3. Description of the Proposed Scheme

3.1 General Description

3.1.1 This section sets out the description of the proposed A9 Dualling: Pass of Birnam to Tay Crossing project, hereafter referred to as the proposed scheme. This is presented for the Design Manual for Roads and Bridges (DMRB) Stage 3 Assessment and forms the basis for the Environmental Impact Assessment and the draft Orders.

Scheme Procurement

3.1.2 For assessment purposes it is assumed that the proposed scheme will be procured by means of a Design and Build (D&B) contract, as set out in the A9 Dualling Delivery Plan (Transport Scotland, 2023). Under the terms of this contract, the contractor will undertake both the detailed design and construction of the proposed scheme. Upon completion of the proposed scheme, responsibility for operating and maintaining the A9 Perth to Inverness Trunk Road would remain with the Scottish Government, and responsibility for operating and maintaining side roads would remain with Perth & Kinross Council. Both the Scottish Government and Perth & Kinross Council may appoint agents to operate and maintain the respective road networks on their behalf.

3.1.3 Under a D&B contract, a specimen (outline) design is prepared for the proposed scheme by Transport Scotland. Tenderers in the D&B procurement process are provided with the specimen design for their information during the tender process. Following a successful tender process, the appointed contractor produces a detailed design for the proposed scheme, which may include refinement and optimisation from the specimen design. Such optimisation must be in accordance with the relevant statutory documents approved for the proposed scheme, which includes the Environmental Impact Assessment Report (EIAR) and the constraints imposed by the EIAR, the Habitats Regulations Appraisal (HRA), Statutory Orders and any specific criteria set within the contract documents.

A9 Dual Carriageway Alignment

3.1.4 The proposed A9 mainline from Pass of Birnam to Tay Crossing is a Dual 2 lane all-purpose road (D2AP), with a 120A kph design speed, in accordance with DMRB CD 109 'Highway link design' (DMRB, 2020). This is the highest category of all-purpose road, where intersections are to be either grade separated junctions, or isolated left-in, left-out junctions for access. A general description of the proposed A9 dual carriageway elements of the proposed scheme is provided in the following paragraphs, and a more detailed description of the required geometry and cross section is provided in Chapter 4 (Engineering Assessment). The proposed scheme is shown on Drawings A9P02-JAC-

HGN-D_ZZZZZ_ZZ-FG-RD-0003 and A9P02-JAC-HGN-D_ZZZZZ_ZZ-FG-RD-0004 included in Volume 2: Engineering Drawings.

3.1.5 The proposed carriageway has been designed in accordance with DMRB CD 127 'Cross-sections and headrooms' (DMRB, 2021b) Figure 2.1.1N1e shown in Figure 3-1. The mainline carriageway will not be kerbed, except across dual carriageway structures, at lay-bys and at localised areas where combined kerb drainage is required.

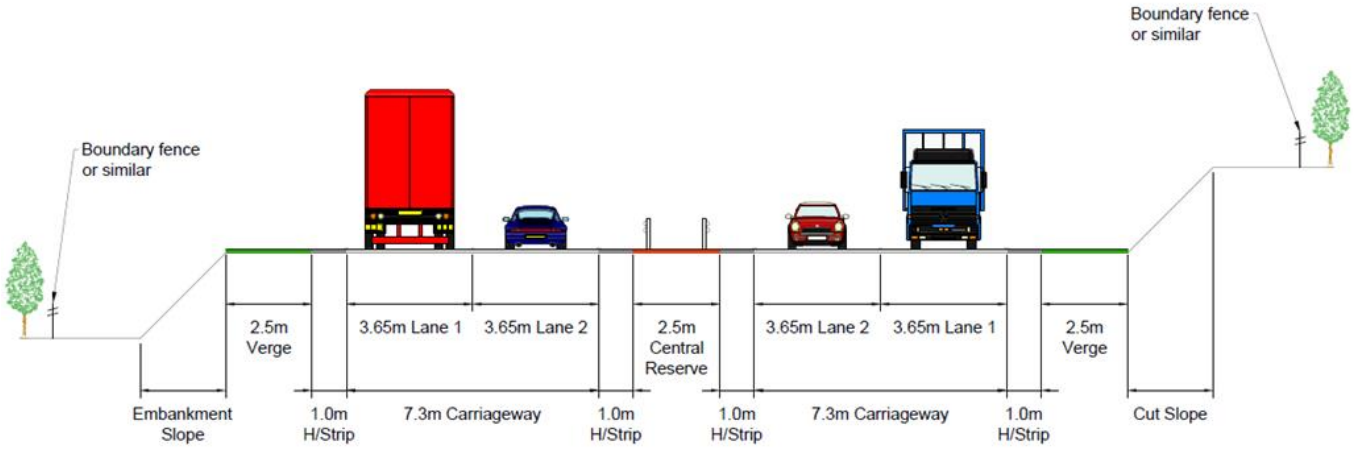

Figure 3-1: Dimensions of cross-section components for rural all-purpose dual carriageway roads mainline (CD127).

3.1.6 The proposed scheme is 8.4km long and is predominantly online widening where the new carriageway generally follows the line and level of the existing A9 carriageway. The online widening associated with the proposed scheme is typically either parallel widening to the northbound side of the existing A9 carriageway, or parallel widening to the southbound side of the existing A9 carriageway. Parallel widening better facilitates construction whilst maintaining many of the advantages of online widening such as reduced footprint, cost and environmental impact.

3.1.7 Throughout this report, references are made to chainage (Ch.), which is a reference to the number of metres from the starting point of the proposed scheme, from south to north (for example Ch. 1500 refers to a point 1,500 metres north of the starting point of the scheme). The proposed scheme commences at Ch. 0, however, the works include the upgrade of two existing lay-bys off the existing dual carriageway section between Ch. -0575 and Ch. 0 as detailed in Paragraphs 3.1.79 and 3.1.80 of this report.

3.1.8 The following description of the proposed scheme should be read in conjunction with Drawings A9P02-JAC-HGN-D_ZZZZZ_ZZ-FG-RD-0003 and A9P02-JAC-HGN-D_ZZZZZ_ZZ-FG-RD-0004 included in Volume 2: Engineering Drawings.

3.1.9 The proposed dualling begins at the northern extent of the existing dual carriageway section of the A9 through the Pass of Birnam. As the alignment heads north, the alignment is generally at-grade with widening mainly to the southbound side of the existing A9 carriageway. A new bridge will be

constructed at approximately Ch. 880, which will allow Murthly Estate Access Track to cross beneath the A9. Continuing north, the alignment moves slightly off-line on the northbound side of the existing A9 to improve the alignment on approach to Birnam Junction.

3.1.10 Birnam Junction is a new grade separated junction located in close proximity to the existing left/right staggered priority junction with the B867 and Perth Road. The junction connects the B867 and Perth Road to the A9 (north and south), and creates a grade separated crossing beneath the A9 via Birnam Junction Bridge at Ch. 2200. Through Birnam Junction, the mainline widening is primarily to the southbound side of the existing A9 carriageway, and while the A9 carriageway remains predominantly at-grade, the B867 has been lowered to provide sufficient headroom through the new Birnam Junction Bridge.

3.1.11 Immediately north of Birnam Junction, the proposed alignment continues predominantly at-grade with a best-fit alignment proposed, consisting of northbound widening switching to southbound widening of the existing A9 carriageway. A best fit alignment is due to the proximity to the Highland Main Line railway on the northbound side, and residential properties on the southbound side.

3.1.12 As the alignment approaches Dunkeld & Birnam Station, the alignment is constrained with the Highland Main Line railway and Dunkeld & Birnam Station located immediately adjacent to the proposed northbound carriageway and residential properties on the southbound side. Through this section, the alignment remains at-grade with widening to the northbound side of the existing A9 carriageway, impacting on the existing station car park and encroaching closer to the station building, which is Category A Listed. South of Dunkeld & Birnam Station, a left-in, left-out junction is proposed on the northbound carriageway at Ch. 3000, to provide maintenance and emergency vehicle access to Dunkeld and Birnam Station Building and Network Rail assets.

3.1.13 North of the station, the A9 crosses Birnam Glen and Inchewan Burn via the Birnam Glen and Inchewan Burn Bridge at Ch. 3460. The scheme remains generally at grade with widening provided to the northbound side of the existing A9 carriageway. On the approach to Dunkeld Junction and continuing north of the junction, the proposed level in this section is approximately 3 metres higher than existing ground levels to ensure the A9 is not impacted by future 1 in 200-year return period (0.5% AEP) plus climate change flood events. The River Braan is designated as part of the River Tay Special Area of Conservation (SAC).

3.1.14 Dunkeld Junction is an at-grade five arm elongated roundabout at Ch. 4100 and provides connections to the A9 (north and south), A923, A822 (Old Military Road) and the Unclassified Road to Inver.

3.1.15 Continuing north, the alignment passes Inver on the northbound side at approximately Ch. 5000. Widening at this location is to the southbound side of the existing A9 carriageway, with a section of the alignment moving slightly offline on the southbound side of the existing A9 carriageway to accommodate The Hermitage Junction described in Paragraph 3.1.36. The Hermitage Junction is a left-in, left-out junction proposed on the northbound carriageway at Ch. 5200, where the alignment is both at-grade and on a straight, to provide access to The Hermitage. Although at-grade, this

realignment and widening impacts a property, Auchlou Cottage, at Ch. 5040, which has already been purchased by Scottish Minister's to accommodate the scheme.

3.1.16 Another left-in, left-out junction is proposed on the southbound carriageway at Ch. 5510. This junction is to accommodate maintenance access to the Sustainable Drainage System (SuDS) features, environmental mitigation, and compensatory flood storage areas, and provides private access to land.

3.1.17 The proposed alignment continues north at-grade, and crosses the Highland Main Line railway via Inver Rail Bridge at Ch. 5750. To accommodate carriageway widening to the southbound side of the existing A9 carriageway, the rail bridge will be extended on the southbound side of the existing A9 carriageway.

3.1.18 North of the Inver Rail Bridge, the alignment is offline to the west, to provide space to improve the alignment on the approach to Dalguise Junction.

3.1.19 Dalguise Junction is a new grade separated junction located approximately 400 metres south of the existing B898 priority junction. The junction connects the B898 to the A9 (north and south), and creates a grade separated crossing beneath the A9 via Dalguise Junction Bridge at Ch. 6950. Through Dalguise Junction, the mainline is primarily offline to the northbound side of the existing A9 carriageway, with the southbound merge utilising the existing A9 alignment where possible.

3.1.20 North of the Dalguise Junction Bridge, the alignment merges back online and remains at grade with widening to the southbound side of the existing A9 carriageway. The A9 then crosses Inch Rail Bridge at Ch. 7370, which will be extended on the southbound side of existing A9 carriageway to accommodate the widening in this location.

3.1.21 Immediately north of the Inch Rail Bridge, the A9 crosses the River Tay at Ch. 7550. The existing River Tay Bridge with remain in place to accommodate the dualled northbound carriageway, and a new bridge will be constructed parallel to the existing structure to accommodate the dualled southbound carriageway. The new bridge will be at the same level as the existing structure over the River Tay.

3.1.22 As the scheme continues north of the River Tay Bridge, the alignment remains at-grade with widening to the southbound side of the existing A9 carriageway. Approximately 750 metres north of the River Tay Bridge, the alignment ties into the Tay Crossing to Ballinluig project. Works at this tie-in will involve the removal of the interim roundabout constructed as part of the Tay Crossing to Ballinluig scheme and connecting in to the dualled section of the project to the north of the interim roundabout.

Junctions

3.1.23 As the proposed scheme is a D2AP road, it is recommended that grade separated junctions are provided on the route, with isolated left-in, left-out access provided in exceptional circumstances for isolated existing accesses. Generally, no accesses are permitted onto this type of road except

for isolated left-in, left-out accesses. Existing direct accesses are to be closed with isolated left-in, left-out accesses proposed at strategic locations to retain existing access to properties and land.

3.1.24 Appendix J of the A9 Dualling Programme, Preliminary Engineering Support Services, DMRB Stage 1 Assessment Report (Jacobs, 2014) contains the Junction and Access Strategy. This strategy includes a decision process flowchart and accompanying matrices to ensure a structured approach to the identification of appropriate alternative access provision in the context of the A9 Dualling Programme. The strategy classified local roads and accesses on the basis described in Table 3-1, with a different approach to be adopted subject to the local road or access classification.

Local Road or Access Category	Description
Tier 1	A and B roads
Tier 2	C and Unclassified Roads
Tier 3	Private/Agricultural Access Roads

Table 3-1: Junction and Access Strategy - Local Road and Access Classification

Grade Separated Junctions

3.1.25 Two grade separated junctions are provided as part of the proposed scheme, one at Birnam and one at Dalguise, both junctions are designed in accordance with DMRB CD122: Geometric Design of Grade Separated Junctions (DMRB, 2022a). A general description of these key elements of the proposed scheme is provided in the following paragraphs, and their locations are shown on Drawings A9P02-JAC-HGN-D_ZZZZZ_ZZ-FG-RD-0003 and A9P02-JAC-HGN-D_ZZZZZ_ZZ-FG-RD-0004 included in Volume 2: Engineering Drawings. A more detailed description of the required geometry and cross-sections is provided in Chapter 4 (Engineering Assessment).

Birnam Junction (Ch. 1900)

3.1.26 The proposed Birnam Junction is in the locality of the existing left/right staggered priority junction with the B867 and Perth Road. It is a grade separated junction incorporating a merge and diverge loop in the northbound direction and a southbound merge slip road. The junction does not include a southbound diverge slip road to minimise the design footprint. As the ground falls to the east towards the River Tay, this would have required the slip road to be on embankments up to a maximum of 20 meters high. Southbound travelling vehicles wishing to leave the dual carriageway to reach B867/Perth Road can do so via the proposed at-grade roundabout at Dunkeld Junction.

3.1.27 The existing priority junctions on the B867 and Perth Road will be realigned, crossing under the A9 on a skew via the proposed Birnam Junction Bridge. The northbound loops and the southbound slip road connect to the realigned B867/Perth Road via priority junctions, in accordance with DMRB CD 123: Geometric design of at-grade priority and signal-controlled junctions (DMRB, 2021a). The slip roads comprise of a single lane with a hardshoulder, joining to the re-aligned B867/Perth Road two-way connector road with a 1 metre wide hardstrip.

Dalguise Junction (Ch. 6800)

3.1.28 The proposed Dalguise Junction is located immediately south of the existing priority junction with the B898. It is a full movement grade separated junction incorporating a merge and diverge loop in the northbound direction, and merge and diverge slip roads in the southbound direction.

3.1.29 The existing priority junction on the B898 will be realigned, crossing under the A9 on a skew via the proposed Dalguise Junction Bridge, before transitioning into the southbound merge slip road. Both northbound loops and the southbound diverge slip road connect to the realigned B898 via priority junctions, in accordance with the DMRB CD 123: Geometric design of at-grade priority and signal-controlled junctions (DMRB, 2021a). The northbound and southbound merge and diverge slip roads comprise a single lane with a hardshoulder, joining to the re-aligned B898 with a 1 metre wide hardstrip.

Roundabouts

3.1.30 The Pass of Birnam to Tay Crossing section included a number of unique challenges in the development of route options due to proximity of residential properties, sports club, the railway and Dunkeld & Birnam Railway Station. Due to the constraints, an at-grade roundabout is provided as part of the proposed scheme, and is designed in accordance with DMRB CD116: Geometric design of roundabouts (DMRB, 2023). A general description of this key element of the proposed scheme is provided in the following paragraphs, and its location is shown on Drawing A9P02-JAC-HGN-D_ZZZZZ_ZZ-FG-RD-0003 included in Volume 2: Engineering Drawings. A more detailed description of the required geometry and cross sections is provided in Chapter 4 (Engineering Assessment).

Dunkeld Junction (Ch. 4100)

3.1.31 The proposed roundabout at Dunkeld Junction is in the locality of the existing right/left staggered priority junction with the A923 and A822 (Old Military Road). The roundabout has five-arms, connecting to the A9 (north and south), A923, A822 (Old Military Road) and the Unclassified Road to Inver. To maximise capacity and reduce queues on approach, a segregated left turning lane is included between the A923 and A9 (southbound carriageway). The roundabout comprises of three lanes, each four metres wide.

3.1.32 The existing priority junctions on to the A923 and A822 (Old Military Road) will be realigned to connect into the proposed roundabout, and the Unclassified Road to Inver which forms an existing priority junction with the A822 is also realigned to connect into the proposed roundabout. The roundabout has been designed in accordance with DMRB CD116: Geometric design of roundabouts (DMRB, 2023).

Left-in, Left-out At Grade Junctions

3.1.33 Three left-in, left-out junctions are provided as part of the proposed scheme, two junctions are located on the northbound carriageway at Dunkeld & Birnam Station and The Hermitage, and one

to the north of Inver on the southbound carriageway. The left-in, left-out junctions have been designed in accordance with DMRB CD122: Geometric design of at-grade priority and signal-controlled junctions (DMRB, 2022a), and a general description of these elements of the proposed scheme is provided in the following paragraphs and their locations are shown on Drawings A9P02-JAC-HGN-D_ZZZZZ_ZZ-FG-RD-0003 and A9P02-JAC-HGN-D_ZZZZZ_ZZ-FG-RD-0004 included in Volume 2: Engineering Drawings. A more detailed description of the required geometry and cross sections is provided in Chapter 4 (Engineering Assessment).

Network Rail Maintenance Access Track (Ch. 3000)

3.1.34 A left-in, left-out junction is provided on the northbound carriageway to provide maintenance and emergency vehicle access to Dunkeld and Birnam Station and Network Rail assets. This left-in, left-out junction incorporates a nearside auxiliary lane on the northbound approach for diverging traffic.

3.1.35 This left-in, left-out junction is not intended for public use, therefore access requirements are expected to be minimal, with public access to the station via the proposed replacement car park on Station Road.

The Hermitage (Ch. 5200)

3.1.36 A left-in, left-out junction is provided on the northbound carriageway to provide access to The Hermitage. The left-in, left-out junction incorporates a central island and a nearside auxiliary lane on the northbound approach for diverging traffic.

3.1.37 The Hermitage is a National Trust for Scotland site that attracts approximately 200,000 visitors each year.

Inver Maintenance Access (North) (Ch. 5500)

3.1.38 The Inver Maintenance Access Track (North) is provided via a left-in, left-out junction on the southbound carriageway to provide access to a SuDS features (Pond G and Swale G) and farmland. The left-in, left-out junction incorporates a nearside auxiliary lane on the northbound approach for diverging traffic.

3.1.39 This left-in, left-out junction is not for public use, therefore access requirements are expected to be minimal.

Local Roads

3.1.40 There are a number of local roads which will be affected to varying extents as part of the proposed scheme. A general description of these local roads is provided in the following paragraphs and their location is shown on Drawings A9P02-JAC-HGN-D_ZZZZZ_ZZ-FG-RD-0003 and A9P02-JAC-HGN-D_ZZZZZ_ZZ-FG-RD-0004 included in Volume 2: Engineering Drawings. A more detailed description of the local roads is provided in Chapter 4 (Engineering Assessment).

B867/Perth Road (Ch. 1750 - Ch. 2500)

3.1.41 The existing B867 and Perth Road will be realigned and connected as part of the proposed Birnam grade separated junction, as described in Paragraph 3.1.26, which will replace the existing at-grade staggered junction arrangement. A 6 metre carriageway cross-section will be maintained along the route with a new parallel WCH provision proposed in the verge, as described in Table 3-7.

3.1.42 A new access will be provided from the B867 to facilitate maintenance access for the proposed SuDS feature (Pond B1). The new access will be located approximately 85 metres south of the proposed junction between the connector road and the Birnam Junction northbound diverge and merge slip roads.

Station Road (Ch. 3380)

3.1.43 The southern extents of Station Road will require realignment to facilitate access to the replacement Dunkeld and Birnam Station car park. A 6 metre carriageway cross-section and the existing WCH provision will be maintained.

Perth Road (Ch. 3870 - Ch. 4010)

3.1.44 The western extent of the existing Perth Road requires a minor realignment to facilitate tie-in to the realigned A923, providing access to the A9 via the proposed Dunkeld Junction Roundabout. A 6 metre carriageway cross-section will be maintained, as will the existing WCH provision as described in Table 3-7.

A822 (Old Military Road) (Ch. 3940 – Ch. 4040)

3.1.45 The A822 will be realigned to facilitate connection to the proposed Dunkeld Junction Roundabout, as described in Paragraph 3.1.14. A 6 metre carriageway cross-section will be maintained along the route, with new parallel WCH provision in the verges, as described in Table 3-7. The connection to the roundabout will be approximately 120 metres south east of the existing junction location.

3.1.46 The realignment will tie-in with the existing A822 carriageway in advance of the retained rail structure, and will include a maintenance parking area, replacing the existing to a similar standard.

A923 (Ch. 4040 – Ch. 4100)

3.1.47 The A923 will be realigned to facilitate connection to the proposed Dunkeld Junction Roundabout, as described in Paragraph 3.1.14. A 7.3 metre carriageway cross-section is proposed, tapering to a 6 metre carriageway cross-section at the tie-in to the existing A923 carriageway. To maximise capacity and reduce queues on approach, a segregated left turning lane is included between the A923 and A9 (south).

3.1.48 Residential properties and the associated access road on Little Dunkeld are in close proximity to the realigned A923. To tie-in with the Dunkeld Junction Roundabout, the vertical profile of the

realigned section of the A923 needs to be raised. A retaining wall is proposed to ensure earthworks of the reprofiled road do not encroach onto the Little Dunkeld residential access road.

Unclassified Road to Inver (Ch. 4100 – Ch. 4290)

3.1.49 The Unclassified Road to Inver will be realigned to facilitate a direct connection to the proposed Dunkeld Junction Roundabout, as described in Paragraph 3.1.14. A 6 metre carriageway cross-section will be maintained along the route, with new parallel WCH provision in the verges, as described in Table 3-7.

3.1.50 A new access will be provided from the Unclassified Road to Inver to facilitate maintenance access for the proposed SuDS feature (Pond D). The new access will be located approximately 170 metres from the Dunkeld Junction Roundabout connection.

B898 (Ch. 6760 – Ch. 7510)

3.1.51 The existing B898 will be realigned as part of the proposed Dalguise grade separated junction, as described in Paragraph 3.1.19, which will replace the existing B898 priority junction with the A9. A 6 metre carriageway cross-section will be maintained along the route with new WCH provision in the verge along a large portion of the route, as described in Table 3-7.

3.1.52 The proposed B898 will include a minor realignment and upgrade of the existing priority junction connection to the Douglas Fir Wood, and three new priority junction arrangements to facilitate a connection to the A9 via the proposed Dalguise Junction.

Access Tracks

3.1.53 There are existing access tracks which will be affected by the proposed scheme to varying extents. A number of new access tracks are also required as a result of the proposed scheme. A general description of these access tracks is provided in the following paragraphs and their location is shown on Drawings A9P02-JAC-HGN-D_ZZZZZ_ZZ-FG-RD-0003 and A9P02-JAC-HGN-D_ZZZZZ_ZZ-FG-RD-0004 included in Volume 2: Engineering Drawings.

Murthly Estate Access Track (Ch. 100 – Ch. 1030)

3.1.54 The existing access to Murthly Estate, located on the southbound carriageway, will be stopped-up, and the access track will be realigned with a new bridge proposed to facilitate crossing of the A9 and connection to the B867. The connection to the B867 will provide access to the A9 via the proposed Birnam Junction. The proposed access track will be 6 metres wide to accommodate forestry operations within the Dalpowie Plantation, and will include 4.75 metres wide verges to provide space to reinstate the avenue style planting to match the existing arrangements within the Garden Design Landscape (GDL) area.

3.1.55 A new access will be provided from the realigned Murthly Estate Access Track to facilitate access to the proposed SuDS feature (Pond A). The new access will be located approximately 260m from the connection between the B867 and the new Murthly Access Track.

Sewage Works Access Track (Ch. 2730 – Ch. 2440)

3.1.56 The existing Sewage Works Access Track will be realigned to facilitate tie-in to the realigned B867/Perth Road, where connection to the A9 will be provided via the proposed Birnam Junction. The realigned access track will be 6 metres wide, tapering to 4 metres wide at the tie-in with the existing access track. The priority junction between the Sewage Works Access and the B867/Perth Road will be relocated approximately 70 metres north of the existing location.

Network Rail Maintenance Access Track (Ch. 2930 – Ch. 3370)

3.1.57 The existing public access to Dunkeld & Birnam Station will be stopped-up, and provision to the station will be provided via the new proposed Dunkeld & Birnam Station Replacement Car Park and Pedestrian Underpass located at the top of Station Road.

3.1.58 The Network Rail Maintenance Access Track will be a new access provided via a new left-in, left-out junction on the northbound A9 carriageway, as described in Paragraph 3.1.34, located 260 metres south of the existing Dunked & Birnam Station access. This new access will provide maintenance and emergency vehicle access to Dunkeld and Birnam Station and Network Rail assets. The new access track will be 6 metres wide, tapering to 3.5 metres wide at the station building. The design includes parking areas for maintenance vehicles and a turning head.

Birnam Glen (Ch. 3450)

3.1.59 Birnam Glen provides access between Birnam and residential properties to the south of the Highland Main Line railway. The horizontal alignment of the access will remain largely unchanged, however, the access will be lowered to maximise headroom under the widened Birnam Glen and Inchewan Burn Bridge. A 3 metre carriageway cross-section will be maintained along Birnam Glen. The proposals include a hardstanding area in a similar location to the existing layout which can be used as a passing place or maintenance parking area, and new private parking bays linked to the station building between the A9 and the existing rail bridge to the south. Birnam Glen connects to Perth Road which will provide access to the A9 via both the proposed Dunkeld Junction Roundabout and Birnam Junction.

Inver Maintenance Access Track (South) (Ch. 4350 – Ch. 4930)

3.1.60 Inver Maintenance Access Track (South) will be a new access to provide maintenance vehicles access to a SuDS feature (Pond F) and the River Braan Bridge from Inver. The proposed access will be 3.5 metres wide, and will predominantly follow the route of the core paths DUNK/137 and DUNK/23 with passing places proposed at regular intervals. This access will also form a mixed traffic street with WCH users accessing the A9 bus stops and existing WCH provisions on the northern

side of the A9. Access to the A9 is provided via the Unclassified Road to Inver arm of the proposed Dunkeld Junction Roundabout.

Inver Maintenance Access Track (North) (Ch. 5370 – Ch. 5550)

3.1.61 The Inver Maintenance Access Track (North) will be a new access provided via a new left-in, left-out junction on the southbound carriageway, as described in Paragraph 3.1.38. This new access will provide access to SuDS features (Pond G and Swale G) and farmland. The new access track will be 6 metres wide to the SuDS features, then the access track will continue at 3.5 metres wide.

Inverwood Access Track (South) (Ch. 6270 – Ch. 6800)

3.1.62 The existing Network Rail Access on the southbound carriageway will be stopped-up, and maintenance access to Network Rail Assets will be realigned via the Inverwood Access Track to connect onto the realigned B898 via priority junction. The re-aligned access track will be 3.5 metres wide, with regular passing places, and the connection onto the B898 will provide access to the A9 via the proposed Dalguise Junction.

Inverwood Access Track (North) (Ch. 6800 – Ch. 7340)

3.1.63 The Inverwood Access Track (North) will be a new access track provided via a priority junction on the realigned B898. This new access will provide access to the SuDS feature (Pond H), utility infrastructure, new and existing WCH provision, and surrounding land via an under track crossing of the Highland Main Line railway. A 3.5 metre carriageway with regular passing places is proposed along the length of the track. The re-aligned access track will be 3.5 metres wide, with regular passing places, and the connection onto the B898 will provide access to the A9 via the proposed Dalguise Junction.

SuDS Feature Access Tracks

3.1.64 In addition to the access tracks described above, there are further access tracks which provide access to SuDS features proposed as part of the sustainable drainage design for the proposed scheme. These are typically 3.5 metres wide access tracks. Their locations within the proposed scheme are shown on Drawings A9P02-JAC-HGN-D_ZZZZZ_ZZ-FG-RD-0003 and A9P02-JAC-HGN-D_ZZZZZ_ZZ-FG-RD-0004 included in Volume 2: Engineering Drawings.

3.1.65 Details in relation to the SuDS features are provided in Chapter 4 (Engineering Assessment).

Structures

3.1.66 The structures listed below are either new, to be widened, or demolished and reconstructed. Their location within the proposed scheme is shown on Drawings A9P02-JAC-HGN-D_ZZZZZ_ZZ-FG-RD-0003 and A9P02-JAC-HGN-D_ZZZZZ_ZZ-FG-RD-0004 included in Volume 2: Engineering Drawings. A more detailed description of these structures is provided in Chapter 4 (Engineering Assessment).

Bridges

3.1.67 The proposed scheme incorporates the modification, extension or replacement of five existing bridges and one existing culvert. These structures are listed in Table 3-2 below.

Structure Reference	Approximate Mainline Chainage (m)	Proposed Works
Birnam Glen and Inchewan Burn Bridge	3460	To be demolished and replaced to accommodate the widened dualled alignment at this location. Minimum headroom: 3.1m.
River Braan Bridge	4330	To be demolished and replaced as the proposed vertical alignment is raised in this location. Minimum headroom: N/A.
Inver Mill Lade Culvert	4940	To be retained and extended to the north to accommodate a re-routed footpath in this area. Minimum headroom: N/A
Inver Rail Bridge	5750	To be retained and extended to the north to accommodate the new southbound carriageway. Minimum headroom: 4.88m.
Inch Rail Bridge	7370	To be retained and extended to the south to accommodate the new southbound carriageway. Minimum headroom: 4.775m.
River Tay Bridge	7550	To be retained with minor modifications to carry the northbound carriageway and a new, parallel structure provided alongside to carry the new southbound carriageway. Minimum headroom: N/A.

Table 3-2: Proposed works to existing Bridges

3.1.68 In addition to these, five new bridges and an underpass will be built within the proposed scheme as listed in Table 3-3.

Structure Reference	Approximate Mainline Chainage (m)	Proposed Works
Murthly Estate Bridge	880	New structure to carry the dualled A9 over the new Murthly Estate Access Track following the closure of the existing at-grade local access. Minimum Headroom: 5.3m.
Birnam Junction Bridge	2200	New structure at Birnam Junction to carry the proposed dualled carriageway over the B867 / Perth Road connection, Minimum Headroom: 5.3m.
Dunkeld and Birnam Station Underpass	3340	New pedestrian underpass to provide connectivity to Dunkeld and Birnam Railway Station beneath the proposed dualled carriageway.

Structure Reference	Approximate Mainline Chainage (m)	Proposed Works
		Minimum Headroom: 3.0m.
Dalguise Junction Bridge	6950	New structure at Dalguise Junction to carry the proposed dualled carriageway over the B898, Minimum Headroom: 5.3m.
Dalguise Access Track Rail Bridge	Adj. 7030	New structure to carry the proposed Dalguise Access Track below the Highland Main Line railway, Minimum Headroom: 3.9m.

Table 3-3: Proposed new Bridges and Underpasses

Retaining Walls

3.1.69 There are a number of locations where retaining walls have been incorporated into the proposed scheme to reduce the extent of earthworks required as listed in Table 3-4.

Structure Reference	Approximate Mainline Chainage (m)	Proposed Works
Dunkeld and Birnam Station Car Park Retaining Wall	Adj. 3320-3360	A new retaining wall approximately 40m in length with a retained height of up to 3.5m will be provided at the north side of the proposed station car park, to minimise encroachment of the cutting slope into adjacent private property.
Dunkeld and Birnam Station Retaining Wall	3280-3380	A new retaining wall approximately 100m in length with a retained height of up to 5.5m will be provided at the rear of the southbound verge of the A9 dual carriageway to accommodate the level difference between the proposed dualled alignment and the proposed station car park.
Birnam Retaining Wall	3500-3850	A new retaining wall approximately 350m in length with a retained height of up to 5.2m will be provided at the rear of the northbound verge to prevent encroachment of the cutting slope into Network Rail land.
A822 Retaining Wall	3960-4040 (A822 Ch. 030-105)	A new retaining wall approximately 75m in length with a retained height of up to 4.4m will be provided at the rear of the northbound verge of the realigned A822 to prevent encroachment of the cutting slope into Network Rail land.
A923 Retaining Wall	4020-4050 (A923 Ch. 060-130)	A new retaining wall approximately 70m in length with a retained height of up to 3.0m will be provided at the rear of the northbound verge of the realigned A923 to accommodate the level difference between the A923 and the adjacent Birnam Walk.
River Braan North Retaining Wall	4370-4516	A new retaining wall approximately 146m long in length with a retained height up to 7.8m will be provided at the rear of the southbound verge to retain the A9 to accommodate the new

Structure Reference	Approximate Mainline Chainage (m)	Proposed Works
		WCH route from the southbound bus lay-by which runs alongside the A9.
Inver Mill Lade Culvert Retaining Wall	4870-4980	A new retaining wall approximately 110m in length with a retained height of up to 9.0m will be provided at the rear of the southbound verge to prevent encroachment of the embankment into the adjacent riverside area.

Table 3-4: Proposed Retaining Walls

Culverts

3.1.70 A number of existing minor watercourses cross under the proposed scheme, as outlined in Table 2.6 in Chapter 2, will require the existing culverts to be widened, extended or re-constructed in order to maintain the crossing as shown in Table 3-5.

Culvert Reference	Approximate Mainline Chainage (m)	Watercourse Number	Proposed Action	Culvert Diameter/height (mm)
WF01	-125	WF01	6m extension upstream	1800
WF05	1735	WF05	35m Extension upstream	600
WF05A	1970	WF05A	26m extension upstream	1000
WF05B	1790	WF05B	27m extension downstream	1000
WF07	2430	WF07	Removal of existing A9 culvert, to be replaced with new culvert, to be 153m in length.	1800
WF09	4095	WF09	Removal of existing A9 culvert to be replaced by two new culverts, 55m and 26m in length separated with an open channel section.	1800
WF12B	6580	WF12B	Replacement culvert 132m in length	1800

Culvert Reference	Approximate Mainline Chainage (m)	Watercourse Number	Proposed Action	Culvert Diameter/height (mm)
WF13	6865 (newly proposed position)	WF13	Newly aligned culvert 190m in length.	1800
WF14A	7430	WF14	3.1m extension upstream	1800
WF16	7995	WF16	Replacement culvert 48m in length	1200
WF18	8355	WF18	Replacement culvert 43m in length	1800

Table 3-5: Culvert Extensions and Replacements

3.1.71 In addition, flood relief culverts are proposed at various locations across the scheme. Table 3-6 summarises the flood relief culverts within the proposed scheme.

Culvert Location	Purpose	Approximate Mainline Chainage (m)	Culvert Diameter (mm)
14 no. flood relief culverts north of River Braan Bridge	Improve connectivity between the River Braan and the proposed compensatory flood storage area and existing flood plain on the southbound side of the A9.	4450 - 4560	3600
3 no. flood relief culverts at Inver	Improve connectivity between the River Braan and the proposed compensatory flood storage area and existing flood plain on the southbound side of the A9.	4890 - 4900	1500

Table 3-6: Proposed Flood Relief Culverts

Drainage Features

3.1.72 The proposed road drainage provides two levels of road surface run-off treatment, primarily comprising of filter drains within the verges (and central reserve where required) to provide the first level of treatment and convey water from the carriageway. The second level of treatment is provided by SuDS features such as Detention Basin, Wetlands and Swales to attenuate the surface water run off.

3.1.73 At bridge structures, side roads and a localised area on the A9 mainline between Ch. 4160 - 4750 where it is not possible to provide filter drains, a combined drainage kerb solution has been utilised to convey the runoff to the proposed drainage network.

3.1.74 Twelve SuDS features are proposed within the scheme and have been identified by taking into consideration the site requirements and constraints. These locations are shown on Drawings A9P02-JAC-HGN-D_ZZZZZ_ZZ-FG-RD-0003 and A9P02-JAC-HGN-D_ZZZZZ_ZZ-FG-RD-0004 included in Volume 2: Engineering Drawings.

3.1.75 The drainage system within the proposed scheme at Dunkeld and Birnam Station Car Park includes a Hydrodynamic Vortex Separator (HVS), which is a proprietary treatment device designed to separate pollutants. This will be used in combination with geocellular storage to provide one level of treatment as there is insufficient space for any other form of attenuation and treatment.

3.1.76 The proposed scheme also includes provision of Pre-earthworks Drainage (PED) which comprises of ditches constructed at the top of cutting slopes or the toe of embankments where required by the design to prevent surface or ground water entering the works.

3.1.77 Further details of the proposed drainage features are included in Chapter 4 (Engineering Assessment) of this report.

Lay-bys

Parking Lay-bys

3.1.78 Two of the existing lay-bys as detailed in Chapter 2 Section 2.3 will be retained as part of the proposed scheme, all other existing lay-bys will be closed and removed.

3.1.79 The two lay-bys to be retained are located within the existing Pass of Birnam dual carriageway section of the A9 and will be upgraded to a Type A layouts in accordance with DMRB CD 169: The design of lay-bys, maintenance hardstandings, rest areas, service areas and observation platforms (hereafter referred to as CD 169) (DMRB, 2022b). The proposed lay-bys provide an increased length of parking area, when compared to the existing provision, and a physical segregation island. The two Type A lay-bys will be provided within the proposed scheme at the following locations:

- Northbound Carriageway: Ch. -345; and
- Southbound Carriageway: Ch. -575.

Bus Lay-bys

3.1.80 Only two bus lay-bys are located within the scheme extents, as detailed in Chapter 2 Section 2.3. These bus lay-bys will be retained as part of the proposed scheme, but relocated further south and will be designed in accordance with CD 169. The two relocated bus lay-bys will be provided within the proposed scheme at the following locations:

- Northbound Carriageway: Ch. 4,600; and
- Southbound Carriageway: Ch. 4,700.

Police Observation Platforms (POP)

3.1.81 Following consultation with Police Scotland locations have been identified where provision of a POP would be advantageous. However, these locations do not align with the standards and would

require a departure from standards. Provisions will be further refined in consultation with the relevant authorities.

Walking, Wheeling, Cycling and Horse-riding (WCH) Provision

3.1.82 The following design objectives described in the A9 Dualling Perth to Inverness NMU Access Strategy (Transport Scotland, 2016), rationalise the proposed scheme walking, cycling and horse-riding assessment and review into a single set of objectives for WCH provision on the A9 Dualling Programme. Non-Motorised Users (NMU) terminology has been replaced by Walking, Wheeling, Cycling, and Horse-riding (WCH) within the most recent guidance. The objectives are detailed below:

- There will be no surface (at-grade) crossings of the dualled A9;
- The integrity and sensitivity of existing NMU routes will be taken into account to inform the design process;
- Avoid permanent severance of Core Paths and rights of way, where possible;
- Maintain existing levels of NMU route connectivity and, where possible, improve for all types of users, including vulnerable users, such as children, the elderly and the disabled;
- Identify opportunities to integrate A9 dualling with existing NMU routes, public transport facilities and local communities within the corridor;
- Where not required by safety standards, remove barriers that may impede or restrict movement by all NMUs within the extent of the A9;
- Where achievable in line with safety standards, provide access to the NMU network from proposed enhanced lay-bys;
- Consider NMU access to, and interaction with, local features of interest to inform locations for lay-bys and public transport provisions;
- Where appropriate utilise redundant sections of carriageway as NMU routes and facilities;
- At crossings of the dualled A9, NMU routes will be rationalised and combined where possible;
- Junctions and accommodation works underpasses will be utilised, where possible, to provide safer NMU crossing points;
- Incorporate consideration of NMU requirements and provisions into the design of side roads and access diversions;

- Over or under road (grade separated) crossing points solely for NMUs will be provided where engineering, environmental, traffic and economic assessments, including site specific considerations, indicate this is justified; and

- Ensure movement of NMUs and their health and safety are not adversely impacted during construction or under permanent arrangements.

3.1.83 The needs of WCH users have been considered throughout the development of the proposed scheme, with various features incorporated into the design to maintain and improve existing WCH routes.

3.1.84 The proposed scheme design incorporates 19 new WCH provision and realignments of existing WCH provision, as described in Table 3-7 and shown on Drawings A9P02-JAC-ENM-D_ZZZZZ_ZZ-FG-RD-0001 and A9P02-JAC-ENM-D_ZZZZZ_ZZ-FG-RD-0002 included in Volume 2: Engineering Drawings.

Existing WCH route Description	WCH Route Type	Main Users[1]	Description of Proposed Routes
A Local Path utilises an existing access track off the B867 and Murthly Estate Access track, to link between the B867 and Roman Bridge Cottage, crossing the A9 at-grade. No dedicated crossing provision across the existing A9 Carriageway is provided at this location.	Local Path	Pedestrians, Cyclists	The proposed realignment of Murthly Estate Access Track and the addition of Murthly Estate Bridge provides an opportunity to create a new WCH grade separated crossing of the A9 carriageway between the B867 and the existing Murthly Estate Access Track on the southbound side of the A9 carriageway.
A number of Local Paths are located between the southbound carriageway of the existing A9 and the River Tay. However, some of these paths do not connect together.	Local Path	Pedestrian	New WCH provision is proposed between Core Path DUNK/10 to the southwest of the Sewage Works, and the Local Paths at Dalpowie Plantation. This forms a circular link between the Local Paths in this area.
Core Path DUNK/142 and NCN77 utilise dedicated WCH provision in the northbound verge of the existing A9 carriageway, between the existing Birnam Junction and the existing left-in, left-out to Dunkeld and Birnam Train Station. These routes then continue through the existing station car park before utilising dedicated WCH provision between the car park and Birnam Glen Road.	Core Path, National Cycle Network (NCN)	Pedestrians, Cyclists, Equestrians	Dedicated WCH provision between the realigned B867 and the proposed Network Rail Maintenance Access Track is proposed in the northbound verge of the proposed A9 carriageway. These routes will continue along the Network Rail Maintenance Access Track before utilising the realigned dedicated WCH provision between the access track and Birnam Glen.
Core Path DUNK/57 utilises dedicated WCH provision in the northbound verge of the existing A9 carriageway and then between	Core Path	Pedestrians, Cyclists	The proposed realignment of Birnam Junction and the addition of Birnam Junction Bridge provides an opportunity to create a new WCH

Existing WCH route Description	WCH Route Type	Main Users[1]	Description of Proposed Routes
the southbound verge of the existing A9 carriageway and Perth Road, crossing the A9 at-grade. No dedicated crossing dedicated provision across the existing A9 Carriageway is provided at this location.			grade separated crossing of the A9 carriageway along the B867/Perth Road, with dedicated WCH provision proposed in the northbound verge. This WCH provision is proposed to be extended approximately 350m south of the tie in to DUNK/142/NCN77 to connect with DUNK/14 at Birnam Quarry, creating a new WCH link.
Core Path DUNK/10 utilises dedicated detached WCH provision between the Sewage Works Access Track and Perth Road, connecting to DUNK/57 and DUNK/103 on Perth Road. DUNK/103 continues towards Birnam in the southbound verge of Perth Road with no dedicated WCH provision.	Core Path	Pedestrians, Cyclists, Equestrians	The proposed realignment of the Sewage Works Access Track provides WCH access between the access track and Perth Road, with no dedicated WCH provision required. The proposed realignment of Perth Road provides the opportunity for dedicated WCH provision to be included within the southbound verge of Peth Road between the top of the Sewage Works Access Track and Birnam.
N/A	N/A	N/A	The proposed Dunkeld & Birnam Station Pedestrian Underpass between the proposed car park at the top of Station Road and platform 2 of Dunkeld and Birnam Train Station provides a new dedicated WCH grade separated crossing of the A9.
A Local Path utilises dedicated WCH provision between the top of Station Road and Birnam Glen.	Local Path	Pedestrians, Cyclists	The proposed relocation of the station car park results in a minor realignment of this Local Path and provides step free access.
Core Path DUNK/11 and NCN77 cross under the A9 carriageway along Birnam Glen with no dedicated WCH provision. This is an existing WCH grade separated crossing. Additionally, there is existing dedicated WCH provision in the southbound verge of Birnam Glen under the existing A9 carriageway. This connects into the Local Path on the southbound side of the A9 carriageway and the Core Path DUNK/142 and NCN77 on the northbound side of the carriageway, however, there is a level difference between the dedicated WCH provision and Birnam Glen carriageway so DUNK/11 and NCN77 cannot utilise it.	Core Path, NCN	Pedestrians, Cyclists, Equestrians	The proposed Birnam Glen Bridge provides a replacement WCH grade separated crossing of the A9 carriageway along Birnam Glen Road. A direct replacement of the existing provision is proposed to be provided along Birnam Glen, with DUNK/11 and NCN77 utilising the carriageway, with the dedicated WCH provision connecting the Local Path and Core Path on either side of the carriageway only.

Existing WCH route Description	WCH Route Type	Main Users[1]	Description of Proposed Routes
N/A	N/A	N/A	The proposed realignment of the A822 and Unclassified Road to Inver arms of Dunkeld Junction Roundabout provides an opportunity to include dedicated WCH provision in the carriageway verges between the Highland Main Line railway structure over the A822 and Core Path DUNK/23 on the Unclassified Road to Inver.
Dedicated footway in the southbound verge of the junction between the A923 and Perth Road	N/A	Pedestrians	The proposed realignment of this junction results in a minor realignment of this footway.
Core Path DUNK/59 and DUNK/144 utilise dedicated footway provision in the northbound verge of the junction between the A923 and Little Dunkeld Road.	Core Path	Pedestrians	The proposed realignment of this junction results in a minor realignment of this footway.
Core Paths DUNK/59 and DUNK/23 utilise dedicated detached WCH provision between Little Dunkeld Road and the Unclassified Road to Inver, crossing under the existing A9 carriageway on the south bank of the River Braan. This is an existing WCH grade separated crossing.	Core Path	Pedestrians, Cyclists, Equestrians	The proposed realignment of the A9 carriageway in this area results in a minor realignment of this WCH provision. Replacement of dedicated detached WCH provision will be provided throughout.
Core Path DUNK/23 crosses the River Braan on a dedicated WCH bridge. However, this bridge was washed away during a flood event in 2023, and no replacement crossing has been reinstated.	Core Path	Pedestrians, Cyclists, Equestrians	The proposed River Braan Bridge provides the opportunity to include dedicated WCH provision in both the northbound and southbound verges of the proposed A9 carriageway. The dedicated WCH provision in the northbound verge of the proposed A9 runs between the connection point of Core Paths DUNK/23 and DUNK/63 on the Unclassified Road to Inver and the proposed relocated northbound bus layby. New dedicated WCH provision will also link the bus layby to DUNK/137 on Inver Maintenance Access Track (South). The dedicated WCH provision in the southbound verge of the proposed A9 runs between the realigned Core Path DUNK/59 and the proposed realigned southbound bus layby. Dedicated WCH provision will also link the bus layby to DUNK/23 and DUNK/137.

Existing WCH route Description	WCH Route Type	Main Users[1]	Description of Proposed Routes
Core Paths DUNK/137 and DUNK/23 utilise dedicated detached WCH provision between Inver and the southern bank of the River Tay, via the western bank of the River Braan, crossing under the existing A9 carriageway. This is an existing WCH grade separated crossing.	Core Path	Pedestrians, Cyclists, Equestrians	The proposed dualling results in this WCH provision to be realigned. The proposed design realigns and widens these Core Paths to become Inver Maintenance Access Track (South) as described in Paragraph 3.1.60, suitable for maintenance vehicles as well as WCH users between Inver and the southbound side of the A9. The proposed River Braan Bridge provides a replacement WCH grade separated crossing of the A9 carriageway in this location. On the southbound side of the A9, the proposed compensatory flood storage area results in a minor realignment of DUNK/23. Replacement of dedicated detached WCH provision will be provided throughout this section.
Core Path DUNK/64 utilises dedicated WCH provision in the northbound verge of the existing A9 carriageway between Inver and The Hermitage junction.	Core Path	Pedestrians, Cyclists, Equestrians	The proposed realignment of the A9 carriageway towards the River Tay in this area provides the opportunity to realign this WCH provision to provide dedicated detached WCH provision between Inver and The Hermitage junction.
Core Path DUNK/100 and NCN77 utilise dedicated WCH provision in the northbound verge of the Dalguise junction, River Tay Underbridge and to approximately 200 metres north of the River Tay Underbridge. From there DUNK/100 and NCN77 share a detached cycle track which loops back through 180° to cross under the existing A9 carriageway. This is an existing WCH grade separated crossing.	N/A	N/A	The safety concerns relating to DUNK/100 and NCN77 raised through consultations with WCH groups and the local public, results in a significant realignment of this WCH provision. Starting on the south of the River Tay Bridge, the proposed realigned route for this DUNK/100 and NCN77 begins at the existing location on the B898, where DUNK/100, DUNK/65 and DUNK/23 connect. The route then travels south on dedicated WCH provision in the southbound verge of the proposed realigned B898, crossing under the proposed A9 and then over the Dalguise Junction southbound diverge into Inverwood Access Track (North). The route then travels north along Inverwood Access Track (North) without any dedicated WCH provision, and before continuing north at the end of the

Existing WCH route Description	WCH Route Type	Main Users[1]	Description of Proposed Routes
			access track on detached WCH provision to the southbound verge of the proposed A9. Continuing north on dedicated WCH provision in the A9 southbound verge, the route crosses the River Tay before looping back 180° on detached WCH provision to connect into DUNK/145 on the east bank of the River Tay. The proposed realignment of the B898 and addition of Dalguise Junction Bridge provides an opportunity to create a new WCH grade separated crossing of the A9.
N/A	N/A	N/A	The proposed Inverwood Access Track (North) provides the opportunity to add a new WCH link between DUNK/23 on the western bank of the River Tay and Inverwood Access Track (North). This provision also links to the new WCH provision through Dalguise Junction, and allows access to the fishing area on the bank of the River Tay.

[1] Although predominant users of the paths are identified, it should be noted that access is not limited to a single user group

Table 3-7: WCH Routes

3.1.85 For details of the wider WCH routes, refer to Chapter 9 (People and Communities – All Travellers) of the EIAR.

Public Transport Facilities

3.1.86 There are two bus lay-bys on the existing A9 at Inver, one on the northbound carriageway and one on the southbound carriageway. As part of the proposed scheme, these bus lay-bys will be relocated as described in Paragraph 3.1.80.

3.1.87 The proposed scheme will support connection to the existing bus stops on Perth Road and will also provide the potential opportunity for new bus turning and bus stop facilities at the replacement Dunkeld & Birnam Station car park.

3.1.88 The proposed scheme will also facilitate connection to Dunkeld and Birnam Station via a new underpass from the replacement car parking facility.

3.2 Do-Minimum Definition

3.2.1 If the proposed scheme is not constructed, the situation describing future conditions is termed the 'Do-Minimum' scenario. The 'Do-Minimum' scenario has been agreed with Transport Scotland to include maintenance of the existing road over a 60-year appraisal period, as well as specific minor improvement schemes in the surrounding area. This acts as a baseline scenario to allow a comparison between the cost and impact of the proposed scheme and the existing scheme over a 60-year period, to ensure that the operation, maintenance and lifecycle costs of not progressing with the proposed scheme are taken into account in the appraisal of the proposed scheme.

3.2.2 For the 'Do-Minimum' scenario, the guidance contained within the Guidance for Estimating Routine Operation and Maintenance and Lifecycle Costs (Transport Scotland - Cost Estimating & Risk Working Group, 2016) has been utilised to define the operation and maintenance costs as per the following:

- The costs of **routine maintenance** activities;
- The costs of **routine operation** of the highway assets;
- The costs of **asset renewals**; and
- An assessment of the **betterment**.

3.3 Cost Estimate

3.3.1 The cost estimate range has been prepared for the proposed scheme in accordance with the Transport Analysis Guidance (Department for Transport, 2024) and is reported in Table 3-8. The quantifiable items of the works have been measured and a cost per unit has been based on rates from similar projects and published data to a base rate of Q3 2023. Other works elements have been assessed as a percentage of the total construction costs.

3.3.2 The total outturn cost estimate is the sum of:

- Pre-construction phase costs, including Design and Preparation, Advanced Works and Land Costs;
    - Professional fees – including all consultants and other advisors appointed in respect of the Proposed Scheme during both preparation and site supervision stages;
    - Survey costs – including ground investigations;
    - Land purchase and compensation payments; and
    - District valuer and legal costs.

- Construction phase costs (including any non-recoverable VAT);
- Risk, opportunity and uncertainty; and
- Inflation through to the end of the construction phase.

3.3.3 A comprehensive list of project risks and opportunities have been considered in the cost estimates. These risks and opportunities were evaluated with potential impact and potential likelihood assessed to establish an overall risk profile. The analysis was undertaken to generate appropriate risk allowances to apply to cost estimates in line with HM Treasury Guidance.

3.3.4 The range of costs presented i.e. “minimum” and “maximum” estimates within Table 3-8 were developed from these risk range values.

3.3.5 Operation and maintenance costs are not included in the total outturn cost estimate, however these have been included in the appraisal of the economic performance of the proposed scheme included in Chapter 7 (Economic Performance of Scheme) of this report.

3.3.6 In line with guidance for costs associated with construction schemes, the proposed scheme costs range from £409 million to £468 million. These can be seen in Table 3-8, all costs listed are in £ millions.

Cost Element	Minimum £M	Maximum £M
Historic Costs to Date (May 2025)	41.9	
PRE-CONSTRUCTION PHASE		
Design and Preparation Costs	6.0	
Advanced Works	10.1	
Land Costs	4.5	
TOTAL PRE-CONSTRUCTION COSTS	20.6	
CONSTRUCTION PHASE		
Preliminaries & Indirect Costs	52.4	
Roadwork Series	75.4	
Structures	82.7	
Tunnels, Special Structures	3.6	
Statutory Undertakers and Authorities	7.1	
Client’s Costs During Construction	32.1	
TOTAL CONSTRUCTION PHASE COSTS	253.3	

Cost Element	Minimum £M	Maximum £M
Gross project Cost (excl. third party contributions & any other project income)	273.9	
NETT PROJECT COST (incl. third party contributions & any other project income)	273.9	
Risk, opportunity and Uncertainty	11.6	70.0
NETT PROJECT COST INCLUDING RISK, OPPORTUNITY & OPTIMUM BIAS	285.5	343.9
Total Inflation to Then Year of Spend	82.2	82.2
TOTAL OUTURN COST ESTIMATE, THEN YEAR PRICES	**409.6**	**468.0**

Table 3-8: Cost Estimate (base year Q3 2023).

3.4 References

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