Fact Sheet

At off slip roads in the northbound and southbound directions, stages of design.

access to the A9 dualling scheme, Tay Crossing the A9, connecting Murthly Estate in consultation with the Children's Parliament) in the locality of th

Birnam Glen access to Network (NCN) Route 77 and Core Paths (in the locality of the existing. and an

compliant gradients and geometry on side roads cut and cover tunnel at least 30 seconds),

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Alternative a and diverted on with fire doors providing to Ballinluig, approximately 0.5 kilometres north of the River Tay crossing. (Stage 4)

The B867 and Perth Road are connected with no gaps in the central reserve that allows safe overtaking. Proposed junctions at Murthly, Dunkeld and Dalguise provide connection to the station from the A9 dual carriageway. No direct access to Dunkeld & Birnam Station from the A9. Layout provides connection to the station from the A9.

Travel

Facilitate Active Travel

Temporary potential diversions to sections of National Cycle Network (NCN) Route 77 and Core Paths (DUK/10, DUK/11, DUK/15, DUK/23, DUK/57, DUK/59, DUK/64, DUK/100, DUK/137, DUK/142, DUK/144 and DUK/145) during construction.

Permanent diversion to NCN Route 77 and Core Paths (DUK/57 and DUK/142) in the locality of the existing Birnam Junction. Likely these routes will be diverted along Perth Road, however opportunity to re-route on top of cut and cover tunnel once construction is complete.

Permanent diversion to Core Path (DUK/11) as Birnam Glen is stepped-down. Diversions likely to be via Station Road and the steps at the station to reconnect with the Core Path west of the station.

Permanent diversion to Core Path (DUK/23), which crosses the River Braan on a footbridge. A new crossing will be required in the locality of the existing.

Public Transport

A 50 miles per hour speed restriction over the southern extent of the scheme, and an at-grade roundabout at Dunkeld, results in most future A9 journeys increasing by at least 30 seconds, compared to the existing condition.

Future traffic flows on Perth Road likely to be similar to existing. Traffic on Station Road expected to increase by approximately 100 vehicles per day due to new access to the station.

Two-way Annual Average Daily Traffic (AADT) flows on the A9 dual carriageway expected to be within the approximate range of 25,000 to 26,700 in 2041.

Improve Safety

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. At-grade roundabout at Dunkeld not consistent with overall A9 Dualling Programme and not recommended for use on Category 7A dual carriageways (suitable for Category 5 and 6 dual carriageways) and will require a Departure from Standards.

Reducing speed limit less than existing provides inconsistency of speed limit throughout the A9 dualling.

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. At grade roundabout at Dunkeld Junction may introduce potential for low severity accidents.

For safety reasons, pedestrians, cyclists, motorbikes (with engines less than 50cc), animals and animal drawn vehicles are not permitted to use a cut and cover tunnel. Due to the high percentage of Heavy Goods Vehicles (HGVs) potentially containing hazardous materials travelling through the cut and cover tunnel, there will be a heightened requirement for emergency evacuation procedures. Crossing points with five doors providing a safe refuge and an escape route will be provided. A cut and cover tunnel of this magnitude may require a manned operations centre with emergency services access.

Improve Integration with Public Transport

A dual carriageway is expected to deliver economic growth and improved links to Public Transport facilities.

Although increased journey times anticipated (by at least 30 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. Proposed junctions at Murthly, Dunkeld and Dalguise provide full access to and from the A9, therefore no adverse impacts on Public Transport anticipated, however at grade roundabout at Dunkeld may introduce delays to strategic bus services, particularly at peak times, compared to a grade separated junction. Impact on existing bus stops at Inver, replacement provision will be considered at more detailed stages of design, in consultation with relevant stakeholders.

No direct access to Dunkeld & Birnam Station from the A9. Layout provides connection to the station from Perth Road through Birnam and Little Dunkeld. Replacement car parking provision on top of cut and cover tunnel at the station could potentially incorporate a bus stop and bus turning area to improve integration with Public Transport facilities.

Construction Issues

At this stage in the design process an initial review of constructability has been undertaken to ensure Option A 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 impacts, costs and construction time.

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. Bedrock is possible at the southern extent of the cut and cover tunnel and could potentially be encountered in excavations and in formation of the bored piling walls.

The new access road to properties on Birmam Glen to the east of the station is in close proximity to Ladyswell Landfill site. 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. This may involve excavation and replacement of material or implementation of an engineered cap. The final form of remediation in this area will depend on the detailed proposals.

A cut and cover tunnel (formation of a structure to form a tunnel in an open excavation, which is subsequently backfilled) proposed as near surface. As insufficient space for open excavation exists, likely formed using retaining walls in the verges and central reserve of the A9 dual carriageway over the 1.5 kilometres length. Land, due to space constraints and ground conditions that retaining walls potentially will be constructed using large diameter bored piles to retain a height of approximately 10 metres, which will dependent time for construction. Illustration will require heavy plant in proximity to residential properties, Dunkeld & Birnam Station, the Highland Main Line railway and the Category A Listed building. Large boulders are present in the ground; therefore, vibration may be significant during piling operations, introducing a structural risk to adjacent residential properties and stakeholder assets.

Tunnel walls would be designed to resist groundwater entry and the proposed bored piling solution would need to be extended considerable depth below the base of the completed cut and cover tunnel. The bored piling walls may impact groundwater flow, which flows towards the River Tay.

Maintaining access to the station during construction will be difficult given the level difference and the working area required to install the bored piling retaining walls. Temporary measures will be considered, however it is likely that no car parking provision will be available during construction and there is a possibility that the station may need to close for a large duration of the works, subject to discussions with Network Rail and the community.

Works to construct the cut and cover tunnel and other elements of the option will be immediately adjacent to the Highland Main Line railway. While some work can be completed with the railway operational, subject to suitable mitigations, monitoring being implemented, some work may be necessary under railway operation, affecting rail users. The Category A Listed station building is approximately 5 metres from the works, therefore there is a possibility of accidental damage due to vibration and the close proximity of heavy plant. To minimise the risk of damage, strengthening works to the building could be considered and careful monitoring would seek to ensure the structural integrity of the building is not adversely affected. Impacts on residential properties to the east would also need to be considered.

Generally, excavations and earthworks for the proposed junctions, which are largely off-line, can be undertaken with minimal disruption to the existing road network.

Inchewan Burn requires to be lowered by approximately 5 metres to accommodate the dual carriageway. It may be possible to dam the burn upstream of the proposed works and pump water into the burn downstream of the works. There is a risk to salmonid and eel, which are vulnerable to extreme weather events and is dependent on effective operation of pumping equipment. Equipment will therefore need to be continuously monitored during the works to avoid possible flooding issues. Works need to be undertaken in consultation with relevant environmental organisations as the burn is a tributary of the internationally important River Tay Special Area of Conservation (SAC).

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.

Risks associated with working in close proximity to the River Tay, which in addition to the River Braan, is within the River Tay SAC, and also the Inchewan Burn, include settlement and polluted run-off and spillages entering the watercourse during construction, potentially causing harmful effects to SAC qualifying species, such as otter and fish.

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 cut and cover tunnel. 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.

New access to Birmam Glen from the AR22 and lowering of the Inchewan Burn would be completed as advanced works. It is likely that the cut and cover tunnel will be constructed as two separate tunnels, northbound and southbound, with the southbound cut and cover tunnel constructed first. The proposed junction at Dunkeld will be constructed once the cut and cover tunnel has been completed. The works will be undertaken under continuous Traffic Management, with reduced speed limits and narrower lane widths, which may increase the risk of accidents between opposing traffic flows. At junctions, temporary arrangements will be required, which may include a temporary roundabout at Dunkeld. This may result in significant congestion, particularly for local traffic as the A9 flow is dominant. At this stage, despite the relative space constraints, it is anticipated that 2-way traffic can be maintained on the A9 during construction, however some short closures may be necessary to complete structural works.

Construction Cost £800 million - £1.6 billion (approximate)

Cost estimates have been undertaken on the 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 materials, road pavement, earthworks, risks and opportunities and inflation). It should be noted that they are cost estimates are for comparison purposes only and will be further refined once more detailed design work is undertaken.

Community Objectives

Health, Noise and Well-being

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.

Likely no exceedance of UK air quality standards and objectives (nitrogen oxides (NOx) and particulate matter (PM10 and PM2.5)) 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.

Traffic noise levels, compared to existing noise levels, are as follows:

- Within extents of cut and cover tunnel – expected to decrease, by at least 10 decibels.
- At Little Dunkeld (outwith cut and cover extents) – expected to decrease, between 3 and 10 decibels.
- At Dunkeld and Inver (outwith cut and cover extents) – similar to existing, any increase less than 3 decibels.

Noise levels at A9 Road – similar to existing, any increase less than 3 decibels.

(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.)

Potential for localised increased noise levels at tunnel extents due to traffic noise deflections from within the cut and cover tunnel section, however this may be reduced by the use of noise absorptive surfaces within the tunnel.

Construction will generate noise and vibration, with the potential to affect residential properties in the locality of the works. Expected to be significant for those properties immediately adjacent to the cut and cover tunnel as bored piling walls are formed over a significant length. 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 be required to develop and implement a Noise and Vibration Management Plan to meet the requirements set-out in the CEMP.

Landscape and Environment

Proposed dual carriageway 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 Dalginross and to a lesser extent for the roundabout at Dunkeld and access to Birmam Glen properties. The total land take for Option A is approximately 45 hectares, although 4 hectares are within the cut and cover tunnel.

Demolition of a residential property at Auchloch and electrical sub-station on Station Road will be required. Potential impact on residential property with associated industrial building at the existing junction between the A9 and AR22 and commercial property within existing Birnam Industrial Estate (former veterinary surgery). Potential disturbance of land associated with current and previous land uses that may release pollutions if unmitigated, including the existing A9, Highland Main Line railway, Ladyswell Landfill site and former curling pond and gravel pit (potentially infilled with unknown material). Expected to be mitigated by implementing appropriate waste management procedures identified in a CEMP. Further investigation required to identify mitigation for works in the locality of Ladyswell Landfill site.

Associated A9 earthworks within the River Tay 1 in 200 year floodplain at Inver and the River Tay crossing will increase flood risk upstream. Requirement for compensatory floodplain elsewhere to replace that lost. Some road
drainage complexities due to the depth of the cut and cover tunnel, and a pumping station may be necessary for effective discharge.

Bridge structures over the River Brann and River Tay required at similar level to existing A9 bridges. Further crossings of seven minor watercourses required. Structures over watercourses likely to lead to changes to the physical characteristics (including the banks and beds), however some modification already exists in these areas. Inchewan Burn would require to be lowered by approximately 5 metres, crossing the A9 dual carriageway in a culvert. This involves major engineering works, extensively modifying the physical characteristics of the watercourse in an area that has previously been subject to river restoration, which, depending on constraints, may extend for a significant length. The modifications to the burn will likely prevent passage of migratory fish species and may result in increased deposition of river bed material, leading to possible blockages and therefore increased flood risk. Risk of potential harmful effects on the SAC qualifying species. Flood risk will likely increase during construction. The works would result in significant adverse impacts to Inchewan Burn and it may prove difficult to gain approval from the relevant statutory bodies to implement the works.

Loss of less than 1 hectare of aquatic and terrestrial habitat associated with the River Tay SAC. Watercourse structures may introduce shading, further impacting SAC qualifying species, such as otter and fish.

Loss of approximately 24 hectares of woodland designated on the Ancient Woodland Inventory, predominantly at the Dalpowie Plantation, Ring Wood and Inver Wood. Provision of compensatory woodland will be considered at future stages of design.

Potential for impacts on protected species, including:
- Loss of otter habitat within the vicinity of the River Tay SAC, River Brann (within the River Tay SAC) and Inchewan Burn.
- Disruption to fish migration and habitat in Inchewan Burn.
- Loss of high reptile habitat in discrete areas throughout the A9.
- Loss of bat roost potential in trees, buildings and structures.
- 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, such as noise, vibration, dust, aquatic pollution and fragmentation of habitat.

Ecological surveys will be undertaken prior to construction for important habitats and protected species to inform assessments and potential mitigation requirements, which might include:
- Appointment of an Ecological Clerk of Works to supervise the works.
- Replacement / compensatory habitat to replace that lost.
- Creation of crossings suitable for certain species.
- Seasonal constraints on the works.
- Controls to avoid or reduce potential effects on species as a result of vibration, noise and light during construction.

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 Murthly Castle 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.

Impacts on visual amenity, both during construction and operation, including:
- Significant impacts on residents within Little Dunkeld, Inver, Inchmahome, Dunkeld, and the Tay Forest Park and Murthly Castle and Designed Landscape.
- Lesser impacts on residents of Birnam and Inchnochell.
- Lesser impacts on visitors to the Hermitage, Inver Mill Caravan Park, Dunkeld Cathedral and Birnam Highland Games Park.

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. Potential for landscaping on top of cut and cover tunnel (potentially available for community use), which would result in beneficial impacts for residents of Birnam and Little Dunkeld and those using Core Paths and cycle routes.

<table>
<thead>
<tr>
<th>Stage 5 Fact Sheet (Detailed)</th>
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<tbody>
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<td><strong>Effects on landscape and visual receptors could be reduced by mitigation, including retaining existing woodland as far as practicable and new planting similar to the existing species.</strong></td>
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- **Excavations and retaining walls required to avoid impact on Dunkeld & Birnam Station and residential and commercial properties:**
  - 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 pile walls with a retained height of approximately 10 metres between Birnam and Dunkeld & Birnam Station.

  **(Note: Approximately 370,000 cubic metres of excavation required for tunnel section construction.)**

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- **Traffic on Perth Road expected to increase by approximately 100 vehicles per day and a significant number of HGV vehicles are not permitted to use a cut-and-cover tunnel.**
  - Dualling Programme to add a second lane (D5AP carriageway), Murthly Castle / Birnam Junction, Rumbling Bridge / Birnam Station, 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. At grade roundabout at Dunkeld not consistent with overall A9 Dualling Programme and not recommended for use on Category 7A dual carriageways (suitable for Category 5 and 6 dual carriageways) and will require a Departure from Standards.

- **Reducing speed limit less than existing provides inconsistency of speed limit throughout the A9 dualling junctions.**

- **Junctions improve access to the A9 for local traffic by removing right-turn manoeuvres across ongoing traffic and generally allows compliant gradients and geometry on side roads.**

- **For safety reasons, pedestrians, cyclists, motorists (with engines less than 50cc), animals and animal drawn vehicles are not permitted to use a cut and cover tunnel.**

- **Dualling Programme to add a second lane (D5AP carriageway), Murthly Castle / Birnam Junction, Rumbling Bridge / Birnam Station, 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. At grade roundabout at Dunkeld not consistent with overall A9 Dualling Programme and not recommended for use on Category 7A dual carriageways (suitable for Category 5 and 6 dual carriageways) and will require a Departure from Standards.**

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- **Future traffic flows on Perth Road likely to be similar to existing.**
  - Traffic on Station Road expected to increase by approximately 100 vehicles per day due to new access to the station.

- **A9 dual carriageway is expected to deliver economic growth and improved links to Public Transport facilities.**

- **Although increased journey times anticipated (by at least 30 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.**

- **Proposed junctions at Murthly, Dunkeld and Dalguise provide full access to and from the A9, therefore no adverse impacts on Public Transport.**

- **At Dunkeld may introduce delays to strategic bus services, particularly at peak times, compared to a grade separated junction.**

- **Impact on existing bus stops at Inver, replacement provision will be considered at more detailed stages of design, in consultation with relevant stakeholders.**

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<th><strong>Active Travel and Recreation</strong></th>
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- **Permanent diversion to use NCN Route 77 and Core Paths (DUNK/57 and DUNK/142) in the locality of the existing Birnam Junction.**

- **Likely these routes will be diverted along Perth Road, however opportunity to re-route on top of cut and cover tunnel once construction is complete.**

For definition of technical terms, please see Glossary [https://a9co-creative.scot/wp-content/uploads/2018/02/A9-Co-Creative-Glossary-Terms-Final.pdf].
Permanent diversion to Core Path (DUNK/11) as Birnam Glen is stopped up. Diversion likely to be via Station Road and the steps at the station to reconnect with the Core Path west of the station.
Permanent diversion to Core Path (DUNK/23), which crosses the River Braan on a footbridge. A new crossing will be required in the locality of the existing.

**Public Transport**
A9 dual carriageway expected to deliver economic growth and improved links to Public Transport facilities. Although increased journey times anticipated (by at least 30 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. Proposed junctions at Murthly, Dunkeld and Dalguise provide full access to and from the A9, therefore no adverse impacts on Public Transport anticipated, however at grade roundabout at Dunkeld may introduce delays to strategic bus services, particularly at peak times. Impact on existing bus stops at Inver, replacement provision will be considered at more detailed stages of design, in consultation with relevant stakeholders.

No direct access to Dunkeld & Birnam Station from the A9. Layout provides connection to the station from Perth Road through Birnam and Little Dunkeld. Replacement car parking provision on top of cut and cover tunnel at the station could incorporate a bus stop and bus turning area to improve integration with public transport facilities.

**Historic Environment**
Approximately 13 hectares of Murthly Castle Garden and Designed Landscape, less than 1 hectare of The Hermitage Garden and Designed Landscape and less than 1 hectare of Birnam Conservation Area affected (existing A9 already passes through these designations), with an adverse impact.

Construction will be in close proximity to the Category A Listed station building and there is potential for the setting of this designation to be adversely affected during construction. Post construction, there would be a positive impact on the building as the link to the local community is reinstated.

**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 Non-Motorsed User 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.