

## **5 The Proposed Scheme**

### **5.1 Introduction**

- 5.1.1 This chapter provides a description of the DMRB Stage 3 proposed scheme design as assessed and reported in the ES, including a summary of the likely methods and programme of its construction.
- 5.1.2 Background is also provided in this chapter on the anticipated procurement process, Transport Scotland's sustainable development policy for the A9, and on existing and projected traffic conditions.

### **5.2 Background**

#### **Scheme Procurement**

- 5.2.1 It is likely that the proposed scheme will be procured by means of a Design and Build (D&B) type contract. Under the terms of this contract type, the Contractor will undertake both the detailed design and construction of the proposed scheme. Responsibility for operating and maintaining the trunk road would remain with the Scottish Government. Responsibility for operating and maintaining side roads would remain with Perth & Kinross Council on completion of the proposed scheme. Both the Scottish Government and Perth & Kinross Council may appoint agents to operate and maintain the respective road networks on their behalf.
- 5.2.2 Under a D&B type contract, a specimen (outline) design is prepared for the proposed scheme, which the appointed Contractor(s) can optimise as the detailed design is developed. Such optimisation must be within the constraints imposed by the ES including the Schedule of Environmental Commitments (Chapter 21), which contains the mitigation measures identified through the EIA process; Statutory Orders (such as land acquisition); and any specific limits set within the contract documents. This will ensure that the detailed design will be implemented in compliance with this ES.
- 5.2.3 Optimisation of the proposed scheme design will still be deemed to comply with this ES provided that any design changes have been subject to environmental review to ensure that the residual impacts would not be greater than those reported in this ES, and subject to Transport Scotland's acceptance of the design changes and the findings of any such review.

#### **Sustainable Development Policy**

- 5.2.4 Consideration of sustainable development issues have and will continue to form an important element of all activities undertaken in the proposed scheme's life cycle, including:
- project design and appraisal;
  - procurement;
  - construction;
  - maintenance; and
  - operation (and decommissioning).
- 5.2.5 The A9 Dualling SEA Post Adoption Statement (Transport Scotland, 2014) included a range of Environmental Design Principles, based on a review of relevant plans, policies and strategies. The agreed environmental principles were reported in full through the Post Adoption Statement. These environmental principles include several of particular relevance to sustainable development, with some key examples provided below:
- promote local/sustainable sourcing of materials;
  - promote sustainable design and innovation to reduce material consumption;
  - avoid and minimise waste generation; and
  - maximise re-use of material resources and use of recycled materials.

5.2.6 The A9 Dualling Sustainability Strategy (Transport Scotland, 2016a) aims to deliver the A9 Dualling Programme as a model of modern infrastructure development, with sustainability embedded through all stages of the delivery process. The sustainability vision for the A9 Dualling Programme is to deliver:

*‘An A9 that connects people, business and communities, respects the natural environment of the corridor and makes a contribution to creating a successful and sustainable Scotland.’*

### 5.3 Traffic Conditions

5.3.1 The existing traffic conditions of the current A9 carriageway are noted in Section 2.5 (Local Context for Dualling) of Chapter 2 (Need for the Scheme), based on 2015 modelled data.

5.3.2 The proposed scheme as part of the A9 Dualling Programme is classed as the ‘Do-Something’ scenario. Traffic forecasting techniques were applied to enable the traffic impacts of the A9 Dualling to be considered against the ‘Do-Minimum’ scenario (i.e. if the proposed scheme were not to proceed). Traffic projections were provided as the latest available (2014 outputs of the Transport Model for Scotland (TMfS)). TMfS is a strategic modelling tool, developed and made available by Transport Scotland for the purposes of assessing the influences of land-use and transport policies on traffic demand.

5.3.3 The flow in 2041, 15 years after the first full year of operation (2026) of the A9 Dualling Programme, includes the effect of the full A9 Dualling Programme and is considered to represent the most robust (worst-case scenario) figures for the purposes of the EIA as reported in this ES. Table 5.1 details the Do-Minimum and Do-Something traffic flows on the Tay Crossing to Ballinluig section of the A9 Dualling Programme.

**Table 5.1: AADT Traffic Flows for Tay Crossing to Ballinluig (Two-way flows)**

Location	Do-Minimum			Do-Something	
	Year 2015	Year 2026	Year 2041	Year 2026	Year 2041
Start of proposed scheme (north of Dunkeld)	14,600	17,100	18,100	23,500	24,900
A9 between C502 Junction and Guay	15,300	18,000	18,800	23,900	25,300
A9 between Guay and Kindallachan	15,300	18,000	18,800	23,900	25,400
A9 between Kinadallachan and Westthaugh of Tulliemet	15,300	17,900	18,900	24,000	25,500
End of proposed scheme (south of Ballinluig)	15,300	18,000	18,800	24,000	25,400

### 5.4 Description of the Proposed Scheme

5.4.1 An overview of the proposed scheme design assessed within this ES is shown on Figure 5.1 with engineering drawings showing the horizontal and vertical alignment of the proposed scheme are provided in Annex A of Appendix A5.1 (Construction Information). Throughout this ES, references are made to chainage (shortened to ‘ch’, for example ch1500), which is a reference to the number of metres from the starting point of the proposed scheme, from south to north. Chainages are also shown on the ES Figures and referred to in the description below.

5.4.2 As explained in Chapter 3 (Alternatives Considered), the preferred route for the proposed scheme was identified following the DMRB Stage 2 assessments, which included an assessment of the potential environmental constraints associated with a number of route options. This was then subject to iterative design development as summarised in Chapter 4 (Iterative Design Development), taking into account the recommendations of environmental specialists, input from the consultation process, and the results of traffic, structural, geotechnical and drainage studies.

5.4.3 The existing 7.7km single carriageway section of the A9 from Tay Crossing to Ballinluig is to be widened to a D2AP (dual carriageway rural all-purpose), with a 0.5km section of single carriageway included at the southern extents of the scheme to tie in to the existing single carriageway. The dualling has been designed as a DMRB Category 7A road with design speed of 120kph, in accordance with DMRB Volume 6, Section 1, Part 1, TD9/93 – Amendment No 1: Highway Link Design (Highways Agency et al, 2002). The dualling provides two lanes in each direction, separated by a central reserve; a more detailed description is provided in the following section.

### **A9 Mainline Carriageway Widening**

- 5.4.4 The A9 Dualling Programme: Tay Crossing to Ballinluig involves widening of the A9 over two distinct sections:
- The Tie-in to Pass of Birnam to Tay Crossing Section (P02) including the A9 Southern Tie-in Interim Roundabout (approximately ch0 to ch700); and
  - North of A9 Southern Tie-in Interim Roundabout to the northern tie-in to the existing dual carriageway at Ballinluig (approximately ch700 to ch8200), predominantly comprising southbound widening for approximately 7.5km with a 'best fit' alignment through Dowally.
- 5.4.5 The mainline will comprise of a dual carriageway with 2.5m verges and two lanes of 3.65m width in each direction, plus a 1m hardstrip to both the inside and outside lanes in each direction and a typically 2.5m wide central reservation separating each carriageway. Both the verges and central reserve will be widened as necessary for visibility. Technical engineering detail on the carriageway cross-sections utilised within the DMRB Stage 3 design are provided within the DMRB Stage 3 Scheme Assessment Report Part 2: Engineering, Traffic and Economic Assessment (Jacobs, 2018).
- 5.4.6 The existing A9 mainline has numerous direct accesses linking to side roads and to land and properties along the route. Once this is upgraded to dual carriageway, the majority of these accesses will be stopped up to meet the desired design and safety standards. As explained in paragraphs 5.4.7 to 5.4.11, alternative access to and from the A9 mainline will be provided by four junctions and four at-grade accesses, and via the existing side road and access track network.

### **A9 Junction Provision**

- 5.4.7 There are four junctions to be provided as part of the proposed scheme, as follows:
- A9 Southern Tie-in Interim Roundabout (ch620) consisting of an interim at-grade roundabout providing a transition from single to dual carriageway pending construction of Dalguise Junction as part of the Pass of Birnam to Tay Crossing project (Project 02) if that is consutrcted after the proposed shceme and providing a safe turning facility from the Dunkeld to Rotmell (C502) Road Junction travelling northbound;
  - The Dunkeld to Rotmell (C502) Road Junction (ch3220) providing a left-in left-out junction on the A9 southbound carriageway. This junction will allow travellers heading south to exit the A9 onto the C502 and for travellers from the C502 to enter the A9 southbound carriageway;
  - Guay South Junction (ch4800, northbound side) providing access from/to the northbound carriageway from/to Dowally, Guay and Kindallachan; and
  - Kindallachan Direct Access (ch5790, southbound side) providing access from/to the southbound carriageway from/to Dowally, Guay and Kindallachan.
- 5.4.8 There are four at-grade accesses to be provided as part of the proposed scheme, as follows:
- Left-in Left-out to Dalmarnock Fishing Bothy 1 (ch990, northbound side);
  - Left-in Left-out to Dalmarnock Fishing Bothy 2 (ch2760, northbound side);
  - Left-in Left-out to Haugh of Kilmorich (ch7200, northbound side); and
  - Left-in Left-out to Haugh Cottages, Westhaugh of Tulliemet and House of Bruar Mail Order Warehouse (ch7620, northbound side).

### **Side Road Amendments/Upgrades**

- 5.4.9 Side roads will be upgraded as necessary to provide access from the existing road network to the mainline of the proposed scheme. Upgrades may involve simple resurfacing or may require realignment and other improvements.
- 5.4.10 Table 5.2 details the side road upgrades forming part of the proposed scheme. Chapter 8 (People and Communities: Community and Private Assets) outlines the expected diversions people travelling to

residential areas and commercial/industrial businesses would undergo as a result of the side road amendments.

**Table 5.2: Proposed Side Road Amendments**

Side road name	Approximate mainline chainage	Cross-section
Dowally to Kindallachan Side Road	ch4050 to ch5950	5.5m wide carriageway (approx.) and 2.5m verges
Dowally-Guay South Overbridge	ch4700	9.4m wide carriageway (approx.) and 2m verges
Dowally to Guay Link Road	ch4820	9.4m wide carriageway (approx.) and 2m and 2.5m verges
Tie in to U163 Guay to Tulliemet Road	ch5020	3.5m wide carriageway (approx.) and 1m verges
Kindallachan Direct Access	ch5780	9.4m wide carriageway (approx.) and 2m verges

- 5.4.11 Replacement car parking for Dowally Church including a bus turning facility are provided on the Dowally to Kindallachan side road adjacent to Dowally Church.

### Access to Land and Properties

- 5.4.12 A number of rural properties, including farms, are located along the proposed scheme. Through consultation with residents and landowners, revised accesses are proposed to tie into the existing road network or onto the A9 main carriageway via the left-in left-out, at-grade junctions described above.
- 5.4.13 Table 5.3 details the revised access provision forming part of the proposed scheme.

**Table 5.3: Proposed Access Amendments**

Access name	Approximate mainline chainage and Figure reference	Cross-section
Tay Crossing Access Track	ch600 to ch800	As existing: 0.5m verge, 2.5m carriageway
Fishing Bothy 1 Access and Track	ch920 to ch1000	1m verge, 3.5m carriageway
Fishing Bothy 2 Access and Track	ch2770 to ch2830	0.5m and 1m verges, 3.5m carriageway
Dowally Farm Access Track	ch4050	1m verge, 5.5m carriageway
Dowally North Access Road	ch4280	As existing: 1m verge, 3m carriageway
Balnabeggan Access	ch4500	As existing: 6m carriageway
Dowally Farm Access Road	ch4220 to ch4700	2m verge, 5.5m carriageway
Network Rail Access Track	ch4820 to ch5240	1m verge, 3.5-5m carriageway
Guay Farmhouse Access Road	ch5300	1m verge, 3m carriageway
Kindallachan North Access Road	ch6800 to ch 6970	1m verge, 3m carriageway
Haugh of Kilmorich Access and Track	ch7050 to ch7200	1m verge, 3m carriageway
Inch Farm Access Road 1	ch7500 to ch7600	2m verge, 3.5-5.5m carriageway
Westhaugh of Tulliemet Farm Access Track	ch7700	2m verge, 12m at bellmouth tapering to 4.5m carriageway
Inch Farm Access Road 2	ch7630 to ch7710	2m verge, 3.5-5.5m carriageway
Westhaugh of Tulliemet Access	ch7700	As existing: 5.4m carriageway
Cuil-an-Duin Access	ch7930 to ch8200	0.5m and 1.5m verges, 3.4m carriageway

### Pedestrian, Cyclist and Equestrian Provision

- 5.4.14 Alternative and new NMU path alignments, which include provision for pedestrians, cyclists and equestrians, have been considered throughout the design process and form part of the proposed scheme design. The NMU Access Strategy (Transport Scotland, 2016b) sets out several objectives with regards to NMU access provision during construction and operation as part of the A9 Dualling Programme and which have been considered throughout the design development of the proposed scheme. This links back to Objective 3 outlined in Section 2.4 (A9 Dualling Programme Review)

(Chapter 2: Need for the Scheme), providing the ability to 'facilitate active travel within the corridor' of the proposed scheme.

5.4.15 The paths that currently cross the existing A9 were derived from the Perth & Kinross Council (PKC) Core Path Plan (PKC, 2012), Right of Way data from Scotways and local designated and undesignated paths identified by Jacobs through consultation. The path realignments and new alignments are summarised below and illustrated on Figure 9.2. Further details are provided in Chapter 9 (People and Communities - All Travellers):

- ch600 to ch800: Local Path (Path 63) realigned along Tay Crossing Access Track;
- ch900 to ch1000: Local Path (Path 63) realigned along Fishing Bothy 1 Access Track;
- ch3050 to ch4300: Core Path (Path 56) and Regional Cycle Route (RCR83) realigned along new segregated path;
- ch4660 to ch5400: Regional Cycle Route (RCR83) realigned along Dowally to Kindallachan Side Road; and
- ch6820 to ch7920: Core Path (Path 65) and Regional Cycle Route (RCR83) realigned along Kindallachan to Ballinluig footpath and Cuil-an-Duin Access Road.

### **Bus Stop Provision**

5.4.16 There are two permanent bus stops on the existing A9 carriageway at Kindallachan, shown on Figure 9.1, which currently provide links between Kindallachan, Ballinluig, Pitlochry and Perth. These will be lost to the proposed scheme. During construction, replacement bus stops will be provided at a safe location with safe access provided for NMU's. During operation, two replacement bus stops are included as part of the proposed scheme:

- northbound bus stop on the carriageway north of Dowally Farm (approx. ch4450); and
- southbound bus stop on the carriageway south of Guay (approx. ch5150).

5.4.17 Access to northbound and southbound bus stops for NMU's are facilitated via the Guay South Overbridge.

5.4.18 Bus stops are included on the Dowally to Kindallachan Side Road south of Kindallachan and at Dowally. This will enable buses to serve the communities of Dowally, Guay and Kindallachan, providing connections to Ballinluig and Pitlochry. The link to Pitlochry will also enable connections to be made to long distance routes such as Perth, Edinburgh, Glasgow and Inverness.

### **Overbridge Structures**

5.4.19 The Guay South Overbridge is proposed to provide vehicular and NMU access over the proposed scheme at ch4700 (refer to Figure 5.1c) and has been designed to accommodate high loads route headroom clearance on the main alignment and single carriageway width for the Dowally – Guay Link Road. The Guay South Overbridge links to the Dowally – Guay Link Road which joins with the Dowally to Kindallachan Side Road at a T-junction on the east side of the proposed scheme. The Dowally Farm Access Road and the Network Rail Access Track also link to the Guay South Overbridge and Dowally – Guay Link Road. The Dowally – Guay South Overbridge, associated side roads and access roads/tracks allow the settlements of Dowally, Guay and Kindallachan on the east side of the proposed scheme to access the northbound carriageway. Similarly the proposed overbridge, side roads and access roads/tracks allow vehicle movements from Dowally Farm on the west side of the proposed scheme to the southbound carriageway and from the southbound carriageway to Dowally Farm.

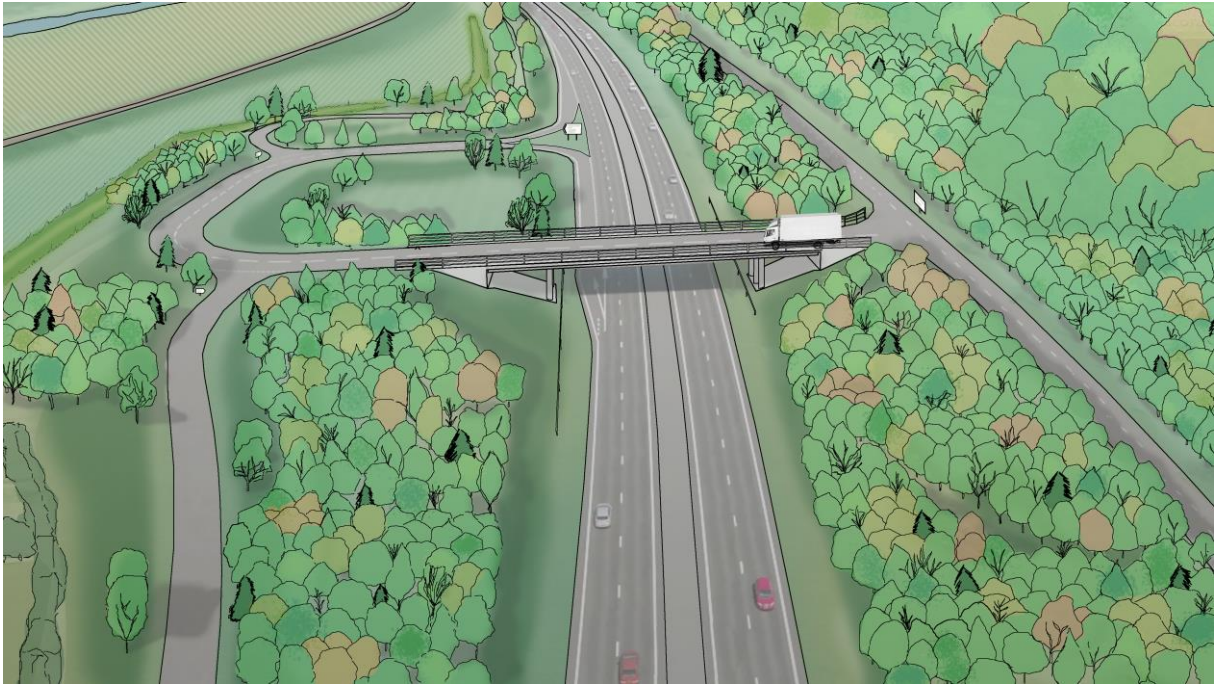
5.4.20 The structures design will be informed by strategic design guidance currently being prepared for the wider A9 dualling, and is anticipated to include the following key requirements:

- three span overbridge with no central pier;
- constant depth deck ;

- quarter-height abutments with verticle faces;
- patterned profile type finish on all exposed vertical concrete surfaces; and
- ground slope in the shadow of the overbridge finished in locally sourced natural stone.

5.4.21 Image 5.1 illustrates the design of the Guay South Overbridge with additional information on the likely construction methods provided in Appendix A5.1 (Construction Information).

**Image 5.1 Artist impression of the proposed Guay South Overbridge**



### **Underbridge Structures**

- 5.4.22 One underbridge structure, Kindallachan Underbridge (ch6080), is required to facilitate the proposed scheme crossing the Kindallachan Burn.
- 5.4.23 Appendix A11.8 (Watercourse Crossings Report), provides more information on the design approach for underbridge structures while Figures A11.8.1-A11.8.29, part of Appendix A11.8 (Volume 2 of the ES), provide general arrangement drawings of the underbridge structure.

### **Earthworks**

#### Cuttings and Embankments

- 5.4.24 Where the completed A9 carriageway is higher or lower than the surrounding ground level, embankments or cuttings will be required. Reducing the gradient of embankments (referred to as 'grading out') has been considered along the route to reflect local landform and aspects such as surrounding land use or other environmental constraints. Similarly, cuttings have been designed to take account of their visibility for road users and others along the A9 corridor. Further information on the design of embankments and cuttings is provided in Chapter 13 (Landscape).
- 5.4.25 The location (chainages) of the key cuttings and embankments in the DMRB Stage 3 design are shown on Figure 5.1, and summarised in Table 5.4 and Table 5.5 respectively.

**Table 5.4: Key Road Cuttings in DMRB Stage 3 Design**

<b>Cuttings</b>			
<b>Chainage (m)</b>		<b>Anticipated Max Depth (m)</b>	<b>Anticipated Slope Gradient (v = vertical, h = horizontal)</b>
<b>From</b>	<b>To</b>		
600	1100	28.9	1V:2H
1200	1750	24.5	1V:3H
1900	2080	24.6	1V:2H
2600	2700	11.8	1V:2H
3550	3800	18.7	1V:3H
3850	4100	4.7	1V:2H
4700	5200	19.1	Side Road: 1V:2H
6200	6330	12.5	1V:2H
6830	7300	33.7	1V:2.5H to 1V:3H
7340	7800	11.5	70° slope (with soil nailing)

**Table 5.5: Key Road Embankments in DMRB Stage 3 Design**

<b>Embankments</b>			
<b>Chainage (m)</b>		<b>Anticipated Max Height (m)</b>	<b>Anticipated Slope Gradient (v = vertical, h = horizontal)</b>
<b>From</b>	<b>To</b>		
2600	2750	10.8	1V:2H
4200	6100	3.5	1V:2H to 1V:3H
6200	6900	4.5	1V:2H
7500	8230	2.6	1V:2H

### Earthworks Balance

- 5.4.26 A summary of the estimated earthworks quantities for construction of the proposed scheme is provided below in Table 5.6, with further details of material use and management of waste during construction provide in Chapter 18 (Materials).

**Table 5.6: Estimated Earthworks Volumes\***

<b>Import/Export</b>	<b>Volume (m³)</b>
Total Acceptable Cut Available (excl. Topsoil)	563,500
Total Fill Required (excl. Topsoil)	332,500
Total Imported Fill Required	0
Total Acceptable Topsoil Available	133,400
Total Topsoil Required	110,600
Surplus Acceptable Topsoil Available	22,700
Estimated Volume of Surplus Cut Material**	331,000

\*Based on preliminary GI results - assumes 90% acceptability.

\*\*Includes acceptable and unacceptable surplus materials and rock.

### **Fencing and Environmental Barriers**

#### Fencing

- 5.4.27 To secure the land area acquired for the implementation of the proposed scheme, temporary fencing will be erected prior to the commencement of construction, where appropriate. There is likely to be a requirement for stock-proof fencing in some areas, where pasture land bounds the proposed scheme.
- 5.4.28 On completion of the works, alternative methods of signifying property boundaries may include the planting of hedgerows or the construction of walls. However, it is important to note that much of the

existing A9 is not fenced and a highway fence that would stretch the full length of the proposed scheme is not a requirement for an all-purpose A-class road.

#### Environmental Barriers

- 5.4.29 Environmental barriers are required to reduce the potential impacts of the proposed scheme at specific locations. Where a requirement has been identified within this ES, environmental barriers will be incorporated to provide mitigation for mammals (including otter and badger fencing) or noise attenuation. These are described respectively in Chapter 12 (Ecology and Nature Conservation) and Chapter 17 (Noise and Vibration).

#### **Drainage Design and Watercourse Crossings**

- 5.4.30 The proposed drainage design and proposals for watercourse crossings take into consideration the Water Environment (Controlled Activities) Regulations 2011 (CAR) (Scottish Government, 2011). These regulations require certain licences to be sought for design and construction activities affecting watercourses, including engineering works (culverts and bridges) and discharges (outfalls, attenuation and treatment). The watercourse crossings and drainage design have been discussed with SEPA in the context of CAR requirements, and further details are contained in Chapter 11 (Road Drainage and the Water Environment) and Appendix A11.8 (Watercourse Crossing Report).
- 5.4.31 It is currently intended that Transport Scotland will provide the Contractor(s) with draft CAR licence applications based on the DMRB Stage 3 design. The appointed Contractor(s) will have responsibility for submitting finalised applications and securing CAR authorisation based on their detailed design.

#### Drainage Design and Flooding

- 5.4.32 The drainage design for the proposed scheme has been developed in accordance with Sustainable Drainage Systems (SuDS) guidance and through consultation with SEPA and PKC, outlined in Chapter 7 (Consultation and Scoping). In certain areas along the existing A9 there are lengths of filter drain in the verges that provide initial (one SuDS level) treatment for some of the run-off from the road and/or adjacent earthworks slopes. Construction drainage is discussed in Appendix A5.1.
- 5.4.33 A minimum of two levels of SuDS is intended to be included for all mainline outfalls in agreement with SEPA and SNH. There are five drainage runs (B, F1, F2, G1 and G2) associated with the proposed scheme where two levels of treatment using conventional SuDS have not been possible. This is due to the relevant drainage runs being constrained by fluvial flood extent and topography, with subsequent associated impacts on flood risk from the adoption of conventional SuDS (e.g. a pond). However, two levels of proprietary treatment are achieved on these runs through the adoption of proprietary (i.e. non-conventional) SuDS, which includes hydrodynamic vortex separator chambers. SEPA has been consulted on the drainage proposals and additional information is provided in Chapter 11 (Road Drainage and the Water Environment).
- 5.4.34 The proposed drainage system makes use of combined surface and groundwater filter drains to provide most of the carriageway drainage. Exceptions to this include kerbed areas, such as junctions and overbridge decks where gullies or combined kerb/drainage units would be used to collect surface water. As part of the drainage system, a series of ponds, basins and swales are included in the proposed scheme design to delay the discharge of surface water to watercourses and remove pollutants by providing water storage to allow sufficient time for solids to settle out.
- 5.4.35 The proposed carriageway drainage system will accommodate a 100% AEP (1-year) rainfall event, without surcharging. The design will also ensure the 20% AEP (5-year) rainfall event will not exceed the drainage system chamber cover and flood the carriageway. A 20% allowance for the effects of climate change has also been incorporated into the carriageway drainage design.
- 5.4.36 Pre-earthworks drainage consisting of shallow filter drains or lined ditches would be used to collect run-off from adjacent land and field drains. The proposed pre-earthworks drainage system will accommodate a 1.3% AEP (75-year) rainfall event. A 20% allowance for the effects of climate change has also been incorporated into the pre-earthworks drainage design.



- 5.4.37 All run-off from the proposed scheme will be collected and treated via the proposed drainage system prior to discharge. For new outfalls, SuDS are designed to treat and attenuate the peak flow from the new highway drainage system during a 0.5% AEP (200-year) rainfall event, plus a 20% allowance for climate change ('plus CC'). Nine proposed drainage runs (B, D1, D2, E, F1, F2, G1, G2 and H) will not provide attenuation to the full 0.5% AEP (200-year) plus CC standard due to existing floodplain constraints. However, attenuation storage and peak runoff rate reduction will be provided for the 3.33 AEP (30-year) rainfall event on these catchments through the adoption of geocellular storage systems or smaller, un-banded conventional SuDS within the floodplain area. In addition, the receiving watercourse (River Tay) is not deemed sensitive to a reduced attenuation standard due to the high flows (Q95 >33m<sup>3</sup>/s) and the lack of attenuation currently afforded within the existing A9 drainage.

#### Watercourse Crossings

- 5.4.38 Wherever possible, watercourses will be maintained along their existing line. There are numerous existing watercourses that pass underneath the existing A9 carriageway, and these crossings will generally be extended or replaced in their current location.
- 5.4.39 The detailed design of these watercourse crossing structures would be developed by the appointed Contractor, subject to suitable provision being made for flood flows and ecological and geomorphological mitigation, and compliance with the environmental commitments detailed within this ES. Additional information is provided in Chapter 11 (Road Drainage and the Water Environment), Appendix A11.8 (Watercourse Crossing Report) and Chapter 12 (Ecology and Nature Conservation).

#### **Traffic Signs and Lighting**

##### Traffic Signs

- 5.4.40 Traffic signs required for the proposed scheme would be prepared to the relevant design standards. The detailed design of this element of the works would be the responsibility of the appointed Contractor(s), and subject to compliance with the contract documents. As part of the design process, the Contractor would consult Transport Scotland and the local roads authorities.

##### Lighting

- 5.4.41 A lighting appraisal was carried out as part of the DMRB Stage 3 engineering assessment to assess the need and economic value of providing road lighting from Tay Crossing to Ballinluig. The existing route is currently not lit, and generally from an environmental perspective it is preferable to avoid road lighting in rural areas, as lighting can increase visual intrusion at night.
- 5.4.42 The DMRB Stage 3 appraisal concluded that it is not necessary to provide lighting along the whole route. For safety reasons and to achieve compliance with DMRB TD16/07 'Geometric Design of Roundabouts' it is required that lighting is provided only at the A9 Southern Tie-in Interim Roundabout (ch620). Further detailed design will seek to minimise lighting impacts at these locations.
- 5.4.43 Temporary lighting may be required across the proposed scheme where night time and/or winter morning/afternoon working is necessary, to minimise traffic disruption/diversions/lane closures, and also along temporary access roads or other locations where temporary traffic management measures require lighting for safety reasons. Temporary lighting may also be required for security and safety reasons at site compounds during morning and evening working hours in winter.

## **5.5 Construction Methods and Programme**

- 5.5.1 This section provides a brief overview of the envisaged construction programme and typical construction activities. Typical construction methods for these activities and the construction assumptions made for the purposes of this ES are provided in Appendix A5.1 (Construction Information). This section sets out a possible construction sequence for the proposed scheme, however, the design and construction process adopted by the appointed Contractor may vary from that described in this outline methodology. The appointed Contractor would be permitted to change the construction process and duration of each works element provided that environmental impacts are

no greater than those described in this ES, and that commitments given in this ES are adhered to (or measures providing equivalent mitigation, subject to agreement with Transport Scotland).

5.5.2 It is currently anticipated that construction will not commence until August 2020 and is expected to have a duration of 2.5 to 3.0 years.

**Outline Construction Programme**

5.5.3 To assist the EIA process, the duration of construction activities was estimated. It is difficult to determine a precise timescale for each element of the works as this will ultimately be determined by a number of factors such as the commencement date of the works, and the construction methods proposed by the appointed Contractor. An outline of the possible timing for the works is indicated in Table 5.7.

**Table 5.7: Indicative Construction Works Timescales\***

Phase Number	Timescale
<b>Phase 1</b>	
Mobilisation	August – October 2020
Traffic Management	October 2020
Southern Tie-in Interim Roundabout, Southern Tie-In and Compensatory Flood Storage Areas	November 2020 – January 2021
<b>Phase 2</b>	
Reconfiguration of traffic management	January 2021
Offline Southbound Carriageway	January 2021 – March 2022
Dunkeld to Rotmell (C502) Road Junction	January – December 2021
Guay South Overbridge	January 2021 – March 2022
<b>Phase 3</b>	
Reconfiguration of traffic management	March 2022
Online Northbound Carriageway	March – December 2022
Remaining Sections of Southbound Mainline	July – August 2022
Final Tie-ins and Central Reserve	December 2022
Road opening	December 2022

\* For the purposes of this assessment, an indicative start date of 01 August 2020 has been used.

**Typical Construction Activities**

5.5.4 The key elements of the construction works have been broken down to facilitate the assessment of potential environmental impacts. The construction activities associated with the proposed scheme are outlined in Table 5.8.

**Table 5.8: Typical Construction Activities**

Section	Construction Activities
Advance Works	<ul style="list-style-type: none"> <li>• Environmental mitigation to be implemented in advance of the main construction contract.</li> <li>• Advance services diversions.</li> <li>• Building demolitions.</li> <li>• Archaeological investigations and excavations.</li> <li>• Site clearance.</li> </ul>

Section	Construction Activities
Roadworks	<ul style="list-style-type: none"> <li>• Site establishment and plant compounds at strategic locations.</li> <li>• Temporary and permanent fencing.</li> <li>• Site clearance and demolition.</li> <li>• Temporary and permanent surface water outfalls.</li> <li>• Service diversions.</li> <li>• Topsoil stripping and storage.</li> <li>• Pre-earthworks drainage.</li> <li>• Earthworks (cuttings and embankments).</li> <li>• Environmental bunds and landscaping.</li> <li>• Drainage, service ducts and chambers.</li> <li>• Topsoil spreading, seeding and turfing.</li> <li>• Pavement construction.</li> <li>• Roadwork finishes including safety barriers, signs, road markings.</li> <li>• Accommodation works.</li> </ul>
Structures	<ul style="list-style-type: none"> <li>• Bridge construction.</li> <li>• Culvert construction.</li> <li>• Retaining wall construction (including River Tay bank stabilisation).</li> </ul>
Environmental	<ul style="list-style-type: none"> <li>• Earthworks mitigation.</li> <li>• Landscape and ecological mitigation planting.</li> </ul>
Temporary Works	<ul style="list-style-type: none"> <li>• Temporary works to facilitate bridge construction</li> <li>• Temporary carriageway to maintain traffic flows where roads are narrow or are affected by construction of the proposed scheme.</li> <li>• Narrow lanes, contraflows or lane/road closures.</li> <li>• River or stream diversions to facilitate culvert construction.</li> <li>• Temporary SuDS at drainage outfalls.</li> </ul>
Maintenance	<ul style="list-style-type: none"> <li>• Landscaping maintenance.</li> <li>• Pavement rehabilitation and other routine maintenance and defects repair works.</li> <li>• Winter maintenance.</li> </ul>

### Construction Compounds

- 5.5.5 The location of construction compounds is unknown at this stage, as these will be determined by the appointed Contractor depending on the phasing and execution of the works. However, where possible these would be located close to the proposed works where there is suitable access.
- 5.5.6 The proposed scheme is to be progressed under the Roads (Scotland) Act 1984. The appointed Contractor may wish to acquire additional land for construction compounds outside the land identified on the Compulsory Purchase Orders (CPOs). In this case, separate permissions for the construction compounds may be required. This would also apply to any other land that may be required beyond the CPO for related activities such as of temporary access routes/haul roads.
- 5.5.7 The construction compounds would provide workplace/welfare facilities (e.g. toilets, staff areas) and parking for office based staff and site operatives. In addition, stores and workshop areas (located within or near the compounds) would be provided for the construction phase.

### Environmental Mitigation

- 5.5.8 The appointed Contractor would be required to implement all relevant environmental mitigation measures at the appropriate time. These would include a range of measures to avoid or reduce construction and operational impacts.
- 5.5.9 Where practicable, physical environmental mitigation features, such as earthworks, would be constructed soon after the completion of the main engineering elements. Earthworks side slopes and verges would be topsoiled and seeded/planted early to minimise the risk of sediment-laden runoff, which may affect the carriageway drainage system and create a potential pollution risk to watercourses. Planting works and ecological habitat creation areas are seasonally dependent and these may be left until later in the construction period following completion of the main works.

## 5.6 Land Acquisition

### Land Made Available

- 5.6.1 Most construction work would take place within the limit of the land made available (LMA) to the appointed Contractor as defined within the contract documents. An indicative LMA is shown on Figure 5.2 and which has informed the habitat and woodland loss calculations undertaken for assessment purposes in this ES.
- 5.6.2 As explained in paragraph 5.5.6, construction compounds may be located outwith the purchased land. The land made available would include land acquired under CPO, land to which the Scottish Ministers already has ownership of or access to, or other areas the appointed Contractor has acquired by landowner agreement to facilitate construction of the works.
- 5.6.3 The land to be acquired for the proposed scheme includes land necessary to construct the proposed scheme and associated infrastructure and to undertake essential environmental mitigation measures.
- 5.6.4 The appointed Contractor may wish to utilise other areas of land not covered by the CPO. In such an instance, the appointed Contractor would have to secure the use of these areas by agreement and through separate planning applications, where appropriate. As the requirement and potential location of such areas is currently unknown, it has not been possible to include an assessment of the effects of them within this ES.

### Loss of Designated Areas

#### River Tay SAC

- 5.6.5 Following design refinement to avoid the River Tay SAC where possible, the DMRB Stage 3 design requires approximately 2.28ha of temporary and 0.21ha of permanent loss of terrestrial and aquatic habitats of the River Tay SAC. The majority of this would be required to facilitate construction of the proposed scheme (2.28ha) and would be returned to its former habitat type post-construction.
- 5.6.6 Approximately 2,139m<sup>2</sup> (0.21ha) of River Tay SAC habitat is predicted to be lost as a result of the proposed scheme's construction (Table 5.9). Approximately 54m<sup>2</sup> would be lost as a result of outfalls/discharge points and of this 27m<sup>2</sup> would be aquatic habitat. A further 408m<sup>2</sup> of aquatic habitat would be lost through extension of the Dowally Burn culvert. The remaining 1,677m<sup>2</sup> of habitat to be lost comprises woodland and grassland habitat.
- 5.6.7 Details of the permanent River Tay SAC habitat loss as a result of the proposed scheme are provided in Table 5.9.

**Table 5.9 Permanent River Tay SAC habitat loss as a result of the proposed scheme**

Location (approx.)	Habitat Type	Area m <sup>2</sup> (approx.)	Item of Infrastructure/Notes
ch150	Terrestrial	9	Outfall A1. Headwall is located in terrestrial SAC habitat consisting of riparian woodland.
ch600-800	Terrestrial	19	Tay crossing access track. Earthworks and upgrades to existing access track will require the loss of deciduous woodland.
ch750	Terrestrial	9	Outfall A2. Headwall is located in terrestrial SAC habitat consisting of riparian woodland.
ch650-750	Terrestrial	1401	Pond A2 and access track. Located within an area of continuous bracken and semi-natural broadleaved woodland.
ch870-1000	Terrestrial	257	Fishing Bothy 1 access track (including retaining wall). Earthworks and upgrades to existing access track will encroach upon edge of deciduous woodland.
ch1600-1900	Terrestrial	-	Contiguous bored pile wall for bank stabilisation works will require the removal of riparian woodland.
ch2000	Terrestrial	9	Outfall B. Outfall headwall on the bank of River Tay will

Location (approx.)	Habitat Type	Area m <sup>2</sup> (approx.)	Item of Infrastructure/Notes
			require the loss off scrub, semi-improved grassland and riparian woodland.
ch3850	Aquatic	9	Outfall C. Habitat loss for outfall headwall on the bank of River Tay.
ch4260	Aquatic	408	Dowally Burn culvert extension. Alteration of aquatic SAC habitat due to extension of culvert.
ch4400	No permanent land-take from SAC.	0	Outfall D1. Outfall discharges into WF37.
ch4900	Aquatic	9	Outfall D2. Habitat loss for outfall headwall on the bank of River Tay at height of mean flow.
ch5500	Aquatic	9	Outfall E. Habitat loss for outfall headwall on the bank of River Tay at height of mean flow.
ch6400	No permanent land-take from SAC.	0	Outfall F1. Outfall discharges into WF42.
ch6550	No permanent land-take from SAC.	0	Outfall F2. Outfall discharges into WF45.
ch7300	No permanent land-take from SAC.	0	Outfall G. Outfall discharges into WF50.
ch8200	No permanent land-take from SAC.	0	Outfall H. Outfall discharges into WF55A.
<b>Total</b>		<b>2139</b>	

### **Ancient Woodland**

5.6.8 Following design refinement to avoid or reduce loss of woodland from areas included in the SNH Ancient Woodland Inventory (AWI), the DMRB Stage 3 design results in approximately 6.35ha of AWI loss. However, the proposed scheme includes approximately 7.75ha of compensatory planting as shown on Figure 13.5 and detailed in Table 12.11 of Chapter 12 (Ecology and Natural Conservation). The planting proposed is in five broad areas of variable size distributed along the proposed scheme. The areas have been selected to maximise the biodiversity benefit of planting; maintain connectivity of existing AWI sites; and maximise opportunities to maintain functionality of local ancient woodland communities. It is also proposed that soil from high quality AWI sites will be re-used as appropriate to maintain fungal and invertebrate microbial biodiversity and provide a seed bank.

## **5.7 References**

Highways Agency, The Scottish Executive Development Department, The National Assembly of Wales and The Department of the Environment for Northern Ireland (2002). DMRB Volume 6, Section 1, Part 1, TD9/93 – Amendment No 1: Highway Link Design.

Highways Agency, The Scottish Executive Development Department, The National Assembly of Wales and The Department of the Environment for Northern Ireland (2006). DMRB Volume 6, Section 2, Part 3 (TD16/07) Geometric Design of Roundabouts.

Jacobs (2018). DMRB Stage 3 Scheme Assessment Report Part 2: Engineering, Traffic and Economic Assessment.

Perth & Kinross Council (2012). Core Paths Plan.

Scottish Government (1984). Roads (Scotland) Act 1984.

[www.legislation.gov.uk/ukpga/1984/54/contents](http://www.legislation.gov.uk/ukpga/1984/54/contents) Scottish Government (2011). Water Environment (Controlled Activities) (Scotland) Regulations (2011) (CAR). [Online] Available at: <http://www.legislation.gov.uk/ssi/2011/209/made>.

Transport Scotland (2014). A9 Dualling Programme: Strategic Environmental Assessment (SEA) – Post Adoption Statement (September 2014).

Transport Scotland (2016a). A9 Dualling: Perth to Inverness – Sustainability Strategy

Transport Scotland (2016b). Non-Motorised User (NMU) Access Strategy