5. Transport Modelling Approach

5.1 Introduction

5.1.1 In accordance with Design Manual for Roads and Bridges (DMRB) Volume 5, Section 1, Part 2 TD37/93 (1993) 'Scheme Assessment Reporting', Chapters 5 to 7 of the Stage 3 report presents the Traffic and Economic assessment of the scheme.

5.1.2 This chapter of the report (Transport Modelling Approach) describes the operation of the traffic model. Chapter 6 (Effects of Scheme Proposals) summarises the primary traffic effects of the proposed scheme. The economic performance of the scheme is presented in Chapter 7 (Economic Performance of Scheme).

5.1.3 The purpose of this chapter is to document refinements to the modelling and forecasting since the Preferred Option was identified in the DMRB Stage 2 Report for the A9 Dualling: Pass of Birnam to Tay Crossing scheme. Further details are presented in Chapter 6 (Effects of Scheme Proposals) with regards to the impact of the scheme on various properties and minor roads, as local access arrangements have been developed and junction design elements refined, since identification of the preferred mainline and junction strategy.

5.1.4 The traffic and economic assessments have been undertaken using the A9 Dualling Traffic Model (A9DTM) developed using S-Paramics software. The model years used in the assessment are 2036 and 2051, representing the anticipated first year of full programme operation and 15 years thereafter. The forecasting of traffic was undertaken by the Lead Traffic and Economic Advisor (LTEA) for the A9 Dualling Programme (AECOM) and details of the modelling assumptions can be found in AECOM 'Technical Note 10: DMRB Stage 3 Approach to Transport Modelling and Appraisal – Revision 4' (AECOM, July 2017), but with a number of updates such as the assessment years to reflect the passage of time.

5.1.5 The outputs from the A9DTM models have been used as the basis for an economic assessment using the Department for Transport's (DfT's) Transport Users Benefit Appraisal (TUBA, v1.9.17.2) software to determine the economic benefits of the proposed scheme compared to the Do-Minimum scenario as described in Chapter 3 (Description of the Proposed Scheme) of this report.

5.2 Transport Model for Scotland

5.2.1 The Transport Model for Scotland (TMfS) is Transport Scotland's national transport model. It is a multimodal, strategic transport model that covers the entire Scottish mainland and connections to significant islands. The current version of the model is TMfS:18, which represents a 2018 Base Year.

5.2.2 The network coverage in TMfS:18 is relatively detailed and covers all significant road and rail links throughout the country. As the coverage of TMfS:18 is national, the zoning system and

representation of travel demand is necessarily aggregate in nature, with a greater focus on inter-urban rather than local movements.

5.2.3 In response to the global climate emergency, the Scottish Government's Climate Change Plan update in 2020 set out a world-leading commitment to reduce car kilometres by 20 per cent by 2030 (relative to a 2019 baseline). The TMfS:18 'With Policy' scenario assumes that the Scottish Government achieve that target. However, TMfS:18 also has a separate 'Without Policy' scenario, which assumes that traffic levels continue to increase. Both these scenarios are passed down to the A9 Dualling Traffic Model and are therefore presented in this traffic assessment.

5.2.4 The two forecast scenarios referred to above are available for the years 2025, 2030, 2035, 2040 and 2045.

5.2.5 The main purpose of TMfS:18 in the context of the A9 Dualling assessment is to provide forecasts that can be passed down to lower tier models such as the A9DTM:15 for both Programme and Project level assessment work. As such, TMfS:18 has not been used for detailed assessment of the performance of the scheme.

5.3 A9 Dualling Traffic Model

Model Extents

5.3.1 The A9 Dualling Traffic Model (A9DTM) is a corridor long microsimulation model developed using S-Paramics software, covering the A9 from Inveralmond Roundabout to north of Daviot, which is located to the south of Inverness. A9DTM:15 (the current version of the A9DTM) has been used in this DMRB Stage 3 assessment. As shown in Illustration 5-1, the A9 and all major junctions with A and B class roads are modelled, along with important local roads. The location of this scheme within the overall context of the A9 between Perth and Inverness is shown in Illustration 1-1 in Chapter 1 (Introduction). This project covers the 8.4 km section of the existing A9 between Pass of Birnam and Tay Crossing as described in Chapter 3 (Description of the Proposed Scheme) of this report.

5.3.2 The A9DTM was originally developed for Transport Scotland by SIAS Ltd (now part of SYSTRA) for use as a planning and forecasting tool for projects on the A9 corridor. The latest version of the model is maintained by AECOM, appointed under separate commission by Transport Scotland. A9DTM:15 is used by the separately appointed engineering consultants for the individual A9 dualling sections identified in Table 1-1 included in Chapter 1 (Introduction) of this report. Development of the model is documented in the A9 Dualling Traffic Model 15 Model Development Report (AECOM, April 2016).

5.3.3 For this project, one amendment was made to the standard base model. This involved adding additional loading points for the zone representing Birnam along the length of Perth Road, to better reflect the multiple accesses along this local road.

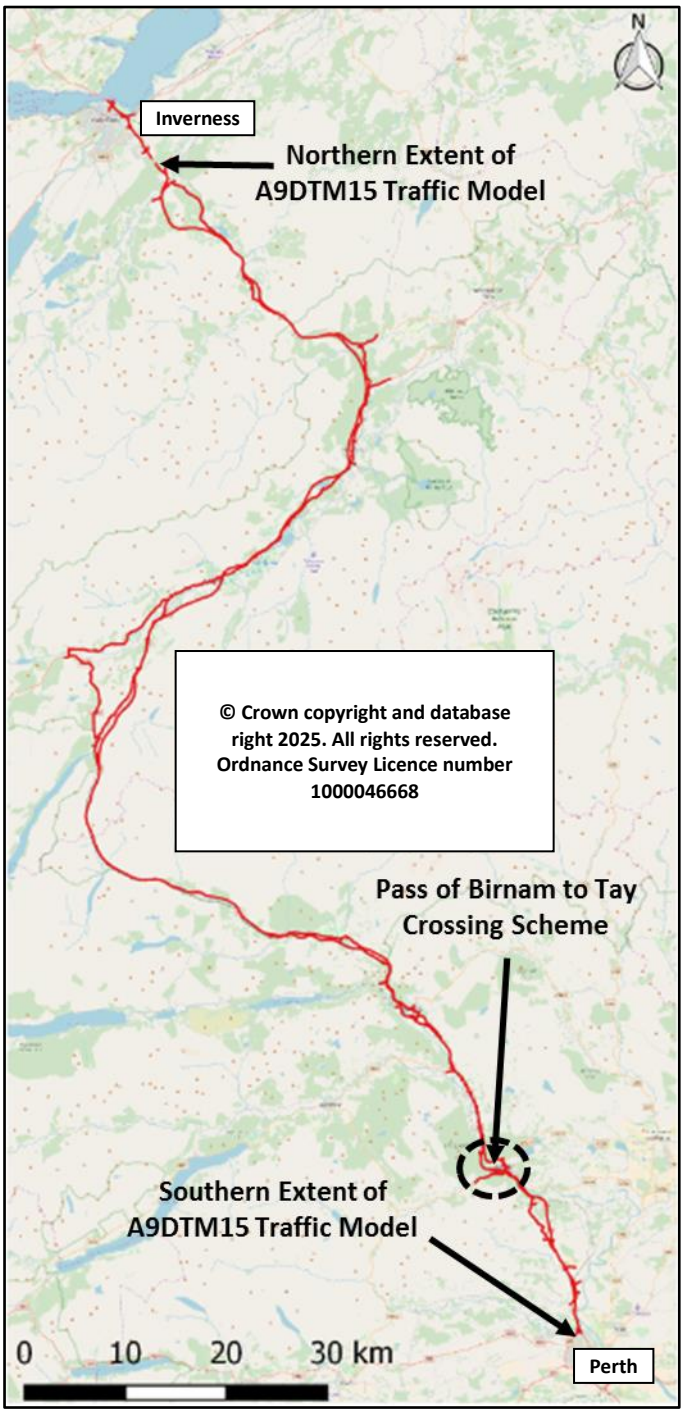

Illustration 5-1: A9DTM:15 Model Extents

Vehicle Types / Classifications

5.3.4 The following vehicle classifications are represented in the model:

- Car;
- Car and Trailer;
- Car and Caravan;
- Motorhome;
- LGV – Light goods vehicle;
- OGV1 – Medium weight goods vehicle (2 axles, up to 7.5 tonnes);
- OGV1 – Medium weight goods vehicle (2 axles, between 7.5 and 12 tonnes);
- OGV1 – medium weight goods vehicle (2 axles, over 12 tonnes);
- OGV1 – Medium weight goods vehicle (3 axles);
- OGV2 – Medium weight goods vehicle (rigid 4 axles);
- OGV2 – Heavy goods vehicle (articulated 4 axles);
- OGV2 – Heavy goods vehicle (articulated 5 axles);
- OGV2 – Heavy Goods vehicle (articulated 6 axles);
- Coach;
- Minibus – Sprinter type; and
- Bus.

5.3.5 Scheduled bus and coach services are coded based on predefined routes and operator timetables in the base year (2015). The trips undertaken by cars are further classified based on the purpose of the journey, which are:

- In work;
- Non-work commute; and
- Non-work other.

Time Periods

5.3.6 The different time periods in the model are as follows:

- Period 1 – 07:00 to 10:00 (AM);
- Period 2 – 10:00 to 16:00;
- Period 3 – 16:00 to 19:00 (PM); and
- Period 4 – 19:00 to 07:00.

5.3.7 Period 4 (19:00 to 07:00) is only included as a warm-up and cool-down period to ensure that there is traffic in the model network at the start of Period 1, and to collect data for vehicles that do not complete their journey by the end of Period 3. It is not an accurate representation of traffic on the network during the night. The outputs from the modelled hours between 07:00 and 19:00 were used to derive estimates of flows and speeds in the non-modelled hours using factored inter-peak flows. These factors were derived from analysis of the classified Automatic Traffic Counter (ATC) data on the A9 mainline between Perth and Inverness that was used in the development of the A9DTM:15 base model. Further details are set out in AECOM 'Technical Note 10: DMRB Stage 3 Approach to Transport Modelling and Appraisal – Revision 4' (AECOM, July 2017).

5.3.8 The base model represents typical conditions for a 2015 weekday in March and June between 07:00 and 19:00 hours. These were the neutral months for which most observed data was available and best represents a typical day. The A9 and all major junctions (e.g. with other A and B-class roads) are represented, as are sections of the A889, A86 and A95 as well as the parallel routes through towns along the corridor such as Dunkeld and Birnam, Pitlochry, and Blair Atholl.

5.3.9 As highlighted in Paragraphs 5.3.4 and 5.3.5, the model represents individual cars (split by in-work, non-work commute and non-work other purposes) with proportions representing standard cars, those towing trailers or caravans and motorhomes. Light and heavy goods vehicles and buses/coaches are also represented. The varying single, dual and Wide Single 2+1 Carriageway (WS2+1) standards along the A9 are represented in the base model and both vertical and horizontal alignments are reflected. The differing vehicle and driver characteristics represented, enable detailed operational effects such as platooning (e.g. travelling behind slower moving HGVs), overtaking in the face of oncoming traffic (on single carriageways) and passing (on dual and WS2+1 sections) to be reflected.

5.3.10 Forecasting into the future with the A9DTM:15 is undertaken via a direct interface with TMfS:18 whereby absolute incremental forecasts of growth for the A9 corridor are applied directly to the A9DTM:15 Base or future year Do-Minimum and Do Something matrices respectively. As well as the 2015 Base model, the standard future years for the Transport Model for Scotland have been replicated in A9DTM:15. However, for the purpose of this A9 DMRB assessment, future year models for 2025, 2036 and 2051 have been created.

5.3.11 For the purposes of the A9 Dualling Programme DMRB Stage 3 assessment, it is acknowledged that build out of the Local Development Plan alongside further capacity improvements will change travel patterns in and around Perth and specifically at Inveralmond Roundabout. It is also known that the interventions will, regardless of final form, improve the operational effectiveness of the A9 trunk road around Perth.

5.3.12 Based on the above, the A9DTM:15 forecast traffic models have been updated to reflect the commitment to improve operational effectiveness along the A9. Specifically, Inveralmond Roundabout has been modified in both the Do-Minimum and Do-Something scenarios in the years 2036 and 2051. This modification ensures that all traffic forecast to use the A9 in the first year of full programme operation is able to enter / leave the corridor within the modelled time-period, providing a traffic assessment that is reflective of the most likely future scenario.

5.4 Birnam Local Traffic Model

5.4.1 In addition to the A9DTM:15 S-Paramics corridor model, which is the principal assessment tool for this project, the Birnam Local Traffic Model (BLTM), which represents a typical summer weekend, was developed in Paramics Discovery to consider the operational aspects of the network under peak travel demand rather than the typical traffic flow represented in A9DTM:15. The base year traffic demand in the BLTM was developed from traffic surveys undertaken on a busy summer weekend in August 2017, with two separate models created representing a typical summer Saturday and a typical summer Sunday. Although not used for formal appraisal in this DMRB Stage 3 assessment, this model was used to provide confidence that an at-grade roundabout at Dunkeld would be expected to operate adequately during the peak tourist season.

5.4.2 Additionally, the smaller and more detailed BLTM is more sensitive than the A9DTM:15 to potential rerouting between the A9 and Perth Road due to the changes in journey times on the A9 as a result of dualling, which allowed for further analysis that could not be undertaken using A9DTM:15. This included representing the potential effect of on-street parking on Perth Road through Birnam, which was observed to reduce the available road width to less than that required for two vehicles to pass. This would therefore act as a constraint on the volume of traffic that may divert along Perth Road at peak times.

5.4.3 Automatic Number Plate Recognition (ANPR) surveys undertaken in August 2017 recorded traffic on Perth Road travelling between the A9 to the south and the A923 through Dunkeld, that did not stop in Birnam. The level of through traffic on Perth Road is not adequately represented in A9DTM:15 but these through trips have been replicated in the BLTM. At least some of these through trips on Perth Road are assumed to take this route due to the existing signing strategy, which directs northbound traffic for Dunkeld to exit the A9 at the existing left/right staggered priority junction at Birnam and travel along Perth Road.

5.4.4 The BLTM was therefore also used to understand the potential impact of changing the signing strategy on the A9 within the extents of the Pass of Birnam to Tay Crossing project. This was

predominantly focused on the signing of traffic on the northbound A9, destined for Dunkeld, to use the Dunkeld Junction rather than the Birnam Junction as is currently signposted.

Vehicle Types / Classifications

5.4.5 The same vehicle classifications were used in the BLTM as in the A9DTM:15 corridor model (see Paragraphs 5.3.4 and 5.3.5).

Time Periods

5.4.6 The time periods in the BLTM are as follows:

- Period 1 - 07:00 to 10:00 (AM);
- Period 2 - 10:00 to 16:00;
- Period 3 - 16:00 to 19:00 (PM);
- Period 4 - 06:00 to 07:00; and
- Period 5 - 19:00 to 20:00.

5.4.7 Note that these differ from A9DTM:15. As the BLTM is significantly smaller, in terms of its geographical extents, the maximum route distance is significantly less than in the A9DTM:15. Consequently, it was not necessary to allow a long warm-up and cool-down period and therefore these periods were reduced to one hour either side of the 12-hour modelled period. This model has a 2017 base year. Local forecasts were derived using proportionate growth from the A9DTM:15.

5.5 Future Year Networks

Do Minimum Model

5.5.1 For the purposes of the economic, environmental and operations / design assessment, the Do-Minimum network is as the road network was in 2015 (i.e. after the introduction of the Average Speed Safety Cameras on the A9) and including the infrastructure projects listed in Appendix 5-1, of this report. These infrastructure projects are not coded in A9DTM:15 as they are outside of the model extents but are included within TMfS:18 from which future traffic growth is determined.

5.5.2 Illustration 5-2 shows the existing road network represented in the Do-Minimum model between the scheme extents at Pass of Birnam and Tay Crossing.

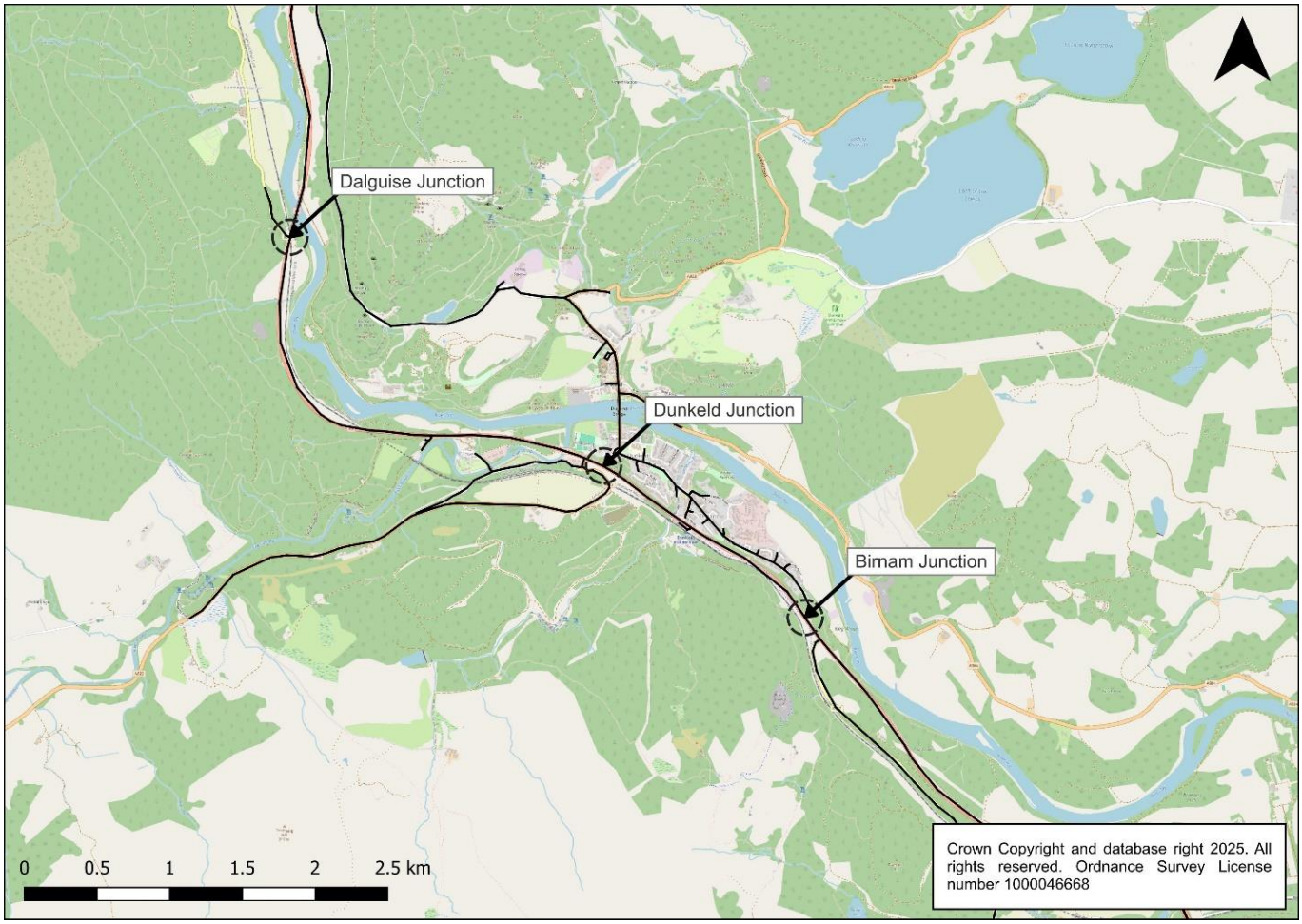

Illustration 5-2: Do-Minimum Model

Do Something Model

5.5.3 For the purposes of the economic assessment, the Do-Something network incorporates only the A9 Pass of Birnam to Tay Crossing project, added to the Do-Minimum network. The traffic demand in each assessment year is the same as that applied to the Do-Minimum network (i.e. a fixed demand assessment). By adopting this approach, the DMRB Stage 3 assessment focuses only on the impacts of the Pass of Birnam to Tay Crossing project and avoids the risk of overestimating the potential economic benefits that may be provided by the wider A9 Dualling Programme, since schemes are being promoted and delivered individually.

5.5.4 In defining the Do-Something network for the environmental and operational / design assessment, it is important to recognise that the approach outlined in Paragraph 5.5.3 cannot be adopted, as it would potentially result in an underestimation of the environmental impact associated should the full A9 Dualling Programme be completed. Therefore, in the case of the Do-Something scenario, the demand associated with the full dualling of the A9 was applied, thereby ensuring that the maximum impact of the upgrade was considered. This higher level of demand was determined by representation of the full A9 Dualling Programme in TMfS:18 to capture the change in travel patterns and mode choice that would arise from consistent dual carriageway standards from Perth

to Inverness. This approach has been applied consistently across all schemes within the A9 Dualling Programme. The traffic forecasts presented in this DMRB Stage 3 Report refer to this Do-Something scenario using both the 'With Policy' and 'Without Policy' forecasts, as discussed in Paragraph 5.2.3, but based on the precautionary principle, only the 'Without Policy' traffic flows were adopted for the Environmental Assessment.

5.5.5 In the Do-Something models used for environmental assessment and presented in this Chapter, the A9 has been coded as a dual carriageway along its entire length with various junction improvements, as identified in Chapter 3 (Description of the Proposed Scheme).

5.6 Assessment Years

5.6.1 The Pass of Birnam to Tay Crossing scheme is one of the 11 projects forming the A9 dualling programme as outlined in Chapter 1 (Scheme Background) of this report. Each individual project within the A9 Dualling Programme will have a project specific opening year in the period up until 2035. However, a significant proportion of the journey time benefits arising from the A9 projects with the earliest opening years, will likely be offset by delays incurred during the construction of other projects on the A9 that are later in the programme. As such, there is unlikely to be a significant volume of induced traffic and strategic rerouting during the period to 2035, when it is anticipated that the dualling programme will be complete. Induced traffic is the term used to describe the phenomenon where an increase in the capacity of a road releases a latent demand for travel and results in an increase in traffic on the road following the upgrade. This is unlikely to be significant when works are ongoing elsewhere on the A9 between Perth and Inverness and therefore the Do-Minimum and Do-Something flows on the A9 are therefore likely to be similar up to and including 2035. Following completion of the final project in the A9 Dualling Programme, the full benefits of upgrading the route to dual carriageway standard will begin to be realised.

5.6.2 The assessment years adopted for operational assessment are therefore 2036 and 2051. 2036 is the assumed first year of operation even though it is anticipated that the Pass of Birnam to Tay Crossing project will be completed before this date. 2051 is the Design Year, as it is 15 years after the assumed first year of full programme operation in accordance with DMRB guidelines.

5.7 Demand Matrices

5.7.1 The demand matrices for the Do-Minimum and Do-Something models for the years 2036 and 2051 were produced by the LTEA for the A9 Dualling Programme (AECOM). These demand matrices were obtained directly through an interface with TMfS:18. The versions used for this assessment were issued on 4th July 2024.

5.7.2 Table 5-1 shows the total traffic demand in the traffic models for the years 2015, 2025, 2036 and 2051 on a typical 12-hour weekday between 07:00 and 19:00 under the 'With Policy' forecast scenario. This traffic demand represents the demand of all types of vehicles through the entire A9DTM:15 corridor, which includes the side road network. These figures should not be mistaken for observed or modelled traffic flows on any specific road within the project extents.

Traffic Demand	Base	Do Minimum			Do Something	
	2015	2025	2036	2051	2036	2051
Traffic demand for 12-hour weekday (07:00 to 19:00)	68,900	66,900	64,500	64,600	65,400	65,700
Growth (with respect to Base Year (2015))	-	-2.9%	-6.4%	-6.3%	-5.1%	-4.6%
Growth (with respect to Do Minimum)	-	-	-	-	+1.4%	+1.9%
Growth rate per annum (with respect to year 2015)	-	-0.3%	-0.3%	-0.2%	-0.2%	-0.1%

Table 5-1: Traffic Demand (Vehicles) – 'With Policy' forecast

Table Notes:

1. *Number of trips rounded to the nearest 100*
2. *Growth rates derived before rounding of trip demand*
3. *Do-Something travel demand relates to the Do-Something scenario under the 'With Policy' forecast*

5.7.3 The average traffic growth rate in the absence of the scheme is approximately minus 0.3 per cent per annum due to the measures that were assumed to be implemented to meet the policy commitment. Table 5-1 also shows that comparing the Do-Minimum and Do-Something models, there is a 1.4 and 1.9 percent increase in traffic demand within the model extents in the years 2036 and 2051 respectively following the completion of A9 Dualling Programme.

5.7.4 Table 5-2 shows the same information in relation to the 'Without Policy' forecast scenario, which assumes that efforts to cut car kilometres by 2030 do not achieve the desired reduction. Under this forecast scenario, traffic is assumed to continue to grow unhindered by measures to reduce car kilometres, following a downturn in traffic volumes arising from the COVID-19 pandemic. As can be seen in Table 5-2, in all scenarios the growth rate increases over time.

Traffic Demand	Base	Do Minimum			Do Something	
	2015	2025	2036	2051	2036	2051
Traffic demand for 12-hour weekday (07:00 to 19:00)	68,900	68,600	72,300	81,100	74,300	83,400
Growth (with respect to Base Year (2015))	-	-0.5%	4.9%	17.7%	7.8%	21.0%
Growth (with respect to Do Minimum)	-	-	-	-	2.8%	2.9%
Growth rate per annum (with respect to year 2015)	-	-0.1%	+0.2%	+0.5%	+0.4%	+0.6%

Table 5-2: Traffic Demand (Vehicles) – 'Without Policy' forecast

Table Notes:

1. *Number of trips rounded to the nearest 100*
2. *Growth rates derived before rounding of trip demand*
3. *Do-Something travel demand relates to the Do-Something (Environmental) scenario under the 'Without Policy' forecast*

5.7.5 Comparing the Do-Minimum and Do-Something models under the 'Without Policy' forecast scenario, there is a 2.8 and 2.9 percent increase in traffic demand within the model extents in the years 2036 and 2051 respectively following the completion of A9 Dualling Programme.

5.7.6 Table 5-3 shows the forecast traffic flows on the A9 at six locations, for the model years 2015, 2025, 2036 and 2051 under the 'With Policy' forecast scenario. These locations are:

- the southern extent of the scheme at Pass of Birnam;
- between the Birnam Junction and the current Dunkeld and Birnam railway station access;
- between the current Dunkeld and Birnam station access and the proposed Dunkeld Roundabout;
- between the proposed Dunkeld Roundabout and the access to The Hermitage (a National Trust for Scotland site);
- between The Hermitage and the B898 Dalguise Junction; and
- Tay Crossing – the northern extent of the Pass of Birnam to Tay Crossing project.

5.7.7 Further forecast traffic flows at key points within the project extents are shown on drawing numbers A9P02-JAC-VTR-X_ZZZZZ_ZZ-FG-TR-0005, A9P02-JAC-VTR-X_ZZZZZ_ZZ-FG-TR-0006, A9P02-JAC-VTR-X_ZZZZZ_ZZ-FG-TR-0007 and A9P02-JAC-VTR-X_ZZZZZ_ZZ-FG-TR-0008 included in Volume 2: Engineering Drawings, of this report.

Traffic Demand	Base	Do Minimum			Do Something	
	2015	2025	2036	2051	2036	2051
Southern Extent of Project 02	15,600	15,200	14,700	15,200	16,200	16,800
A9 Between Birnam and the current Dunkeld and Birnam railway station access	14,900	14,700	14,300	14,800	15,400	16,100
A9 Between the current Dunkeld and Birnam station access and Dunkeld Roundabout	15,000	14,800	14,400	14,900	15,400	16,100
A9 between Dunkeld Roundabout and The Hermitage	14,900	14,600	14,200	14,700	16,000	16,600
A9 between the Hermitage and Dalguise Junction	15,000	14,700	14,200	14,700	16,000	16,600
Northern Extent of Project 02	14,600	14,300	13,800	14,400	15,500	16,100
Overall Growth (with respect to 2015)	-	-2%	-6% to -4%	-3% to -1%	3% to 7%	7% to 11%
Overall Increase (with respect to Do Minimum)	-	-	-	-	7% to 13%	8% to 13%
Growth rate per annum (with respect to year 2015)	-	-0.2%	-0.3% to -0.2%	-0.1% to 0%	0.1% to 0.3%	0.2% to 0.3%

Table 5-3: Annual Average Daily Traffic (AADT) Flows – Pass of Birnam to Tay Crossing – 'With Policy' forecast

Table Notes:

1. *Flows rounded to the nearest 100 AADT*
2. *Growth rates derived before rounding traffic flows*
3. *Do-Something traffic flows relate to the Do-Something scenario under the 'Without Policy' forecast*

5.7.8 Based on the 'With Policy' forecast scenario and the absence of the A9 Dualling programme, the Scottish Government could potentially reduce car kilometres by 20% at a national level, without traffic on the A9 needing to fall by 20%, as is shown in Table 5-3. This is because the policy reduction is a national target and a reduction in car kilometres can most easily be met in the cities, where trips are shorter and public transport alternatives more plentiful. By the assumed first year of full programme operation (2036) traffic levels on this part of the A9 under the Do-Minimum could be up to six percent less than the 2015 baseline, with traffic levels increasing over the first 15 years of the operational phase, such that the design year traffic flows under the Do-Minimum would be comparable with existing levels of traffic.

5.7.9 Construction of the full A9 Dualling Programme would result in an increase in traffic on the A9 of between 7% and 13% between Pass of Birnam and Tay Crossing, compared to the Do-Minimum scenario under the 'With Policy' forecasts.

5.7.10 The overall growth rate from 2015 under the Do-Something scenario in 2036 outlined in Table 5-3 is significantly greater than the growth indicated in Table 5-1 because Table 5-3 is focussed on the growth of A9 traffic, rather than all traffic within the model extents, which includes local traffic.

5.7.11 Table 5-4 shows the forecast traffic flows on the A9 at six locations, for the model years 2015, 2025, 2036 and 2051 under the 'Without Policy' forecast scenario.

Traffic Demand	Base	Do Minimum			Do Something	
	2015	2025	2036	2051	2036	2051
Southern Extent of Project 02	15,600	15,600	17,100	20,000	20,500	25,000
A9 Between Birnam and the current Dunkeld and Birnam railway station access	14,900	15,000	16,600	19,500	19,400	23,700
A9 Between the current Dunkeld and Birnam station access and Dunkeld Roundabout	15,000	15,100	16,700	19,600	19,400	23,800
A9 between Dunkeld Junction and The Hermitage	14,900	15,000	16,400	19,300	20,200	24,700
A9 between the Hermitage and Dalguise Junction	15,000	15,000	16,500	19,300	20,200	24,700
Northern Extent of Project 02	14,600	14,600	16,100	18,900	19,600	24,000
Overall Growth (with respect to 2015)	-	0% to 1%	10% to 11%	28% to 31%	29% to 35%	58% to 66%
Overall Increase (with respect to Do Minimum)	-	-	-	-	16% to 23%	21% to 28%
Growth rate per annum (with respect to year 2015)	-	0% to 0.1%	0.4% to 0.5%	0.7%	1.2% to 1.5%	1.3% to 1.4%

Table 5-4: Annual Average Daily Traffic (AADT) Flows – Pass of Birnam to Tay Crossing – 'Without Policy' forecast

Table Notes:

1. *Flows rounded to the nearest 100 AADT*
2. *Growth rates derived before rounding traffic flows*
3. *Do-Something traffic flows relate to the Do-Something (Environmental) scenario under the 'Without Policy' forecast*

5.7.12 Table 5-4 presents the 'Without Policy' forecast scenario, which assumes that the volume of traffic on the A9 continues to rise over time. Under this scenario there would be an increase in traffic on the A9 of between 13% and 21% between Pass of Birnam and Tay Crossing, after the completion of the full A9 Dualling Programme, compared to the Do-Minimum scenario. The traffic flows in Table 5-4 are presented from the traffic models used for environmental and operational/design assessment as indicated in Paragraph 5.5.4.

5.7.13 The overall growth rate from 2015 under the Do-Something scenario in 2036 outlined in Table 5-4 is significantly greater than the growth indicated in Table 5-2 because Table 5-4 is focussed on the growth of A9 traffic, rather than all traffic within the model extents, which includes local traffic. This means that traffic growth on the A9 is significantly greater than on much of the local road network.

5.8 Pass of Birnam to Tay Crossing

5.8.1 The paragraphs below outline the impacts to traffic at the major junctions within the project extents. While there are also a few minor accesses onto the A9 within this section, the impact of traffic on the network operation is not reflected in the traffic modelling work undertaken using A9DTM:15. However, the impacts are discussed further in Chapter 6 (Effects of Scheme Proposals).

B867 Birnam Junction

5.8.2 The proposed B867 Birnam grade separated junction is situated in the locality of the existing left/right staggered priority junction with the B867 as shown on drawing number A9P02-JAC-HGN-D_ZZZZZ_ZZ-FG-RD-0003 included in Volume 2: Engineering Drawings, of this report and below in Illustration 5-3. The junction incorporates merge/diverge loops in the northbound direction and a merge slip road in the southbound direction, with no southbound diverge slip road. The B867 and Perth Road are connected, crossing the A9 via a bridge across the A9 carriageway. This provides an uninterrupted traffic flow between the routes rather than having to join and leave the A9 via the staggered junction as at present.

5.8.3 The absence of a southbound diverge slip road means that traffic from the north, which can currently access Birnam village via either the Dunkeld or Birnam priority junctions, will need to leave the A9 at the Dunkeld Roundabout and access Birnam village only from that location. Traffic from the north, which currently makes a right turn off the A9 onto the B867 will also have to leave the A9 at the Dunkeld Roundabout and travel along the length of Perth Road to access the B867 or alternatively remain on the A9 to the Bankfoot junction.

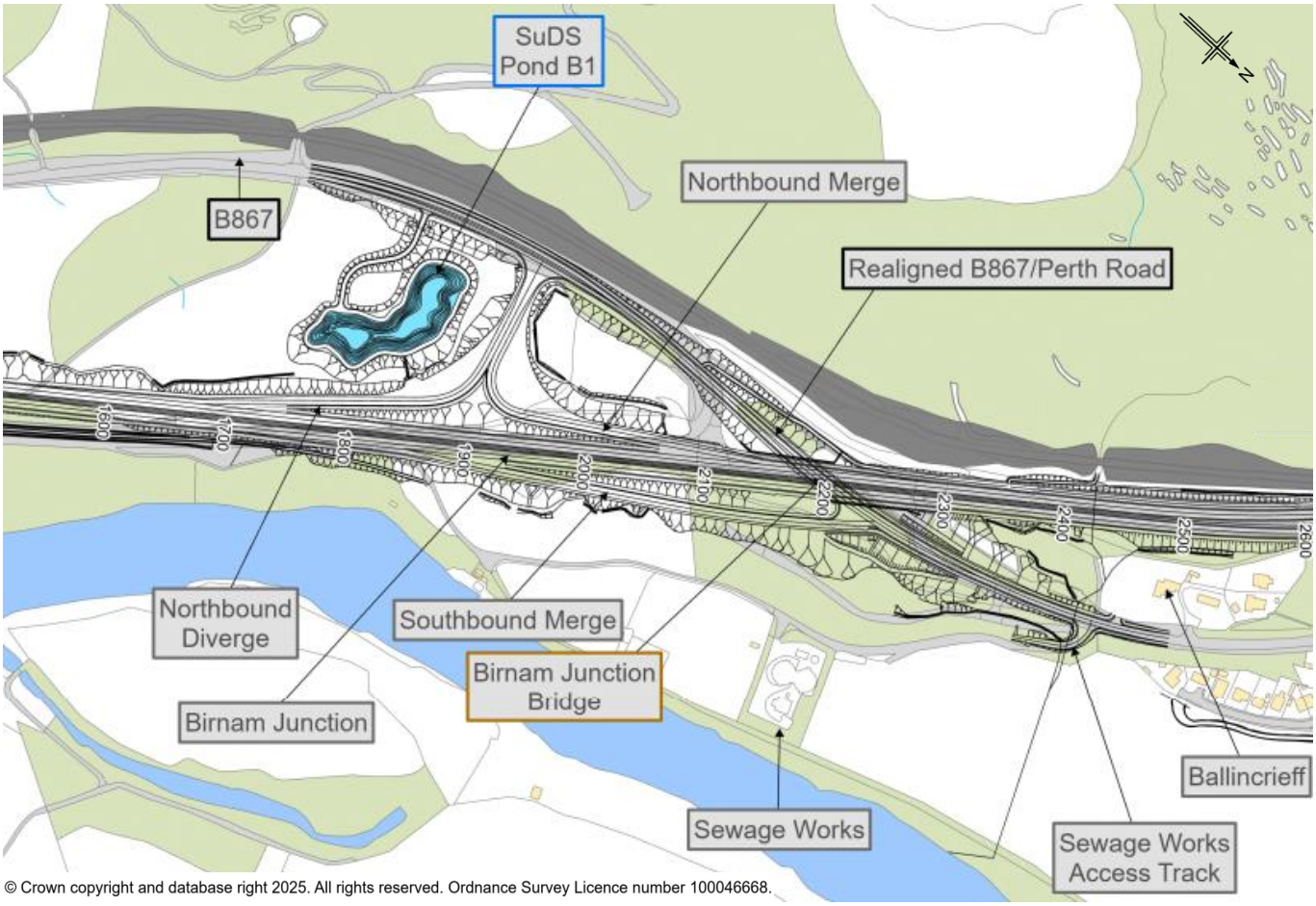

Illustration 5-3: B867 Birnam Grade Separated Junction

5.8.4 Forecast traffic flows under the 'With Policy' forecast scenario at the proposed Birnam Grade Separated Junction are shown in Table 5-5.

Traffic Demand	Base	Do Minimum			Do Something	
	2015	2025	2036	2051	2036	2051
A9 to the south	15,600	15,200	14,700	15,200	16,200	16,800
A9 to the north	14,900	14,700	14,300	14,800	15,400	16,100
B867	900	900	900	900	1,100	1,000
Perth Road	1,700	1,600	1,500	1,500	1,800	1,800

Table 5-5 - Annual Average Daily Traffic (AADT) Traffic Flows – Birnam Grade Separated Junction – 'With Policy' forecast

Table Notes:

1. *Flows rounded to the nearest 100 AADT*
2. *Do Something traffic flows relate to the Do Something scenario under the 'With Policy' forecast*

5.8.5 Forecast traffic flows under the 'Without Policy' forecast scenario at the proposed Birnam Grade Separated Junction are shown in Table 5-6.

Traffic Demand	Base	Do Minimum			Do Something	
	2015	2025	2036	2051	2036	2051
A9 to the south	15,600	15,600	17,100	20,000	20,500	25,000
A9 to the north	14,900	15,000	16,600	19,500	19,400	23,700
B867	900	900	1,000	1,100	1,100	1,200
Perth Road	1,700	1,700	1,700	1,800	2,100	2,500

Table 5-6 - Annual Average Daily Traffic (AADT) Traffic Flows – Birnam Grade Separated Junction – 'Without Policy' forecast

Table Notes:

1. *Flows rounded to the nearest 100 AADT*
2. *Do Something traffic flows relate to the Do Something (Environmental) scenario under the 'Without Policy' forecast*

A822/A923 Dunkeld Roundabout

5.8.6 The proposed A822 / A923 Dunkeld Roundabout is situated in the locality of the existing left/right staggered priority junction with the A822 and A923 as is shown on drawing number A9P02-JAC-HGN-D_ZZZZZ_ZZ-FG-RD-0003 included in Volume 2: Engineering Drawings, of this report and below in Illustration 5-4. The junction incorporates an elongated roundabout with five arms, and a segregated left turn is provided between the A923 and A9 southbound carriageway.

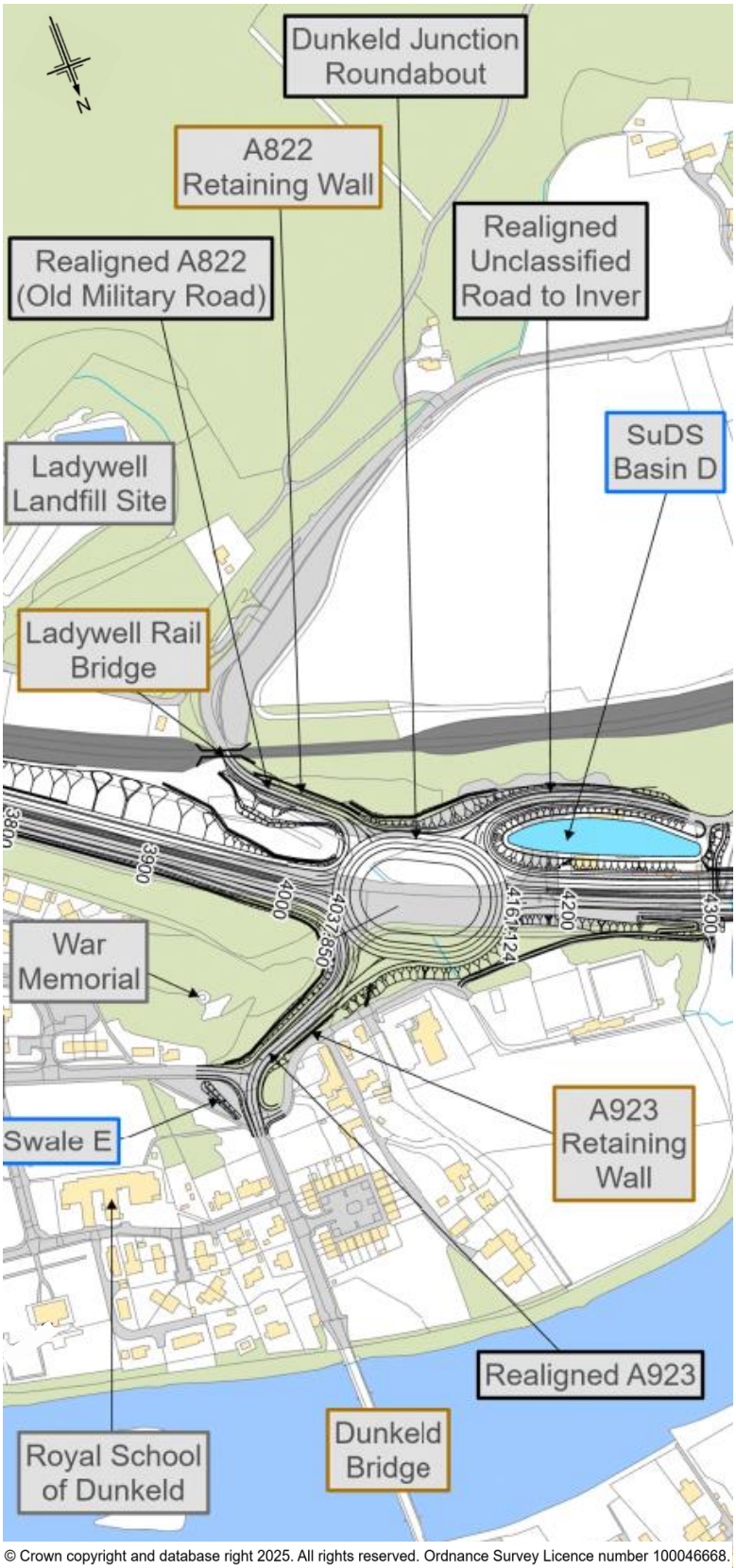

Illustration 5-4: A822 / A923 Dunkeld Roundabout

5.8.7 Forecast traffic flows under the 'With Policy' forecast scenario at the proposed Dunkeld Roundabout are shown in Table 5-7.

Traffic Demand	Base	Do Minimum			Do Something	
	2015	2025	2036	2051	2036	2051
A9 to the south	15,000	14,800	14,400	14,900	15,400	16,100
A9 to the north	14,900	14,600	14,200	14,700	16,000	16,600
A822	1,500	1,400	1,200	1,100	1,200	1,200
A923	4,000	3,800	3,500	3,400	4,000	3,900
Inver Road	400	400	400	400	400	400

Table 5-7 - Annual Average Daily Traffic (AADT) Traffic Flows - Dunkeld Roundabout – 'With Policy' forecast

Table Notes:

1. *Flows rounded to the nearest 100 AADT*
2. *Do Something traffic flows relate to the Do Something scenario under the 'With Policy' forecast*

5.8.8 Forecast traffic flows under the 'Without Policy' forecast scenario at the proposed Dunkeld Roundabout are shown in Table 5-8.

Traffic Demand	Base	Do Minimum			Do Something	
	2015	2025	2036	2051	2036	2051
A9 to the south	15,000	15,100	16,700	19,600	19,400	23,800
A9 to the north	14,900	15,000	16,400	19,300	20,200	24,700
A822	1,500	1,500	1,600	1,900	1,800	2,300
A923	4,000	3,900	4,100	4,500	5,200	6,100
Inver Road	400	400	400	500	400	400

Table 5-8 - Annual Average Daily Traffic (AADT) Traffic Flows - Dunkeld Roundabout – 'Without Policy' forecast

Table Notes:

1. *Flows rounded to the nearest 100 AADT*
2. *Do Something traffic flows relate to the Do Something (Environmental) scenario under the 'Without Policy' forecast*

The Hermitage (National Trust for Scotland) Junction

5.8.9 The proposed Hermitage Junction is situated at the site of the existing priority junction, which provides access to the car park for this National Trust for Scotland site and Craigvinean Forest, part

of the Tay Forest Park managed by Forestry and Land Scotland. The junction layout is as shown on drawing number A9P02-JAC-HGN-D_ZZZZZ_ZZ-FG-RD-0003 included in Volume 2: Engineering Drawings, of this report and below in Illustration 5-5. This is a left-in left-out arrangement on the A9 northbound carriageway.

5.8.10 Traffic approaching from the north will no longer be able to turn right into The Hermitage car park and drivers will need to continue south on the A9 to the Dunkeld Roundabout approximately 1.1km to the south and make a U-turn to access the A9 northbound carriageway. Overall, the additional distance travelled to access The Hermitage from the north will be approximately 2.5km.

5.8.11 Traffic leaving The Hermitage car park will no longer be able to make a right turn to head south and will instead need to join the A9 northbound carriageway, leave the A9 at the B898 Dalguise Junction and join the A9 southbound carriageway. Overall, the additional distance travelled to access the southbound carriageway from The Hermitage will be approximately 4km.

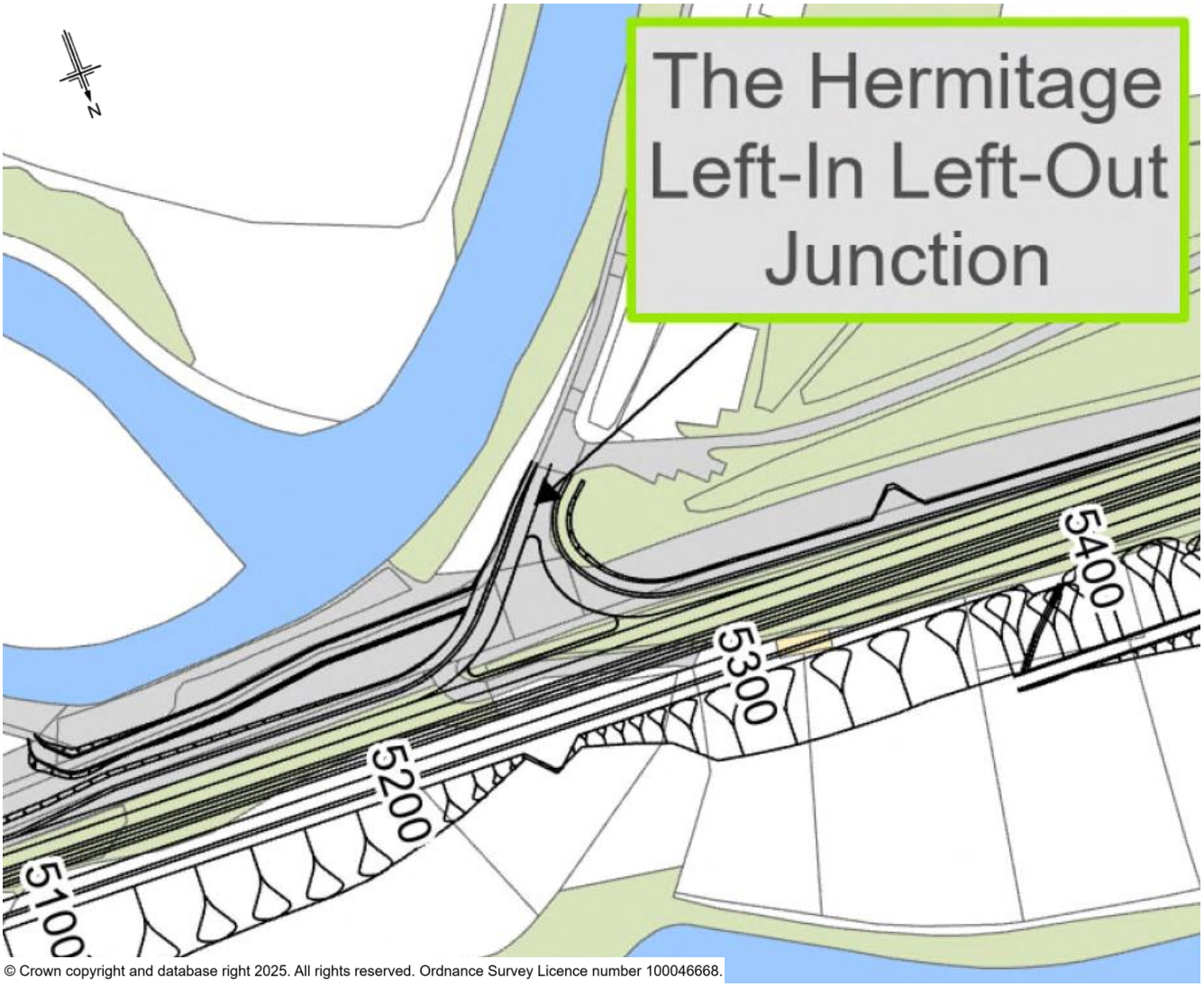

Illustration 5-5: The Hermitage Junction

5.8.12 Forecast traffic flows under the 'With Policy' forecast scenario at the proposed Hermitage Junction are shown in Table 5-9.

Traffic Demand	Base	Do Minimum			Do Something	
	2015	2025	2036	2051	2036	2051
A9 to the south	14,900	14,600	14,200	14,700	16,000	16,600
A9 to the north	15,000	14,700	14,200	14,700	16,000	16,600
The Hermitage	400	400	300	300	300	300

Table 5-9 - Annual Average Daily Traffic (AADT) Traffic Flows – The Hermitage Junction – 'With Policy' forecast

Table Notes:

1. *Flows rounded to the nearest 100 AADT*
2. *Do Something traffic flows relate to the Do Something scenario under the 'With Policy' forecast*

5.8.13 Forecast traffic flows under the 'Without Policy' forecast scenario at the proposed Hermitage Junction are shown in Table 5-10.

Traffic Demand	Base	Do Minimum			Do Something	
	2015	2025	2036	2051	2036	2051
A9 to the south	14,900	15,000	16,400	19,300	20,200	24,700
A9 to the north	15,000	15,000	16,500	19,300	20,200	24,700
The Hermitage	400	400	400	500	400	500

Table 5-10 - Annual Average Daily Traffic (AADT) Traffic Flows – The Hermitage Junction – 'Without Policy' forecast

Table Notes:

1. *Flows rounded to the nearest 100 AADT*
2. *Do Something traffic flows relate to the Do Something (Environmental) scenario under the 'Without Policy' forecast*

B898 Dalguise Junction

5.8.14 The proposed B898 Dalguise Junction is situated at the site of the existing priority junction with the B898. The proposed junction layout is as shown on drawing number A9P02-JAC-HGN-D_ZZZZZ_ZZ-FG-RD-0004 included in Volume 2: Engineering Drawings, of this report and below in Illustration 5-6. This arrangement caters for all movements.

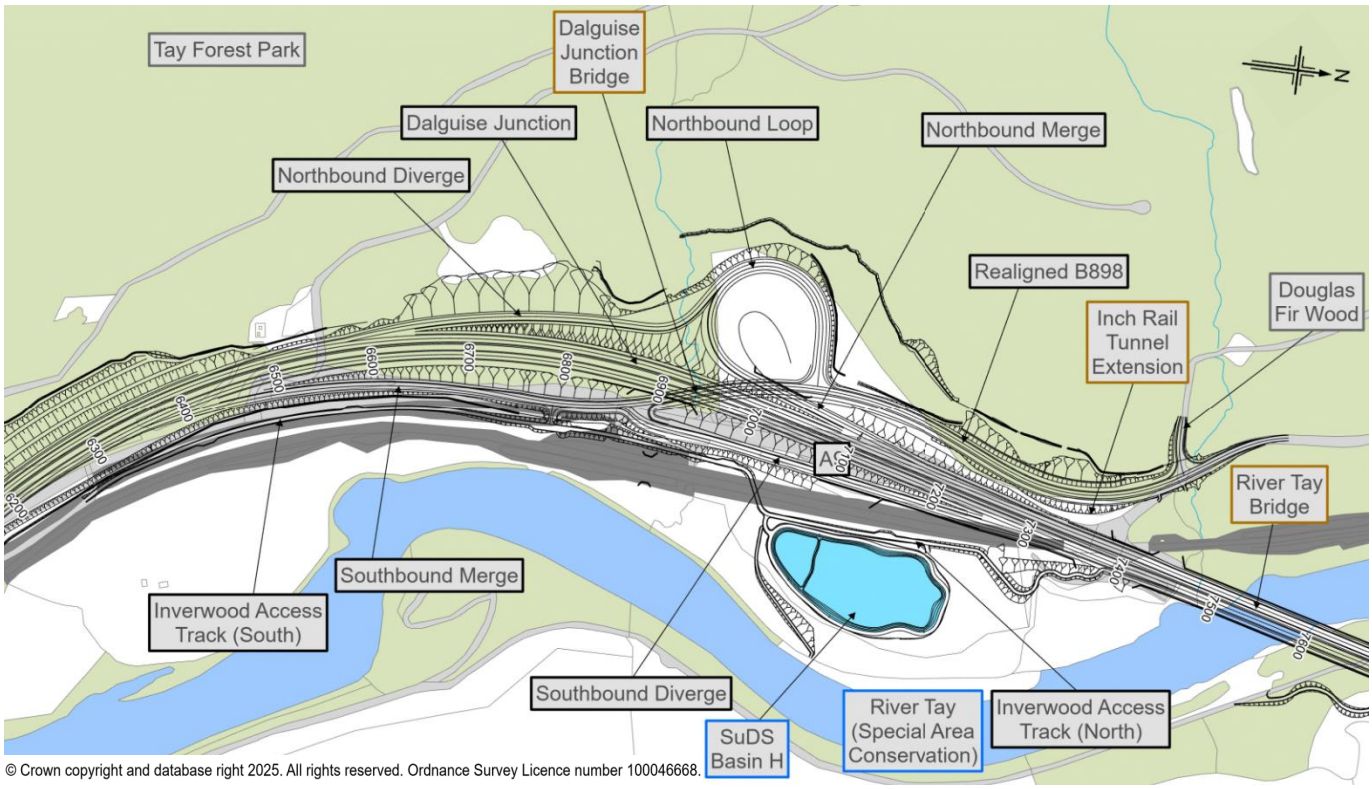

Illustration 5-6: B898 Dalguise Junction

5.8.15 Forecast traffic flows under the 'With Policy' forecast scenario at the proposed B898 Dalguise Junction are shown in Table 5-11.

Traffic Demand	Base	Do Minimum			Do Something	
	2015	2025	2036	2051	2036	2051
A9 to the south	15,000	14,700	14,200	14,700	16,000	16,600
A9 to the north	14,600	14,300	13,800	14,400	15,500	16,100
B898	500	500	500	500	500	500

Table 5-11 - Annual Average Daily Traffic (AADT) Traffic Flows – Dalguise Junction – 'With Policy' forecast

Table Notes:

1. *Flows rounded to the nearest 100 AADT*
2. *Do Something traffic flows relate to the Do Something scenario under the 'With Policy' forecast*

5.8.16 Forecast traffic flows under the 'Without Policy' forecast scenario at the proposed B898 Dalguise Junction are shown in Table 5-12.

Traffic Demand	Base	Do Minimum			Do Something	
	2015	2025	2036	2051	2036	2051
A9 to the south	15,000	15,000	16,500	19,300	20,200	24,700
A9 to the north	14,600	14,600	16,100	18,900	19,600	24,000
B898	500	500	600	600	600	700

Table 5-12 - Annual Average Daily Traffic (AADT) Traffic Flows – Dalguise Junction – 'Without Policy' forecast

Table Notes:

1. *Flows rounded to the nearest 100 AADT*
2. *Do Something traffic flows relate to the Do Something (Environmental) scenario under the 'Without Policy' forecast.*