Provision of new bus lay-bys, northbound and southbound, in the locality of Inver and The Hermitage.
NS ST2 0034	Allotments to be provided on top of the cut and cover tunnel.
NS ST2 0035	Final landscape design to enhance, beautify and integrate the dual carriageway with the surrounding environment.
NS ST2 0036	Wildflowers to be planted.
NS ST2 0037	Enhance NMU routes, including: ▪ Underpass connection through the A9 to The Hermitage from the route adjacent to the River Tay; ▪ Mountain bike facility on top of the cut and cover tunnel; ▪ Route from Dunkeld & Birnam Station to Dalguise: ▪ Bridge across the River Braan (to bypass section closed due to landslip); and Overbridge across the River Tay, between Birnam and Dunkeld (due to increase in traffic through community as a result of A9 dualling).

1.9.7 Out of scope ideas, included in Table 1.15, were passed to Dunkeld & Birnam Community Council for discussion with relevant stakeholders.

Table 1.15: A9 Co-Creative Process Out of Scope Ideas

Unique Reference (Stage 2)	Summary Description
SC ST2 0001	Construction of a new pedestrian crossing over the River Tay, in the locality of the existing Telford Bridge.
SC ST2 0002	HGVs and tour buses prevented from travelling through the community.
SC ST2 0003	Provision of a new NMU route between Dunkeld and Perth.
SC ST2 0004	Provision of temporary at-grade roundabouts on the existing A9 in the locality of the existing junctions at Birnam and Little Dunkeld.
SC ST2 0005	Improvements to existing traffic signs and road markings on the existing single carriageway.
SC ST2 0006	Highland Main Line railway moved off-line to the west, with a dualled track and a relocated station.
SC ST2 0007	Funding for improved facilities for Dunkeld & Birnam Recreational Club.
SC ST2 0008	War Memorial relocated into the village to improve accessibility (if not directly impacted by the scheme).
SC ST2 0009	Relocated Network Rail maintenance siding, to replace that lost by A9 dualling, located at Dunkeld & Birnam Station.
SC ST2 0010	Improvements to existing Birnam Glen/Inchewan Burn road underbridge and infill parapet on the A9 (existing joint is out of alignment).
SC ST2 0011	Businesses utilising Birnam Industrial Estate, relocated to an area in the locality of Dunkeld North Car Park, should the option to utilise the industrial estate as a replacement car parking facility be progressed.
SC ST2 0012	Improvement works to the existing A9 single carriageway, including provision of a central barrier or bollards to separate traffic, lighting at junctions and implementation of low noise surfacing and high friction surfacing.
SC ST2 0013	Highland Main Line railway dualled between Perth and Dunkeld.
SC ST2 0014	Works undertaken to Dunkeld & Birnam Station and the Highland Main Line railway to address current accessibility issues.
SC ST2 0015	Existing Dunkeld & Birnam Station building utilised by the local community.
SC ST2 0016	Liaise with Network Rail to ensure long-term planning period for rail travel, replacing the existing short-term timescales.
SC ST2 0017	Clear vegetation in the vicinity of the existing A9 and Highland Main Line railway.
SC ST2 0018	Reduced speed limit and traffic control measures on the side road network (30mph) and within residential areas (20mph).
SC ST2 0019	Provision of electric vehicle charging equipment within Dunkeld and Birnam.
SC ST2 0020	Live link boards at all bus stops within the community.
SC ST2 0021	At-grade roundabout in the locality of the existing junction with the A923 and Perth Road in Little Dunkeld.
SC ST2 0022	Designated safe routes to school.
SC ST2 0023	New sports facility in Birnam and Dunkeld.
SC ST2 0024	Relocation of existing tennis courts and bowling green facility (if not directly impacted by the scheme).
SC ST2 0025	Provision of a 24-hour petrol station in the locality of the existing left/right staggered priority junction with the B867 and Perth Road at Birnam.
SC ST2 0026	Implementation of noise and visual mitigation measures on the existing A9.
SC ST2 0027	Improved maintenance of A9 in winter when temperatures are low.
SC ST2 0028	Scottish and Southern Energy (SSE) and Scottish Gas Network (SGN) to relocate overhead powerlines alongside the A9.
SC ST2 0029	Conduct appropriate research into moving freight from road to rail.
SC ST2 0030	New pedestrian/cycle bridge across Inchewan Burn linking Stell Park Road with the station.

Unique Reference (Stage 2)	Summary Description
SC ST2 0031	Refurbish existing rail overbridge at Dunkeld & Birnam Station, new northbound platform waiting room and new station entrance with parking, bus stop, electric vehicle charging equipment bays, bike hire point and pedestrian/cycle links to the wider Birnam and Dunkeld Area.
SC ST2 0032	RRS to be installed alongside WCH routes adjacent to the existing A9 single carriageway.
SC ST2 0033	Bus services within Birnam and Dunkeld to be maintained.
SC ST2 0034	Flood prevention measures implemented in the locality of the Inchewan Burn.
SC ST2 0035	Consideration of local Small and Medium-Sized Enterprises in developing access to the station to encourage growth and investment.
SC ST2 0036	Tourist information signs improved on current A9 single carriageway.
SC ST2 0037	Refurbish existing rail overbridge at Dunkeld & Birnam Station with lifts provided for access to Platform 2 (northbound).
SC ST2 0038	Provide access to Platform 2 (northbound) at Dunkeld & Birnam Station via lifts or ramps.
SC ST2 0039	Works to Birnam Glen to improve access to properties to the west of Dunkeld & Birnam Station (if not directly impacted by the scheme).
SC ST2 0040	Reduce carriageway cross-section of side road network.

1.9.8 The constituent parts from Stage 4 were constructed into Whole Route Options. To form the Whole Route Options, the top-ranked elements were utilised, considering how they naturally fit together and using a degree of engineering judgement where necessary. The Whole Route Options identified were agreed by all parties involved in the A9 Co-Creative Process (Transport Scotland, Birnam to Ballinluig A9 Community Group and PAS). The four route options available for the public vote at Stage 5 are detailed in Table 1.16.

Table 1.16: A9 Co-Creative Process Options Summary

Scheme Option	General Information	Murthly/Birnam Junction	Dunkeld Junction	Dalguise Junction
A	On-line route, largely following the alignment of the existing A9. Proposed A9 dual carriageway lowered into a cut and cover tunnel for approximately 1.5 kilometers. Reconnection of Station Road to Dunkeld & Birnam Station with a replacement car park provided on the structure. Speed limit of 50mph between southern extent of scheme and Dunkeld Junction. 70mph speed limit for the remainder of the scheme.	Grade separated junction in the locality of the existing private access to Murthly Castle. Diamond layout, with northbound and southbound merge and diverge slip roads. An overbridge is provided across the A9 linking to the B867. Requires connection of the B867 and Perth Road.	At-grade roundabout, providing connections to the A9 (north and south), A923, A822 and road to Inver.	Grade separated junction with roundabout on the east of the A9, connected to the B898, which crosses the A9 via an underbridge. Northbound loop, with merge and diverge and southbound slip roads.
B	On-line route, largely following the alignment of the existing A9.	Grade separated junction, half diamond layout. Northbound and	At-grade roundabout, providing connections to the A9 (north and south),	Grade separated junction with roundabout on the east of the A9, connected

Scheme Option	General Information	Murthly/Birnam Junction	Dunkeld Junction	Dalguise Junction
	Proposed A9 dual carriageway lowered into a cut and cover tunnel for approximately 450 metres. Reconnection of Station Road to Dunkeld & Birnam Station with a replacement car park provided on the structure. Speed limit of 70mph.	southbound merge and diverge slip roads. Connection of B867 and Perth Road, crossing the A9 via an overbridge.	A923, A822 and road to Inver.	to the B898, which crosses the A9 via an underbridge. Northbound loop, with merge and diverge and southbound slip roads.
C	Off-line route to the west incorporating a bored tunnel between the existing Birnam Junction and Inver. Speed limit of 70mph. Assumed existing A9 retained for local access to Dunkeld & Birnam Station and Dunkeld.	Grade separated junction in the locality of the existing private access to Murthly Castle. Diamond layout, with northbound and southbound merge and diverge slip roads. An overbridge is provided across the A9 linking to the B867. Requires connection of the B867 and Perth Road.	No junction appropriate.	Grade separated junction with roundabout on the east of the A9, connected to the B898, which crosses the A9 via an underbridge. Northbound loop, with merge and diverge and southbound slip roads.
D	On-line route, largely following the alignment of the existing A9. Proposed A9 dual carriageway lowered into an underpass approximately 150 metres long. Reconnection of Station Road to Dunkeld & Birnam Station with a replacement car park provided on the structure. Speed limit of 70mph.	At-grade roundabout, providing connections to the A9 (north and south), B867 and Perth Road in the locality of the existing Birnam Junction.	At-grade roundabout, providing connections to the A9 (north and south), A923, A822 and road to Inver.	Grade separated junction with roundabout on the east of the A9, connected to the B898, which crosses the A9 via an underbridge. Northbound loop, with merge and diverge and southbound slip roads.

1.9.9 Options A, B, C and D incorporated a left-in left-out junction at The Hermitage.

1.9.10 The outcome of the A9 Co-Creative Process, and the Community's Preferred Route Option, was identified at Stage 5 following a community vote. In total 720 voting cards were submitted. The results of the voting are given below.

- Option A – Total Score: 1,771 (37%);
- Option B – Total Score: 1,090 (23%);
- Option C – Total Score: 1,053 (22%); and
- Option D – Total Score: 818 (17%).

1.9.11 As a result, the Community's Preferred Route Option is Option A, which is summarised below. The commitment from the A9 Co-Creative Process is that the Community's Preferred Route Option will be presented to Scottish Ministers for consideration.

Community's Preferred Route Option

- 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 1.5 kilometres, commencing at the southern extent in the locality of the existing Birnam Junction and terminating approximately 300 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 50mph required between the southern extent of the scheme and the proposed Dunkeld Junction. 70mph speed limit for the remainder of the scheme.
- Murthly/Birnam Junction:
  - Grade separated junction in the locality of the existing private access to Murthly Castle.
  - Diamond layout, facilitating all vehicle movements. Overbridge provided across the A9, connecting to the B867 to the west.
  - Requires a connection of the B867 and Perth Road in the locality of the existing Birnam Junction, crossing the A9 at the southern extent of the cut and cover tunnel.
- 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.

1.10 Jacobs Assessment (2018 to 2019)

Initial Assessment, Community's Preferred Route Option

1.10.1 Following completion of the A9 Co-Creative Process, further assessment work was undertaken on the Community's Preferred Route Option. This initial assessment work considered the environmental, engineering and traffic impacts of the Community's Preferred Route Option and included consultation with key stakeholders and residents that live in close proximity to the A9 that may be directly impacted.

1.10.2 It is noted that the Community's Preferred Route Option has a number of advantages. Most notably, it presents an opportunity to improve accessibility to Dunkeld & Birnam Station and the station building, which is Category A Listed, by reconnecting to Station Road and creating a replacement car park on top of the tunnel. The option also reduces noise levels over the extent of the cut and cover tunnel and

improves visual amenity, with opportunities to establish new planting or possibly recreational space on top of the tunnel, which would benefit the local community.

1.10.3 However, the assessment work, which is detailed in the *'A9 Dualling Programme: Pass of Birnam to Tay Crossing, Identification of DMRB Stage 2 Whole Route Options Report (Jacobs, 2019)'*, identified a number of challenges with the Community's Preferred Route Option, which are summarised below.

- Construction complexity within a narrow and sensitive corridor, with piling works required to construct the cut and cover tunnel resulting in noise and visual impacts. Approximately 3,700,1.2 metre diameter piles required, bored approximately 15 metres into the ground;
- A tunnel requires a wider carriageway cross-section due to the need to include an emergency pedestrian evacuation route. Piling works will be required approximately 2.5 metres from the Category A Listed station building;
- Concerns noted from some local residents, businesses and key stakeholders about the construction complexity, disruption and noise and vibration impacts over a prolonged period of time (construction duration anticipated to be a minimum of 4 ½ to 5 years, dependent on working hours). Some residents are also concerned with potential damage to property as a result of piling works in close proximity;
- Requirement for a 24-hour manned control room and other infrastructure associated with a tunnel;
- Additional land required for specialist plant and equipment for the construction of the tunnel, such as concrete batching and mud plant, with approximately 430,000 tonnes (180,000 cubic metres) of concrete required for the tunnel. This results in approximately 45,000 total lorry movements, which equates to around 125 vehicle movements per day;
- Approximately 535,000 cubic metres of material is required to be excavated for construction of the tunnel. This results in approximately 90,000 lorry movements to dispose of excess material, which equates to around 250 vehicles per day;
- Inchewan Burn will require to be lowered, introducing an 8 metre vertical drop, which will have significant environmental impacts. Both SEPA and NatureScot have raised concerns with regards to the impact on the natural characteristics of the burn and sediment transfer;
- Safety issues in relation to a cut and cover tunnel have been noted by key stakeholders, with the emergency services noting potential delays to reach an accident in the tunnel. Concerns have also been raised with the potential of a minor accident on a roundabout at Dunkeld leading to stationery vehicles in the tunnel, which is a significant risk; and
- Significant construction costs with regular maintenance and inspection required, incurring ongoing costs.

1.10.4 The dualling of the A9 will require the Scottish Government to compulsory purchase land from private individuals. Transport Scotland must therefore be in a position to fully justify that land-take and the impacts on the individual that the dualling may create, both in the short-term during construction, and during the operation of the road. As such, and as good practice dictates that a range of options should be considered, additional options to address the challenges identified in the initial assessment, for each constituent section of the scheme were identified, considered and comparatively assessed.

1.10.5 Inclusion of additional options in the formal route options assessment (DMRB Stage 2 assessment) ensures that the assessment process is robust and that decisions are made in full consideration of the choices available and that the Preferred Route Option is defendable through the planning process.

1.10.6 All additional options were submitted by the public as part of the A9 Co-Creative Process. Furthermore, in identifying the additional options, consideration was given to the key principles and outcomes of the A9 Co-Creative Process, as well as the community and Transport Scotland's objectives.

1.10.7 The additional options were presented to the public in late March 2019 and detailed in the *'A9 Dualling Programme: Pass of Birnam to Tay Crossing, Identification of DMRB Stage 2 Whole Route Options Report (Jacobs, 2019)'*. A summary of the additional options is given in Table 1.17

Table 1.17: Initial Assessment, Constituent Additional Options

Additional Option	Description
Murthly/Birnam Junction	
Murthly/Birnam Additional Option 1	▪ Grade separated junction in the locality of the existing Birnam Junction; ▪ Merge/diverge loops in the northbound direction and a merge slip road in the southbound direction, with no southbound diverge slip road; ▪ B867 and Perth Road connected, crossing the A9 via an underbridge; and ▪ Includes an underbridge to connect the existing private access to Murthly Castle to the B867.
Murthly/Birnam Additional Option 2	▪ Grade separated junction in the locality of the existing Birnam Junction; ▪ Merge/diverge loops in the northbound and southbound directions, facilitating all vehicle movements; ▪ B867 and Perth Road connected, crossing the A9 via an underbridge; and ▪ Includes an underbridge to connect the existing private access to Murthly Castle to the B867.
A9 Dual Carriageway	
A9 Dual Carriageway Additional Option 1	▪ A9 dual carriageway lowered into a 150 metre long underpass structure in the locality of Dunkeld & Birnam Station. Generally, at-grade outwith this section; ▪ Largely following the horizontal alignment of the existing A9; ▪ Reconnection of Station Road to Dunkeld & Birnam Station; ▪ Replacement car park facility provided on top of the structure; ▪ Speed limit of 70mph throughout; and ▪ Inchewan Burn lowered by approximately 6 metres to accommodate the A9 dual carriageway.
A9 Dual Carriageway Additional Option 2	▪ A9 dual carriageway largely following the horizontal and vertical alignment of the existing A9; and ▪ Speed limit of 70mph throughout.
Dunkeld & Birnam Station	
Dunkeld & Birnam Station Additional Option 1	▪ Relocated station to the north, to an area of land immediately north of Inchewan Burn; ▪ Extension of existing rail passing loop to the north to accommodate the relocated station, which will require signalling works; ▪ Provision of new platforms and associated station infrastructure, including shelters; ▪ Vehicular access to the station from the A822, immediately west of the current railway underbridge, which is the tie-in point for the works associated with Dunkeld Junction; ▪ New car parking facility, which will include approximately fifty spaces, incorporating an appropriate number of accessible spaces, a vehicle pick-up drop-off and potentially provision for a bus stop and bus turning; ▪ Relocated station will include a pedestrian footbridge, incorporating either lifts or ramps to allow access between platforms; ▪ WCH access maintained from Birnam Glen with a new structure constructed across Inchewan Burn; ▪ Suitable footpaths, in accordance with current relevant accessibility and disability legislation, will link to the platforms and station facilities; and

Additional Option	Description
	▪ No public vehicular access direct to the existing station platforms and Category A Listed building. A left-in left-out junction would be provided for Network Rail maintenance personnel only.
Dunkeld & Birnam Station Additional Option 2	▪ Existing Dunkeld & Birnam Station maintained in its current position; ▪ Birnam Industrial Estate acquired, and the land utilised to construct a station car park facility, which will include car parking provision for approximately fifty spaces, a vehicle pick-up drop-off point and potentially provision for a bus stop. The new car park will be accessed from Station Road; ▪ Current arrangements for access to the station via Birnam Glen, utilising stairs remains; ▪ A new pedestrian underpass structure constructed below the proposed A9 dual carriageway, linking the new car park with Platform 1 (southbound) of the station; ▪ The underpass structure will incorporate lifts and stairs to facilitate access from the underpass level to the station; ▪ No works proposed to the existing station infrastructure, including platforms, pedestrian overbridge and track; and ▪ No public vehicular access direct to the existing station platforms and Category A Listed building. A left-in left-out junction would be provided for Network Rail maintenance personnel only.
Dunkeld Junction	
Dunkeld Junction Additional Option 1	▪ Grade separated junction, variation of diamond layout; ▪ All vehicle movements facilitated; ▪ Connection of the A822 and A923, crossing the A9 on an underbridge structure; ▪ Priority junction connecting the road to Inver with the realigned A822/A923; ▪ Northbound slip roads, incorporating taper merge and diverge; ▪ Northbound diverge slip road linking to the realigned A822/A923; ▪ Northbound merge slip road linking to the road to Inver; and ▪ Southbound slip roads, incorporating taper merge and diverge, linking to the realigned A822/A923.

1.10.8 The Jacobs Assessment (2014 to 2016), undertaken prior to the A9 Co-Creative Process, suggested a northbound left-in left-out as the preferred option at The Hermitage, which is an NTS site. The A9 Co-Creative Process also identified a left-in left-out junction as the preference at this location (Table 1.13). As previous assessment and the local community preference is consistent, additional junction options at The Hermitage were not investigated.

1.10.9 Similarly, at Dalguise Junction, Jacobs assessment identified a grade separated junction, with a roundabout on the east of the A9 connected to the B898 via an underbridge, with a northbound loop arrangement and merge and diverge southbound slip roads. Through the A9 Co-Creative Process the community identified this option as their preference (Table 1.11). As such, additional options at Dalguise Junction were not investigated.

Initial Options Assessment

1.10.10 Based on the initial assessment completed within the '*A9 Dualling Programme: Pass of Birnam to Tay Crossing, Identification of DMRB Stage 2 Whole Route Options Report (Jacobs, 2019)*', it was recommended that the relocated Dunkeld & Birnam Station option should be removed from further consideration. The reasons for this are given below.

- Does not meet a key principle from the A9 Co-Creative Process to re-connect Station Road to the station;
- Involves works to track, signalling and platforms, that would impact the operation of the Highland Main Line railway, adding to the scheme complexity;
- Adverse impact on the Category A Listed station building, which may impact the future sustainability of the building;
- Greater changes to the landscape character, impacting the visual amenity for residents of Telford Gardens and Stell Park Road; and
- Impact on Ladywell Landfill site, with potential to encounter contaminated soils and groundwater.

1.10.11 The level of assessment undertaken was unable to eliminate any other options, including the additional options under consideration for the Murthly/Birnam Junction. Therefore, all other options were progressed for consideration as part of this DMRB Stage 2 assessment.

Option Generation

1.10.12 Additional Whole Route Options were developed considering how the constituent options fit together naturally, the key principles of the A9 Co-Creative Process and the community's and Transport Scotland's objectives. The placement of options in the public vote at Stages 4 and 5 of the A9 Co-Creative Process was also considered, as well as how the Whole Route Options address concerns of local residents and key stakeholders. A detailed narrative as to how the Additional Whole Route Options were generated is included in the *'A9 Dualling Programme: Pass of Birnam to Tay Crossing, Identification of DMRB Stage 2 Whole Route Options Report (Jacobs, 2019)'*. These Additional Whole Route Options will be considered alongside the Community's Preferred Route Option, as part of this DMRB Stage 2 assessment.

1.10.13 As the comparative assessment undertaken in the *'A9 Dualling Programme: Pass of Birnam to Tay Crossing, Identification of DMRB Stage 2 Whole Route Options Report (Jacobs, 2019)'* did not identify significant differences (in engineering, environment and traffic) between the three options considered for Murthly/Birnam Junction, all three junction options were taken forward to be considered as part of this DMRB Stage 2 assessment.

1.10.14 Each option includes the same junction option at The Hermitage and Dalguise, as detailed in Paragraphs 1.10.8 and 1.10.9.

<u>Additional Whole Route Option 1</u>

- On-line route, largely following the horizontal alignment of the existing A9 single carriageway.
- A9 dual carriageway lowered into a 150 metre long underpass structure in the locality of Dunkeld & Birnam Station.
- Dunkeld & Birnam Station retained in its current position with Station Road reconnected to the station. Parking on top of the underpass.
- Speed limit of 70mph throughout.
- Murthly/Birnam Junction, three options under consideration:
  - Option 1:
    - Grade separated junction in the locality of the existing private access to Murthly Castle.
    - Diamond layout, facilitating all vehicle movements. Overbridge provided across the A9, connecting to the B867 to the west.
    - Includes a connection of the B867 and Perth Road in the locality of the existing Birnam Junction, crossing the A9 via an underbridge.

- Option 2:
  - Grade separated junction in the locality of the existing Birnam Junction.
  - Loops in the northbound direction and a merge slip road in the southbound direction, with no southbound diverge slip road.
  - B867 and Perth Road connected, crossing the A9 via an underbridge.
  - Includes an underbridge to connect the existing private access to Murthly Castle to the B867.
- Option 3:
  - Grade separated junction in the locality of the existing Birnam Junction.
  - Loops in the northbound and southbound directions, facilitating all vehicle movements.
  - B867 and Perth Road connected, crossing the A9 via an underbridge.
  - Includes an underbridge to connect the existing private access to Murthly Castle to the B867.

- 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, facilitating all vehicle movements.
  - 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.

<u>Additional Whole Route Option 2</u>

- On-line route, largely following the horizontal and vertical alignment of the existing A9 single carriageway.
- Generally, the same level as the existing A9 throughout, raised in the locality of Dunkeld Junction.
- Dunkeld & Birnam Station retained in its current position.
- Birnam Industrial Estate acquired, and the land used to construct a car parking facility accessed from Station Road, incorporating approximately fifty spaces.
- A new pedestrian underpass structure, incorporating lifts, constructed below the proposed A9 dual carriageway, linking the new car park to the station.
- Speed limit of 70mph throughout.
- Murthly/Birnam Junction, three options under consideration:
  - Option 1:
    - Grade separated junction in the locality of the existing private access to Murthly Castle.
    - Diamond layout, facilitating all vehicle movements. Overbridge provided across the A9, connecting to the B867 to the west.

- Includes a connection of the B867 and Perth Road in the locality of the existing Birnam Junction, crossing the A9 via an underbridge.

- Option 2:
  - Grade separated junction in the locality of the existing Birnam Junction.
  - Loops in the northbound direction and a merge slip road in the southbound direction, with no southbound diverge slip road.
  - B867 and Perth Road connected, crossing the A9 via an underbridge.
  - Includes an underbridge to connect the existing private access to Murthly Castle to the B867.
- Option 3:
  - Grade separated junction in the locality of the existing Birnam Junction.
  - Loops in the northbound and southbound directions, facilitating all vehicle movements.
  - B867 and Perth Road connected, crossing the A9 via an underbridge.
  - Includes an underbridge to connect the existing private access to Murthly Castle to the B867.

- Dunkeld Junction:
  - Grade separated junction in the locality of the existing Dunkeld Junction.
  - Variation of a diamond layout, facilitating all vehicle movements, with northbound and southbound slip roads.
  - A822 and A923 connected, crossing the A9 via an underbridge.
- 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.

<u>Additional Whole Route Option 3</u>

- On-line route, largely following the horizontal and vertical alignment of the existing A9 single carriageway.
- Generally, the same level as the existing A9 throughout.
- Dunkeld & Birnam Station retained in its current position.
- Birnam Industrial Estate acquired, and the land used to construct a car parking facility accessed from Station Road, incorporating approximately fifty spaces.
- A new pedestrian underpass structure, incorporating lifts, constructed below the proposed A9 dual carriageway, linking the new car park to the station.
- Speed limit of 70mph throughout.
- Murthly/Birnam Junction, three options under consideration:
  - Option 1:

- Grade separated junction in the locality of the existing private access to Murthly Castle.
- Diamond layout, facilitating all vehicle movements. Overbridge provided across the A9, connecting to the B867 to the west.
- Includes a connection of the B867 and Perth Road in the locality of the existing Birnam Junction, crossing the A9 via an underbridge.

- Option 2:
  - Grade separated junction in the locality of the existing Birnam Junction.
  - Loops in the northbound direction and a merge slip road in the southbound direction, with no southbound diverge slip road.
  - B867 and Perth Road connected, crossing the A9 via an underbridge.
  - Includes an underbridge to connect the existing private access to Murthly Castle to the B867.
- Option 3:
  - Grade separated junction in the locality of the existing Birnam Junction.
  - Loops in the northbound and southbound directions, facilitating all vehicle movements.
  - B867 and Perth Road connected, crossing the A9 via an underbridge.
  - Includes an underbridge to connect the existing private access to Murthly Castle to the B867.

- 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, facilitating all vehicle movements.
  - 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.

1.11 DMRB Stage 2 Assessment (Report Layout)

1.11.1 The A9 Co-Creative Process was a partnership between Transport Scotland and the Birnam to Ballinluig A9 Community Group, and involved the public identifying ideas for A9 dualling in the Pass of Birnam to Tay Crossing section. The innovative process has been a departure from the standard assessment and preparation of road schemes in the United Kingdom (UK). Beyond the completion of the A9 Co-Creative Process, the design and assessment of the project must be aligned with the DMRB process, which is how road schemes in the UK are progressed and assessed.

1.11.2 This DMRB Stage 2 Scheme Assessment Report for the Pass of Birnam to Tay Crossing project has been prepared in accordance with the DMRB (TD 37/93: Scheme Assessment Reporting). The purpose of this report is to identify route options within the Preferred Route Corridor, taking account of constraints, potential environmental, engineering and traffic and economic effects and considering feedback from the public and other stakeholders. These options are assessed, identifying the

environmental, engineering, traffic and economic advantages, disadvantages and constraints associated with each route option. The Preferred Route Option is selected taking account of these assessments and taken forward for further development and refinement as part of the DMRB Stage 3 assessment.

1.11.3 As noted in Paragraph 1.10.13, the initial assessment undertaken in the *'A9 Dualling Programme: Pass of Birnam to Tay Crossing, Identification of DMRB Stage 2 Whole Route Options Report (Jacobs, 2019)'* did not identify significant differences between the options considered for Murthly/Birnam Junction. As such, the initial focus of this DMRB Stage 2 assessment is on the Murthly/Birnam Junction options to determine a preferred junction option, which is summarised in Chapter 3 (Murthly/Birnam Junction DMRB Stage 2 Assessment). This recommendation has been considered in the Additional Whole Route Options detailed in Paragraph 1.10.14, which will be subject to a DMRB Stage 2 assessment, along with the Community's Preferred Route Option.

1.11.4 In accordance with the DMRB (TD 37/93: Scheme Assessment Reporting), this DMRB Stage 2 Scheme Assessment Report is presented in the following volumes:

Volume 1: Main Report and Appendices

- Part 1 - The Scheme
- Part 2 - Engineering Assessment
- Part 3 - Environmental Assessment
- Part 4 - Transport and Economic Assessment
- Part 5 - Assessment Summary
- Part 6 - Appendices

Volume 2: Engineering Drawings

Volume 3: Environmental Figures

1.11.5 This report can be viewed on the Transport Scotland website (www.transport.gov.scot/projects/a9-dualling-perth-to-inverness/a9-pass-of-birnam-to-tay-crossing/).

1.12 Stakeholders

1.12.1 There are numerous stakeholders with interests in the locality of the Pass of Birnam to Tay Crossing project. Key Statutory Bodies that have been consulted as part of the assessment are listed below.

- HES;
- Network Rail;
- PKC;
- Public Utility Companies;
- SEPA;
- NatureScot; and
- Transport Scotland (Roads).

1.12.2 In addition to the above Statutory Bodies there are numerous other parties with interests in the scheme, many of whom have been consulted, including:

- Accessibility Groups and Organisations;
- Birnam to Ballinluig A9 Community Group;

- Bus Operating Companies;
- Dunkeld & Birnam Community Council;
- Emergency Services;
- Forestry and Land Scotland;
- Freight Transport Association;
- Landowners;
- Local Land, Property and Business Owners;
- Local Communities;
- NTS;
- WCH Groups and Organisations;
- Road Haulage Association; and
- Scottish Forestry.

2. Existing Conditions

2.1 Introduction

2.1.1 A review has been undertaken in relation to the existing engineering, environmental and traffic conditions along the A9 for the Pass of Birnam to Tay Crossing project. These existing conditions are considered within this DMRB Stage 2 Scheme Assessment Report to provide a background and understanding of how the proposed dualling may impact, be influenced by, or improve these conditions. The existing engineering and traffic conditions are presented in this part of the report, with the environmental conditions presented in Volume 1, Part 3 - Environmental Assessment.

2.2 Scheme Location and Environment

Location

2.2.1 The Pass of Birnam to Tay Crossing project commences at the northern extent of the current section of existing dual carriageway that extends from Perth to the Pass of Birnam. It extends approximately 8.4 kilometres, bypassing the towns of Birnam, Little Dunkeld and Dunkeld to the east, and Inver and The Hermitage to the west. The tie-in point with the following scheme, Tay Crossing to Ballinluig, is approximately 0.75 kilometres north of the current River Tay crossing. The project location is shown on Drawing A9P02-JAC-GEN-X_ZZZZZ_XX-FG-RD-0001, which is contained in Volume 2: Engineering Drawings.

Topography

2.2.2 At Dunkeld and Birnam the A9 passes through the steep sided, narrow River Tay valley, with the topography rising steeply to the west and with the floodplain associated with the River Tay to the east.

2.2.3 At the southern extent the existing A9 is surrounded by Ancient Woodland that forms part of the Murthly Castle Gardens and Designed Landscape (GDL) with the undulating topography of Birnam Wood, Rochanroy Wood and Ring Wood to the immediate west. Birnam Hill is north-west of Birnam Wood and is approximately 400 metres Above Ordnance Datum (AOD). To the east of the A9, the floodplain opens out and the settlements of Little Dunkeld and Birnam are located on the west bank of the River Tay, which is a Special Area of Conservation (SAC). A further small settlement, Inver, is located to the immediate west of the A9 between the River Braan and River Tay on a low-lying area of land. The Hermitage, which is an NTS protected site is also to the west of the A9 and offers attractive woodland walks. The A9 generally follows the alignment of the River Tay as it continues north, beneath steep forested slopes on the west that lead to the summits of Creag Bheag (420 metres AOD) and Creag an Eunaich (459 metres AOD). Beyond the river, to the east, the topography rises to the summit of Craig-y-Barns Hill (337 metres AOD). Beyond the River Tay crossing the topography rises to the immediate east of the A9, with vegetated slopes. Figure 2.1 shows a view of the typical topography between the Pass of Birnam and Tay Crossing.

2.2.4 A full description of the topography and landscape of the existing A9 between the Pass of Birnam and Tay Crossing is provided in Volume 1, Part 3 - Environmental Assessment, Chapter 12 (Landscape).

Figure 2.1: Typical Topography between the Pass of Birnam and Tay Crossing

Climate

2.2.5 Records indicate that the climate within the project extents is typical of the central highlands of Scotland. The average annual temperature in Dunkeld is approximately 8.1°C, with a monthly temperature range between -1°C and 19°C. The warmest months are July and August and the coldest January and December. Monthly rainfall is between 44 millimetres and 87 millimetres with January the wettest month. Frost is prominent during winter months, peaking in January and December, which has an average of 13 days of air frost. The month of May has the most hours of sunshine, 171 hours, and December the least, 34 hours. (*Sources: Climate-Data.org and The Gazetteer for Scotland*)

2.2.6 Highland sections centrally located between Perth and Inverness are particularly affected by winter weather. For traveller safety, road closures are implemented through the use of snow gates at or near the following locations, which correspond to high points along the route.

- Blair Atholl, north of the Pass of Killiecrankie;
- Trinafour/Dalnacardoch Estate, south of the Pass of Drumochter;
- Dalwhinnie, north of the Pass of Drumochter; and
- Newtonmore, within Cairngorm Mountains, north of the Pass of Drumochter.

2.2.7 Whilst these existing snow gates are outside the extents of this section, they will be taken into consideration in the overall context of traffic movements and general access.

Land Use

2.2.8 Land use in the locality of the existing A9 between the Pass of Birnam and Tay Crossing is varied and includes the following general categories:

- Local communities;
- Residential and business property;
- Community assets, including those provided by public authorities and commercial organisations for use by the whole community (e.g., doctors' surgeries, schools, hospitals, post offices, churches and general stores);
- Community land and other areas identified as open space within the Perth & Kinross Local Development Plan (LDP) 2, which provide an established public recreational resource (e.g., playing fields, country parks and woodlands);
- Land allocated for development through the local development plan and/or planning applications;

- Commercial agricultural, forestry and sporting land interests (e.g., shooting/stalking or fishing for commercial purposes); and
- WCH Routes - National Cycle Network (NCN) Route 77, Regional Cycle Network (RCN) Route 83, Core Paths and Rights of Way.

2.2.9 The main communities in the locality of the existing A9 between the Pass of Birnam and Tay Crossing are:

- Birnam;
- Little Dunkeld;
- Dunkeld; and
- Inver.

2.2.10 Most residential properties are located within these communities, with the remainder made up of scattered rural dwellings, including a number of farmhouses and cottages. Refer to Drawings A9P02-JAC-GEN-X_ZZZZZ_ZZ-FG-RD-0001 and A9P02-JAC-GEN-X_ZZZZZ_ZZ-FG-RD-0002, included in Volume 2: Engineering Drawings to identify the location of these communities relative to the existing A9. These drawings should also be used as a reference for other features identified within this section of the report.

2.2.11 Business property in the locality of the existing A9 within the Pass of Birnam and Tay Crossing project includes:

- Caravan Sites;
- Garages;
- Guest Houses and Hotels;
- Nurseries;
- Restaurants; and
- Shops.

2.2.12 A number of business properties, primarily focussed on local services, are present within the well-established communities of Dunkeld and Birnam. A more comprehensive list is provided in Appendix A8.1: Business Properties, included in Volume 1, Part 6 - Appendices.

2.2.13 Business property also includes an industrial estate and yards in Birnam which house a variety of businesses that operate both locally and more widely across Scotland. Business properties at Inver includes Forestry Land Scotland and Invermill Farm Caravan Park.

2.2.14 Community facilities within the project extents include:

- Birnam Arts & Conference Centre (art centre, community centre, library, conference centre and café);
- Birnam Post Office;
- Children's play areas;
- Churches (St. Mary's Episcopal Church and Little Dunkeld Kirk);
- Craigvinean Surgery;
- Dunkeld & Birnam Recreation Club (outdoor recreation centre comprising all-weather tennis courts, bowling green and a grass football pitch);
- Dunkeld & Birnam Station;

- Dunkeld Cathedral;
- Dunkeld Fire Station;
- The Hermitage (NTS visitor attraction); and
- The Royal School of Dunkeld (nursery and primary school and Community Education/Adult Education base).

2.2.15 Agricultural, forestry and sporting interests in the Pass of Birnam to Tay Crossing project extents include:

- Forestry and Land Scotland;
- Atholl Estate;
- Murthly Estate;
- Invermill Farm
- Inchmagrannachan Farm;
- Land at Ladywell;
- Land at Ladywell Bridge;
- Ladywell Farm;
- Dalmarnock Fishing Beat and Woodlands Cottage; and
- Dunkeld House Salmon Fishings.

2.2.16 A full description of the land uses in the locality of the existing A9 between the Pass of Birnam and Tay Crossing is provided in Volume 1, Part 3 - Environmental Assessment, Chapter 8 (Population - Land Use). The location of the communities referred to above are shown on Drawings A9P02-JAC-GEN-X_ZZZZZ_ZZ-FG-RD-0001 and A9P02-JAC-GEN-X_ZZZZZ_ZZ-FG-RD-0002, included in Volume 2: Engineering Drawings.

Environmental Constraints

2.2.17 A number of natural and man-made environmental constraints exist within the Pass of Birnam to Tay Crossing project extents. These include:

- Habitat identified on the Ancient Woodland Inventory;
- Conservation Areas;
- GDL;
- Listed Buildings;
- National Scenic Areas (NSAs); and
- SACs.

2.2.18 Further details on the existing environmental constraints are included in the various sections included in Volume 1, Part 3 - Environmental Assessment and are also shown in the associated environmental figures included in Volume 3: Environmental Figures.

Man-Made Features

2.2.19 A number of man-made engineering features exist within the Pass of Birnam to Tay Crossing project extents. Man-made engineering features with respect to the historic and current road network include:

- The route of the current A9, which was constructed in the 1970s;

- The local road network, which is operated and maintained by PKC. The main routes that interface with the A9 are the B898, B867, Perth Road, A923 and A822, which follows the route of General Wade's Old Military Road, originally constructed in the 18th Century; and
- Access tracks, many of which form direct junctions with the current A9, providing access to land adjacent to the road. In total, there are 13 direct accesses on the current A9.

2.2.20 Further man-made features that exist within the Pass of Birnam to Tay Crossing project include:

- The Highland Main Line railway, which is approximately 190 kilometres (118 miles) long, travelling through the Scottish Highlands. The route is predominantly single track through this area, with a short section of double track creating a passing loop at Dunkeld & Birnam Station. The Highland Main Line railway is in close proximity to the A9 at Birnam and Dunkeld and passes under the A9 carriageway approximately 1.5 kilometres west of the existing A822 junction, and immediately south of the River Tay crossing. There are no trunk road or local road level crossings of the railway within the project extents;
- Dunkeld & Birnam Station is located immediately to the west of the A9. The station is located on a section of passing loop and has platforms in both directions. Presently vehicular access to the station is direct from the A9. The station building is Category A Listed, and the listing includes the pedestrian footbridge. The signal box at the station is Category B Listed;
- There are a number of residential areas in the locality of the existing A9, including Birnam, Little Dunkeld, Dunkeld and Inver that use the local road network to access the A9. Birnam, Little Dunkeld and Dunkeld can be accessed using either the existing left/right staggered priority junction with the B867 and Perth Road at Birnam, or the existing right/left staggered priority junction with the A923 and A822 at Dunkeld. Inver can be accessed via the A822;
- There are several business properties in the locality of the existing A9 between the Pass of Birnam and Tay Crossing, which are accessed via the A9 and the existing local road network. Brodie's Timber, Forestry and Land Scotland (Tay Forest District Office) and Foster Contracting are accessed via the A822 and the unclassified road to Inver. The Birnam Industrial Estate is located immediately east of the A9 in the locality of Dunkeld & Birnam Station and comprises of several business units. One of these units is under Transport Scotland ownership and is currently rented by a local bakery (Aran Bakery). The other units house a joinery business (Merriman Joinery), a ski business (Lonely Mountain Skis), Dunkeld Plumbers and T & M Developments. This industrial estate is in Birnam and is accessed via Perth Road utilising the junctions at Birnam or Dunkeld; and
- Ladywell Landfill site, which is monitored by PKC, is located immediately to the west of the Highland Main Line railway and is approximately 380 metres north-west of Dunkeld & Birnam Station.

Watercourses

2.2.21 The Pass of Birnam to Tay Crossing project crosses a number of prominent watercourses, including:

- Inchewan Burn;
- The River Braan; and
- The River Tay.

2.2.22 In addition, there are eleven existing drainage culverts that cross the A9, which are detailed in Drawings A9P02-JAC-GEN-X_ZZZZZ_ZZ-FG-RD-0001 and A9P02-JAC-GEN-X_ZZZZZ_ZZ-FG-RD-0002, included in Volume 2: Engineering Drawings.

2.2.23 A more detailed description of the prominent watercourses referred to above is included in Volume 1, Part 2 - Engineering Assessment and a more detailed description of all watercourses, including minor watercourses is included in Volume 1, Part 3 - Environmental Assessment, Chapter 10 (Road Drainage and the Water Environment). The location of the prominent watercourses referred to above are shown

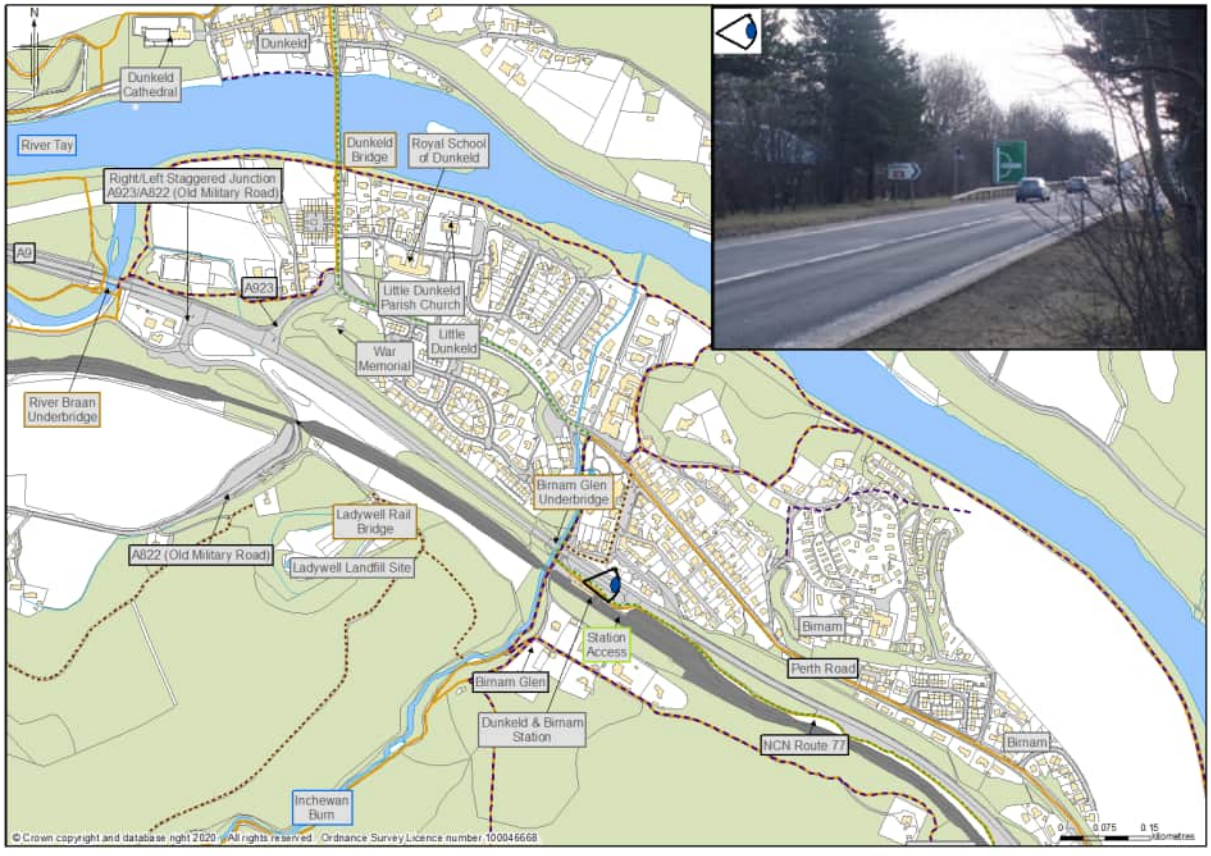
on Drawings A9P02-JAC-GEN-X_ZZZZZ_ZZ-FG-RD-0001 and A9P02-JAC-GEN-X_ZZZZZ_ZZ-FG-RD-0002, included in Volume 2: Engineering Drawings.

2.3 Existing Road Network

Description of Existing A9 Trunk Road

2.3.1 The existing A9 between the Pass of Birnam and Tay Crossing was constructed in the 1970s as two separate bypass projects. The section is 8.4 kilometres long and as-built drawings from the original construction confirm the single carriageway cross-section is 7.3 metres wide with 0.7 metre wide nearside hardstrips. However, the carriageway is wider at places to provide ghost islands, diverge tapers and lay-bys. Verge widths vary throughout to accommodate forward visibility, traffic signs, safety barriers and speed cameras where appropriate. The current carriageway is kerbed. Figure 2.2 shows the existing A9 carriageway.

Figure 2.2: Existing A9 Trunk Road



2.3.2 The following description of the existing A9 should be read in conjunction with Drawings A9P02-JAC-GEN-X_ZZZZZ_ZZ-FG-RD-0001 and A9P02-JAC-GEN-X_ZZZZZ_ZZ-FG-RD-0002, included in Volume 2: Engineering Drawings.

2.3.3 Travelling north, the section of the A9 within the project extents commences at the end of the existing dual carriageway section at the Pass of Birnam on a right-hand horizontal curve. There is a priority junction on the southbound carriageway on the inside of the right-hand curve, which provides access to Murthly Estate. The junction incorporates a short length of left-hand diverging lane loop for right turns and a nearside auxiliary lane on the southbound approach. A Type B lay-by, in accordance with the DMRB (CD169: The design of lay-bys, maintenance hardstandings, rest areas, service areas and observation platforms), is located on the northbound carriageway towards the northern extent of the right-hand horizontal curve.

2.3.4 Continuing north, the alignment transitions to a left-hand bend, which includes a Type B lay-by in the southbound carriageway, and then on to a straight section where there is a left/right staggered priority junction. This junction links to the B867 to Bankfoot on the west and Perth Road, which leads to Birnam, Little Dunkeld and Dunkeld, to the east. The junctions incorporate diverge tapers and ghost islands to facilitate turning traffic. Merge tapers are not provided.

2.3.5 Immediately north of the junction, the A9 passes through a left-hand horizontal curve and the alignment is parallel and in close proximity to the Highland Main Line railway to the west and residential properties to the east. Following the left-hand curve is a right-hand curve and then a straight as the A9 passes Dunkeld & Birnam Station, which is on the west. A priority junction on the northbound carriageway provides access to the station. The junction incorporates a nearside auxiliary lane on the northbound approach but no ghost island for right turning traffic or merge taper for traffic joining the A9. Directly north of the station, the A9 crosses Birnam Glen and the Inchewan Burn on an underbridge. It should be noted that sub-standard headroom clearance of approximately 4.5 metres is provided on the underbridge, limiting the size of vehicles that can travel along Birnam Glen Road. A headroom clearance of 5.3 metres is required to be in accordance with the DMRB (CD127: Cross-sections and headrooms).

2.3.6 Continuing north, the A9 is in cutting with the Highland Main Line railway to the west and residential properties of Stell Park Road, Telford Gardens and King Duncan's Place elevated to the east. The A9 enters a left-hand horizontal curve and there is a right/left staggered priority junction. The junction is with the A923 to the east, providing access to Birnam, Little Dunkeld and Dunkeld, and the A822 (Old Military Road) to the west, which provides a route to Crieff and Crianlarich. The junctions incorporate diverge tapers and ghost islands to facilitate turning traffic with no merge tapers. The A822 (Old Military Road) passes underneath the Highland Main Line railway via an existing masonry arch bridge structure that has sub-standard headroom clearance of approximately 4.7 metres. Access to Inver is via an unclassified side road that forms a simple priority junction with the A822 (Old Military Road) close to the junction with the A9.

2.3.7 The A9 crosses the River Braan watercourse via an underbridge and approaches Inver, which is on the west of the carriageway, on a left-hand horizontal curve. The River Tay SAC is on the immediate east and Type B lay-bys are provided on both the northbound and southbound carriageways. Two short sections of retaining wall have been constructed on opposite sides of the A9 at Inver to avoid impacting adjacent residential properties. A priority junction is located on the southbound carriageway to access the property known as Auchlou, which is under Transport Scotland ownership, on the east of the A9. This access is immediately north of a bus lay-by. A bus lay-by is also provided on the northbound carriageway in this location.

2.3.8 The alignment continues north on a series of large radii reverse curves as it passes The Hermitage on the west. Access to The Hermitage is via a priority junction on the northbound carriageway, which includes a nearside auxiliary lane on the northbound approach and a ghost island to facilitate right turning traffic from the southbound carriageway. No merge taper is included. Two minor accesses are present on the southbound carriageway to access land between the A9 and the River Tay.

2.3.9 Approaching the River Tay crossing, the A9 passes through a right-hand compound curve, comprising of three separate radii. Dense woodland lines the route on its west side and the Highland Main Line railway, which passes beneath the A9 at the beginning of the curve, lies to the east. There are a number of minor accesses on the A9, providing access to adjacent land. A Type B lay-by is provided on the northbound carriageway and a Type A lay-by on the southbound carriageway. Immediately south of the River Tay crossing, the A9 transitions on to a straight and there is a priority junction on the northbound carriageway with the B898, which provides a route to Dalguise, Kinnaird and Balnaguard. This junction incorporates a diverge taper and is located close to where the Highland Main Line railway passes below the A9. While a ghost island is not provided to accommodate southbound right-turning traffic, there is a central median, approximately 1 metre wide at this location. There is no merge taper provided. The

A9 is on a straight as it crosses the River Tay and continues on to a left-hand curve as it approaches the tie-in point with Project 3: Tay Crossing to Ballinluig.

2.3.10 The Pass of Birnam to Tay Crossing section is subject to the national speed limit, which is 60mph for cars and motorbikes and 50mph for buses, coaches and minibuses. For goods vehicles, the speed limit is either 40mph or 50mph dependant on the maximum laden weight. However, on single carriageway sections of the A9, HGVs are subject to a speed limit of 50mph, which was introduced on 28th October 2014. Prior to this date, HGVs were limited to a maximum speed of 40mph.

2.3.11 Along the length of the A9 between Dunblane and Inverness average speed cameras have been implemented and have been operational since 28 October 2014. Average speed cameras record the time a vehicle enters and leaves a particular section of the A9. The distance between the cameras is fixed, which then allows for the average speed of the vehicle to be calculated and recorded. There is one average speed camera within the Pass of Birnam to Tay Crossing section of the A9, located south of the junction with the B867 on the northbound verge.

Description of Existing Local Road Network

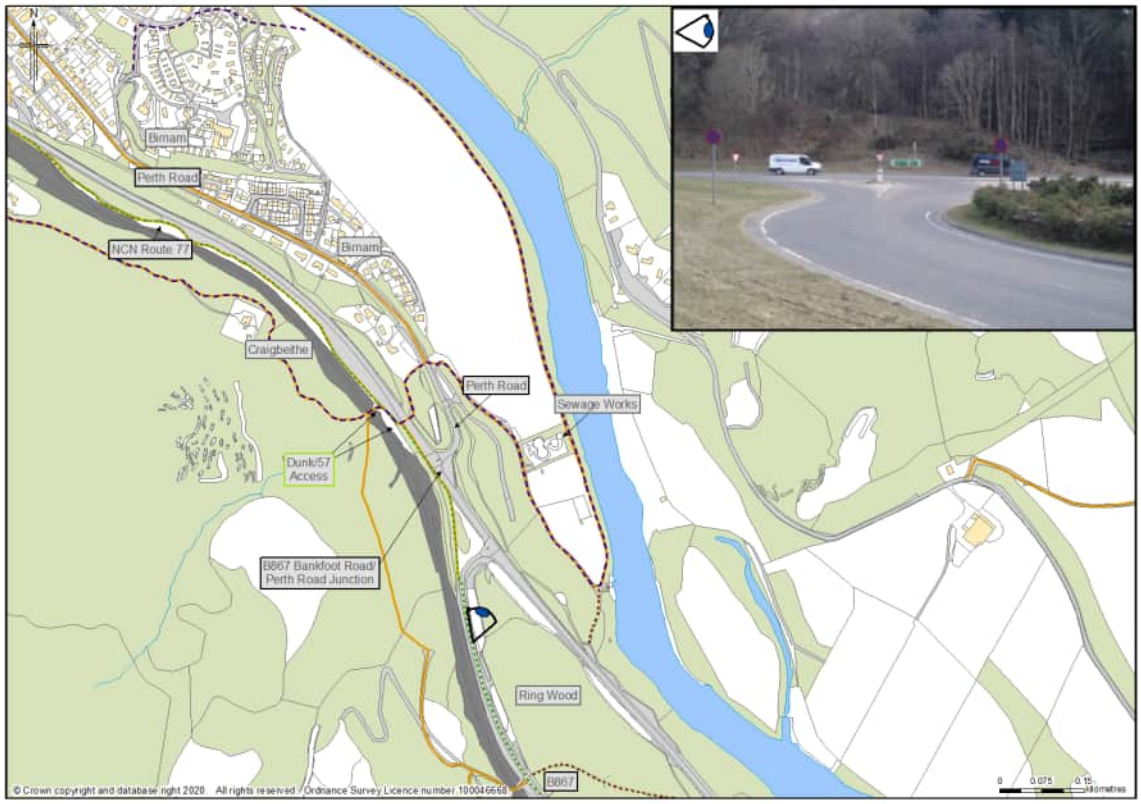
B867 (Bankfoot to Birnam)

2.3.12 The B867 is a single carriageway road generally 7.3 metres wide and commences at the junction with the A9 at Birnam. The B867 rises steeply from the A9 heading south-east, parallel to the A9, before turning south towards the villages of Waterloo and Bankfoot. South of Bankfoot the B867 re-joins the A9 via a left-in left-out junction on the northbound carriageway.

2.3.13 The edge of the carriageway is kerbed in the vicinity of the junction with the A9 and the width of the grass verges is variable. There are no footways present at this point, however NCN Route 77 departs its on-road route along the B867 to join a segregated cycle path in advance of the junction with the A9. The southern section of the route from its junction with the A9 to a point just north of the village of Waterloo has a footway along at least one side of the road. There is no lighting present in the vicinity of the junction with the A9. A restricted speed limit of 30mph is signed through Bankfoot but the remainder of the route is to the national speed limit of 60mph.

2.3.14 Figure 2.3 shows the existing B867 at its junction with the A9 and the route of the B867 is shown on Drawing A9P02-JAC-GEN-X_ZZZZZ_ZZ-FG-RD-0001, included in Volume 2: Engineering Drawings.

Figure 2.3: B867 (Bankfoot to Birnam)



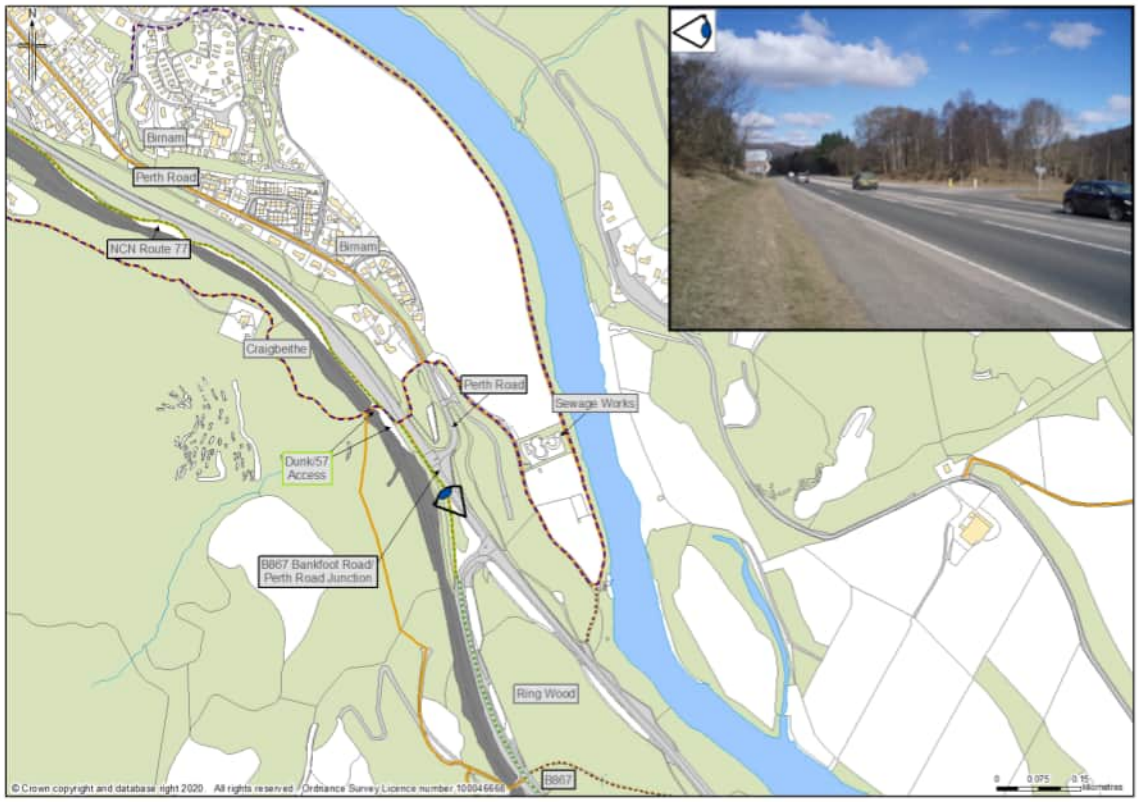
Perth Road (Birnam to Dunkeld)

2.3.15 Perth Road is a single carriageway road generally 7.3 metres wide and commences at the at-grade major/minor junction with the A9 at Birnam. Perth Road descends west from the A9 heading into Birnam, parallel to the A9, and continues in this direction until its junction with the A923 at Dunkeld.

2.3.16 The edge of the carriageway is kerbed for the majority of the road from the junction with the A9 to the end of the road at its junction with the A923. The road has a footway along at least one side of the road for the majority of its extents, with footways to both sides through the main built up area in Birnam. There is no lighting present in the vicinity of the junction with the A9 but a restricted speed limit of 30mph is signed on entry into Birnam and street lighting is provided along the remainder of the road through the town.

2.3.17 Figure 2.4 shows the existing Perth Road junction with the A9 and the route of Perth Road is shown on Drawing A9P02-JAC-GEN-X_ZZZZZ_ZZ-FG-RD-0001, included in Volume 2: Engineering Drawings.

Figure 2.4: Perth Road (Birnam to Dunkeld)



A923 (Dunkeld to Blairgowrie)

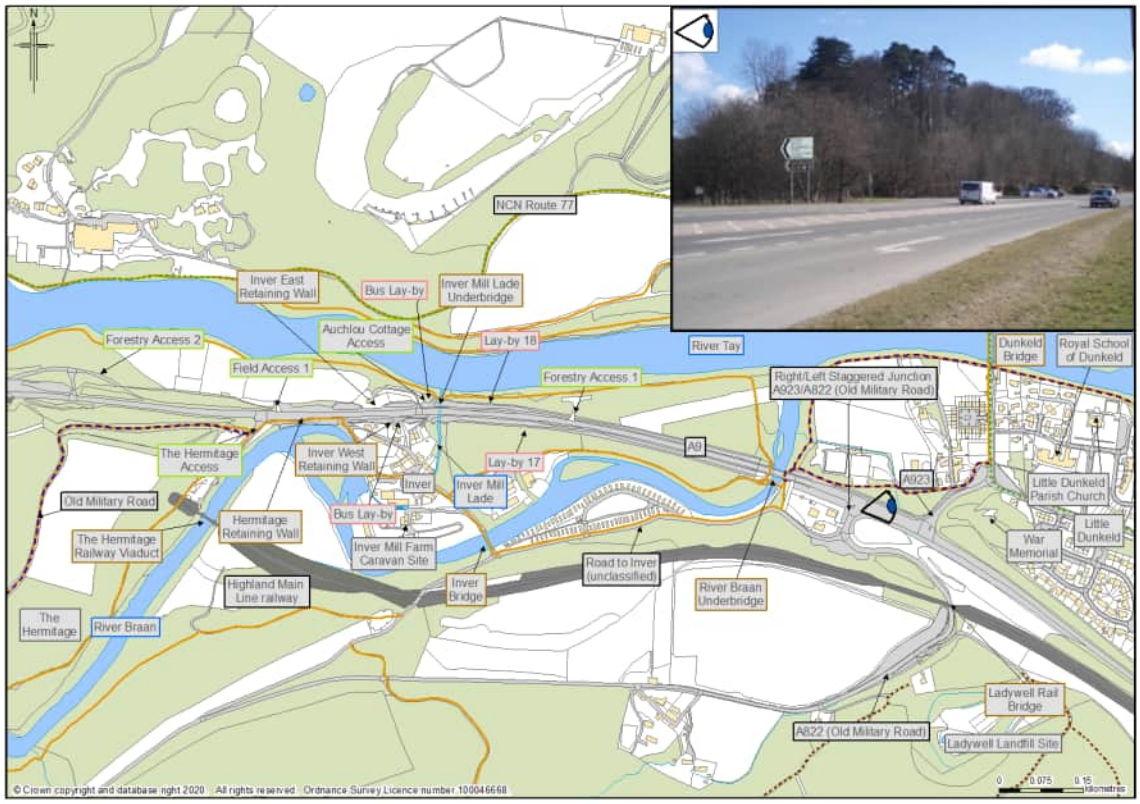
2.3.18 The A923 is a single carriageway road generally 7.3 metres wide and commences at the junction with the A9 at Dunkeld. The A923 descends from the A9 in a northerly direction, crossing the River Tay via the Dunkeld Bridge before entering Dunkeld. The road then continues north through the centre of the town before turning east at a major/minor priority junction and continuing to Blairgowrie.

2.3.19 Beyond the project extents the A923 runs through the villages of Butterstone, Forneth and Achlader before reaching Blairgowrie.

2.3.20 The edge of the carriageway is kerbed in the vicinity of the junction with the A9 and the width of the grass verges is variable. Kerbing is continued along both sides of the road through the town of Dunkeld. Footways are provided on both sides of the road from the A923 junction with Perth Road through the town of Dunkeld. There is no lighting present in the vicinity of the junction with the A9. A restricted speed limit of 30mph is signed immediately east of the junction with the A9, which changes to a 20mph speed limit east of the junction with Perth Road. The 20mph speed limit is maintained through Dunkeld and returns to a 30mph limit towards the eastern extent. Outwith the extent of Dunkeld, a national speed limit of 60mph is in place.

2.3.21 Figure 2.5 shows the existing A923 at its junction with the A9 and the route of the A923 is shown on Drawing A9P02-JAC-GEN-X_ZZZZZ_ZZ-FG-RD-0001, included in Volume 2: Engineering Drawings.

Figure 2.5: A923 (Dunkeld to Blairgowrie)



A822 (Dunkeld to Crieff)

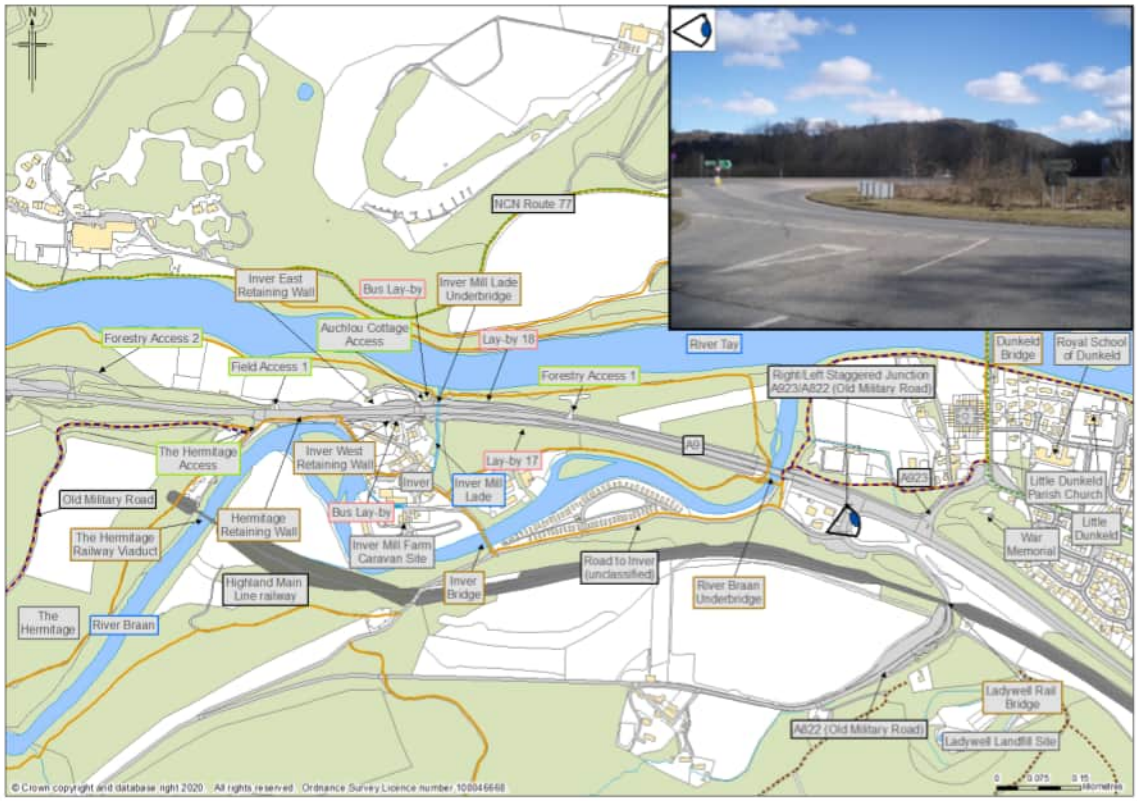
2.3.22 The A822 is a single carriageway road generally 7.3 metres wide and commences at the junction with the A9 at Dunkeld. The A822 joins the A9 at its major/minor priority junction and stays relatively level to provide a junction with the unclassified road to Inver. West of this junction the alignment rises from the A9 and crosses beneath the Highland Main Line railway. The A822 continues to rise as it heads west until it reaches a junction with the A826, where it turns in a southern direction towards Crieff.

2.3.23 Beyond the project extents the A822 travels through a number of villages including Trochry, Milton, Amulree and Newton before reaching Crieff.

2.3.24 The edge of the carriageway is kerbed in the vicinity of the junction with the A9 and the width of the grass verges is variable. Kerbing is continued along both sides of the road up to the railway bridge. No footways are provided along the A822 in the vicinity of the A9. There is no lighting present in the vicinity of the junction with the A9.

2.3.25 Figure 2.6 shows the existing A822 at its junction with the A9 and the route of the A822 is shown on Drawing A9P02-JAC-GEN-X_ZZZZZ_ZZ-FG-RD-0001, included in Volume 2: Engineering Drawings.

Figure 2.6: A822 (Dunkeld to Crieff)



B898 (Dalguise to Grandtully)

2.3.26 The B898 is a single carriageway road generally 7.3 metres wide and commences at the junction with the A9 to the immediate south of the River Tay crossing. The B898 travels in a north-west direction from its major/minor priority junction with the A9 before turning west at Logierait, where the B898 continues towards Grandtully.

2.3.27 Beyond the project extents the B898 travels through a number of villages including Dalguise, Kincraigie and Balnaguard before reaching Grandtully.

2.3.28 The edge of the carriageway is kerbed in the vicinity of the junction with the A9 and the width of the grass verges is variable. Kerbing is continued along both sides of the road up to the junction into the Craigvinean Forest. A footway is provided along the B898 for a short distance in the vicinity of the A9 up to the access to the forest. There is no lighting present in the vicinity of the junction with the A9.

2.3.29 Figure 2.7 shows the existing B898 at its junction with the A9 and the route of the B898 is shown on Drawing A9P02-JAC-GEN-X_ZZZZZ_ZZ-FG-RD-0002, included in Volume 2: Engineering Drawings.

Figure 2.7: B898 (Dalguise to Grandtully)

Description of Existing Junctions

B867/Perth Road Junction

2.3.30 The B867 and Perth Road junctions connect to the A9 at a left/right staggered priority junction, allowing for full cross-carriageway movements in both directions. The junction consists of a ghost island layout on the A9 with nearside diverge lanes. There are no merge tapers included. Small physical approach islands are provided on the B867 and Perth Road at the junction with keep left illuminated bollards present on the island. The junction is un-lit.

2.3.31 Figure 2.3 shows the existing at-grade junction layout looking north from the B867 approach to the A9. Figure 2.4 shows the existing Perth Road junction layout from the eastern approach from the A9. The existing B867 and Perth Road junctions are shown on Drawing A9P02-JAC-GEN-X_ZZZZZ_ZZ-FG-RD-0001, included in Volume 2: Engineering Drawings.

A822/A923 Junction

2.3.32 The A822 and A923 junctions connect to the A9 at a right/left staggered priority junction, allowing for full cross-carriageway movements in both directions. The junction consists of a ghost island layout on the A9 with nearside diverge lanes. There are no merge tapers included. Small physical approach islands are provided on the A822 and A923 at the junction with keep left illuminated bollards present on the island. The junction is un-lit.

2.3.33 Figure 2.5 shows the existing at-grade junction layout looking north east from the A9 towards the A923 junction. Figure 2.6 shows the existing A822 junction layout with the A9 from the junction of the unclassified road to Inver with the A822. The existing A923 and A822 junctions are shown on Drawing A9P02-JAC-GEN-X_ZZZZZ_ZZ-FG-RD-0001, included in Volume 2: Engineering Drawings.

B898 Junction

2.3.34 The B898 junction is connected to the A9 via an at-grade priority junction allowing for full cross-carriageway movements at the junction. The junction does not have a ghost island layout on the A9 to provide segregation for right turning traffic from the southbound carriageway, however a central median, approximately 1 metre wide is present on the A9. A nearside diverge taper is included on the northbound carriageway. A merge taper is not provided. A small physical approach island is provided on the B898 at the junction with keep left illuminated bollards present. The junction is un-lit.

2.3.35 Figure 2.7 shows the existing at-grade junction layout from the B898 approach looking south along the A9. The existing B898 is shown on Drawing A9P02-JAC-GEN-X_ZZZZZ_ZZ-FG-RD-0002, included in Volume 2: Engineering Drawings.

Description of Existing Direct and Field Accesses

2.3.36 As part of the PES commission a strategy was developed to provide a consistent approach with regards to the provision of access to the A9 corridor. The strategy considers three tiers of roads.

- Tier 1 - A and B Class Roads;
- Tier 2 - C and Unclassified Roads; and
- Tier 3 - Private and Agricultural Access Roads.

2.3.37 Thirteen accesses within the project extents have been identified to be Tier 3. The locations of these accesses are shown on Drawings A9P02-JAC-GEN-X_ZZZZZ_ZZ-FG-RD-0001 and A9P02-JAC-GEN-X_ZZZZZ_ZZ-FG-RD-0002, included in Volume 2: Engineering Drawings. Each access is described in Table 2.1.

Table 2.1: Description of Existing Direct and Field Accesses

Access	Gated / Open	Surface Treatment	Description
Murthly Castle & Dalpowie Plantation Access	Gated	Surfaced	A nearside diverge auxiliary lane, approximately 45 metres long, is provided on the A9 southbound carriageway to accommodate left-turning traffic. No merge taper is included. A left-hand diverging lane loop, which allows right turning traffic to wait off the A9, and to make the crossing movement at right angles is provided on the northbound carriageway. The access is gated, kerbed and surfaced.
Dalpowie Plantation Access	Gated	Surfaced	Forestry access is provided to the rear of the left-hand diverging lane loop, which provides access to Murthly Castle & Dalpowie Plantation Access, on the northbound carriageway. The access is gated, kerbed and surfaced.
Station Access	Open	Surfaced	A nearside diverge auxiliary lane, approximately 70 metres long, is provided on the A9 northbound carriageway to accommodate left-turning traffic. No merge taper is included. No ghost island is provided to accommodate right-turning southbound traffic. The access is open, kerbed and surfaced.
Forestry Access 1	Gated	Surfaced	A direct access is provided on the southbound carriageway to access land and forestry adjacent to the A9. There are no diverge or merge tapers provided and no ghost island to accommodate right-turning northbound traffic. The access is gated and surfaced (in the immediate locality of the A9 junction).
Auchlou Cottage Access	Gated	Surfaced	A direct access is provided to Auchlou Cottage on the southbound carriageway. There are no diverge or merge tapers provided and no ghost island to accommodate right-turning northbound traffic. The access is immediately to the north of a bus lay-by. The access is gated, kerbed and surfaced.
Field Access 1	Gated	Surfaced	A direct access is provided on the southbound carriageway to access land adjacent to the A9. There are no diverge or merge tapers provided and no ghost island to accommodate right-turning northbound traffic. The access is gated, kerbed and surfaced. It should be noted that the access is within the ghost island development (hatched area) for The Hermitage.

Access	Gated / Open	Surface Treatment	Description
The Hermitage Access	Open	Surfaced	A nearside diverge auxiliary lane, approximately 75 metres long, is provided on the A9 northbound carriageway to accommodate left-turning traffic. No merge taper is included. A ghost island to facilitate right-turning traffic from the southbound carriageway is included. The access is open, kerbed and surfaced.
Forestry Access 2	Gated	Surfaced	A direct access is provided on the southbound carriageway to access forestry adjacent to the A9. There are no diverge or merge tapers provided and no ghost island to accommodate right-turning northbound traffic. The access is gated, kerbed and surfaced.
Forestry Access 3	Open	Surfaced	A direct access is provided on the southbound carriageway to access forestry adjacent to the A9. There are no diverge or merge tapers provided and no ghost island to accommodate right-turning northbound traffic. The access is open, kerbed and surfaced.
Forestry Access 4 (Tay Forest Park)	Gated	Surfaced	A direct access to the Tay Forest Park is provided on the northbound carriageway of the A9. There are no diverge or merge tapers provided and no ghost island to accommodate right-turning southbound traffic. The access is gated, kerbed and surfaced.
Forestry Access 5	Gated	Surfaced	A direct access is provided on the southbound carriageway to access forestry adjacent to the A9. There are no diverge or merge tapers provided and no ghost island to accommodate right-turning northbound traffic. The access is gated, kerbed and surfaced.
Forestry Access 6	Gated	Surfaced	A direct access is provided on the northbound carriageway to access forestry adjacent to the A9. There are no diverge or merge tapers provided and no ghost island to accommodate right-turning southbound traffic. The access is gated and surfaced.
Field and Utility Maintenance Access	Gated	Surfaced	A direct access is provided on the southbound carriageway to access land and forestry adjacent to the A9. There are no diverge or merge tapers provided and no ghost island to accommodate right-turning northbound traffic. The access is gated, kerbed and surfaced. It should be noted that the access is directly opposite the B898 junction. While a ghost island is not provided at the B898 junction, there is a central median, approximately 1 metre wide at this location.

Existing A9 Geometric Design Standards

2.3.38 An assessment has been undertaken of the geometry of the existing A9 single carriageway, utilising the 3-dimensional topographical survey data available. Horizontal and vertical geometry, as well as Stopping Sight Distance (SSD), has been considered in relation to the Desirable Minimum standards detailed in the DMRB (CD109: Highway link design) to identify sections that are not in compliance with current design standards for rural single carriageways. Details of this assessment is given below.

- Horizontal Alignment - A horizontal curve of radius 537 metres, which is one step below Desirable Minimum (720 metres) for a rural single carriageway with a 100 kilometres per hour (60mph) Design Speed, is included between The Hermitage and the River Tay crossing.

  The remainder of the horizontal alignment is compliant with relevant design standards.
- Vertical Alignment - The vertical alignment is compliant with relevant design standards.
- SSD - The SSD is below Desirable Minimum standards (215 metres forward visibility) at several locations on the existing A9. However, the reduction in SSD does not fall below 120 metres, which is two steps below Desirable Minimum. In accordance with the DMRB (CD109: Highway link design), this is a permitted Relaxation, as it is not on the immediate approach to a junction or combined with any other Relaxations.

Local Road Junction Geometric Design Standards

2.3.39 An assessment of local road junctions has been undertaken to determine their compliance with Desirable Minimum standards detailed in DMRB (CD123: 'Geometric design of at-grade priority and signal-controlled junctions'. This assessment has focused on the design criteria detailed below.

- Junction Corner Radii - Where no provision is made for large goods vehicles, it is recommended that the minimum corner radius at simple junctions is 10 metres in rural areas. This only applies however, where there are no nearside diverge tapers or lanes, or nearside merge tapers.

  Where a nearside diverge taper or lane is provided, the corner radius should be 40 metres. Where a merge taper is present, a corner radius of 30 metres should be provided.
- Visibility, Major Road - Drivers approaching a junction on the major road (A9 single carriageway) must have full visibility of the junction for a distance corresponding to the Desirable Minimum SSD for the major road (100 kilometres per hour/60mph).
- Visibility, Minor Road - Drivers approaching on the minor road must have full visibility of the junction for a distance corresponding to the Desirable Minimum SSD for the minor road.
- Junction Visibility (15 metres from Give Way line) - From a point 15 metres along the centreline of the minor road, from the give-way line, an approaching driver should be able to clearly view the junction form.

- Junction Visibility (9 metres from Give Way line) - From a point 9 metres along the centreline of the minor road, from the give-way line, an approaching driver should be able to clearly view a distance equivalent to the Desirable Minimum SSD for a distance of 215 metres (for a Design Speed of 100 kilometres per hour/60mph).

2.3.40 Table 2.2 summarises the junction's compliance with the relevant design standards.

Table 2.2: Summary of Existing Priority Junction Standards

Junction	Compliance with DMRB Standards					
	Junction Corner Radii		Visibility		Junction Visibility	
	Diverge	Merge	Major Road	Minor Road	15 metres from Give Way Line	9 metres from Give Way Line
B867	×	✓	✓	×	✓	✓
Perth Road	×	✓	✓	×	✓	✓
Dunkeld & Birnam Station	×	✓	✓	N/A	✓	×
A923	✓	✓	✓	✓	✓	✓
A822 (Old Military Road)	×	✓	✓	×	✓	✓
The Hermitage	×	✓	✓	N/A	✓	✓
B898	×	✓	✓	×	✓	✓

2.3.41 The immediate approaches to the junctions for the B867, Perth Road, A822 and B898 are all subject to the National Speed Limit (60mph) for a single carriageway. Given the rural nature of these roads, they are often lined with vegetation with nominal verge widths. As such, Desirable Minimum SSD is not readily available, resulting in Departures from requirements. Existing signs and road markings therefore highlight the road layout and presence of junctions. The A923 is subject to a 30mph speed limit in the locality. The junctions for Dunkeld & Birnam Station and The Hermitage are directly onto a car park area. As such, a check of approach visibility on the minor road is not appropriate.

Traffic Conditions

Existing Traffic Flows

2.3.42 Annual Average Daily Traffic (AADT) data on the A9 has been taken from the permanent Automatic Traffic Counter (ATC) sites maintained by Transport Scotland for the 24-hour period. These figures are shown in Table 2.3.

2.3.43 For the local road network, where no ATC data is available, the flows have been estimated by factoring the 12-hour junction turning counts, undertaken in November 2012, March 2013 and March 2015, using the average ratio of AADT to 12-hour weekday flows, derived from analysis of ATC data along the A9 between Perth and Inverness. These figures are also shown in Table 2.3.

2.3.44 All traffic flows in Table 2.3 have been rounded to two significant figures. This table includes location references which can be referenced against Drawings A9P02-JAC-GEN-X_ZZZZZ_ZZ-FG-RD-0001 and A9P02-JAC-GEN-X_ZZZZZ_ZZ-FG-RD-0002, included in Volume 2: Engineering Drawings.

Table 2.3: Traffic Count Data (two-way)

Location (including location reference)	Drawing Reference Location	AADT
A9 Mainline (South of the Junction with the A923)[1]	Ref T1	14,000
A9 Mainline (South of the Junction with the B898)[1]	Ref T2	13,000
Perth Road (Birnam)[2]	Ref T3	1,400
B867 (Bankfoot Road Junction)[3]	Ref T4	700
Dunkeld Station[4]	Ref T5	90
A923 (Dunkeld)[3]	Ref T6	2,800
A822 (Old Military Road)[3]	Ref T7	1,400
B898 (Dalguise)[3]	Ref T8	360

[1] Based on ATC data from Transport Scotland's Scottish Road Traffic Database (SRTDb)
[2] Based on Junction Turning Count (March 2013)
[3] Based on Junction Turning Count (November 2012)
[4] Based on Junction Turning Count (March 2015)

Traffic Accidents

2.3.45 Prior to October 2014, the accident rate on the A9 was lower than the national average. However, the accident severity was significantly more, with accidents on the A9 four times more likely to result in a fatality. A contributory factor to these statistics was excessive vehicle speeds, which led to the installation of the A9 Average Speed Camera System in October 2014. The national accident rates, severity splits and casualty splits against the local values for the A9 between Perth and Inverness prior to the introduction of average speed cameras is shown in Table 2.4 as derived from analysis of accidents between 1st January 2008 and 31st December 2013.

Table 2.4: Comparison of Accident Rates and Ratios

Accident Rate	National Average			A9 Perth to Inverness		
	0.2228 PIA/MVKm			0.0822 PIA/MVKm		
	Fatal	Serious	Slight	Fatal	Serious	Slight
Severity Split	3%	16%	81%	12%	22%	66%
Casualty Rate	0.04	0.22	1.35	0.20	0.42	1.60

2.3.46 The impacts of a safety intervention, such as speed cameras, is usually assessed over a period of three years from implementation but five years of data would be required to calculate a local accident rate for appraisal purposes. The A9 Safety Group published analysis of the impact of the Average Speed Camera System in March 2018 to detail the first three years of operation (November 2014 to October 2017). Compared to a baseline period of January 2011 to December 2013, analysis shows that between Perth and Inverness, introduction of average speed cameras has:

- Resulted in nine fewer deaths than the baseline period;
- Reduced the number of fatal casualties by over 40%;
- Reduced the number of fatal and serious casualties by over 32%;
- Reduced the number of total casualties by 31%;
- Reduced the number of fatal accidents by 20%; and

- Reduced the number of fatal and serious accidents by over 10%.

2.3.47 These statistics highlight a sustained improvement in driver behaviour and a trend of reduced collisions and casualties compared to baseline data.

2.3.48 The configuration and operating characteristics of the A9 continues to change. Construction work on Project 10: Kincraig to Dalraddy commenced in the Autumn of 2015 and opened to traffic in autumn 2017. Construction work on the A9 Dualling: Luncarty to Pass of Birnam project commenced in the Autumn of 2018 and opened to traffic in summer 2021. It is difficult to deduce if roadworks contributed to accidents and it is noted that post opening traffic for each section will be moving at a higher speed on a new and safer dual carriageway. In addition, various on-line GI contracts for other A9 dualling projects have also resulted in constantly changing travel conditions along the A9. For this reason, updated accident rates have not been calculated for the single carriageway sections of the A9.

2.3.49 Transport Scotland has recorded STATS19 data (accident, casualties and vehicle tables and personal injury accident data) for the period between 1st January 2015 and 31st December 2019. The location and severity of Personal Injury Accidents (PIAs) during the time-period referenced is shown on Drawings A9P02-JAC-VTR-X_ZZZZZ_ZZ-FG-TR-0001 and A9P02-JAC-VTR-X_ZZZZZ_ZZ-FG-TR-0002, included in Volume 2: Engineering Drawings.

2.3.50 Fatal accidents (identified as red dots on Drawings A9P02-JAC-VTR-X_ZZZZZ_ZZ-FG-TR-0001 and A9P02-JAC-VTR-X_ZZZZZ_ZZ-FG-TR-0002) are recorded where the level of injuries sustained cause death within 30 days of the accident. Serious accidents (identified as orange dots on Drawings A9P02-JAC-VTR-X_ZZZZZ_ZZ-FG-TR-0001 and A9P02-JAC-VTR-X_ZZZZZ_ZZ-FG-TR-0002) are recorded where a casualty is detained in hospital or sustains fractures, concussions, severe cuts or where death occurs 30 or more days after the accident. Slight accidents (identified as yellow dots on Drawings A9P02-JAC-VTR-X_ZZZZZ_ZZ-FG-TR-0001 and A9P02-JAC-VTR-X_ZZZZZ_ZZ-FG-TR-0002) are recorded when a casualty sustains a sprain, bruise, or slight cut.

2.3.51 In total, there were 13 accidents on this section of the A9 between January 2015 and December 2019. Of those 13 accidents, two were fatal, six serious and the remaining five slight in severity. Plotting the accident locations along the route, there is evidence to suggest that a number of these accidents occurred at existing junction locations. Six of these 13 accidents occurred at or near the right/left staggered priority junction with the A923 and A822 (Old Military Road), with a serious accident occurring at both the B867 and B898 junctions. Two accidents occurred near lay-by 17 to the east of Inver and may have been connected to vehicles entering or exiting the lay-by or the field access on the other side of the road. Just three of the 13 accidents are located more than 50 metres from a junction or lay-by. These 13 accidents involved a total of 30 vehicles and yielded a total of 36 casualties, with between one and six casualties per accident. Each accident involved two or three vehicles.

Road Pavement Condition

2.3.52 A desk study was undertaken to determine the pavement construction and pavement condition on the existing A9 between the Pass of Birnam and Tay Crossing. The information used in the desk study was obtained from Transport Scotland's Integrated Road Information System (IRIS), which is a database maintained by Transport Scotland for the purpose of logging and predicting the condition of the trunk road network in Scotland.

2.3.53 Analysis of the information obtained from IRIS indicates that for this section of the existing A9 between the Pass of Birnam and Tay Crossing, the majority of the pavement consists of bituminous material overlaying Cement Bound Material (CBM) with some sections comprising fully flexible construction. The existing pavement does not include low noise surfacing.

2.3.54 The residual pavement life of this section of the A9 between the Pass of Birnam and Tay Crossing has also been determined from IRIS. Inspection of the IRIS data shows that almost 10% of the pavement has a residual life of less than 5 years, 20% between 5 and 20 years residual life and 70% has a residual life of over 20 years remaining.

2.3.55 The estimated residual life is determined from deflectograph data and historical results have shown that it is not always reliable in predicting residual life within pavements consisting of bituminous material overlying CBM. It should be noted that the deflectograph survey used for this assessment was undertaken in May 2014. Prior to undertaking a detailed pavement design further detailed pavement analysis will be undertaken to determine the existing pavement condition.

Structures

2.3.56 There are 6 bridges, 2 major culverts, 9 minor culverts and 3 retaining walls on the existing A9 between the Pass of Birnam and Tay Crossing. These structures cross the Highland Main Line railway, a local road and watercourses, including the River Braan and River Tay. The locations of the existing bridges, culverts and retaining walls are shown on Drawings A9P02-JAC-GEN-X_ZZZZZ_ZZ-FG-RD-0001 and A9P02-JAC-GEN-X_ZZZZZ_ZZ-FG-RD-0002, included in Volume 2: Engineering Drawings. A summary of the existing bridges and culverts is given in the following section.

Bridges

2.3.57 A summary of the existing bridges is provided in Table 2.5. A more detailed description of each bridge follows this table.

Table 2.5: Existing Structures

Structure Reference	No. of Spans	Skew Span Length (m)	Skew Angle	Total Deck Length (m)	Total Deck Width (m)	Form of Construction
Birnam Glen Underbridge (A9 400) Structure crosses Birnam Glen (local road) and Inchewan Burn (watercourse).	2	1) 15.55m 2) 15.55m	5°	32.3m	13.35m	Precast, prestressed concrete 'T' beams with composite in-situ concrete infill
River Braan Underbridge (A9 410) Structure crosses the River Braan (watercourse).	1	29.5m	0°	30m	13.6m	Weathering steel Universal Beams composite with a reinforced concrete deck slab
Inver Mill Lade Underbridge (A9 420) Structure crosses Inver Mill Lade (watercourse).	1	3.5m (clear)	0° (A9 and mill lade cross at 5°)	4.4m	40.5m	Reinforced concrete box culvert

Structure Reference	No. of Spans	Skew Span Length (m)	Skew Angle	Total Deck Length (m)	Total Deck Width (m)	Form of Construction
Inver Rail Tunnel (A9 430) Structure crosses the Highland Main Line railway.	1	10.3m	34.5° (A9 and railway cross at approx. 64°)	11.4m	42.1m	Precast, prestressed concrete 'T' beams with composite in-situ concrete infill
Inch Rail Tunnel (A9 440) Structure crosses the Highland Main Line railway.	1	10.3m	0° (A9 and railway cross at approx. 70°)	11.2m	87.3m	Precast, prestressed concrete 'T' beams with composite in-situ concrete infill
River Tay Underbridge (A9 450) Structure crosses the River Tay (watercourse).	3	1) 69.5m 2) 87.0m 3) 69.5m	0°	226.3m	13.4m	Continuous steel plate girders composite with a reinforced concrete deck slab

Birnam Glen Underbridge (A9 400)

2.3.58 The Birnam Glen Underbridge, located immediately north of Dunkeld & Birnam Station, carries the existing A9 carriageway over Birnam Glen and the Inchewan Burn. It was constructed around 1977 and is a two-span structure with the superstructure comprising inverted precast, prestressed concrete 'T' beams with composite in-situ concrete infill. The intermediate support is a reinforced concrete leaf pier on spread footings and the end supports comprise a full height reinforced concrete counterfort abutment on spread footings at the north end and a reinforced concrete bank seat abutment on spread footings at the south end. The bridge has a skew of approximately 5°, two skew spans of 15.55 metres and an overall skew deck length of approximately 32.3 metres. The deck is 13.35 metres wide and includes raised verges at each edge. Steel P2 parapets are mounted on plinth upstands at the rear of the verges.

River Braan Underbridge (A9 410)

2.3.59 The River Braan Underbridge, located north of the junction with the A822 (Old Military Road), carries the existing A9 carriageway over the River Braan and local footpaths. It was constructed around 1977 and is a single span structure with the superstructure comprising weathering steel Universal Beams composite with a reinforced concrete deck slab. The end supports are full height reinforced concrete cantilever abutments on spread footings. The bridge is square and has a span of 29.5 metres. The deck is 13.6 metres wide and includes raised verges at each edge. Aluminium P2 parapets are mounted on plinth upstands at the rear of the verges.

Inver Mill Lade Underbridge (A9 420)

2.3.60 The Inver Mill Lade Underbridge, located approximately 0.8 kilometres north of Dunkeld, carries the existing A9 carriageway over a small watercourse. It was constructed around 1977 and is a single span reinforced concrete box culvert with reinforced concrete wingwalls and scour protection at the inlet

and outlet. The culvert has a clear span of 3.5 metres and minimum headroom of 1.7 metres. The highway and watercourse cross at a skew of approximately 5° but the culvert is right-spanning with an overall length of 40.5 metres. Corrugated steel tensioned safety barriers are provided in the verges.

Inver Rail Tunnel (A9 430)

2.3.61 The Inver Rail Tunnel, located approximately 1.6 kilometres north of Dunkeld, carries the existing A9 carriageway over the Highland Main Line railway. It was constructed around 1977 and is a single span structure with the superstructure comprising inverted precast, prestressed concrete 'T' beams composite with in-situ concrete infill. The end supports are full height reinforced concrete cantilever abutments on spread footings (east abutment) and bored piles (west abutment). The bridge deck is trapezoidal in plan and has a skew of approximately 34.5°. The carriageway crosses the railway at a skew of approximately 64°, leading to large redundant areas on the deck outwith the carriageway. The skew span of the deck is approximately 10.3 metres and the deck width is approximately 42.1 metres.

2.3.62 The minimum headroom to the railway below is 4.86 metres. Aluminium parapets are present above each portal, with corrugated steel tensioned safety fencing provided in the verges in front of the redundant deck areas. The railway is single track at this location.

Inch Rail Tunnel (A9 440)

2.3.63 The Inch Rail Tunnel, located immediately south of the River Tay crossing, carries the existing A9 carriageway over the Highland Main Line railway. It was constructed around 1977 and is a single span structure. The superstructure comprises inverted precast, prestressed concrete 'T' beams composite with in-situ concrete infill. The end supports are full height reinforced concrete cantilever abutments on spread footings. The carriageway crosses the railway at a skew of approximately 70°, leading to large redundant areas on the deck outwith the carriageway. The bridge deck is curved in plan to follow the alignment of the railway below. The square span of the deck is 10.3 metres and the deck width is approximately 87.3 metres.

2.3.64 The minimum headroom to the railway below is 4.71 metres. Reinforced concrete parapets with masonry facing are present above each portal and return along the adjacent abutment walls. Corrugated steel tensioned safety fencing is provided in the verges across the front of the redundant deck areas. The railway is single track at this location.

River Tay Underbridge (A9 450)

2.3.65 The River Tay Underbridge carries the existing A9 carriageway over the River Tay. It was constructed around 1977 and is a three-span structure with the superstructure comprising continuous steel plate girders composite with a reinforced concrete deck slab. The intermediate supports are reinforced concrete columns with a capping beam, all on piled foundations and the end supports comprise reinforced concrete bank seat abutments on piled foundations. The bridge is square, and the span lengths are approximately 69.5 metres, 87 metres and 69.5 metres. The deck is 13.37 metres wide and includes raised verges 2.0 metres and 1.8 metres wide. Aluminium parapets are mounted on plinth upstands at the rear of the verges. The intermediate supports are located within the watercourse under normal flow conditions.

Culverts

2.3.66 Transport Scotland's IRIS database lists two culverts located on the existing A9 between Pass of Birnam and Tay Crossing. These are as follows:

- Inver Culvert (A9 430 C10) - Located north of the Inver Rail Tunnel

- Craigvinean Culvert (A9 430 C70) - Located north of Lay-by 19 on the northbound carriageway

2.3.67 The two culverts within this section were constructed around 1973 and 1977 respectively. They are single span structures of unknown construction. They carry the existing A9 over minor watercourses for catchment runoff under the existing A9 trunk road.

2.3.68 It is noted that Transport Scotland's IRIS database generally only includes larger culverts, and not smaller ones. A total of eleven culverts have been located on the A9 as part of hydrological studies site walkover, therefore an additional nine culverts are present over and above those contained in Transport Scotland's IRIS database. The locations of the existing culverts referred to above are shown on Drawings A9P02-JAC-GEN-X_ZZZZZ_ZZ-FG-RD-0001 and A9P02-JAC-GEN-X_ZZZZZ_ZZ-FG-RD-0002, included in Volume 2: Engineering Drawings.

2.3.69 The culverts recorded during the hydrological studies site walkover are shown in Table 2.6. The culvert and watercourse numbers referred to in the table are shown on the Environmental Figures included in Volume 3: Environmental Assessment.

Table 2.6: A9 Pass of Birnam to Tay Crossing Culverts

Culvert Number	Reference Point on Drawings A9P02-JAC-GEN-X_ZZZZZ_ZZ-FG-RD-0001 & A9P02-JAC-GEN-X_ZZZZZ_ZZ-FG-RD-0002	Watercourse Number	Type	Diameter (mm)
2	2000m south of B867 junction	2	Pipe	720
5	430m south of B867 junction	5	Pipe	600
5A	120m south of B867 junction	5A	Pipe	1000
7	250m north of B867 junction	7	Pipe	600
9	30m north of A923 junction	9	Pipe	600
12 (Inver Culvert)	890m north of A923 junction (Inver Mill Lade Underbridge)	12	Box Culvert	2000 x 3400
12A	100m north of Inver Rail Tunnel	12A	Pipe	1050
12B	820m north of Inver Rail Tunnel	12B	Pipe	1000
13 (Craigvinean Culvert)	430m south of B898 junction	13	Pipe	1000
16	620m north of B898 junction	16	Pipe	1020
18	960m north of B898 junction	18	Pipe	770

Retaining Walls

2.3.70 Transport Scotland's IRIS database lists three retaining walls located between Pass of Birnam and Tay Crossing. These are as follows:

- Inver West Retaining Wall (A9 420 W10);
- Inver East Retaining Wall (A9 420 W12); and
- Hermitage Access Retaining Wall (A9 420 W44).

2.3.71 The three retaining walls have lengths up to 65 metres and retained heights of up to 3.7 metres. They were constructed between 1977 and 1997. All are of reinforced concrete cantilever construction with spread footings.

2.3.72 The Inver West and Inver East retaining walls support adjacent properties and gardens above the level of the A9. Retaining walls were provided to limit the width of the existing A9 cutting and level of encroachment on adjacent properties.

2.3.73 The Hermitage Access retaining wall supports the A9 above the banks of the River Braan. A retaining wall was provided to limit the extents of the existing A9 embankment in this area and encroachment on the River Braan.

2.3.74 The locations of the existing retaining walls referred to above are shown on Drawings A9P02-JAC-GEN-X_ZZZZZ_ZZ-FG-RD-0001 and A9P02-JAC-GEN-X_ZZZZZ_ZZ-FG-RD-0002, included in Volume 2: Engineering Drawings.

Roadside Features

Lay-Bys

2.3.75 This section of A9 dualling has six lay-bys, three in the northbound direction and three in the southbound direction. In addition, a further two bus lay-bys are included in the scheme, one in the northbound direction and one in the southbound direction.

2.3.76 On the northbound carriageway, Type B lay-bys are provided north of the existing private access to Murthly Castle, to the south of Inver and to the north of The Hermitage. Type B lay-bys do not include a segregation island between the main carriageway and the lay-by itself and, in accordance with the DMRB (CD169: The design of lay-bys, maintenance hardstandings, rest areas, service areas and observation platforms), should only be utilised on single carriageways where the speed limit is less than 40mph. The northbound bus lay-by is in the locality of Inver.

2.3.77 On the southbound carriageway, Type B lay-bys are provided north of the existing private access to Murthly Castle and to the south of Inver. A Type A lay-by is provided south of the River Tay crossing. Type A lay-bys include a segregation island between the main carriageway and the lay-by and should be used on single carriageways where the speed limit is greater than 40mph and on dual carriageways. Type A lay-bys may be utilised on single carriageways with speed limit less than 40mph where high traffic flows are expected. The southbound bus lay-by is in the locality of Inver.

2.3.78 The locations of the existing lay-bys are shown on Drawings A9P02-JAC-GEN-X_ZZZZZ_ZZ-FG-RD-0001 and A9P02-JAC-GEN-X_ZZZZZ_ZZ-FG-RD-0002, included in Volume 2: Engineering Drawings. A summary of the existing lay-bys is shown in Table 2.7. A lay-by numbering system is present on the A9 between Perth and Inverness and is referenced in the table.

Table 2.7: Existing Lay-Bys

Lay-by Number	Approximate Location	Lay-by Type	Direction
15	Approximately 350 metres north of the existing private access to Murthly Castle	Type B	Northbound
16	Approximately 630 metres north of the existing private access to Murthly Castle	Type B	Southbound
17	Approximately 280 metres south of Inver	Type B	Northbound
18	Approximately 180 metres south of Inver	Type B	Southbound
19	Approximately 1.5 kilometre north of The Hermitage	Type B	Northbound
20	Approximately 350 metres south of the River Tay	Type A	Southbound

2.3.79 The DMRB (CD169: The design of lay-bys, maintenance hardstandings, rest areas, service areas and observation platforms) recommends that on single carriageways with greater than 8,000 AADT, lay-bys should be provided at between 2 kilometres and 5 kilometres intervals. As such, the existing lay-bys within this section of A9 dualling are in accordance with this standard.

Lighting

2.3.80 There is no lighting on the existing A9 carriageway or the associated junctions. The only notable presence of lighting in the locality is street lighting within Birnam, Little Dunkeld, Dunkeld and Inver and low-level pedestrian lighting provided at Dunkeld & Birnam Station. A full analysis of the extent to which the existing street lighting complies with current design standards has not been undertaken at this stage.

Road Restraint Systems (RRS')

2.3.81 RRS' are provided at various points along the existing A9 between Pass of Birnam and Tay Crossing to protect errant vehicles from colliding with roadside hazards. Table 2.8 shows the approximate locations of RRS', their approximate length and the associated hazard that the RRS' offers protection from.

Table 2.8: Existing RRS

Approximate Location	Verge	Approximate Length	Hazard
Existing Dual Carriageway Section	Northbound Verge	180m	Trees
Existing Dual Carriageway Section	Central Reserve	200m	Adjacent Dual Carriageway
Existing Dual Carriageway Section	Southbound Verge	250m	Embankment, Speed Camera Sign, Parking Sign, Trees
Existing Dual Carriageway Section	Southbound Verge	200m	Embankment, Trees
South of Murthly Estate Access	Southbound Verge	240m	Speed Limit Sign, Embankment, Trees
North of Murthly Estate Access	Southbound Verge	150m	Embankment, Trees, Dual Carriageway Sign
North of Murthly Estate Access	Southbound Verge	55m	Embankment, Trees
South of Birnam Junction	Northbound Verge	125m	Average Speed Camera and Average Speed Camera Sign
South of Birnam Junction	Southbound Verge	80m	Embankment, Lay-by
South of Birnam Junction	Northbound Verge	50m	Advance Direction Sign
South of Birnam Junction	Northbound Verge	540m	Tourist Information Signs, B867 Junction - Advance Direction Sign, Pedal Cycle Route Crossing Sign, Embankment
South of Birnam Junction	Southbound Verge	60m	Embankment, Trees
South of Birnam Junction	Southbound Verge	180m	Advance Direction Sign, Dual Carriageway Ahead Sign, Parking Sign
North of Birnam Junction	Northbound Verge	240m	Embankment
North of Birnam Junction	Southbound Verge	900m	Advance Direction Signs, Tourist Information Sign, Risk of Falling or Fallen Rock Sign, Embankment, Pedal Cycle Route Crossing Sign
North of Birnam Junction	Northbound Verge	585m	Cycle Path, Advance Direction Sign, Railway Station Sign

Approximate Location	Verge	Approximate Length	Hazard
South of Inchewan Burn/Birnam Glen Underbridge	Northbound Verge	35m	Bridge Structure
South of Inchewan Burn/Birnam Glen Underbridge	Southbound Verge	35m	Bridge Structure
North of Inchewan Burn/Birnam Glen Underbridge	Northbound Verge	35m	Bridge Structure
North of Inchewan Burn/Birnam Glen Underbridge	Southbound Verge	35m	Bridge Structure, Railway Station Sign
South of Dunkeld Junction	Northbound Verge	60m	Advance Direction Sign
North of Dunkeld Junction	Southbound Verge	450m	Service Sign, Tourist Information Sign, Bridge Structure
North of Dunkeld Junction	Northbound Verge	180m	Parking Sign, Bridge Structure,
North of Dunkeld Junction	Southbound Verge	65m	Advance Direction Sign
South of The Hermitage Junction	Northbound Verge	60m	Tourist Information Sign
South of The Hermitage Junction	Southbound Verge	55m	Advance Direction Sign
South of The Hermitage Junction	Northbound Verge	135m	Embankment
North of The Hermitage Junction	Southbound Verge	200m	Embankment, Trees
North of The Hermitage Junction	Northbound Verge	560m	Trees, Inver Rail Tunnel
North of The Hermitage Junction	Southbound Verge	440m	Embankment, Inver Rail Tunnel
South of Dalguise Junction	Northbound Verge	70m	Advance Direction Sign
South of Dalguise Junction	Southbound Verge	50m	Embankment
South of Dalguise Junction	Northbound Verge	75m	Embankment, Trees
South of Dalguise Junction	Southbound Verge	520m	Embankment, Inch Rail Tunnel, Highland Main Line railway
South of Dalguise Junction	Northbound Verge	280m	Embankment, Advance Direction Sign
South of Tay Crossing Structure	Northbound Verge	55m	Bridge Structure
South of Tay Crossing Structure	Southbound Verge	30m	Bridge Structure
North of Tay Crossing Structure	Northbound Verge	100m	Bridge Structure, Advance Direction Sign
North of Tay Crossing Structure	Southbound Verge	135m	Bridge Structure, Advance Direction Sign, Parking Sign
North of Tay Crossing Structure	Northbound Verge	95m	Embankment, Trees, Cycle Path

2.3.82 A full analysis of the extent to which the existing RRS comply with current design standards has not been undertaken at this stage.

Traffic Signs

2.3.83 Traffic signs on the existing A9 within the Pass of Birnam to Tay Crossing section are generally mounted in the verge and include advanced warning signs, direction signs, hazard warning signs, regulatory signs and tourist information signs. Existing signs are in English. Signs are generally mounted on standard posts, however, several have passively safe posts to avoid the need for further lengths of RRS. The tourist information signs direct travellers to local points of interest and tourist destinations. No permanent variable message signs are present in the locality.

Drainage

2.3.84 Road drainage on the existing A9 carriageway within the Pass of Birnam to Tay Crossing section of A9 dualling generally consists of kerbs and gullies to transport carriageway run-off, via carrier drains, to outfall into adjacent watercourses, including the River Tay and River Braan. No treatment or attenuation measures are included within the existing drainage network. Lengths of filter drains are present in verges to facilitate drainage run-off in the verge and from adjacent earthworks slopes.

2.3.85 Junctions and side roads, including Perth Road, the A923, A822 and B898, also incorporate kerbs and gullies, with carriageway run-off directed to local watercourses.

2.3.86 A full assessment of existing drainage arrangements has not been undertaken at this time and will be completed as part of the DMRB Stage 3 assessment.

Public Utilities

2.3.87 Public Utilities within the locality of the existing A9 have been identified by C2 Preliminary Inquiries information requested from utility companies in accordance with the New Roads and Street Works Act 1991, Code of Practice. Public utility apparatus is shown on Drawings A9P02-JAC-VUT-X_ZZZZZ_ZZ-FG-RD-0001 and A9P02-JAC-VUT-X_ZZZZZ_ZZ-FG-RD-0002, included in Volume 2: Engineering Drawings and detailed below.

Telecommunications

2.3.88 Records show both underground and overhead BT Openreach plant is present within the project extents. The following plant is present within the immediate extents of the A9, local roads and accesses.

- Underground plant is located in the A9 verges and follows the mainline carriageway from the southern extent through to the northern extent;
- Underground cables cross the A9 in the vicinity of the left/right staggered priority junction with the B867 and Perth Road and the right/left staggered priority junction with the A923 and A822;
- Underground cables extend from its junction with the A9 into The Hermitage;
- Overhead cables are located adjacent to Dunkeld & Birnam Station and the right/left staggered priority junction with the A923 and A822;
- Overhead cables cross the mainline carriageway at 4 locations:
  - Chainage 200 after the tie-in at the southern extent of the scheme;
  - Chainage 2750, north of the left/right staggered priority junction with the B867 and Perth Road;
  - Chainage 3460, at the Birnam Glen Underbridge; and
  - Chainage 5030, to the north of Inver.
- An existing mobile phone mast and associated apparatus is located adjacent to the A9 southbound verge south of the River Tay crossing. This mast is used by both O_2 and Three mobile phone companies.

Gas

2.3.89 Records show that SGN plant is present within the project extents. The following plant is present within the immediate extents of the A9.

- A high-pressure gas main crosses the A9 at three locations along the scheme extents:

- Chainage 1300, south of the left/right staggered priority junction with the B867 and Perth Road;
- Chainage 1850, south of the left/right staggered priority junction with the B867 and Perth Road; and
- Chainage 7360, immediately south of the River Tay crossing.

- A low-pressure gas main crosses the A9 at Chainage 3430, immediately south of the Birnam Glen/Inchewan Burn Underbridge.

2.3.90 A Pipeline Consultation Zone is designated through this section and is covered by Local Planning Policy EP4. The extents of the Pipeline Consultation Zone are shown in Volume 3: Environmental Figures, Figures 8.1 a-c.

Electricity

2.3.91 Records show SSE apparatus is present throughout the study area, as detailed below.

- Overhead cables cross the A9 carriageway at four locations along the route:
  - Chainage 1150, immediately north of the existing private access to Murthly Castle;
  - Chainage 5000, south of The Hermitage;
  - Chainage 6460, south of the existing priority junction with the B898; and
  - Chainage 7380, in the immediate locality of the existing priority junction with the B898.
- Overhead cables follow the route of the A9 carriageway, adjacent to the southbound carriageway, for an extended length from the Inver Rail tunnel to the priority junction with the B898 junction;
- Underground cables cross the A9 carriageway at ten locations along the route:
  - Chainage 170, immediately north of the southern tie-in of the scheme;
  - Chainage 1400, north of the existing private access to Murthly Castle;
  - Chainage 1800, south of the existing left/right staggered priority junction with the B867 and Perth Road;
  - Chainage 2900, south of Dunkeld & Birnam Station;
  - Chainage 3400, in the locality of Dunkeld & Birnam Station;
  - Chainage 3450, along Birnam Glen;
  - Chainage 4250, in the locality of the existing right/left staggered priority junction with the A923 and A822 (Old Military Road);
  - Chainage 4600, north of the River Braan crossing;
  - Chainage 7200, south of the existing priority junction with the B898; and
  - Chainage 7400, south of the River Tay crossing.

Water Supply and Sewerage

2.3.92 Records show Scottish Water apparatus is present throughout the study area, as detailed below.

- Distribution water mains cross the A9 carriageway at three locations along the route:
  - Chainage 2100, at the existing left/right staggered priority junction with the B867 and Perth Road;
  - Chainage 3400, in the locality of Dunkeld & Birnam Station; and

- Chainage 4050, at the existing right/left staggered priority junction with the A923 and A822 (Old Military Road).

▪ Sewage pipes cross the A9 carriageway at three locations along the route:

- Chainage 3350, in the locality of Dunkeld & Birnam Station;
- Chainage 3450, along Birnam Glen; and
- Chainage 4050, in the locality of the existing right/left staggered priority junction with the A923 and A822 (Old Military Road).

Bus Services

2.3.93 Information regarding existing local and school bus services within the study area and the wider local area was obtained from PKC and through consultation with bus companies. It should be noted that no data was available regarding the number of travellers using the services.

2.3.94 Numerous bus services currently operate on the A9 and surrounding side roads. Two formal bus lay-bys are located on the A9 in the vicinity of Inver and are used predominantly by local and school bus companies. The remaining official bus stops are located on the side road network within Dunkeld and Birnam on the A923 and Perth Road.

2.3.95 In addition to the official bus stops, it is understood that a number of buses stop informally to collect and drop-off passengers. In most cases this occurs on the side road network however, PKC has suggested that Stagecoach Perth (Service 23/27) currently stops in the vicinity of the junction with the B898 for the convenience of local residents. Details of the known bus routes are contained in Table 2.9.

Table 2.9: Existing Bus Services

Service No.	Operator	Origin	Destination	Routes	Frequency (times a day)
23	Stagecoach in Perth	Perth	Aberfeldy	A923/Perth Road/A9	Approximately once every hour in each direction (Monday to Saturday). Six services northbound and seven services southbound (Sunday).
27	Stagecoach in Perth	Perth	Ballinluig	A923/Perth Road/A9	Four services in each direction (Monday to Friday). Two services in each direction (Saturday).
M10	Citylink	Glasgow	Inverness	A9	Two daily services in each direction.
M90	Citylink/Parks of Hamilton	Edinburgh	Inverness	A9 (one service A923/Perth Road/A9)	Four services in each direction.
M91	Citylink/Parks of Hamilton	Edinburgh	Inverness	A923/Perth Road/A9	One daily service in each direction.
G10	Citylink Gold	Glasgow	Inverness	A9	Four daily services in each direction.

WCH Provision

2.3.96 A full description of existing WCH routes within the A9 corridor is included in Volume 1, Part 3 - Environmental Assessment, Chapter 17 (Population - Accessibility). The location of WCH routes are shown on Drawings A9P02-JAC-GEN-X_ZZZZZ_ZZ-FG-RD-0001 and A9P02-JAC-GEN-X_ZZZZZ_ZZ-FG-RD-0002, included in Volume 2: Engineering Drawings.

- Core Paths - Core Paths facilitate, promote, and manage access rights under the Land Reform (Scotland) Act 2003, providing the public access throughout the local area. The Core Path network is a key part of outdoor access provision and is intended to cater for a range of public users, including walkers, cyclists, horse riders and disabled people.

  Every local authority therefore has a responsibility to prepare a Core Path Plan. The PKC Core Paths Plan was adopted in January 2012.

  Dunkeld and Birnam are well known for its riverside and forestry walks with numerous Core Paths providing connectivity between Birnam Hill, The Hermitage, Craigvinean Forest, Inver Wood, the River Tay, Dunkeld & Birnam Station, and the communities of Inver, Birnam, Little Dunkeld and Dunkeld. In total there are 33 paths in the locality designated as Core Paths.

- Public Rights of Way - A Public Right of Way is a route that can be used by all members of the public. Public Rights of Way vary from long hill routes (often historical routes) to local routes that provide access to amenities. Access along public rights of way is protected by the Countryside (Scotland) Act 1967, Section 46. This Act requires the local authority to '*assert, protect and keep open and free from obstruction or encroachment any public rights of way*'. Diversions can be considered if the proposed diversion is deemed suitable by the planning authority.

  There are eight Rights of Way in the vicinity of the A9 between the Pass of Birnam and Tay Crossing.

- Local Paths - There are a number of non-designated paths within the locality. Many of these paths act as connectors for the Core Path network or provide greater access to outdoor recreation, such as woodland areas.

- National and Regional Cycle Network Routes - The NCN is a UK-wide network of more than 16,000 miles of signed paths and routes, maintained by Sustrans.

  NCN Route 77 travels through Birnam and Dunkeld. Beginning at the southern extend of the scheme, NCN Route 77 travels along the B867 to the existing junction with the A9. The route then follows a segregated footpath immediately west of the existing A9 to Dunkeld & Birnam Station, where it transfers to Birnam Glen. The route joins Perth Road and travels north, before joining the A923, which travels through Dunkeld. NCN Route 77 continues onto a segregated path and travels alongside the east bank of the River Tay until it reaches the River Tay crossing at the northern extent of the scheme. The route crosses the River Tay on the road structure before continuing north on the B898.

  RCN Route 83 connects to NCN Route 77 at the eastern extent of Dunkeld and travels along the C502 towards Dowally and beyond.

3. Murthly/Birnam Junction DMRB Stage 2 Assessment

3.1 Introduction

3.1.1 To address the challenges identified through the initial assessment work (see Section 1.10) and to ensure a range of options are considered in the DMRB Stage 2 assessment process, three junction options were considered at Murthly/Birnam, the option identified by the community through the A9 Co-Creative Process and two additional options, as detailed in Table 1.17. These options were comparatively assessed, as detailed in the *'A9 Dualling Programme: Pass of Birnam to Tay Crossing, Identification of DMRB Stage 2 Whole Route Options Report (Jacobs, 2019)',* however significant differences were not identified that would eliminate options from further assessment. As such, the junction options have been subject to a DMRB Stage 2 level assessment.

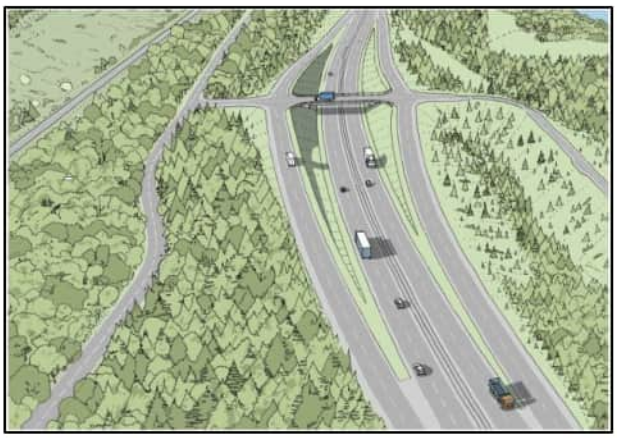
3.1.2 The full DMRB Stage 2 assessment of the Murthly/Birnam Junction options, including details as to how the options were developed, is reported in *Appendix A3.1: Murthly/Birnam Assessment Report*. A summary of the DMRB Stage 2 assessment is included in Chapter 3.3 (DMRB Stage 2 Assessment).

3.2 Murthly/Birnam Junction Options

3.2.1 The three junction options under consideration for the Murthly/Birnam Junction are summarised below and shown in Drawings A9P02-JAC-HML-Z_JC01A_JC-FG-RD-0001, A9P02-JAC-HML-Z_JC01B_JC-FG-RD-0001 and A9P02-JAC-HML-Z_JC01C_JC-FG-RD-0001, included in Volume 2: Engineering Drawings.

The Community's Preferred Route Option (Option 1)

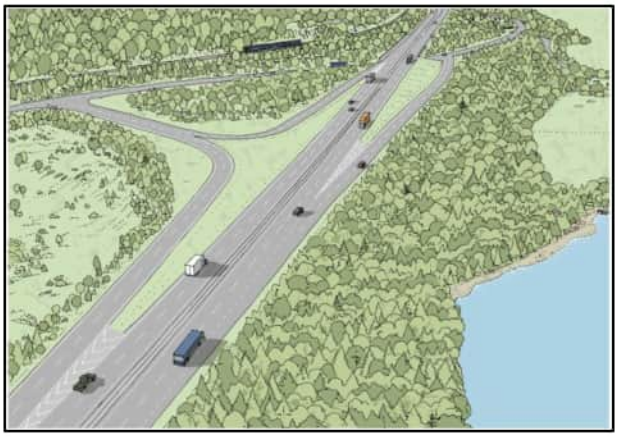
Figure 3.1: Murthly/Birnam Junction, Option 1



- Grade separated junction in the locality of the existing private access to Murthly Castle;
- Diamond layout, facilitating all vehicle movements. Overbridge provided across the A9, connecting to the B867 to the west; and
- Includes a connection of the B867 and Perth Road in the locality of the existing Birnam Junction, crossing the A9 via an underbridge.

Additional Option 1 (Option 2)

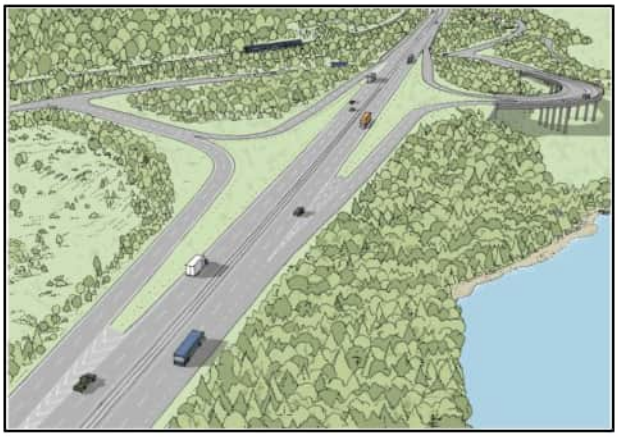
Figure 3.2: Murthly/Birnam Junction, Option 2



- Grade separated junction in the locality of the existing Birnam Junction;
- Merge/diverge loops in the northbound direction and a merge slip road in the southbound direction, with no southbound diverge slip road;
- B867 and Perth Road connected, crossing the A9 via an underbridge; and
- Includes an underbridge to connect the existing private access to Murthly Castle to the B867.

Additional Option 2 (Option 3)

Figure 3.3: Murthly/Birnam Junction, Option 3



- Grade separated junction in the locality of the existing Birnam Junction;
- Merge/diverge loops in the northbound and southbound directions, facilitating all vehicle movements with the southbound loop placed on a viaduct structure;
- B867 and Perth Road connected, crossing the A9 via an underbridge; and
- Includes an underbridge to connect the existing private access to Murthly Castle to the B867.

3.3 DMRB Stage 2 Assessment

3.3.1 The Community's Preferred Route Option 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. However, for the purposes of assessment, and to ensure a robust comparison between options, Option 1, which is the Community's Preferred Route Option at Murthly/Birnam Junction, has been considered for a 70mph speed limit. As such, some design parameters, such as length of slip roads and forward visibility, which will impact the degree of central reserve and verge widening applied on the A9, have been amended in accordance with the DMRB (CD122: Geometric design of grade separated junctions).

3.3.2 The summarised DMRB Stage 2 assessment for the Murthly/Birnam Junction is given below.

Engineering

3.3.3 The conclusion of the engineering assessment on the Murthly/Birnam Junction options, focussed on those topics that demonstrate significant differences, is summarised below.

- Geotechnics & Earthworks
  - A detailed GI has been undertaken for the scheme and for analysis, it is assumed that 90% of excavated material can be re-used as

general fill, with the remaining 10% unacceptable, requiring disposal. Considered in isolation, all options require similar volumes of excavation, however Option 1, which is predominantly on embankment, requires a higher volume of fill material, with a significant volume being imported.

Option 3 incorporates a significant viaduct structure on the southbound loop, to reduce impacts on the River Tay designated flood zone. The viaduct structure is approximately 240 metres long and would require significant piled foundations in close proximity to the River Tay and a high-pressure gas pipeline, increasing complexity.

The variation between route options is considered to be a differentiator, with Option 3 the least favourable.

- Structures - Option 1 requires two structures. An overbridge structure that forms part of the junction itself and an underbridge structure to connect the B867 and Perth Road. Options 2 and 3 also require two structures, an underbridge structure to connect the B867 and Perth Road and an underbridge structure to connect the Murthly Castle private access to the B867. In addition, Option 3 incorporates a 240 metre long viaduct structure on the southbound loop, which will be a substantial, costly and significant structure.

  The variation between route options is considered to be a differentiator, with Option 3 the least favourable.

- Public Utilities - While the number of interfaces with Public Utility apparatus for each option is generally similar, the southbound loop incorporated within Option 3 crosses a high-pressure gas pipeline, which will require significant and costly diversions.

  The variation between route options is considered to be a differentiator, with Option 3 the least favourable.

- Constructability - Option 1 is largely off-line and is more remote from the main population of residential properties within Birnam. However, the junction does result in increased impacts for three isolated residential properties that are in close proximity to the northbound merge slip road. The option can be constructed with minimal impacts to A9 and local traffic, albeit the overbridge associated with the junction option may require a night-time closure of the A9. To accommodate the necessary forward visibility through the junction for a 70mph speed limit, central reserve and verge widening is required. To maintain a smooth alignment through the widened section, the southern extent of the scheme would be lengthened by approximately 270 metres, potentially adding to the construction duration and cost.

  Option 3 includes a viaduct structure on the southbound loop. Construction of such a structure in close proximity to the River Tay and a high-pressure gas pipeline will be complex.

  The variation between route options is considered to be a differentiator, with Option 2 the most favourable and Option 3 the least favourable.

Environment

3.3.4 The conclusion of the environmental assessment on the proposed Murthly/Birnam Junction options, focussed on those topics that identify differentiators between proposed junction options, is summarised below.

- Biodiversity - All proposed junction options would result in the loss of verified Ancient Woodland habitat, which would also indicate additional effects on species such as bats, birds, red squirrel and pine marten. Provision of Ancient Woodland habitat compensatory planting would be required for all proposed junction options.

  Option 1 has the highest overall effect as it results in the highest loss of Ancient Woodland habitat. Option 3 has an intermediate effect and Option 2 has the lowest overall effect on Ancient Woodland.

  The differences between proposed junction options are considered sufficient to be differentiator, with Option 2 the most favourable (lowest overall effect) and Option 1 the least favourable (highest overall effect).

- Landscape - All options would have effects on the Lowland River Corridor: Strath Tay Local Landscape Character Area (LLCA), the Strath Tay: Lower Glen LLCA, Strath Tay: Dunkeld and Birnam LLCA (Settlement), River Tay (Dunkeld) NSA and Murthly Castle GDL.

  Option 3 would have a greater effect on the Strath Tay: Lower Glen LLCA than Options 1 and 2.

  All options would have effects on the River Tay (Dunkeld) NSA with Option 2 predicted to have a lower effect than Options 1 and 3.

  The differences between proposed junction options are considered sufficient to be a differentiator, with Option 3 the least favourable (highest overall effect) and Option 2 the most favourable (lowest overall effect).

- Visual - Option 1 would result in the highest overall effects (least favourable) on the View from the Road than Options 2 and 3, due to the inclusion of the proposed overbridge, slip roads and associated earthworks which would interrupt the views experienced by both northbound and southbound travellers. Northbound travellers, in particular, would experience a substantial change in the View from the Road, the structure interrupting initial views of Strath Tay and the Highland hills beyond.

  Options 2 and 3 would have the lowest overall effects (most favourable) on View from the Road, with travellers experiencing more open views than the existing situation and experiencing lesser changes than Option 1.

- Noise & Vibration - After mitigation, construction noise and vibration is unlikely to be significant and is not considered to be a differentiator between proposed junction options.

  Without mitigation, Option 2 is predicted to result in six potential significant adverse noise effects due to increased traffic flows on Perth Road. Reducing the speed limit on Perth Road to 20mph as it passes the affected properties would be expected to mitigate these effects. This mitigation, however, has not been included in the

comparative assessment and would be considered in more detail as part of the DMRB Stage 3 assessment, in consultation with relevant stakeholders, including PKC.

Options 1 and 3 are not predicted to result in potential significant adverse noise effects on noise sensitive receptors.

The differences between proposed junction options are considered sufficient to be a differentiator, with Option 2 the least favourable (highest overall effect).

Traffic & Economics

- Traffic - All options include a grade separated junction with A9 traffic uninterrupted. As a result, journey times on the strategic network will be similar for all options. Option 2, which omits a southbound diverge slip road, will result in an increase in traffic on Perth Road of between 200 and 400 vehicles per day, which is not considered significant. Traffic on Perth Road is approximately 1,800 AADT (2-way) south of Station Road and approximately 2,600 AADT (2-way) north of Station Road.

  Options 1 and 3, which facilitate all vehicle movements, would not result in an increase in traffic on Perth Road.

- Safety - All options are for a grade separated junction to access/egress the A9 and connect to the existing side road network, meeting the requirements of a Category 7A dual carriageway. This provides a safety benefit over the existing layout, which incorporates at-grade junctions and right-turn manoeuvres.

- Cost - The anticipated costs for the three options, considered in isolation are:

  Option 1 - £33 million

  Option 2 - £23 million

  Option 3 - £44 million

  (Note: Costs quoted are for construction only. They do not include allowance for pre-construction costs, risk and opportunity premiums, inflation or Optimism Bias.)

Recommendation

3.3.5 Based on the DMRB Stage 2 level assessment undertaken on the three proposed junction options for Murthly/Birnam Junction, it is recommended that Option 2 is the preferred junction option and should be taken forward for inclusion in the Additional Whole Route Options.

4. Description of Route Options

4.1 Whole Route Options

4.1.1 Considering the Murthly/Birnam Junction assessment and recommendation, detailed in Chapter 3 (Murthly/Birnam Junction DMRB Stage 2 Assessment), three Additional Whole Route Options will be considered in the DMRB Stage 2 assessment, alongside the Community's Preferred Route Option. A summary of the route options is given below. A more detailed description of each option is included in Volume 1, Part 2 - Engineering Assessment.

Community's Preferred Route Option (Option ST2A)

- 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 1.5 kilometres, commencing at the southern extent in the locality of the existing Birnam Junction and terminating approximately 300 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 50mph required between the southern extent of the scheme and the proposed Dunkeld Junction. 70mph speed limit for the remainder of the scheme.
- Murthly/Birnam Junction:
  - Grade separated junction in the locality of the existing private access to Murthly Castle.
  - Diamond layout, facilitating all vehicle movements. Overbridge provided across the A9, connecting to the B867 to the west.
  - Requires a connection of the B867 and Perth Road in the locality of the existing Birnam Junction, crossing the A9 at the southern extent of the cut and cover tunnel.
- 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.

Additional Whole Route Option 1 (Option ST2B)

- On-line route, largely following the horizontal alignment of the existing A9 single carriageway.
- A9 dual carriageway lowered into a 150 metre long underpass structure in the locality of Dunkeld & Birnam Station.
- Dunkeld & Birnam Station retained in its current position with Station Road reconnected to the station. Parking on top of the underpass.

- Speed limit of 70mph throughout.
- Murthly/Birnam Junction:
  - Grade separated junction in the locality of the existing Birnam Junction.
  - Loops in the northbound direction and a merge slip road in the southbound direction, with no southbound diverge slip road.
  - B867 and Perth Road connected, crossing the A9 via an underbridge.
  - Includes an underbridge to connect the existing private access to Murthly Castle to the B867.
- 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, facilitating all vehicle movements.
  - 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.

Additional Whole Route Option 2 (Option ST2C)

- On-line route, largely following the horizontal and vertical alignment of the existing A9 single carriageway.
- Generally, the same level as the existing A9 throughout, raised in the locality of Dunkeld Junction.
- Dunkeld & Birnam Station retained in its current position.
- Birnam Industrial Estate acquired, and the land used to construct a car parking facility accessed from Station Road, incorporating approximately fifty spaces.
- A new pedestrian underpass structure, incorporating lifts, constructed below the proposed A9 dual carriageway, linking the new car park to the station.
- Speed limit of 70mph throughout.
- Murthly/Birnam Junction:
  - Grade separated junction in the locality of the existing Birnam Junction.
  - Loops in the northbound direction and a merge slip road in the southbound direction, with no southbound diverge slip road.
  - B867 and Perth Road connected, crossing the A9 via an underbridge.
  - Includes an underbridge to connect the existing private access to Murthly Castle to the B867.
- Dunkeld Junction:
  - Grade separated junction in the locality of the existing Dunkeld Junction.
  - Variation of a diamond layout, facilitating all vehicle movements, with northbound and southbound slip roads.

- A822 and A923 connected, crossing the A9 via an underbridge.

- 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.

Additional Whole Route Option 3 (ST2D)

- On-line route, largely following the horizontal and vertical alignment of the existing A9 single carriageway.
- Generally, the same level as the existing A9 throughout.
- Dunkeld & Birnam Station retained in its current position.
- Birnam Industrial Estate acquired, and the land used to construct a car parking facility accessed from Station Road, incorporating approximately fifty spaces.
- A new pedestrian underpass structure, incorporating lifts, constructed below the proposed A9 dual carriageway, linking the new car park to the station.
- Speed limit of 70mph throughout.
- Murthly/Birnam Junction:
  - Grade separated junction in the locality of the existing Birnam Junction.
  - Loops in the northbound direction and a merge slip road in the southbound direction, with no southbound diverge slip road.
  - B867 and Perth Road connected, crossing the A9 via an underbridge.
  - Includes an underbridge to connect the existing private access to Murthly Castle to the B867.
- 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, facilitating all vehicle movements.
  - 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.

4.2 Do-Minimum Scenario

4.2.1 To measure the performance of a particular route option in the context of its operation (in terms of traffic), its impact on the environment, and its economic impact (to inform any cost benefit analysis), there must in the first instance be an agreed 'base' scenario against which any option or solution is measured against. The base scenario is referred to as the *Do-Minimum* and any options or solutions are typically known as *Do-Something* scenarios. The *Do-Minimum* must consider the point in time at which the comparison between a *Do-Something* option and a *Do-Minimum* option will be made, such that the *Do-Minimum* scenario can properly reflect the forecast base scenario at that point in time, insofar as possible. Therefore, for example, future infrastructure interventions that may be in place prior to the comparison date and which would impact on the operation of the existing or future dualled A9 must be taken into consideration.

4.2.2 In the context of the A9, the *Do-Minimum* scenario has been defined as the existing situation in 2015, i.e., the existing A9 infrastructure prior to the construction of any of the A9 dualling projects with no planned upgrade works other than normal routine maintenance and pavement repairs, and with any relevant proposed road and public transport schemes expected to be in place prior to the completion and opening of the A9.

4.3 Cost Estimates

Introduction

4.3.1 Initial scheme cost estimate ranges have been prepared for each route option under consideration. The quantifiable items of the works have been measured and a cost per unit has been applied based on rates from similar projects and published data. Other works elements have been assessed as a percentage of the total construction costs.

4.3.2 The total outturn cost estimate is the sum of:

- Pre-construction phase costs;
- Construction phase costs (including non-recoverable Value Added Tax (VAT));
- Risk, opportunity and uncertainty;
- Optimism Bias; and
- Inflation through to the end of the construction phase.

4.3.3 Operation and maintenance costs are not included in the total outturn cost estimates, however, these have been included in the appraisal of the economic performance of route options included in Volume 1, Part 4 - Traffic Assessment, Chapter 22 (Economic Performance of Route Options).

4.3.4 Optimism Bias is the term used to allow for the tendency for designers to be overly optimistic in their forecasts of the costs and time required to construct and maintain a trunk road scheme or other infrastructure project. Consequently, the total costs associated with the works, along with the works programme, may be underestimated and additional funds may have to be sought, leading to increased disruption, delay and cost. To overcome this issue an Optimism Bias factor is typically applied to the estimated total cost of the work, to reduce the likelihood of any unforeseen costs causing the budget of the project to be exceeded.

4.3.5 In line with guidance for costs associated with construction schemes, Optimism Bias has been applied to all direct costs within this assessment within the range of 25% to 44%.

Cost Estimate Summary

4.3.6 The scheme cost estimate range for each route option is provided in Table 4.1.

Table 4.1: Cost Estimates

Route Option	Scheme Cost Estimate (Minimum) (Excluding VAT)	Scheme Cost Estimate (Most Likely) (Excluding VAT)	Scheme Cost Estimate (Maximum) (Excluding VAT)
Option ST2A	£1,008 million	£1,266 million	£1,626 million
Option ST2B	£420 million	£495 million	£629 million
Option ST2C	£405 million	£478 million	£546 million
Option ST2D	£303 million	£362 million	£420 million