

Scheme Details					
Option Ref. (Stage 5)					
Route C, Junction 1 (WR.ST5.0003)					
Option Component Ref (Stage 4)					
Mainline Off-Line	Murthly Castle / Birnam Junction	Dunkeld & Birnam Station	Dunkeld Junction	The Hermitage Junction	Dalguise Junction
MF.ST4.0003	MU.ST4.0002 BN.ST4.0017	N/A	N/A	HT.ST4.0005	DG.ST4.0002
Option Description					
<p>Whole Route Option C commences at the northern extent of the existing section of dual carriageway at the Pass of Birnam, south of Birnam and Dunkeld. The option includes an off-line tunnelled section between Birnam and Dunkeld with the majority of the remaining alignment on-line, largely following the alignment of the existing single carriageway extending approximately 8.3 kilometres to tie-in to the following A9 dualling scheme, Tay Crossing to Ballinluig, approximately 0.5 kilometres north of the River Tay crossing.</p> <p>At the southern extent, the alignment is on a right-hand curve and is largely at existing ground level transitioning to a left-hand curve on approach to the existing junction with the B867 and Perth Road at Birnam. Option C incorporates a grade separated junction in the locality of the existing access to Murthly Castle. This junction is a diamond layout, with on and off slip roads in the northbound and southbound directions, facilitating all vehicle movements. A bridge is provided over the A9, connecting Murthly Estate to the east and the B867 to the west, via a T-junction.</p> <p>Option C incorporates a 2.5 kilometre bored tunnel section of the A9 that commences in the locality of the existing junction with the B867 and Perth Road at Birnam. As a result, on approach to the existing junction, the A9 begins to change both horizontally and vertically as the alignment moves to the west away from the existing A9 carriageway and is lower than existing ground. The B867 and Perth Road are connected and diverted on top of the bored tunnel. The existing A9 is also connected and will remain operational as a local road subject to further design refinements and consultation with relevant stakeholders.</p> <p>Within the bored tunnel the alignment is on a left-hand curve crossing under the Highland Main Line railway before straightening on approach to and passing underneath the residential properties of Birnam Glen. As the A9 is within a bored tunnel in the vicinity of the station, access to the station can be maintained in its existing layout utilising the existing A9 single carriageway. Birnam Glen access will remain as existing. No alterations are required to the Inchewan Burn due to the bored tunnel alignment.</p> <p>Option C continues into a left-hand curve in the locality the existing junction with the A923 and A822 at Little Dunkeld maintaining a lowered alignment through this section protecting the existing infrastructure of the Highland Main Line railway, A822, Road to Inver and A923. Option C remains low, providing the required clearance under the River Braan. To the north of the River Braan, Option C begins to rise sharply exiting the bored tunnel and continuing on a left-hand curve passing Inver to the west before straightening towards The Hermitage as the alignment reaches existing ground level. A left-in left-out junction is proposed on the northbound carriageway immediately north of Inver to provide access to The Hermitage. Due to no viable solution for a junction at Dunkeld, the proposed junctions at Murthly and Dalguise will be used as turning points for traffic using the left-in left-out junction at The Hermitage.</p> <p>The alignment crosses the Highland Main Line railway in the locality of the existing rail crossing at Inver and continues on a right-hand curve before crossing the railway at the existing Inch crossing and transitioning to a straight to cross the River Tay. This section of A9 dualling terminates approximately 0.5 kilometres north of the River Tay crossing.</p> <p>To the south of the proposed River Tay crossing, and the existing priority junction with the B898 at Dalguise, Option C incorporates a grade separated junction. This junction incorporates loops in the northbound direction and slip roads in the southbound direction, facilitating all vehicle movements. The realigned B898 crosses under the A9 via an underbridge, connecting to a roundabout on the east side of the A9, which also connects to the southbound exit and entry slip roads.</p> <p>Option C incorporates a 70 miles per hour speed limit.</p>					
Transport Scotland Objectives					
Improve Operational Performance	<p>Improves journey times for A9 traffic (by approximately 15 seconds) and journey time reliability, compared to the existing condition, by provision of a high standard dual carriageway with no gaps in the central reserve that allows safe overtaking.</p> <p>As a junction cannot be provided in the vicinity of Little Dunkeld, all local traffic would be required to use the proposed Murthly Castle / Birnam Junction.</p> <p>Option C will potentially retain the existing A9 between Birnam and Little Dunkeld. This will allow traffic travelling between Dunkeld, Inver and the A822 to access the A9 at Murthly without using Perth Road. This 'local bypass' to the southwest of Birnam, would limit the adverse impacts of additional traffic that would have to travel south</p>				

	<p>through Birnam to access the A9 northbound carriageway. Without the existing A9 remaining operational, Perth Road would become congested and on street parking would have to be prohibited.</p> <p>Subject to the existing A9 remaining operational as a local road, future traffic flows on Perth Road similar to existing. If existing A9 stopped-up, potential increase of approximately 4,000 vehicles per day.</p> <p>No direct access to Dunkeld & Birnam Station from the A9 as off-line to the west, access to the station can be maintained in its existing layout utilising the existing A9 single carriageway. No impact on existing station car park and station layout.</p> <p>Two-way Annual Average Daily Traffic (AADT) flows on the A9 dual carriageway expected to be within the approximate range of 23,700 to 26,700 in 2041.</p>
Improve Safety	<p>No gaps in the central reserve, eliminating right-turn manoeuvres across oncoming traffic. Layout of A9 (Dual 2-lane All Purpose (D2AP) carriageway), Murthly Castle / Birnam Junction, The Hermitage and Dalguise Junction recommended for use on category 7A dual carriageways (also suitable for category 5 and 6 dual carriageways) and consistent with the overall A9 Dualling Programme. Based on forecast traffic flows, the bored tunnel will be Category AA, the highest category of bored tunnel with the most onerous requirements for safety and fire prevention equipment.</p> <p>Alignment is generally compliant with relevant design standards. However, a Relaxation from Standards for horizontal curvature on approach to The Hermitage will be required to realign with existing A9 carriageway. Outwith northern portal of the bored tunnel section of the alignment a Departure from Standards will be required on approach to The Hermitage junction due to the excessive gradient required to tie-in at existing ground levels.</p> <p>Junctions improve access to the A9 for local traffic by removing right-turn manoeuvres across oncoming traffic and generally allows compliant gradients and geometry on side roads. Some Relaxations and Departures from Standards necessary to avoid severe environmental impact on people, property and landscapes. Appropriate mitigation to reduce or eliminate potential hazards will be considered at future stages of design.</p> <p>For safety reasons, pedestrians, cyclists, motorbikes (with engines less than 50cc), animals and animal drawn vehicles are not permitted to use a bored tunnel. Due to the high percentage of Heavy Goods Vehicles (HGVs) potentially containing hazardous materials travelling through the bored tunnel, there will be a heightened requirement for emergency evacuation procedures. Crossing points with fire doors providing a safe refuge and an escape route will be provided. A bored tunnel of this magnitude it likely to require a manned operations centre with emergency services access.</p>
Facilitate Active Travel	<p>Potential temporary diversions to sections of National Cycle Network (NCN) Route 77 and Core Paths (DUNK /23, DUNK/57, DUNK/137 and DUNK/142) during construction.</p> <p>No significant permanent alterations to existing Non-Motorised User (NMU) routes in the locality.</p>
Improve Integration with Public Transport	<p>A9 dual carriageway is expected to deliver economic growth and improved links to Public Transport facilities. However, an off-line bored tunnel restricts direct access to Birnam, Little Dunkeld and Dunkeld, adversely impacting local journey times and local Public Transport routes. Option C provides improved journey times for A9 traffic (by at 15 least seconds). Dualling will improve journey time reliability, compared to the existing condition, by provision of a high standard dual carriageway with no gaps in the central reserve that allows safe overtaking.</p> <p>The exclusion of a junction provision at Dunkeld may adversely affect local journey times and Public Transport and will require further consultation with operators to assess viability of potential new routes.</p> <p>Impact on existing bus stops at Inver, replacement provision will be considered at more detailed stages of design, in consultation with relevant stakeholders.</p> <p>No direct access to Dunkeld & Birnam Station from the A9 as off-line to the west, access to be provided via existing A9 in its current layout. No impact on existing station car park and station layout.</p>
Construction Issues	
Constructability	<p>At this stage in the design process an initial review of constructability has been undertaken to ensure Option C can be constructed and to identify possible issues. Exact construction methods will be identified by the successful Contractor, allowing them to use their experience to identify innovative methods that may lessen complexity and reduce associated costs and construction time.</p> <p>There is no ground investigation on the bored tunnel alignment at the deepest parts of the proposed alignment to properly assess the likely ground conditions for boring. The investigative works undertaken previously were not designed for either off-line road alignments or bored tunnels, thus the available data has been interpreted and</p>

	<p>extrapolated to give an indication of the conditions that could be expected within the proposed tunnel bore. This interpretation in itself represents a significant risk.</p> <p>In general, based on the ground investigation information available, soil conditions are expected to be predominantly dense to very dense materials, including potential for large boulders. In places, these deposits will be water bearing. The presence of bedrock is anticipated where the bored tunnel passes beneath the northern flank of Birnam Hill over a length of 1,000 metres.</p> <p>Within the bored tunnel alignment there are a number risk relating to ground conditions including:</p> <ul style="list-style-type: none"> • Potential for encountering flowing sands and gravels. • Hard boring conditions such as boulders and rock. This may result in Tunnel Boring Machine (TBM) stoppages to allow time for maintenance due to increased wear on TBM components. • Controlling tunnel settlement, particularly in areas of sensitive third party assets for example beneath buildings (where tunnel is in soils). This issue is more problematic where the bored tunnel is relatively shallow and the cover to the bored tunnel crown is less than 1.5 diameters. Although the bored tunnel alignment passes beneath properties opposite Dunkeld station, the bored tunnel is at sufficient depth that settlement at this location is unlikely to be a particular issue. • Presence of bedrock within the tunnel bore, especially where the material at the bored tunnel face is mixed between bedrock and soils. <p>Laydown areas of approximately 40,000 square metres and 10,000 square metres would be required at the start and end of the tunnel drive respectively. It is assumed that driving would commence at the southern end and proceed to the northern portal.</p> <p>Servicing the tunnels during construction such as materials in and out would place significant burden on the existing transport network. Constructing one bore at a time would require 1,000 HGV vehicles per week at peak times to service the works. The use of two TBMs, to reduce overall construction programme by constructing the twin-bores simultaneously, would double the HGV vehicles at peak times to 2,000 HGVs per week.</p> <p>The mainline alignment of the bored tunnel is in close proximity to Ladywell Landfill site, however vertically the tunnel is anticipated to be below the levels of the Ladywell Landfill site. However, as the ground conditions, nature and extent of the waste deposited in the landfill area are not known at this stage there is potential for contaminated ground to be encountered in this area, which may require non-standard earthworks treatment. The final form of remediation in this area will depend on the detailed proposals.</p> <p>Generally, excavations and earthworks for the proposed junctions, which are largely off-line, can be undertaken with minimal disruption to the existing road network. The scale of the portals at each end of the tunnel will require significant engineering works. In order to commence tunnelling the crown of the tunnel will require to be at least one bore diameter beneath the ground. For a 14 metre inside diameter tunnel this requires a portal structure formed to depths of 30 metres below ground level. The construction of these portal structures is a significant engineering challenge on its own, requiring anchored/propped retaining walls in either temporary or permanent condition. It would be possible to make parts of the portals into cut and cover tunnel sections in the permanent case.</p> <p>The off-line twin-bore tunnels of 14 metre inside diameter would be formed using a TBM to the south of the existing A9 single carriageway. The tunnel would be lined with a segmental concrete lining. The large tunnel diameter is dictated by the road alignment required for a Category 7A D2AP carriageway incorporating a 70 miles per hour speed limit.</p> <p>Tunnel ventilation would likely be via jet fans (negating the requirement for ventilation shafts). Public safety in the event of an emergency would be managed through cross passages at approximately 150 metre centres.</p> <p>Bridge structures will likely be built in two stages as the individual carriageways are constructed. One half of the structure will be constructed along with the section of dual carriageway. Traffic is then moved to the newly constructed carriageway while the second half of the structure is constructed. Structures are then connected to form a single structure.</p> <p>Risks associated with working in close proximity to the River Tay, which in addition to the River Braan, is within the River Tay Special Area of Conservation (SAC), and also the Inchewan Burn, include siltation and polluted run-off and spillages entering the watercourse during construction, potentially causing harmful effects to SAC qualifying species, such as otter and fish.</p> <p>There are numerous existing overhead and underground public utilities in the locality of the A9, including that belonging to Scottish Water, Scottish Gas Networks British Telecom (BT) and Scottish & Southern Energy (SSE). A number of these utilities will need to be diverted as a result of the works, particularly those in the locality of the</p>
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	<p>underpass. Where possible, utilities will be diverted in advance of the main works. Given the scale of likely diversions, this work could take approximately 2 years.</p> <p>It is likely the bored tunnel will be constructed as two separate bored tunnels, northbound and southbound with the southern tunnel portal completed first. Significant excavations required at both tunnel portals to accommodate the TBM and required work areas. The works will be undertaken under continuous Traffic Management, with reduced speed limits and narrow lane widths, which may increase the risk of accidents between opposing traffic flows. At junctions, temporary arrangements will be required. This may result in significant congestion, particularly for local traffic as the A9 flow is dominant. Maintaining operation of the existing A9 during construction works is a particular challenge, especially at the northern portal. At the southern end, the proposed A9 alignment is to the south west of the existing A9, thus allowing the tunnel portal to be formed adjacent to the existing A9. At the northern end, the proposed A9 (in tunnel/tunnel portal) is broadly coincident (but significantly lower) than the existing A9. The River Tay, River Braan and the village of Inver restricts the available space at the northern portal area. Construction of the northern portal would require offline diversion of A9 traffic using existing infrastructure (potentially via the C502 or via Aberfeldy). This would add extensive diversions during the construction of the northern tunnel portal potentially adding traffic through Dunkeld and Birnam during this phase.</p>
Construction Cost	<p>£4 billion - £8 billion (approximate)</p> <p>Cost estimates have been undertaken on level of design undertaken at Stage 5 of the co-creative process. The costs include pre-construction costs (design and preparation costs, advanced works costs and land costs) and construction costs (preliminaries and indirect costs and direct construction costs, including structures, road pavement, earthworks, risks and opportunities and inflation). It should be noted that these cost estimates are for comparison purposes only and will be further refined upon further design work undertaken.</p>
Community Objectives	
Health, Noise and Well-being	<p>Potential dust nuisance during construction for residential properties in the immediate locality of A9 works. Measures may be implemented by the Contractor to reduce dust emissions, including appropriate storage and covering of stockpiled materials, use of sprinklers and hoses to prevent dust production and concrete mixing in enclosed areas.</p> <p>Likely no exceedance of UK air quality standards and objectives (nitrogen oxides (NO₂) and particulate matter (PM₁₀ and PM_{2.5})) as a result of road traffic emissions. No further impact on residents of Perth Road anticipated in terms of air quality as traffic is likely to be similar to existing.</p> <p>Traffic noise levels, compared to existing noise levels, are as follows:</p> <ul style="list-style-type: none"> • Within extents of bored tunnel – expected to decrease, between 3 and 10 decibels. • At Birnam and Little Dunkeld (outwith bored tunnel extents) – expected to decrease, between 3 and 10 decibels. • At Inver – similar to existing, any increase less than 3 decibels. • At Dunkeld and Inver (outwith bored extents) – similar to existing, any decrease less than 3 decibels. • At Perth Road – similar to existing, any increase less than 3 decibels. <p>(Note: It is assumed that low noise surfacing will be provided on the A9, however no other mitigation, such as noise fences or noise bunds, is included, this will be considered in the future.)</p> <p>Potential for localised increased noise levels at tunnel extents due to traffic noise deflections from within the tunnel section, however this may be reduced by the use of noise absorptive surfaces within the tunnel.</p> <p>Construction will generate noise and vibration, with the potential to affect residential properties in the locality of the works. Noise and vibration limits during construction will be specified within a Construction Environmental Management Plan (CEMP). The approach will be agreed between the Contractor and the Environmental Health Officer of Perth & Kinross Council. The Contractor will also require to develop and implement a Noise and Vibration Management Plan to meet the requirements set-out in the CEMP.</p>
Landscape and Environment	<p>Proposed dual carriageway outwith the bored tunnel is generally on-line, therefore land-take is limited to areas immediately adjacent to the existing A9. Some additional land-take is required for the grade separated junctions at Murthly and Dalguise. The total land-take for Option C is approximately 41 hectares, although 8 hectares are within the bored tunnel.</p> <p>Demolition of a residential property at Auchlou. Potential disturbance of land associated with current and previous land uses (existing A9, Highland Main Line railway and former curling pond (potentially infilled with unknown</p>

	<p>material)), that could release pollutants if unmitigated. Expected to be mitigated by implementing appropriate waste management procedures identified in a Construction Environment Management Plan (CEMP).</p> <p>Associated A9 earthworks within the River Tay 1 in 200-year floodplain at Inver and the River Tay crossing, increasing flood risk upstream. Requirement for compensatory floodplain elsewhere to replace that lost.</p> <p>The proposed tunnel and portal at Inver offer the opportunity to remove a proportion of the existing road embankment and existing A9 River Braan bridge and thus offer a net gain in floodplain storage at that location and increased flood conveyance from the River Braan towards the River Tay reducing flood risk to eastern parts of Inver. Further consideration of this opportunity would be required to understand the downstream impacts on the flows and water levels experienced in the River Tay.</p> <p>The proposed northern tunnel portal clashes with the culvert carrying the Inver Mill Lade, which would be lost. Alternatives would have to be considered for a replacement structure, so as not to increase flood risks to the north of Inver. Alternatives would be either a new culvert to the River Tay further to the west or a piped culvert solution on the current alignment of the Inver Mill Lade.</p> <p>Bridge structure over the River Tay required at similar level to existing A9 bridge. Further crossings of six minor watercourses required. Structures over watercourses likely to lead to changes of the physical characteristics (including the banks and beds), however some modification already exists in these areas. Northern tunnel portal and earthworks on approach lie within the River Tay and River Braan floodplains. Flood protection retaining walls would be required for 250 metres either side from the northern tunnel portal. Flood risk will likely increase during construction.</p> <p>Loss of less than 1 hectare of aquatic and terrestrial habitat associated with the River Tay SAC and shading of River Tay SAC associated habitat as a result of the River Tay underbridge, could affect SAC qualifying species such as otter and fish.</p> <p>Loss of approximately 25 hectares of woodland designated on the Ancient Woodland Inventory, predominantly at Dalpowie Plantation, Ring Wood and Inver Wood. Provision of compensatory woodland considered at future assessment stages.</p> <p>Potential for impacts on protected species, including:</p> <ul style="list-style-type: none"> • Loss of otter habitat within the vicinity of the River Tay SAC. • Loss of high reptile habitat suitability in discrete areas where the A9 route is outwith the bored tunnel extents. • Bat roosts and bat roost potential in trees, structures and buildings where the A9 route is outwith the bored tunnel extents. • Potential loss of red squirrel shelters/habitat in woodland areas. • Potential loss of breeding bird habitat in woodland and scrub areas. • Potential construction related impacts including: noise; vibration; dust; aquatic pollution events (including silt release) and fragmentation of habitat that could occur throughout the A9 route. <p>Ecological surveys will be undertaken prior to construction for important habitats and protected species to inform assessments and potential mitigation requirements, which might include:</p> <ul style="list-style-type: none"> • Appointment of an Ecological Clerk of Works to supervise works. • Replacement/compensation habitat for lost habitat features. • Creation of crossing structures (for example, culverts with mammal ledges and dry mammal underpasses); • Seasonal constraints of works. • Meeting consenting requirements in respect of works affecting protected species. • Controls to avoid or reduce potential effects on species as a result of vibration, noise, and light during construction. <p>Loss of existing, mature roadside woodland and alterations to landform as a result of the road itself, associated earthworks and new bridges. Murthly Castle / Birnam Junction would contribute to the loss of woodland within the Murthly Castle Garden and Designed Landscape and there would be adverse impacts on the River Tay (Dunkeld) National Scenic Area (which the existing A9 currently passes through) and the landscape character. These impacts would principally result from the works associated with the above ground sections of the A9 dualling and bored tunnel portals, with no or very limited effects on landscape receptors resulting from the tunnelled section.</p> <p>Impacts on visual amenity, both during construction and operation, including:</p> <ul style="list-style-type: none"> • Significant impacts on residents within Inver, Inchmagrannachan.
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	<ul style="list-style-type: none"> • Significant impacts on people using the B867, the Highland Main Line railway, NCN 77, Core Paths, the Tay Forest Park and Murthly Castle and Designed Landscape. • Lesser impacts on residents of Birnam and Inchfield. • Lesser impacts on people using the B898, local roads, rights of way in the wider area. • Lesser impacts on visitors to the Hermitage, Inver Mill Caravan Park and Dunkeld Cathedral. <p>The introduction of street lighting on roundabouts and associated approach roads in an area that is currently not lit would have localised adverse impacts on landscape and visual amenity.</p> <p>The visual amenity of residents within Inchmagrannachan in addition to people using the B867, the Highland Main Line railway, NCN77, Core Paths in the wider area, visitors to the Tay Forest Park and people within the Murthly Castle Garden and Designed Landscape would potentially be significantly adversely affected.</p> <p>Effects on landscape and visual receptors would be reduced through mitigation measures such as the retention of existing vegetation as far as practicable in addition to the implementation of new planting similar to existing species.</p> <p>Excavations and retaining walls required to avoid impact on surrounding area, specifically around the bored tunnel south and north portals:</p> <ul style="list-style-type: none"> • Excavations - up to approximately 29 metres deep on approach to Dalguise Junction. • Embankments - up to approximately 23 metres high on Murthly Estate Access Road. • Retaining Walls – Bored tunnel portal structures require anchored/propped retaining walls in either the temporary/permanent condition to minimise land-take. <p>(Note: Potentially 960,000 cubic metres of excavation required for both bored tunnel portals. Volume is dependent on final arrangement of the portals.)</p>
Safety	<p>No gaps in the central reserve, eliminating right-turn manoeuvres across oncoming traffic. Layout of A9 (Dual 2-lane App Purpose (D2AP) carriageway), Murthly Castle / Birnam Junction, The Hermitage and Dalguise Junction recommended for use on category 7A dual carriageways (also suitable for category 5 and 6 dual carriageways) and consistent with the overall A9 Dualling Programme. Based on forecast traffic flows, the tunnel will be Category AA, the highest category of tunnel with the most onerous requirements for safety and fire prevention equipment.</p> <p>Alignment is generally compliant with relevant design standards. However, a Relaxation from Standards for horizontal curvature on approach to The Hermitage will be required to realign with existing A9 carriageway. Outwith the northern portal of the bored tunnel section of the alignment a Departure from Standards will be required on approach to The Hermitage Junction due to the excessive gradient required to tie-in at existing ground levels.</p> <p>Junctions improve access to the A9 for local traffic by removing right-turn manoeuvres across oncoming traffic and generally allows compliant gradients and geometry on side roads. Some Relaxations and Departures from Standards necessary to avoid severe environmental impact on people, property and landscapes. Appropriate mitigation to reduce or eliminate potential hazards will be considered at future stages of design.</p> <p>For safety reasons, pedestrians, cyclists, motorbikes (with engines less than 50cc), animals and animal drawn vehicles are not permitted to use a bored tunnel. Due to the high percentage of HGVs potentially containing hazardous materials travelling through the bored tunnel, there will be a heightened requirement for emergency evacuation procedures. Crossing points with fire doors providing a safe refuge and an escape route will be provided. A bored tunnel of this magnitude it likely to require a manned operations centre with emergency services access.</p>
Local Economy	<p>Subject to the existing A9 remaining operational as a local road, future traffic flows on Perth Road similar to existing. If existing A9 stopped-up, potential increase of approximately 4,000 vehicles per day.</p> <p>A9 dual carriageway is expected to deliver economic growth and improved links to Public Transport facilities. However, an off-line bored tunnel restricts direct access to Birnam, Little Dunkeld and Dunkeld, adversely impacting local journey times and local Public Transport routes. Option C provides improved journey times (by at 15 least seconds). Dualling will improve journey time reliability, compared to the existing condition, by provision of a high standard dual carriageway with no gaps in the central reserve that allows safe overtaking.</p> <p>The exclusion of a junction provision at Dunkeld may adversely affect local journey times and Public Transport and will require further consultation with operators with operators to assess viability of potential new routes.</p> <p>Impact on existing bus stops at Inver, replacement provision will be considered at more detailed stages of design, in consultation with relevant stakeholders.</p>

	<p>No direct access to Dunkeld & Birnam Station from the A9 as off-line to the west, access to be provided via existing A9 in its current layout. No impact on existing station car park and station layout.</p> <p>Two-way AADT flows on the A9 dual carriageway expected to be within the approximate range of 23,700 to 26,700 in 2041.</p>
Active Travel and Recreation	<p>Potential temporary diversions to sections of NCN Route 77 and Core Paths (DUNK /23, DUNK/57, DUNK/137 and DUNK/142) during construction.</p> <p>No significant permanent alterations to existing NMU routes in the locality.</p>
Public Transport	<p>A9 dual carriageway is expected to deliver economic growth and improved links to Public Transport facilities. However, an off-line bored tunnel restricts direct access to Birnam, Little Dunkeld and Dunkeld, adversely impacting local journey times and local Public Transport routes. Option C provides improved journey times for A9 traffic (by at least 15 seconds). Dualling will improve journey time reliability, compared to the existing condition, by provision of a high standard dual carriageway with no gaps in the central reserve that allows safe overtaking.</p> <p>The exclusion of a junction provision at Dunkeld may adversely affect local journey times and Public Transport and will require further consultation with operators to assess viability of potential new routes.</p> <p>Impact on existing bus stops at Inver, replacement provision will be considered at more detailed stages of design, in consultation with relevant stakeholders.</p> <p>No direct access to Dunkeld & Birnam Station from the A9 as off-line to the west, access to be provided via existing A9 in its current layout. No impact on existing station car park and station layout.</p>
Historic Environment	<p>Approximately 15 hectares of Murthly Castle Garden and Designed Landscape and less than a hectare of The Hermitage Garden and Designed Landscape affected (existing A9 already passes through these designations), leading to an adverse impact on these designations. In addition to potential visual impacts, the construction of the Murthly Castle / Birnam Junction could potentially erode the boundary of the Murthly Castle Garden and Designed Landscape.</p>

Future Scheme Development Beyond Co-Creative

The design and assessment undertaken for the co-creative process has been completed to inform the decision making process. However, further design refinement and scheme assessment is required on the preferred route to ensure the design is to the same level of detail as is normal for major Trunk Road projects at the route options stage, and sufficient assessment work is completed to allow the Scottish Ministers to make their decision on the preferred option with confidence that it can be delivered successfully through the planning process.

This will include, but not limited to, the following:

- Additional ground investigation, focused on the lowered section of A9 for the on-line options (A, B and D) and for the offline option C, the ground investigation will need to focus on the locality of the off-line tunnel, at the northern and southern extents.
- Additional ecological and environmental surveys and consideration of environmental mitigation.
- Flood modelling and road drainage design.
- Design refinement and engineering assessment, including compliance with standards and constructability assessment.
- Design of key structures including, tunnels, bridges and retaining walls.
- Development of NMU routes.
- Additional traffic modelling and analysis.
- Public Utility diversions strategy.
- Consultation with statutory and non-statutory consultees.
- Consultation with affected landowners.
- Consideration of non-spatial options.
- Scheme cost review, including assessment of risks and opportunities.