



A9 Dualling Programme: Pass of Birnam to Tay Crossing

Transport Scotland

Identification of DMRB Stage 2 Whole Route Options

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Author: D. MALEY
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Jacobs

95 Bothwell Street
Glasgow, Scotland G2 7HX
United Kingdom
T +44 (0)141 243 8000
F +44 (0)141 226 3109
www.jacobs.com

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List of Abbreviations

AWI	-	Ancient Woodland Inventory
DMRB	-	Design Manual for Roads and Bridges
GCR	-	Geological Conservation Review
GDL	-	Garden and Designed Landscape
GI	-	Ground Investigation
HES	-	Historic Environment Scotland
HGV	-	Heavy Goods Vehicle
IIP	-	Infrastructure Investment Plan
NCN	-	National Cycle Network
NMU	-	Non-Motorised User
NSA	-	National Scenic Area
NTS	-	National Transport Strategy
PES	-	Preliminary Engineering Services
RISS	-	Route Improvement Strategy Study
SAC	-	Special Area of Conservation
SEA	-	Strategic Environmental Assessment
SEPA	-	Scottish Environment Protection Agency
SNH	-	Scottish Natural Heritage
SPA	-	Special Protection Area
SSSI	-	Site of Scientific Interest
STPR	-	Strategic Transport Projects Review
SuDS	-	Sustainable Drainage System
TRBO	-	Trunk Road & Bus Operations
WS2+1	-	Wide Single Carriageway (two lanes of travel in one direction and a single lane in the other)

Executive Summary

In July 2004, Transport Scotland commissioned AECOM (formerly URS / Scott Wilson) to undertake a Route Improvement Strategy Study (RISS) for the new A9 trunk road between Perth and Blair Atholl. The study recommended upgrading of the A9 between Perth and Pitlochry to dual carriageway standard. As such, in 2009, Transport Scotland appointed AECOM to progress the development of the Pass of Birnam to Tay Crossing section of A9 dualling. AECOM considered an on-line corridor for a dual carriageway, with off-line corridors discounted, primarily due to adjacent topography and the resultant environmental impact. AECOM considered an initial five options that were refined and developed to two options.

In 2011, the Cabinet Secretary announced full dualling of the A9 between Perth and Inverness by 2025. In response, Transport Scotland commissioned a Strategic Environmental Assessment (SEA) and Preliminary Engineering Services (PES) that considered a route wide assessment. The SEA and PES commissions established a range of overarching strategies and objectives for the scheme. A key conclusion of the PES commission is that the A9 dual carriageway will be a Category 7A all-purpose dual carriageway, in accordance with the Design Manual for Roads and Bridges (DMRB).

In August 2014, Jacobs was awarded the commission to progress the Pass of Birnam to Tay Crossing scheme. On appointment, Jacobs refined the options previously produced by AECOM and introduced a further option, considering the final conclusions of the SEA and PES commissions and outstanding residual issues, most notably the requirement for a Category 7A dual carriageway. A further option was also considered.

The options generated by Jacobs were presented to the public at an exhibition in January 2016. Feedback was requested from the community and concerns were raised as to the scale of the proposals, particularly the grade separated junction layouts. As a result, Transport Scotland agreed to an A9 Co-Creative Process. Consisting of five stages, beginning in January 2018 and concluding in June 2018, the A9 Co-Creative Process involved the public suggesting ideas for A9 dualling and voting for the Community's Preferred Route Option.

Since completion of the A9 Co-Creative Process, initial assessment has been undertaken on the Community's Preferred Route Option. This work has considered environmental, constructability and economic impacts and identified a number of key challenges. Key stakeholders and residents that live in close proximity to the A9 have also been consulted to gain their views on the Community's Preferred Route Option. As a result of the challenges identified by the initial assessment, many of which are difficult to mitigate, and to ensure a robust assessment process, additional options to the Community's Preferred Route Option have been developed. Two additional options have been identified for the A9 dual carriageway, Dunkeld & Birnam Station and Murthly/Birnam Junction, and one additional option has been identified for Dunkeld Junction.

Initial assessment has been completed for the additional options. This assessment has recommended that one of the additional options at Dunkeld & Birnam Station, which involved a relocated station, should be removed from further consideration. The level of assessment undertaken in the initial assessment was unable to eliminate other options.

Using the disaggregated options and the outcome of the initial assessment, Whole Route Options have been constructed. This considered how the constituent options fit together naturally, the key principles of the A9 Co-Creative Process and the community's and Transport Scotland's objectives. The placement of options in the public vote at Stages 4 and 5 of the A9 Co-Creative Process has also been considered, as well as how the Whole Route Options address concerns from some local residents and key stakeholders. As a result, three Additional Whole Route Options have been developed and will be considered alongside the Community's Preferred Route Option as part of the DMRB Stage 2 assessment. The assessment will identify the environmental, engineering, traffic and economic advantages and constraints associated with each route option. The results of this assessment, and community and stakeholder feedback, will be presented to Scottish Ministers for consideration and a Preferred Route Option will be selected. The Preferred Route Option will be taken forward for further development as part of the DMRB Stage 3 assessment.

1. Introduction

1.1 Scheme Development (2004 to 2016)

- 1.1.1 In July 2004, Transport Scotland commissioned AECOM (formerly URS / Scott Wilson) to undertake a Route Improvement Strategy Study (RISS) for the new A9 trunk road between Perth and Blair Atholl. The study recommended upgrading of the A9 between Perth and Pitlochry to dual carriageway standard. As such, in 2009, Transport Scotland appointed AECOM to progress the development of the Pass of Birnam to Tay Crossing section of A9 dualling. AECOM considered an on-line corridor for a dual carriageway, with off-line corridors discounted, primarily due to adjacent topography and the resultant environmental impact. AECOM considered an initial five options that were refined and developed to two options.
- 1.1.2 In 2011, the Cabinet Secretary announced full dualling of the A9 between Perth and Inverness by 2025. In response, Transport Scotland commissioned a Strategic Environmental Assessment (SEA) and Preliminary Engineering Services (PES) study that considered a route wide assessment. The SEA and PES commissions established a range of overarching strategies and objectives for the scheme.
- 1.1.3 The scheme objectives established by the PES commissions for the A9 Dualling Programme are given below.
- To improve the operational performance of the A9 by:
 - Reducing journey times; and
 - Improving journey time reliability.
 - To improve safety for motorised and Non-Motorised Users (NMUs) by:
 - Reducing accident severity; and
 - Reducing driver stress.
 - To facilitate active travel within the corridor; and
 - To improve integration with Public Transport facilities.
- 1.1.4 The PES commission also concluded that the proposed A9 dual carriageway will be a Category 7A all-purpose dual carriageway, in accordance with the Design Manual for Roads and Bridges (DMRB) (Volume 6, Section 1, Part 1, TD 9/93: Highway Link Design). The standard requires that there will be no gaps in the central reserve and no at-grade minor junctions. It is also recommended that only grade separated junctions are provided on the route for safe access and egress to the A9. Isolated left-in left-out accesses may be provided in exceptional circumstances. Compact grade separated junctions and at-grade roundabouts should not be provided on Category 7A carriageways.
- 1.1.5 In August 2014, Jacobs was awarded the commission to progress the Pass of Birnam to Tay Crossing scheme. On appointment, Jacobs refined the options previously produced by AECOM and introduced a further option, considering the final conclusions of the SEA and PES commissions and outstanding residual issues, most notably the requirement for a Category 7A dual carriageway. A further option was also considered.
- 1.1.6 A detailed description of the project background is included in Appendix A.

1.2 A9 Co-Creative Process

- 1.2.1 The options considered by Jacobs were presented to the public at an exhibition in January 2016 and discussed at a public meeting in February 2016. Feedback was requested from the community and concerns were raised as to the scale of the proposals, particularly the grade separated junction layouts. Dunkeld & Birnam Community Council requested more detailed consultation be undertaken with the local community to review the options and investigate if other suitable alternative options, that

address community concerns, were available. As a result, Transport Scotland agreed to a co-creative process. Significant planning for the process was undertaken throughout 2016 and 2017, which involved appointing PAS (formerly Planning Aid Scotland), to facilitate the process. The Birnam to Ballinluig A9 Community Group was formed with the intention of representing the community during the A9 Co-Creative Process.

1.2.2 Following a series of community workshops in October and November 2017, the Birnam to Ballinluig A9 Community Group generated community objectives. The community’s objectives are detailed below.

- Reduce current levels of noise and pollution in the villages of Dunkeld, Birnam and Inver to protect human health and well-being of residents and visitors and to enable them to peacefully enjoy their properties and amenity spaces.
- Protect and enhance the scenic beauty and natural heritage of the area and its distinctive character and quality.
- Provide better, safer access on and off the A9 from both sides of the road while ensuring easy, safe movement of vehicular traffic and NMUs through the villages, helping to reduce stress and anxiety and support the local community.
- Promote long-term and sustainable economic growth within Dunkeld and Birnam and the surrounding communities.
- Examine and identify opportunities to enhance the levels of cycling and walking for transport and leisure, including the improvement of existing footpaths and cycle ways, to promote positive mental health and well-being.
- Ensure that all local bus, intercity bus services and train services are maintained and improved.
- Preserve and enhance the integrity of the unique and rich historical and cultural features of the Dunkeld, Birnam and Inver communities, thereby supporting well-being and the local economy.

1.2.3 The A9 Co-Creative Process consisted of five stages, beginning in January 2018 and concluding in June 2018. An outline of the process is given in Table 1.1.

Table 1.1: A9 Co-Creative Process Summary

Stage	Description
Stage 1, Community Options Gathering	Encouraging and facilitating the gathering of options and ideas from the community.
Stage 2, Developing an All-Candidate Option List	Reviewing options gathered, grouping and sorting where necessary and progressing all those that meet the progression criteria (i.e. option is a dual carriageway for the A9 and option is safe in terms of geometric standards, based on professional engineering assessment).
Stage 3, Creating a Long List	Reviewing those options progressed from Stage 2, considering, to a greater degree, safety implications of the options and the early identification of mitigation issues of concern to the community.
Stage 4, Selecting a Short List	Assessing the options against community and Transport Scotland objectives to allow the identification of a short list of options to progress to Stage 5.
Stage 5, Agreeing a Preferred Option	Conducting appropriate environmental, engineering and traffic and economic analysis to provide factual information to allow further assessment and identification of the Community’s Preferred Route Option.

1.2.4 At Stage 1 of the process, the community was invited to submit ideas for A9 dualling. A total of 167 submissions were received, which included a wide range of ideas and options. At Stage 2 of the process, ideas were divided into constituent parts for assessment (i.e. Mainline On-line, Mainline Off-line, Murthly/Birnam Junction, Dunkeld Junction, Dalguise Junction, Dunkeld & Birnam Station and The Hermitage). Options that were single carriageway or that which were deemed unsafe, based on the level of assessment undertaken, were eliminated, creating a long list of options to be assessed in

greater detail at Stage 3. Stages 4 and 5 included a public vote to determine the Community's Preferred Route Option. A summary of the options progressed through to Stage 4 of the A9 Co-Creative Process is given in Table 1.2.

Table 1.2: A9 Co-Creative Process Options Progression

Category	Options at Stage 2	Options Eliminated at Stage 2	Options Progressed to Stage 3	Options Eliminated at Stage 3	Options Progressed to Stage 4
Mainline On-line	13	1	12	0	12
Mainline Off-line	12	2	10	1	9
Birnam/Murthly Junction	27	3	24	1	23
Dunkeld Junction	21	6	15	2	13
Dalguise Junction	12	3	9	0	9
Dunkeld & Birnam Station	18	7	11	0	11
The Hermitage	9	4	5	0	5
Total	112	26	86	4	82

1.2.5 Stage 4 included a public vote to determine a shortlist of options to be progressed to Stage 5. The results of the community vote are given in Tables 1.3 to 1.9.

Table 1.3: A9 Co-Creative Process Stage 4 Results (Mainline On-line)

Option	Summary Description	Total Score	Percentage
MO_0004	On-line tunnel, approximately between Birnam Junction and Dunkeld Junction	374	26.9
MO_0013	On-line tunnel, in the locality of Dunkeld & Birnam Station	274	19.7
MO_0002	Lowered A9 in vicinity of Dunkeld & Birnam Station, structure utilised for car park	201	14.5
MO_0006	On-line tunnel, approximately between Birnam Junction and The Hermitage	172	12.4
MO_0005	On-line tunnel, approximately between the southern and northern scheme extents	86	6.2
MO_0008	On-line tunnel, between Birnam and Dunkeld, northbound carriageway above southbound carriageway	84	6.0
MO_0001	On-line and at-grade with a combination of northbound and southbound widening	82	5.9
MO_0007	On-line route with southbound widening south of Birnam Junction	77	5.5
MO_0012	On-line route, southbound widening only	13	0.9
MO_0010	On-line route, northbound carriageway in structure above southbound carriageway	11	0.8
MO_0009	On-line tunnel for southbound carriageway, northbound carriageway at ground level	8	0.6
MO_0011	On-line route, raised in locality of Dunked & Birnam Station	7	0.5
Total Number of Ranking Cards Submitted: 139			

Table 1.4: A9 Co-Creative Process Stage 4 Results (Mainline Off-line)

Option	Summary Description	Total Score	Percentage
MF_0003	Off-line tunnel to the west, approximately between Birnam Junction and Dunkeld Junction	207	22.1
MF_0002	Off-line tunnel to the west, approximately between Birnam Junction and north of The Hermitage	199	21.2
MF_0012	Off-line route to the west following existing topography, approximately between southern and northern extents	129	13.8
MF_0001	Off-line tunnel to the west, approximately between southern and northern extents	107	11.4
MF_0005	Off-line tunnel to the east, approximately between southern and northern extents	84	9.0
MF_0006	Off-line route below the Highland Main Line railway	79	8.4
MF_0009	Off-line route to the west following the Highland Main Line railway, railway realigned to follow the route of the existing A9	53	5.7
MF_0007	Off-line tunnel to the west for northbound carriageway, approximately between Birnam Junction and north of The Hermitage, southbound carriageway utilizing the existing A9	48	5.1
MF_0004	Off-line tunnel to the west, approximately between Dunkeld Junction and north of The Hermitage	31	3.3
Total Number of Ranking Cards Submitted: 131			

Table 1.5: A9 Co-Creative Process Stage 4 Results (Murthly/Birnam Junction)

Option	Summary Description	Total Score	Percentage
MU_0002	Grade separated junction, diamond layout. Connection of the B867 and Murthly Estate, crossing the A9 on an overbridge structure. Northbound and Southbound slip roads, incorporating taper merge and diverge, linking to the new overbridge structure.	189	11.1
BN_0003	Grade separated junction, half diamond layout. Connection of the B867 and Perth Road, crossing the A9 on an underbridge structure. Northbound slip roads, incorporating taper diverge, linking to the realigned B867/Perth Road. Southbound slip roads, incorporating taper merge, linking to the realigned B867/Perth Road. No provision of northbound merge or southbound diverge movements.	185	10.8
BN_0001	At-grade roundabout at Birnam.	177	10.4
BN_0018	Grade separated junction, half diamond layout. Connection of the B867 and Perth Road, crossing the A9 on an overbridge structure. Northbound slip roads, incorporating taper diverge, linking to the realigned B867/Perth Road. Southbound slip roads, incorporating taper merge, linking to the realigned B867/Perth Road. No provision of northbound merge or southbound diverge movements.	138	8.1
BN_0004	Grade separated junction, half diamond layout. Connection of the B867 and Perth Road, crossing the A9 on an underbridge structure. Northbound slip roads, incorporating taper merge and diverge, linking to the	133	7.8

Option	Summary Description	Total Score	Percentage
	<p>realigned B867/Perth Road.</p> <p>Southbound slip roads, incorporating taper merge, linking to the realigned B867/Perth Road.</p> <p>No provision of northbound merge or southbound diverge movements.</p>		
BN_0016	<p>Grade separated junction, bridge roundabout.</p> <p>Skewed elongated roundabout, crossing the A9 on underbridge structure. B867 and Perth Road realigned to join the roundabout.</p> <p>Northbound slip roads, incorporating taper merge and diverge. Northbound merge and diverge slip roads linking to the roundabout.</p> <p>Southbound slip roads, incorporating taper merge and diverge. Southbound merge and diverge slip roads linking to the roundabout.</p>	111	6.5
MU_0001	<p>At-grade elongated roundabout at Murthly Estate access.</p>	104	6.1
BN_0008	<p>Grade separated junction, half cloverleaf layout.</p> <p>Connection of the B867 and Perth Road, crossing the A9 on an overbridge structure.</p> <p>Northbound loop, 50 metres radius, basic merge plus hook diverge, incorporating taper merge and diverge, linking to the realigned B867/Perth Road.</p> <p>Southbound loop, 50 metres radius, basic diverge plus hook merge, incorporating taper merge and diverge, linking to the realigned B867/Perth Road.</p> <p>For Off-line A9 route.</p>	77	4.5
BN_0005	<p>Compact grade separated junction, compact loops, underbridge, full movements.</p>	76	4.4
BN_0021	<p>Grade separated junction, diamond layout.</p> <p>Connection of the B867 and Perth Road, crossing the A9 on an underbridge structure.</p> <p>Northbound slip roads, incorporating taper merge and diverge, linking to the realigned B867/Perth Road.</p> <p>Southbound slip roads, incorporating taper merge and diverge, linking to the realigned B867/Perth Road.</p>	61	3.6
BN_0010	<p>Grade separated junction, half cloverleaf layout.</p> <p>Connection of the B867 and Perth Road, crossing the A9 on an underbridge structure.</p> <p>Northbound loop, 50 metres radius, basic merge plus hook diverge, incorporating taper merge and diverge, linking to the realigned B867/Perth Road.</p> <p>Southbound loop, 50 metres radius, basic diverge plus hook merge, incorporating taper merge and diverge, linking to the realigned B867/Perth Road.</p>	59	3.5
BN_0025	<p>Grade separated junction, diamond layout.</p> <p>Connection of the B867 and Perth Road, crossing the A9 on an overbridge structure.</p> <p>Northbound slip roads, incorporating taper merge and diverge, linking to the roundabout located to the west of the A9.</p> <p>Southbound slip roads, incorporating taper merge and diverge, linking to the roundabout located to the east of the A9.</p> <p>For On-line route MO.ST4.0013.</p>	58	3.4
BN_0013	<p>Grade separated junction, diamond layout.</p> <p>Connection of the B867 and Perth Road, crossing the A9 on an underbridge structure.</p> <p>Northbound slip roads, incorporating taper merge and diverge, linking to the roundabout located to the west of the A9.</p> <p>Southbound slip roads, incorporating taper merge and diverge, linking to the roundabout located to the east of the A9.</p>	58	3.4

Option	Summary Description	Total Score	Percentage
BN_0006	Local grade separated junction, underbridge, full movements.	56	3.3
BN_0024	Grade separated junction, half diamond layout. Connection of the B867 and Perth Road, crossing the A9 on an underbridge structure. Northbound slip roads, incorporating taper diverge, linking to the realigned B867/Perth Road. Southbound slip roads, incorporating taper merge, linking to the realigned B867/Perth Road. No provision of northbound merge or southbound diverge movements. For Off-line A9 route.	44	2.6
BN_0022	Grade separated junction, diamond layout. Connection of the B867 and Perth Road, crossing the A9 on an underbridge structure. Northbound slip roads, incorporating taper merge and diverge, linking to the realigned B867/Perth Road. Southbound slip roads, incorporating taper merge and diverge, linking to the realigned B867/Perth Road. A9 northbound and southbound carriageway one above the other.	38	2.2
BN_0014	Grade separated junction, half diamond layout. Connection of the B867 and Perth Road, crossing the A9 on an underbridge structure. Northbound slip roads, incorporating taper merge, linking to the realigned B867/Perth Road. Southbound slip roads, incorporating taper merge, linking to the realigned B867/Perth Road. No provision of northbound or southbound diverge movements.	35	2.0
BN_0017	No Junction. Connection of the B867 and Perth Road, crossing the A9 on an underbridge.	35	2.0
BN_0019	Grade separated junction, half diamond layout. Northbound slip roads, incorporating taper merge, linking to the realigned B867/Perth Road. Southbound slip roads, incorporating taper merge, linking to the realigned B867/Perth Road. No provision of northbound or southbound diverge movements. No connection of B867 and Perth Road.	24	1.4
BN_0007	Local grade separated junction, overbridge, full movements.	22	1.3
BN_0009	Grade separated junction, half diamond layout. Connection of the B867 and Perth Road, crossing the A9 on an underbridge structure. Northbound slip roads, incorporating taper merge and diverge, linking to the realigned B867/Perth Road. Southbound slip roads, incorporating taper merge and diverge, linking to the realigned B867/Perth Road. For Off-line A9 route.	11	0.6
BN_0020	Grade separated junction, half diamond layout. Connection of the B867 and Perth Road, crossing the A9 on an underbridge structure. Northbound slip roads, incorporating taper diverge, linking to the realigned	11	0.6

Option	Summary Description	Total Score	Percentage
	B867/Perth Road. Southbound slip roads, incorporating taper merge and diverge, linking to the realigned B867/Perth Road. No provision of northbound merge movement.		
BN_0023	Grade separated junction, half diamond layout. Connection of the B867 and Perth Road, crossing the A9 on an underbridge structure. Southbound slip roads, incorporating taper merge and diverge, linking to the realigned B867/Perth Road. No provision of northbound merge or diverge movements.	6	0.4
Total Number of Ranking Cards Submitted: 162			

Table 1.6: A9 Co-Creative Process Stage 4 Results (Dunkeld Junction)

Option	Summary Description	Total Score	Percentage
DN_0002	At-grade elongated roundabout at Little Dunkeld.	709	39.8
DN_0016	Grade separated junction, variation of diamond layout. Roundabout on the west of the A9, connected to the realigned A923, which crosses the A9 on an underbridge. Northbound slip roads, incorporating taper merge and diverge, linking to the roundabout. Northbound slip roads, incorporating taper merge and diverge, linking to the realigned A923.	199	11.2
DN_0015	Grade separated junction, diamond layout. Connection of the road to Inver and A923, crossing the A9 on an underbridge structure. Priority junction connecting the road to Inver with the realigned A822/A923. Northbound slip roads, incorporating taper merge and diverge. Northbound diverge slip road linking to the realigned road to Inver/A923. Northbound merge slip road linking to the road to Inver. Southbound slip roads, incorporating taper merge and diverge, linking to the realigned road to Inver/A923.	141	7.9
DN_0006	Local grade separated junction, underbridge, full movements.	137	7.7
DN_0004	Grade separated junction, variation of diamond layout. Designed for a 50mph Speed Limit. Connection of the A822 and A923, crossing the A9 on an underbridge structure. Priority junction connecting the road to Inver with the realigned A822/A923. Northbound slip roads, incorporating taper merge and diverge. Northbound diverge slip road linking to the realigned A822/A923. Northbound merge slip road linking to the road to Inver. Southbound slip roads, incorporating taper merge and diverge, linking to the realigned A822/A923.	136	7.6
DN_0018	Grade separated junction, two bridge roundabout. Roundabout crossing the A9 on two underbridge structures. A822, A923 and road to Inver realigned to join the roundabout. Northbound slip roads, incorporating taper merge and diverge. Northbound diverge and merge slip roads linking to the roundabout. Southbound slip roads, incorporating taper merge and diverge, linking to the roundabout.	122	6.9

Option	Summary Description	Total Score	Percentage
DN_0019	Grade separated junction, variation of diamond layout. Connection of the A822 and A923, crossing the A9 on an underbridge structure. Priority junction connecting the road to Inver with the realigned A822/A923. Northbound slip roads, incorporating taper merge and diverge. Northbound diverge slip road linking to the realigned A822/A923. Northbound merge slip road linking to the road to Inver. Southbound slip roads, incorporating taper merge and diverge, linking to the realigned A822/A923. A9 northbound and southbound carriageway one above the other.	112	6.3
DN_0013	Grade separated junction, northbound slip roads only. Roundabout on the west of the A9, connected to the realigned A923, which crosses the A9 on an underbridge. Northbound slip roads, incorporating taper merge and diverge, linking to the roundabout. No provision of southbound merge or diverge movements.	82	4.6
DN_0003	At-grade elongated roundabout north of Dunkeld.	40	2.2
DN_0012	No junction. Connection of the A822 and A923, crossing the A9 on an underbridge structure. No provision of northbound or southbound merge or diverge movements.	39	2.2
DN_0017	Grade separated junction. Connection of the A822 and A923, crossing the A9 on an underbridge structure. Northbound slip roads, incorporating taper merge, linking to the realigned A822/A923. Southbound slip roads, incorporating taper merge, linking to the realigned A822/A923. No provision of northbound or southbound diverge movements.	28	1.6
DN_0011	Grade separated junction. Connection of the A822 and A923, crossing the A9 on an underbridge structure. Southbound slip roads, incorporating taper merge and diverge, linking to the realigned A822/A923. No provision of northbound merge or diverge movements.	22	1.2
DN_0009	Grade separated junction, half diamond layout. Connection of the A822 and A923, crossing the A9 on an underbridge structure. Northbound slip roads, incorporating taper merge, linking to the realigned A822/A923. Southbound slip roads, incorporating taper diverge, linking to the realigned A822/A923. No provision of northbound diverge or southbound merge movements.	14	0.8
Total Number of Ranking Cards Submitted: 217			

Table 1.7: A9 Co-Creative Process Stage 4 Results (Dalguise Junction)

Option	Summary Description	Total Score	Percentage
DG_0002	Grade separated junction, northbound loop arrangement and southbound slip roads. Roundabout on the east of the A9, connected to the realigned B898, which crosses the A9 on an underbridge. An alternative means of access from the B898 to existing forestry tracks would be	195	18.7

Option	Summary Description	Total Score	Percentage
	<p>required.</p> <p>Southbound slip roads, incorporating taper merge and diverge, linking to the roundabout.</p> <p>Northbound loop, 50 metres radius, basic merge plus hook diverge, incorporating taper merge and diverge, linking to the realigned B898.</p>		
DG_0005	<p>Grade separated junction, variation of diamond layout.</p> <p>Connection of the B898 and southbound merge slip road, crossing the A9 on an underbridge structure.</p> <p>An alternative means of access from the A898 to existing forestry tracks would be required.</p> <p>Northbound slip roads, incorporating taper merge and diverge, linking to the realigned B898.</p> <p>Southbound slip roads, incorporating taper merge and diverge. Southbound diverge slip road linking to the realigned B898/southbound merge slip road.</p>	184	17.7
DG_0003	<p>Grade separated junction, diamond layout.</p> <p>Roundabout on the east and west of the A9, connected to a new road, crossing the A9 on an underbridge structure, which links to the realigned B898. The realigned B898 continues, providing access to adjacent land.</p> <p>An alternative means of access from the B898 to existing forestry tracks would be required.</p> <p>Northbound slip roads, incorporating taper merge and diverge, linking to the roundabout on the west of the A9.</p> <p>Southbound slip roads, incorporating taper merge and diverge, linking to the roundabout on the east of the A9.</p>	176	16.9
DG_0006	<p>Grade separated junction, northbound hybrid arrangement and southbound slip roads.</p> <p>Roundabout on the east of the A9, connected to the realigned B898, which crosses the A9 on an underbridge.</p> <p>An alternative means of access from the B898 to existing forestry tracks would be required.</p> <p>Southbound slip roads, incorporating taper merge and diverge, linking to the roundabout.</p> <p>Northbound slip roads, incorporating taper merge and diverge, linking to the realigned B898.</p>	124	11.9
DG_0001	<p>At-grade roundabout.</p>	110	10.6
DG_0012	<p>Grade separated junction, half diamond layout.</p> <p>Connection of the B898 and southbound merge slip road, crossing the A9 on an underbridge structure.</p> <p>An alternative means of access from the B898 to existing forestry tracks would be required.</p> <p>Northbound slip road, incorporating taper diverge, linking to the realigned B898.</p> <p>Southbound slip road, incorporating taper merge, linking to the realigned B898.</p> <p>No provision of northbound merge or southbound diverge movements.</p>	98	9.4
DG_0007	<p>Grade separated junction, two bridge roundabout.</p> <p>Junction located to north of River Tay Crossing.</p> <p>Roundabout crossing the A9 on two underbridge structures. B898 realigned to join the roundabout.</p> <p>Northbound slip roads, incorporating taper merge and diverge. Northbound diverge and merge slip roads linking to the roundabout.</p>	66	6.3

Option	Summary Description	Total Score	Percentage
	Southbound slip roads, incorporating taper merge and diverge, linking to the roundabout.		
DG_0010	Grade separated junction, variation of diamond layout. Connection of the B898 and southbound merge slip road, crossing the A9 on an underbridge structure. An alternative means of access from the B898 to existing forestry tracks would be required. Northbound slip road, incorporating taper merge and diverge, linking to the realigned B898. Southbound slip road, incorporating taper merge and diverge, linking to the realigned B898.	55	5.3
DG_0009	Grade separated junction, half diamond layout. Connection of the B898 and southbound merge slip road, crossing the A9 on an underbridge structure. An alternative means of access from the B898 to existing forestry tracks would be required. Northbound slip road, incorporating taper merge, linking to the realigned B898. Southbound slip road, incorporating taper merge, linking to the realigned B898. No provision of northbound or southbound diverge movements.	32	3.1
Total Number of Ranking Cards Submitted: 117			

Table 1.8: A9 Co-Creative Process Stage 4 Results (Dunkeld & Birnam Station)

Option	Summary Description	Total Score	Percentage
DS_0001	Station Road extended across the A9 on structure, structure utilised for car park	561	34.0
DS_0003	Station Road extended across the A9, A9 removed (for off-line A9 route)	177	10.7
DS_0009	Station Road extended across the A9 on structure, structure utilised for pick-up/drop-off point, new parking facility north of Inchewan Burn	169	10.2
DS_0012	New access road from the A822 to properties on Birnam Glen	168	10.2
DS_0006	Birnam Industrial Estate utilised for station car park, underpass under A9 to station	148	9.0
DS_0004	Relocated Dunkeld & Birnam Station to the north of the Inchewan Burn	128	7.8
DS_0008	New parking facility north of Inchewan Burn	83	5.0
DS_0016	Station Road extended across the A9 on structure, structure utilised for car park (for on-line route MO.ST4.0007)	72	4.4
DS_0011	Birnam Industrial Estate utilised for station car park, existing pedestrian access maintained	71	4.3
DS_0015	Vehicular access to west of Dunkeld & Birnam Station from A822 with new parking	38	2.3
DS_0014	Station Road extended below A9 (for raised A9 route)	34	2.1
Total Number of Ranking Cards Submitted: 171			

Table 1.9: A9 Co-Creative Process Stage 4 Results (The Hermitage)

Option	Summary Description	Total Score	Percentage
HT_0005	Northbound left-in left-out junction	402	40.9
HT_0001	At-grade roundabout at The Hermitage.	216	22.0
HT_0007	No junction, connection alongside A9 between A822 and The Hermitage	155	15.8
HT_0008	No junction, connection alongside A9 between Inver and The Hermitage	109	11.1

Option	Summary Description	Total Score	Percentage
HT_0003	<p>Grade separated junction, diamond layout.</p> <p>Connection of The Hermitage and land to the west of the River Tay, crossing the A9 via an underbridge structure.</p> <p>Northbound slip road, incorporating taper merge and diverge, linking to the realigned access road.</p> <p>Southbound slip road, incorporating taper merge and diverge, linking to the realigned access road.</p>	100	10.2
Total Number of Ranking Cards Submitted: 134			

- 1.2.6 As part of the A9 Co-Creative Process, a number of ideas submitted were either non-spatial or out of scope of the A9 Dualling Programme. In total 37 non-spatial ideas were submitted and 40 out of scope ideas. A number of the non-spatial ideas will automatically be considered in later stages of scheme development. Other non-spatial ideas, which are important to the community, will be retained and considered as appropriate in later stages of scheme development, subject to programme, budget, deliverability and other constraints. A list of the non-spatial ideas submitted is included in Appendix B.
- 1.2.7 Out of scope ideas, included in Appendix C, were passed to Dunkeld & Birnam Community Council for discussion with relevant stakeholders.
- 1.2.8 The constituent parts from Stage 4 were constructed into Whole Route Options. To form the Whole Route Options, the top-ranked elements were utilised, considering how they naturally fit together and using a degree of engineering judgement where necessary. The Whole Route Options identified were agreed by all parties involved in the A9 Co-Creative Process (Transport Scotland, Birnam to Ballinluig A9 Community Group and PAS). The four route options available for the public vote at Stage 5 are detailed in Table 1.10.

Table 1.10: A9 Co-Creative Process Options Summary

Scheme Option	General Information	Birnam Junction	Dunkeld Junction	Dalguise Junction
A	On-line route, largely following the alignment of the existing A9. Proposed A9 dual carriageway lowered into a cut and cover tunnel for approximately 1.5 kilometers. Reconnection of Station Road to Dunkeld & Birnam Station with a replacement car park provided on the structure. Speed limit of 50mph between southern extent of scheme and Dunkeld Junction.	<p>Grade separated junction in the locality of the existing private access to Murthly Castle. Diamond layout, with northbound and southbound merge and diverge slip roads. An overbridge is provided across the A9 linking to the B867.</p> <p>Requires connection of the B867 and Perth Road.</p>	At-grade roundabout, providing connections to the A9 (north and south), A923, A822 and road to Inver.	Grade separated junction with roundabout on the east of the A9, connected to the B898, which crosses the A9 via an underbridge. Northbound loop, with merge and diverge and southbound slip roads.
B	On-line route, largely following the alignment of the existing A9. Proposed A9 dual carriageway lowered into a cut and cover tunnel for approximately 450 metres. Reconnection of	<p>Grade separated junction, half diamond layout in the locality of the existing Birnam Junction. Northbound and southbound merge and diverge slip roads.</p> <p>Connection of B867 and</p>	At-grade roundabout, providing connections to the A9 (north and south), A923, A822 and road to Inver.	Grade separated junction with roundabout on the east of the A9, connected to the B898, which crosses the A9 via an underbridge. Northbound loop, with merge and diverge and southbound

Scheme Option	General Information	Birnam Junction	Dunkeld Junction	Dalguise Junction
	Station Road to Dunkeld & Birnam Station with a replacement car park provided on the structure. Speed limit of 70mph.	Perth Road, crossing the A9 via an overbridge.		slip roads.
C	Off-line route to the west incorporating a bored tunnel between the existing Birnam Junction and Inver. Speed limit of 70mph. Assumed existing A9 retained for local access to Dunkeld & Birnam Station and Dunkeld.	Grade separated junction in the locality of the existing private access to Murthly Castle. Diamond layout, with northbound and southbound merge and diverge slip roads. An overbridge is provided across the A9 linking to the B867. Requires connection of the B867 and Perth Road.	No junction appropriate.	Grade separated junction with roundabout on the east of the A9, connected to the B898, which crosses the A9 via an underbridge. Northbound loop, with merge and diverge and southbound slip roads.
D	On-line route, largely following the alignment of the existing A9. Proposed A9 dual carriageway lowered into an underpass approximately 150 metres long. Reconnection of Station Road to Dunkeld & Birnam Station with a replacement car park provided on the structure. Speed limit of 70mph.	At-grade roundabout, providing connections to the A9 (north and south), B867 and Perth Road in the locality of the existing Birnam Junction.	At-grade roundabout, providing connections to the A9 (north and south), A923, A822 and road to Inver.	Grade separated junction with roundabout on the east of the A9, connected to the B898, which crosses the A9 via an underbridge. Northbound loop, with merge and diverge and southbound slip roads.

1.2.9 Options A, B, C and D incorporated a left-in left-out junction at The Hermitage.

1.2.10 The outcome of the A9 Co-Creative Process, and the Community's Preferred Route Option, was identified at Stage 5 following a community vote. In total 720 voting cards were submitted. The results of the voting are given below.

- Option A – Total Score: 1,771 (37%);
- Option B – Total Score: 1,090 (23%);
- Option C – Total Score: 1,053 (22%); and
- Option D – Total Score: 818 (17%).

1.2.11 As a result, the Community's Preferred Route Option is Option A, which is shown in Figures 1.1 to 1.4.

1.2.12 The commitment from the A9 Co-Creative Process is that the Community's Preferred Route Option will be presented to Scottish Ministers for consideration.

Figure 1.1: Community's Preferred Route Option, Image 1 - Southern Tunnel Extent



Figure 1.2: Community's Preferred Route Option, Image 2 - Murthly Junction

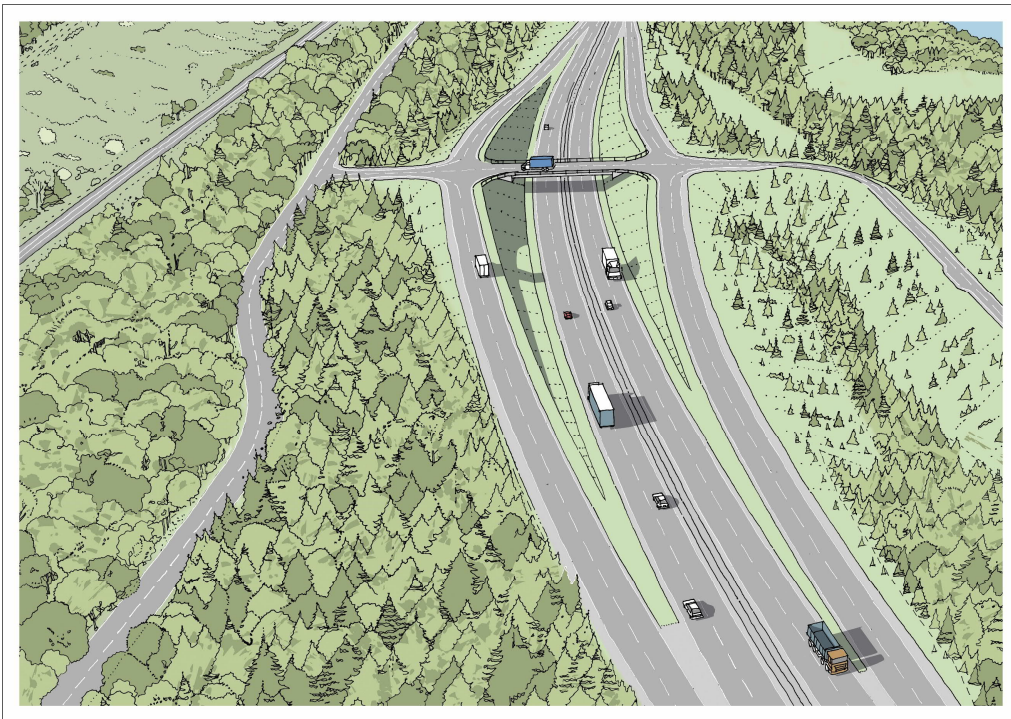


Figure 1.3: Community's Preferred Route Option, Image 3 - Cut and Cover Tunnel

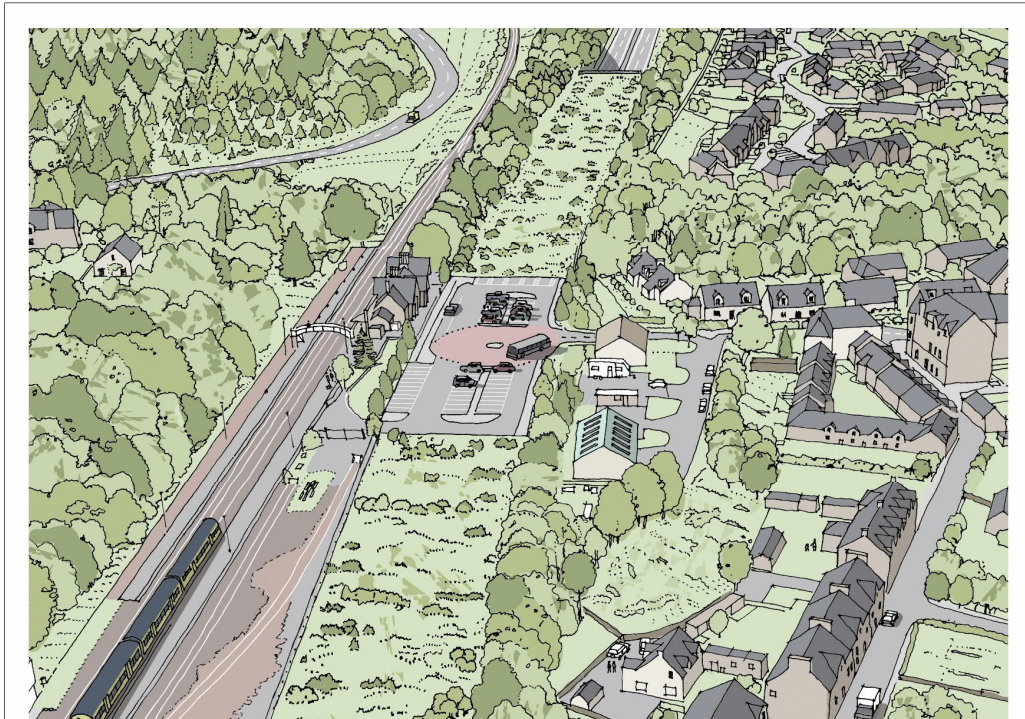


Figure 1.4: Community's Preferred Route Option, Image 4 - At-grade Dunkeld Roundabout



1.3 Scope & Objectives

- 1.3.1 Since completion of the A9 Co-Creative Process, initial assessment has been undertaken on the Community's Preferred Route Option. This work has considered environmental, constructability and economic impacts and identified a number of key challenges. Key stakeholders, including the Scottish Environment Protection Agency (SEPA), Scottish Natural Heritage (SNH), Historic Environment Scotland (HES), freight organisations, emergency services, Network Rail and residents that live in close proximity to the A9 have also been consulted to gain their views on the Community's Preferred Route Option.
- 1.3.2 This report details this initial assessment, highlighting the challenges identified. As a result of the challenges identified, many of which are difficult to mitigate, the views expressed by key stakeholders and some local residents, and to ensure a robust assessment process, additional options to the Community's Preferred Route Option have been developed, which are detailed in this report.
- 1.3.3 This report also documents how the additional options have been collated into Whole Route Options that will be considered, alongside the Community's Preferred Route Option, in the DMRB Stage 2 assessment.

2. Initial Assessment, Community's Preferred Route Option

2.1 Introduction

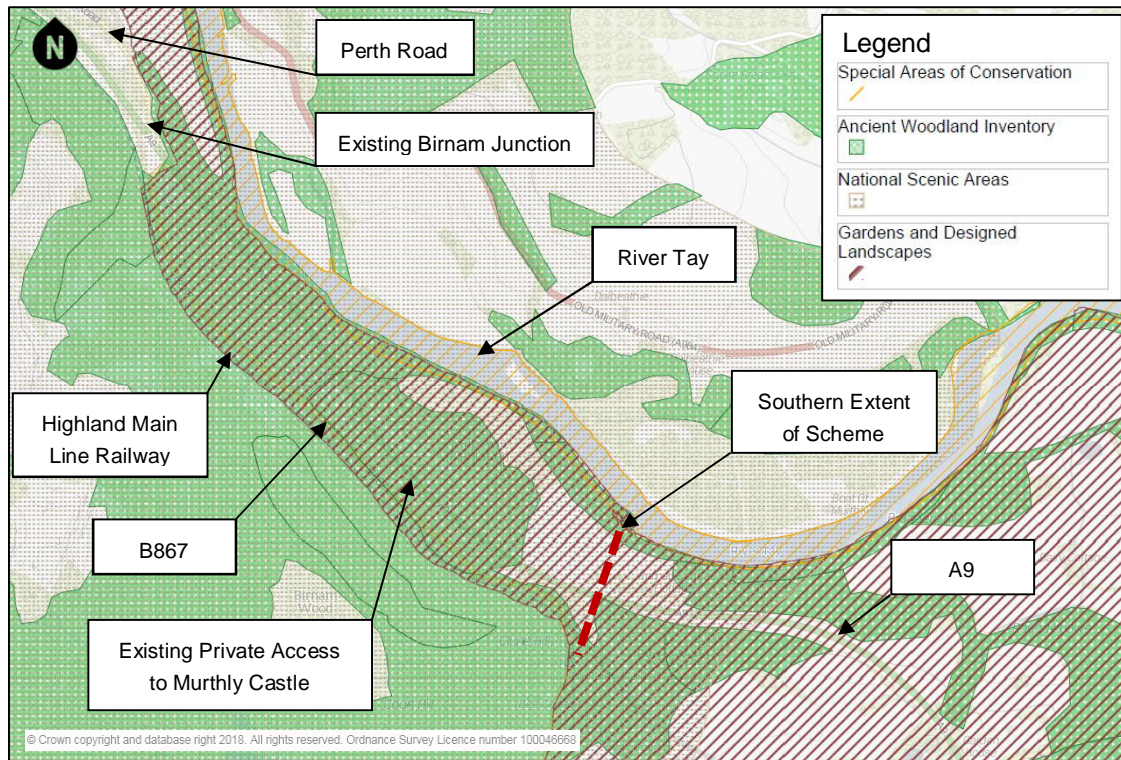
- 2.1.1 The A9 Co-Creative Process was completed within an agreed timescale. Therefore, only a limited assessment was possible on the Whole Route Options identified at Stage 5 of the process, which was provided to assist in identifying the Community's Preferred Route Option.
- 2.1.2 As a result, since the completion of the A9 Co-Creative Process, further assessment work has been undertaken on the Community's Preferred Route Option. This initial assessment work has considered the environmental, engineering and traffic impacts of the option and included consultation with key stakeholders and residents that live in close proximity to the A9 that may be directly impacted. This assessment will provide a more robust level of information on the Community's Preferred Route Option that will form the basis for future assessment, in accordance with the DMRB (Volume 5, Section 1, Part 2, TD 37/93: Scheme Assessment Reporting). Furthermore, it will also provide additional information for Scottish Ministers, who will confirm the Preferred Route Option. The key outcomes of the assessment work are detailed in the following sections.

2.2 Murthly/Birnam Junction

Introduction

- 2.2.1 The junction in the locality of the existing private access to Murthly Castle, incorporated within the Community's Preferred Route Option, was suggested by a member of the public at Stage 1 of the A9 Co-Creative Process. The submitted idea only showed an approximate location for the junction and did not identify a favoured layout. Instead, the idea simply stated that a grade separated junction, facilitating all movements, should be provided. At the following stages of the A9 Co-Creative Process, Jacobs modelled the junction option, considering the most suitable layout and location in terms of geometric standards and minimising environmental impacts.
- 2.2.2 In the locality of the existing private access to Murthly Castle there are a number of constraints, including the River Tay Special Area of Conservation (SAC), Ancient Woodland, River Tay (Dunkeld) National Scenic Area (NSA), Murthly Castle Gardens and Designed Landscapes (GDL) and residential properties. Furthermore, the existing private access to Murthly Castle is in close proximity (approximately 800 metres) to the southern extent of the scheme, where it joins the existing dual carriageway through the Pass of Birnam. The existing constraints are shown in Figure 2.1.

Figure 2.1: Existing Constraints, Murthly/Birnam Junction



- 2.2.3 These existing constraints dictate the most suitable layout and location of the grade separated junction. Two types of grade separated junction were considered, a diamond layout and a half-cloverleaf, incorporating loops, in accordance with the DMRB (Volume 6, Section 2, Part 1, TD 22/06: Layout of Grade Separated Junctions). On the northbound carriageway there is insufficient space to incorporate a loop without significantly impacting the adjacent B867 and Highland Main Line railway. As such, on the northbound carriageway, slip roads are the only viable option. On the southbound carriageway, a loop arrangement, with a radius of 50 metres, could be provided, however it would involve greater land-take from the River Tay (Dunkeld) NSA and Murthly GDL and would have further impact on Ancient Woodland. Slip roads, in a diamond layout, have the advantage that land-take is minimised, reducing the impact on adjacent environmental constraints. As a result, a diamond layout, with northbound and southbound slip roads, is considered the most suitable layout. The junction includes an overbridge across the A9 connecting to the Murthly Estate on the east and the B867 to the west, via a priority junction. A connection between the B867 and Perth Road is required in the locality of the existing junction at Birnam. This connection will cross the A9 via an overbridge immediately north of the southern extent of the cut and cover tunnel.
- 2.2.4 While the DMRB (Volume 6, Section 2, Part 5, TD 40/94: Layout of Compact Grade Separated Junctions) states that compact grade separated junctions should not be used on Category 7A dual carriageways, consideration was given to the use of such a junction in the locality of the existing private access to Murthly Castle. As detailed above however, there is insufficient space on the northbound carriageway to provide a compact loop due to the close proximity of the B867 and Highland Main Line railway. While a compact loop, with a radius of 40 metres, could be provided on the southbound carriageway, the DMRB recommends that individual junctions should not involve different layout types. In addition, this would have a greater impact on adjacent environmental constraints. As such, the use of a compact loop was not considered further.
- 2.2.5 The proposed junction is sited in the immediate locality of the existing private access to Murthly Castle, which provides a suitable connection with the B867 and maintains access to Murthly Castle. Moving the junction to the immediate north would position the northbound slip roads and junction overbridge closer to residential properties on the west side of the proposed A9 dual carriageway, with

an increased adverse impact. On the southbound carriageway in this location the River Tay, which is a SAC, meanders towards the A9. As a result, moving the junction north would likely have an adverse impact on the River Tay SAC, as well as the NSA, GDL and Ancient Woodland. Given the constraints, the only viable alternative location for a grade separated junction to the north is in the locality of the existing left/right staggered priority junction with the B867 and Perth Road at Birnam.

- 2.2.6 Moving the junction to the south would involve siting the junction within the existing dual carriageway section of the A9 through the Pass of Birnam, south of the current tie-in point, lengthening the scheme extents. Immediately south of the existing tie-in point the A9 is largely on a 735-metre radius horizontal curve, which is one step below Desirable Minimum standards for the proposed Design Speed. While the existing dual carriageway incorporates approximately 10 metres of central reserve widening, and verge widening, to accommodate forward visibility, this may need to be extended to ensure driver safety, increasing the land-take associated with the scheme and the impact on the surrounding environment.
- 2.2.7 Furthermore, lengthening the scheme to the south would impact two existing lay-bys. Lay-bys are important as they provide an opportunity for drivers to stop for a short time. Given the number of junctions on the scheme and the required weaving distance between junctions and lay-bys, it is unlikely that lay-by's can be provided within the Pass of Birnam to Tay Crossing scheme. The scheme to the immediate north, Tay Crossing to Ballinluig, also does not contain lay-bys. As such, impacting the existing lay-bys beyond the southern extent of the Pass of Birnam to Tay Crossing section of A9 dualling may result in a length of approximately 20 kilometres without a lay-by. The DMRB (Volume 6, Section 3, Part 3, TD 69/07: The Location and Layout of Lay-bys and Rest Areas) recommends on a dual carriageway that lay-bys are provided at 2.5-kilometre intervals.
- 2.2.8 It should be noted that the DMRB (Volume 2, Section 2, Part 9, BD 78/99: Design of Road Tunnels) recommends that junctions should not be provided in, or in close proximity to, tunnels, primarily on safety grounds. As the southern extent of the cut and cover tunnel is in the locality of the existing left/right staggered priority junction at Birnam, the junction for the Community's Preferred Route Option must be south of the existing junction.
- 2.2.9 The junction included in the Community's Preferred Route Option at Murthly/Birnam is designed for a 50 miles per hour speed limit, as a result of the imposed speed limit through the cut and cover tunnel. Should a junction at the location of the private access to Murthly Castle be provided with an option that permits a 70 miles per hour speed limit, the proposed slip roads would be slightly longer and to accommodate an increased forward visibility, additional verge and central reserve widening would be required, increasing land-take and further impacting the NSA, GDL and Ancient Woodland. To accommodate the widening, the southern extent of the scheme would be extended by approximately 300 metres, which would impact the existing lay-bys on the existing dual carriageway section.

Engineering Assessment

- 2.2.10 The junction does not have any significant engineering issues.
- 2.2.11 As part of the PES commission, which was the equivalent to a DMRB Stage 1 assessment, a Junctions & Accesses Strategy was developed for the treatment of existing junctions and accesses along the A9. The strategy states that a junction should be provided where an A or B class road currently accesses the existing A9. The proposed Murthly Junction is not in the location of an existing junction and therefore does not comply with this strategy. Whilst this does not preclude the Murthly Junction, it is a factor to be considered in terms of accessibility.

Environmental Assessment

- Landscape & Visual - Murthly Junction is within the River Tay (Dunkeld) NSA and the combination of dramatic topography and dense woodlands helps to create the 'Gateway to the Highlands' experience for travellers on the A9. The Murthly Junction would have an impact on the 'Gateway to

the Highlands' Special Quality of the NSA, both during construction and operation, as a result of changes to the views experienced by northbound travellers on the A9. This includes potential obstruction or limitation of views as a result of the new junction overbridge and associated earthworks. The junction is also expected to have an impact on other Special Qualities of the NSA, including the 'Exceptionally Rich, Varied and Beautiful Woodlands' and the 'Beauty of Cultural Landscapes Accompanying Natural Grandeur', as a consequence of the loss of areas of mature woodland. However, the landscape character has capacity to accommodate the junction as impacts are localised.

The junction would be further from more densely populated areas at Birnam and would be screened by intervening woodland. However, the junction would impact isolated properties, with adverse visual impacts expected, particularly during winter months as filtered views of the A9, junction and earthworks emerge.

- Water Environment - No significant issues are anticipated.
- Ecology & Nature Conservation - Murthly Junction results in the loss of woodland on the Ancient Woodland Inventory (AWI). The permanent reduction in Ancient Woodland habitat and associated plant communities would have a negative impact on the populations of protected species that rely on it for food, shelter and breeding. Compensatory planting would require to be provided to offset for the loss of Ancient Woodland habitat and to maintain connections or re-connect these areas with existing AWI sites.
- Cultural Heritage - Murthly Junction would result in land-take from the Murthly Castle GDL and would have a direct significant impact on the GDL, which is of national importance. The junction also reinforces the existing severance with the western end of Birnam. Murthly Castle GDL is an outstanding landscape, which significantly contributes to the surrounding Tay Valley scenery and provides an attractive setting for several Category A Listed buildings.
 The junction would also impact any surviving archaeological remains of the enclosures and gardens of Dalpowie Lodge, which is a site recorded on the Perth & Kinross Historic Environment Record. The impact would be significant, however any remains are unlikely to be complex and their loss could be mitigated by recording works in advance of, or during, construction.
- Geology and Soils - No significant issues anticipated.
- People & Communities - Murthly Junction would result in loss of woodland from Murthly Estate and would change the access to Murthly Estate, albeit is noted this is not the public entrance to the castle.
- Air Quality - Predicted air pollutant concentrations would be well below threshold levels set by the Scottish Government. They would also be below European Limit Values.
- Noise & Vibration - No significant issues anticipated.

Traffic & Economic Assessment

2.2.12 As the proposed junction at Murthly facilitates all vehicle movements, it is not likely to have any significant traffic impacts. A slight increase on traffic on the B867 is expected between the proposed junction and Perth Road due to the location of the junction.

Feedback from the Local Community & Key Stakeholders

- Local Community
 - The wider local community has expressed a preference through the A9 Co-Creative Process for the Murthly Junction, which is approximately 1 kilometre south of the current Birnam Junction. It is assumed this is because the junction is further from more densely populated areas and therefore has perceived noise and visual benefits. However, there are a number of isolated dwellings in the locality of the proposed junction. Residents have expressed concerns with regards to impact on their property and setting, as well as the impacts on the local environment, particularly on areas of Ancient Woodland.
- SEPA
 - SEPA has suggested that provision of a junction at the existing access to Murthly Castle is an improvement on options that are within the designated floodplain.
- SNH
 - SNH has suggested that a junction in the locality of the existing Birnam Junction would be more favourable. SNH noted that considerable thought would be required as to how to mitigate impacts on the surrounding landscape for a Murthly Junction option.
- HES
 - HES has noted the outstanding landscape of Murthly GDL that will be directly impacted by the proposed junction.
- Perth & Kinross Council
 - Perth & Kinross Council noted that the junction facilitates all vehicle movements, which is their preference.

2.3 Cut & Cover Tunnel (including Dunkeld & Birnam Station)

Introduction

- 2.3.1 The Community's Preferred Route Option lowers the A9 dual carriageway into a cut and cover tunnel for approximately 1.5 kilometres, commencing at the southern extent in the locality of the existing Birnam Junction and terminating at its northern extent approximately 300 metres south of the existing Dunkeld Junction.

Engineering Assessment

- 2.3.2 As a result of existing constraints, notably the Highland Main Line railway and residential properties, the proposed A9 dual carriageway incorporates a horizontal curve within the cut and cover tunnel that is below Desirable Minimum standards for a 120kph Design Speed in a tunnel. As a result, a Design Speed of 85kph has been assumed through the cut and cover tunnel, and a speed limit of 50 miles per hour proposed for safety. This is below the existing speed limit of 60 miles per hour.
- 2.3.3 For safety reasons, pedestrians, cyclists, motorbikes (with engines less than 50cc), animals and animal drawn vehicles would not be permitted to use the cut and cover tunnel.
- 2.3.4 Road drainage for the proposed cut and cover tunnel is complex, primarily due to the lowered road alignment, existing topography and narrow corridor. A combination of filter drains, attenuation ponds, geocellular storage systems, swales and hydrodynamic vortex separators will be used to collect and treat road surface run-off in the locality of the tunnel portals. Given the constraints, it is more difficult to achieve the necessary two levels of treatment, in accordance with the SEA, Environmental Principles. However, a possible alternative solution that includes suitable treatment has been developed, but will require further discussions with environmental stakeholders, including SEPA.
- 2.3.5 Within the cut and cover tunnel, sump tanks will be required to collect surface water run-off, accidental spillages and water from fire suppression systems. These sump tanks would need to be emptied when required and transported for treatment. It is likely the sump tanks would be emptied via a manhole

within the tunnel. As such, one direction of the tunnel will need to be closed for this operation, utilising bi-directional traffic in the other half of the tunnel. However, it should be noted that bi-directional traffic in a tunnel is not desirable, due to the risk of head-on collisions and reduced speed limits would likely be employed.

- 2.3.6 Further to the tunnel drainage requirement, as a redundancy measure for extreme weather events a pump system consisting of a pump house, duty pumps and back-up pumps, will be included to drive water run-off from the closed tunnel system if necessary.
- 2.3.7 Construction of the 1.5 kilometre cut and over tunnel in such a constrained and sensitive corridor will be complex. As insufficient space exists for an open excavation, the walls that form part of the cut and cover tunnel would be constructed using large diameter (1.2 metres diameter) bored piles to retain a height of approximately 10 metres. The bored piles themselves will be approximately 15 metres long and approximately 3,700 piles would be required in total. Installation will require heavy plant in close proximity to residential properties, Dunkeld & Birnam Station, the Highland Main Line railway and the Category A Listed station building. A total of approximately 430,000 tonnes (180,000m³) of concrete is required to construct the cut and cover tunnel. At the most intense period of construction, it is anticipated that approximately 500 tonnes (210m³) of concrete will be produced each day, requiring an on-site concrete batching plant. Additional areas for processing and storing materials and plant will also be required, in addition to site offices and car parking.
- 2.3.8 It is not anticipated that the works will have a structural impact on residential properties. However, before commencement of piling works, Pre-Construction Condition Surveys may be undertaken to inspect the existing condition. This would be used as a baseline to monitor impacts of construction works and would highlight any structural issues that may be caused by the works. In the event of any damage, the successful contractor, subject to the conditions of contract with Transport Scotland, would be liable and therefore responsible for any remediation works.
- 2.3.9 Construction works will be undertaken approximately 2.5 metres from the Category A Listed station building, there is therefore a risk of accidental damage. Given the scale of the works in close proximity to the station and Highland Main Line railway, maintaining access to Dunkeld & Birnam Station during construction is challenging. However, a number of options, including temporary extension of the existing platforms and pedestrian bridge could be utilised to avoid lengthy closures of the station. Sufficient monitoring works would be required to ensure the Highland Main Line railway is not impacted during construction. If the construction works were to impact the Highland Main Line railway, the railway would be closed, possibly for a considerable period of time, while remedial works were carried out.
- 2.3.10 At this stage, it is anticipated that construction of the Community's Preferred Route Option will be between 4 ½ and 5 years. This assumes a 6-day working week (Monday to Friday, 7am to 7pm, Saturday, 8am to 1pm, with no night-time, Sunday and bank holiday working) with 6 piling rigs in operation, completing a total of approximately 12 piles per day. This would increase to between 5½ and 6 years if a 5-day working week was employed. Piling works is expected to be between 12 to 18 months depending on working days and hours. Perth & Kinross Council (Environmental Health) will decide permissible working days and hours and have suggested this would be undertaken in consultation with the local community.
- 2.3.11 A cut and cover tunnel was proposed by the community through the A9 Co-Creative Process. A bored tunnel, constructed using a Tunnel Boring Machine (TBM), has been considered to determine if there are any advantages. Such an arrangement would require a twin bore, with separate bores for the northbound and southbound carriageway. To ensure the structural stability of the tunnel, it must be a suitable depth below existing ground level (approximately 35 metres). This is particularly important at watercourses. Maintaining the appropriate clearance at Inchewan Burn means the vertical alignment of the road will not meet the proposed at-grade roundabout at Dunkeld without significant Departures from Standards that would be difficult to accept. Furthermore, a bored tunnel would have a longer construction duration and would introduce significant retaining walls on approach to the bored

structure, potentially requiring ground anchors or other, more complex, solutions. This option has therefore been suspended from further consideration.

- 2.3.12 Maintaining bi-directional traffic flows on the A9 throughout construction will be challenging and reduced speed limits and narrow lane widths will be required. A number of construction phases will be implemented to maintain traffic flows. It is noted that the only alternative route is along Perth Road, through Birnam and Little Dunkeld, which is not suitable for the volume of traffic and the high proportion of Heavy Goods Vehicles (HGVs).
- 2.3.13 The cut and cover tunnel will require a control room, likely located on top of the tunnel near the southern portal, that will need full-time staff to monitor the tunnel. In addition, the tunnel equipment, such as the fire safety apparatus and ventilation equipment, will need to be checked and maintained regularly. As such, one direction of the tunnel will need to be closed for this operation, utilising bi-directional traffic in the other half of the tunnel.
- 2.3.14 Works to lower Inchewan Burn by approximately 8 metres are complex and will require permanent and temporary bored and sheet piling works, as well as the erection of a temporary bridge carrying A9 traffic, to allow the existing A9 road bridge over Inchewan Burn to be demolished. The burn itself would be diverted through a temporary culvert while the permanent drop structure and box culvert are constructed.
- 2.3.15 Construction of the cut and cover tunnel will involve excavation of a significant volume of earthwork material (approximately 535,000m³) and the scheme overall will have a significant volume of material to be taken off site for disposal (approx. 698,000m³). This will impact the overall cost of the scheme and does not represent good practice in terms of overall sustainability.
- 2.3.16 The material required to be excavated for construction of the tunnel results in approximately 90,000 lorry movements to dispose of excess material, which equates to around 250 vehicles movements per day. Furthermore, the concrete required to construct the tunnel would necessitate approximately 45,000 total lorry journeys. Due to the significant amount of construction vehicle movements, this presents significant Traffic Management issues for live A9 traffic, increasing the complexity and risk.
- 2.3.17 There are numerous existing overhead and underground public utilities in the locality of the A9, including that belonging to Scottish Water, Scottish Gas Networks, British Telecom (BT) and Scottish & Southern Energy (SSE). A number of these utilities will need to be diverted as a result of the works, particularly those in the locality of the cut and cover tunnel. Of particular concern is Scottish Water apparatus who have previously expressed concerns with a lowered A9. Further consultation would be required with public utility companies if this option were progressed. Utilities may need to be incorporated at the top of the cut and cover tunnel, adding additional complexity and risk. If this is not achievable, diversions, probably through Perth Road, undertaken in advance of the works to lower the A9, would be required, leading to prolongation of work and disruption to local traffic.

Environmental Assessment

- Landscape & Visual - The proposed cut and cover tunnel would have a significant impact on the 'Gateway to the Highlands' Special Quality of the NSA, by eliminating the opportunity for views of the valley from the A9 (in combination with the Murthly Junction, there would be a cumulative impact on the Special Qualities). Design of the tunnel portals would require careful consideration to minimise visual impacts as far as practicable by complimenting the surrounding environment. Construction related activities, likely to be over a prolonged period, would also have a significant impact on the NSA. In addition, construction would also generate visual impacts for residents of Birnam and users of local Core Paths, National Cycle Network (NCN) routes and the Highland Main Line railway. By reducing the prominence of road infrastructure, the proposed cut and cover tunnel

would have potentially beneficial impacts on the character of the landscape. Impacts once the road is operational would however be dependent on the nature of planting established above the cut and cover tunnel and its re-integration into the surrounding wooded landscape.

Post construction, the cut and cover tunnel would remove visibility of A9 traffic through Birnam, resulting in beneficial impacts on visual amenity. There would also be an opportunity to establish new planting or a possible green space above the tunnel, which would potentially be beneficial to the 'Exceptionally Rich, Varied and Beautiful Woodlands' Special Quality of the NSA.

Visual impact to residents of Station Road, due to the introduction of the new station car park and the loss of woodland adjacent to the A9.

- Water Environment
 - The cut and cover tunnel would involve lowering the A9 dual carriageway in the locality of Dunkeld & Birnam Station and Inchewan Burn, a tributary of the River Tay (the River Tay is designated as a SAC). As a result, Inchewan Burn would need to be lowered by approximately 8 metres to accommodate the lowered A9. Lowering the burn would result in significant changes to its form and function, including modifications to its banks and bed, alterations to the burn's flow characteristics and fish passage would be impeded.
The lowering works would necessitate a drop structure, as a result of space constraints, and the watercourse would pass below the A9 in a culvert. Modifications to the watercourse, which would include the banks and bed, would extend significantly downstream, impacting a previously restored section and require removal of a partly vegetated riparian zone. Work to the watercourse, over a long duration, would also increase the delivery of fine sediment to the downstream reach of the watercourse, increasing siltation risk.
- Ecology & Nature Conservation
 - The works to Inchewan Burn would result in the permanent loss of upstream passage for all migratory fish species. The proposed culvert and regrading works would also result in geomorphological changes, therefore habitats currently utilised by Atlantic salmon and European eels, although still available, would be altered. In the lower reaches, it is expected that suitable habitat for juvenile Atlantic salmon and European eels would re-establish. Spawning potential within the burn would however, remain limited.
The works to Inchewan Burn would also impact otter due to the fragmentation of habitat and the creation of a barrier to movement. However, post construction, the habitat created on top of the cut and cover tunnel would act as a green bridge, facilitating otter movements along Inchewan Burn. The additional habitat on top of the cut and cover tunnel would also provide increased potential connectivity for bats and reptiles and additional bird breeding habitat. It should be noted however that there are limited benefits for other species of conservation interest due to the constrained nature of the site, bounded by the Highland Main Line railway to the west and Birnam to the east.
- Cultural Heritage
 - The cut and cover tunnel would have a significant beneficial impact on the setting of the Dunkeld & Birnam Station building, which is Category A Listed, as the connection with Station Road is restored. Improved access may also give greater potential for sustainable re-use of the building, which is currently unoccupied.
Construction of retaining walls for the cut and cover tunnel would be

- within 2.5 metres of the station building, therefore there is potential for accidental damage.
- **Geology and Soils**
 - A new access road would be required for properties on Birnam Glen as a result of the cut and cover tunnel. This access road is located within Ladywell Landfill site. The historic landfill site is operated by Perth & Kinross Council and is governed under a Waste Management License. Any required changes would need to be agreed by Perth & Kinross Council and SEPA.
It is highly likely contaminated soils and groundwater and elevated concentrations of ground gasses, such as methane and carbon dioxide, would be encountered. In addition, there could be permanent changes to established groundwater flow patterns with subsequent effects on groundwater quality and quantity. It is anticipated that these risks would be managed during construction.
The liability for contamination associated with previous landfill operations at Ladywell Landfill site would likely transfer to Transport Scotland with acquisition of the land.
 - **People & Communities**
 - Significant construction impacts on people and communities would be expected and would likely be for a prolonged period. These would include disruption to access arrangements to properties, communities and to Dunkeld & Birnam Station and disruption to businesses. The proximity of construction works to residential properties may require re-locating residents during periods of acute disruption and should construction related noise impacts not be able to be appropriately mitigated.
Whilst overall land-take would be limited due to the use of land above the tunnel, the Birnam Industrial Estate, located on Station Road immediately adjacent to the A9, and an electrical sub-station also in the locality, would be demolished to accommodate the scheme.
The reconnection of Station Road to Dunkeld & Birnam Station would have a beneficial impact for the local community and fulfils elements of the community's objectives. There would also be an opportunity for community/recreational use of the land above the tunnel.
Some residential properties on Perth Road, Station Road, Gladstone Terrace, Birnam Terrace and Telford Gardens would be expected to experience beneficial impacts in their amenity during operation arising from the community/recreation area and a reduction in operational noise levels. This also fulfils elements of the community's objectives. Operational impacts on businesses would be expected to be neutral.
 - **Air Quality**
 - Predicted air pollutant concentrations would be well below threshold levels set by the Scottish Government. They would also be below European Limit Values.
 - **Noise & Vibration**
 - Significant adverse construction noise and vibration impacts would be expected for residents immediately alongside the A9, including those on Perth Road, Station Road, Gladstone Terrace, Birnam Terrace and Telford Gardens. This is a result of the construction complexities within a narrow corridor over a prolonged period of time. Dunkeld & Birnam Station building is particularly sensitive to vibration and would be in the immediate vicinity of construction works.
While mitigation would be employed during construction to control noise and vibration, the scale of construction works and close proximity to key receptors, means it would likely remain an issue.

Consideration would be given to the temporary relocation of residents immediately adjacent to the A9 during periods of acute disruption.

A large number of beneficial noise impacts are expected as a result of the cut and cover tunnel. The potential for localised increased noise levels at tunnel extents due to traffic noise deflections from within the cut and cover tunnel section has been reviewed. At this time, it is anticipated that the overall operational noise levels for receptors at the tunnel portals would be lower than existing noise levels.

Traffic & Economic Assessment

- 2.3.18 As the southern section of the scheme will be subject to a 50 miles per hour speed limit, there may be an impact on traffic flows on Perth Road. A reduced A9 speed limit may encourage traffic to use the B867 and Perth Road as an alternative route for access to Dunkeld, rather than continuing on the A9 to Dunkeld Junction. There is potential for an additional 500 to 800 vehicles per day on Perth Road, however this could be mitigated, in part, by a suitable signing strategy that directs traffic for Dunkeld to the proposed Dunkeld Junction.
- 2.3.19 A 50 miles per hour speed limit results in most future A9 journeys increasing by at least 30 seconds, compared to the existing condition. As this is slower than the existing A9, which currently has a speed limit of 60 miles per hour, this will have a reduced economic benefit.

Feedback from the Local Community & Key Stakeholders

- Local Community
 - The wider local community has expressed a preference for the 1.5 kilometre cut and cover tunnel, with the option obtaining 37% of the vote at Stage 5 of the A9 Co-Creative Process. It is assumed the wider community prefer this option as it has noise and visual benefits and allows the reconnection of Station Road. However, those residents that live directly alongside the A9 have expressed significant concerns over the duration and impacts of the construction phase. The main concerns being noise and vibration impacts and potential structural damage to properties. Some residents have suggested an at-grade dual carriageway should be progressed.
- SEPA
 - SEPA stated that the Inchewan Burn proposals, as a result of the cut and cover tunnel, are unlikely to be compliant with The Water Environment (Controlled Activities) (Scotland) Regulations 2011 and will therefore be a derogation. Generally, derogations require public consultation.
SEPA also stated that the proposed lowering of the Inchewan Burn will severely damage the morphology of a short section of the watercourse.
SEPA noted that measures should be put in place during construction to minimise any risk of flooding.
- SNH
 - SNH noted that impacts on the Inchewan Burn should be considered and focussed on the overarching conservation objectives which aim to avoid deterioration of the qualifying habitat and ensure the integrity of the site is maintained.
- HES
 - HES has noted the Community's Preferred Route Option will have a significant impact on the setting of the station, however they consider the impact to be positive, as it re-connects Station Road.
- Perth & Kinross Council
 - Perth & Kinross Council highlighted concerns during the potentially prolonged construction phase and noted that suitable plans for Traffic

Management would be required. The council also suggested that pre-condition surveys should be carried out prior to construction on properties immediately adjacent to the A9.

Perth & Kinross Council (Environmental Health) stated concerns on the complexity and duration of the construction phasing and noted major concerns regarding possible noise and air pollution during the works. They also noted concerns regarding air quality and noise as a result of the tunnel and ventilation equipment, which will be in operation 24-hours per day, at the northern and southern portals.

Perth & Kinross Council noted concerns with the possible impact on Ladywell Landfill Site as a result of the proposed access to Birnam Glen. Perth & Kinross Council noted that the landfill site extended to the Highland Main Line railway to the east and is monitored by them.

- Network Rail
 - Network Rail noted concern that Dunkeld & Birnam Station may be closed to passengers during construction and highlighted that signalling staff, and other maintenance personnel, would require continual access throughout the construction period. Losing access would have wider implications on the operation of the Highland Main Line railway and is a major concern to Network Rail and could have wider re-signalling issues. (It is noted that a number of options have been investigated to maintain access to the station, including temporary extension of the existing platforms and pedestrian bridge.)
Network Rail stated concerns about construction works in close proximity to Dunkeld & Birnam Station building, which is Category A Listed, and the potential for damage.
Network Rail noted concerns with piling works in close proximity to the Highland Main Line railway and the possible impact this may have on rail operations.
- Police Scotland
 - Police Scotland highlighted concerns with the proposed 1.5 kilometre cut and cover tunnel. Their principal concern was how they would deal with a road traffic accident within the tunnel, especially since the A9 is a major artery for road traffic. This may result in the A9 being closed for a significant period of time. If traffic is queued within the cut and cover tunnel, it may be difficult for Police Scotland to gain access to the incident. Police Scotland stated that the lower speed limit proposed (50 miles per hour) would require strict enforcement, otherwise it would be ignored, leading to safety issues.
Police Scotland noted concerns with the safe operation of the cut and cover tunnel and the at-grade roundabout at Dunkeld in unison. The greatest concern is that an incident on the roundabout would very quickly escalate affecting the cut and cover tunnel, or vice versa. A relatively minor accident, therefore has the potential to delay the A9 for a considerable period of time.
- Scottish Ambulance Service
 - The Scottish Ambulance Service suggested that a prolonged construction period would impact response times and transportation of patients. As a result, they may need to consider re-locating resources to mitigate the impacts.
The Scottish Ambulance Service noted that a tunnel represents a particular concern because of its potential to increase journey times, responding to call-outs and transporting patients to hospital. It would be more difficult for ambulances to pass queueing traffic in a tunnel as there would be less space to allow vehicles to pull over on to a verge to allow an ambulance to pass. An open road would be preferable.

- Scottish Fire & Rescue Service - The Scottish Fire & Rescue Service noted that, while they have no significant concerns with the 1.5 kilometre cut and cover tunnel, they will need to re-train their staff to deal with incidents in the tunnel. They also noted concerns regarding the construction of the project. A prolonged construction period would impact response times.
- Freight Transport Association - The Freight Transport Association noted concerns about a prolonged construction period and the impact this would have on A9 traffic, which may lead to congestion and delay.

The Freight Transport Association noted advancements in technology and the possibility of driverless vehicles in the future. They suggested that inclusion of an at-grade roundabout and cut and cover tunnel may impede the advancement of driverless vehicles on the A9.

Feedback from Freight Transport Association members noted road safety concerns with the cut and cover tunnel and the associated costs, noting that the benefits do not justify the increased expenditure.
- Transport Scotland (Standards Branch) - Transport Scotland (Standards Branch) noted concerns with the proposed cut and cover tunnel, in terms of future maintenance and the requirements for fire safety. They also noted that any fire within the tunnel had the potential to close the A9 for an extended period of time, which would be a concern for the strategic road network given the lack of suitable diversion routes.

Transport Scotland (Standards Branch) stated concerns over the proposed reduced speed limit within the tunnel, particularly for northbound traffic on approach to the at-grade roundabout. Enforcement will be required, otherwise it could become a safety issue.
- Transport Scotland (Network Maintenance) - Transport Scotland (Network Maintenance) stated that stationary traffic in tunnels, as a result of incident or breakdown, is a major safety concern and should be avoided.

Transport Scotland (Network Maintenance) noted that tunnels require ongoing maintenance that will incur significant additional costs. A control room will be required that will need full-time staff to monitor the tunnel. In addition, the tunnel equipment will need to be checked and maintained regularly, which will likely need to be done under tunnel closures. One direction of the tunnel could be closed to allow for maintenance, however bi-directional traffic in a tunnel is not desirable, due to the risk of head-on collisions. Should any maintenance, or incident, require the complete closure of the tunnel, the only alternative is through Birnam and Little Dunkeld, which is not suitable for the volume of traffic and high proportion of HGVs. Although it is noted that this is the same as the current situation. As a comparison, it was noted that the Clyde Tunnel, in Glasgow, has one direction closed two nights a week to carry out essential maintenance, however it is acknowledged that the Clyde Tunnel is over 50 years old.

As the tunnel requires constant lighting, possibly pumps for drainage and other machinery, the sustainability of the proposal was queried. Concerns with noise and air quality at tunnel portals was also highlighted.
- Scottish Citylink (Bus Operator) - Scottish Citylink has noted concerns with the proposed reduced speed for the southern extent of the scheme, suggesting this may increase journey times, which contradicts their aspiration for reduced

journey times.

Scottish Citylink also noted concerns about the duration of construction, which may significantly delay their services. Concerns were also noted regarding possible tunnel closures to undertake maintenance works.

Scottish Citylink suggested that if the A9 was in tunnel, this may encourage services to bypass Dunkeld, affecting local bus provision. Scottish Citylink stated while at present they access Birnam via Perth Road, their preference is for a bus lay-by to be provided on the proposed A9 dual carriageway. Scottish Citylink noted that they would not divert any future services away from Perth Road, therefore accessing Dunkeld & Birnam Station from Station Road is unlikely.

2.4 At-grade Roundabout at Dunkeld

Introduction

- 2.4.1 The Community's Preferred Route Option incorporates an at-grade elongated roundabout in the locality of the existing junction with the A923 and A822 at Little Dunkeld. This roundabout provides connections to the A9 (north and south), A923, A822 and road to Inver, with a segregated left lane between the A923 and A9 south to improve the overall capacity of the roundabout and reduce queueing traffic on the A923.

Engineering Assessment

- 2.4.2 Provision of an at-grade roundabout conflicts with the A9 Dualling Programme aim that the route should be a Category 7A all-purpose dual carriageway with grade separated junctions. Inclusion of an at-grade roundabout will therefore require a Departure from Standards.
- 2.4.3 The at-grade roundabout is generally at existing carriageway level, therefore it has a potentially reduced impact on the Highland Main Line railway and residential and commercial properties and a reduced land-take. The River Braan structure is also reduced in terms of width and elevation, compared to a grade separated junction, therefore decreasing cost. Overall, compared to a grade separated junction, an at-grade roundabout has a reduced construction complexity.
- 2.4.4 At-grade roundabouts do not provide segregated NMU crossing facilities, which has been noted as a concern to some cycle groups. However, it should be noted that the current road layout does not provide NMU crossing points in the location of the Dunkeld Junction, with NMU crossing provision provided to the north at the River Braan.

Environmental Assessment

- Landscape & Visual - As the roundabout would largely be at existing carriageway levels, and there is potential to retain areas of existing woodland, potential impacts on landscape character, and the Special Qualities of the NSA, would be limited. The potential for impacts on the visual amenity of people, including residents of Little Dunkeld would also be limited.

The roundabout would likely incorporate street lighting, as required by the DMRB (Volume 6, Section 2, Part 3, TD 16/07: Geometric Design of Roundabouts), which would have the potential to result in localised impacts on visual amenity. The level of impact would depend on the nature of the lighting and any technical innovation that would be applied.
- Water Environment - No significant issues anticipated.

- Ecology & Nature Conservation - No significant issues anticipated.
- Cultural Heritage - No significant issues anticipated.
- Geology and Soils - No significant issues anticipated.
- People & Communities - Construction of the roundabout, and associated road drainage systems would require the demolition of a residential property and associated industrial property on the A822 at the existing Dunkeld Junction.
No significant impact on NMUs anticipated as alternative routes exist to the immediate north.
- Air Quality - No significant issues anticipated.
- Noise & Vibration - No significant adverse operational noise impacts are expected as a result of the at-grade roundabout. Road traffic noise would potentially be more perceptible at the nearest noise sensitive receptors to the north of the proposed roundabout due to the increase in the number of vehicles accelerating and decelerating at the junction, particularly HGVs.

Traffic & Economic Assessment

- 2.4.5 An at-grade roundabout at Dunkeld increases journey time on the A9 by approximately 10 to 20 seconds per vehicle, compared to a grade separated junction. This delay means that A9 journey times in 2041 are anticipated to be broadly similar to existing (2017) A9 journey times. As such, the at-grade roundabout has reduced economic benefits, compared to a grade separated junction.
- 2.4.6 There are concerns that minor accidents on the roundabout may result in queueing on the northbound approach to the roundabout, which may extend within the tunnel, generating a safety issue.
- 2.4.7 Delays on the A923 approach as a result of the roundabout may result in vehicles re-routing along Perth Road, through Little Dunkeld and Birnam, to the grade separated junction at Murthly. A rise of approximately 600 additional vehicles may be expected on a typical summer Saturday in 2041.
- 2.4.8 Queueing is expected on the A822 approach to the roundabout. It is anticipated that at peak times on a typical summer weekend, queues will disperse in approximately 5 minutes. Queueing is also anticipated on the A923, although due to the proposed capacity of the approach and the provision of a segregated left-turn lane, this is expected to disperse within 5 minutes on a typical summer weekend.

Feedback from the Local Community & Key Stakeholders

- Local Community - The wider local community has expressed a clear preference for an at-grade roundabout at Dunkeld. It is assumed this is due to the easier construction and possible reduced noise and visual impacts compared to a grade separated junction. At Stage 4 of the A9 Co-Creative Process, the at-grade roundabout obtained a score of 709, which represented approximately 40% of the total scoring (second place had a score of 199, representing approximately 11% of the vote). A small number of local residents that live directly alongside the A9 have expressed concerns with the functionality of a roundabout, expressing a preference for a grade separated junction. Residents of Inver have also expressed concerns that queueing on the roundabout may inhibit their ability to access the A9.
- SNH - SNH highlighted that the proposed at-grade roundabout would likely incorporate street lighting, in accordance with relevant design

standards. SNH advised that lighting should be carefully considered to reduce potential impacts on the NSA.

- Perth & Kinross Council
 - Perth & Kinross Council stated that at-grade roundabouts were not beneficial to NMUs.
- Police Scotland
 - Police Scotland noted that the proposed at-grade roundabout at Dunkeld has the potential to have a greater number of road traffic accidents compared to a grade separated junction, which is a concern. There is a higher proportion of slight and damage only incidents and whilst these are not formally recorded, they can have a significant operational impact. It was also noted that many road accidents on the existing A9 involve tourists who are unfamiliar with the road layout or HGVs that require larger areas to manoeuvre. Police Scotland suggested that, based on experience, full grade separated junctions were much better in reducing accident occurrence rates.

Police Scotland noted concerns with the safe operation of the cut and cover tunnel and roundabout in unison. The greatest concern is that an incident on the roundabout would very quickly escalate affecting the cut and cover tunnel, or vice versa. A relatively minor accident, therefore has the potential to delay the A9 for a considerable period of time.

- Scottish Ambulance Service
 - The Scottish Ambulance Service noted that the proposed at-grade roundabout has the potential to increase road traffic accidents, which is a concern. They noted that Broxden Roundabout is susceptible to HGVs overturning due to an adverse camber and that motorcyclists can be more vulnerable at roundabouts. Whilst most of the road traffic accidents are damage only or minor injury accidents, they are numerous and impact ambulance response times, and stretch their resources.

- Scottish Fire & Rescue Service
 - The Scottish Fire & Rescue Service noted that the at-grade roundabout at Dunkeld has the potential to increase road traffic accidents, which is a concern. While these road traffic accidents may be minor, it could lead to queueing on the A9, which would likely extend to the cut and cover tunnel. This could increase the time taken by the Scottish Fire & Rescue Service to attend incidents.

- Freight Transport Association
 - The Freight Transport Association noted that when driving at a constant speed, HGVs did not emit a significant volume of pollutants, in some cases less than cars. However, under acceleration, HGVs emit much more significant concentrations of pollutants. As a result, inclusion of an at-grade roundabout, which interrupts free flowing traffic may affect air quality.

The Freight Transport Association highlighted concerns regarding at-grade roundabouts, particularly for the movements of HGVs. The Freight Transport Association suggested that a high number of accidents involving HGVs occurred on roundabouts as they require larger areas to manoeuvre.

The Freight Transport Association noted advancements in technology and the possibility of driverless vehicles in the future. They suggested that inclusion at an at-grade roundabout and cut and cover tunnel may impede the advancement of driverless vehicles on the A9.

Feedback from Freight Transport Association members noted road safety concerns with the roundabout, suggesting it would inhibit traffic flow and will cause more accidents than the existing A9. A clear

- preference for a grade separated junction was noted.
- Road Haulage Association
 - The Road Haulage Association stated their surprise that a roundabout was selected by the community as their preferred option at Dunkeld.
The Road Haulage Association suggested that a roundabout may impact fuel economy, which would be a concern to its members. However, they noted that, as only one roundabout is included, this may not be a significant issue.
 - Transport Scotland (Standards Branch)
 - Transport Scotland (Standards Branch) noted the inclusion of an at-grade roundabout in the Community's Preferred Route Option is a Departure from the overall A9 dualling strategy for a Category 7A dual carriageway.
 - Transport Scotland (Trunk Road & Bus Operations (TRBO))
 - Transport Scotland (TRBO) noted a major concern with the safe operation of the cut and over tunnel and roundabout in unison. The greatest concern is that an incident on the roundabout would very quickly escalate affecting the cut and cover tunnel. A relatively minor incident has the potential to delay the A9 for a considerable period of time and has the potential to escalate to a more serious incident relatively quickly. A grade separated junction, that permits free flowing traffic, would be more suitable.
Transport Scotland (TRBO) noted that the proposed at-grade roundabout at Dunkeld had the potential to have a greater number of road traffic accidents compared to a grade separated junction. They also noted concerns that a roundabout may be subject to queuing, particularly during the summer peak, which would impact the safe operation of the A9.
 - Scottish Citylink (Bus Operator)
 - Scottish Citylink stated concerns with possible queuing on approach to the roundabout and the possible impact this may have on their services.

2.5 Scheme Cost & Economic Assessment

- 2.5.1 The Community's Preferred Route Option is approximately 8.4 kilometres long (6% of the overall A9 dualling) and is estimated to cost between £1 billion and £1.6 billion. This would be up to 53% of the estimated cost for the entire 129 kilometres of dual carriageway improvements. The cost estimate includes pre-construction costs (design and preparation costs, advanced works costs and land costs) and construction costs (preliminary an indirect costs and direct construction costs, including structures, road pavement, earthworks, risks and opportunities and inflation).
- 2.5.2 The overall A9 dualling estimate, for 129 kilometres, is £3 billion.
- 2.5.3 Construction of a 1.5 kilometre cut and cover tunnel would require the adoption of a 50 miles per hour speed limit between the southern extent of the scheme and the Dunkeld Junction, due to inadequate forward visibility within the tunnel. As the posted speed limit would be less than the current speed limit of 60 miles per hour, there would be no journey time savings over the length of the speed restriction and journey times would likely be greater than existing at less busy periods when traffic is less likely to be delayed by slower moving vehicles.
- 2.5.4 The economic benefits of a cut and cover tunnel will therefore be significantly less than any option which permits a 70 miles per hour speed limit throughout. The proposed cut and cover tunnel would cost more to construct than a broadly at grade option and would also cost more to maintain and operate. The combination of greatly reduced benefits and increased costs would have a significant adverse impact on the economic assessment of this option.

2.6 Risks

2.6.1 Key risks identified for the Community's Preferred Route Option are given below.

- Technical Complexity - Complexity associated with building a tunnel of significant length in a constrained corridor whilst maintaining traffic on the A9.
- Working Hours - The construction programme assumes working six days per week (Monday to Saturday). However, this would need to be fully agreed with Perth & Kinross Council (Environmental Health) and may be challenged by residents and stakeholders. Should working on Saturday be prohibited, the construction programme could be extended by approximately 20%.
- Plant Availability - The programme assumed the use of 6 piling rigs on site simultaneously. It is unlikely that the successful contractor would own that number of piling rigs and would therefore need to externally source the plant. Should plant not be readily available, the proposed construction sequence would be altered, lengthening the construction programme and adding to the cost.
- Material Disposal - Approximately 698,000m³ of subsoil and topsoil would require disposal. Potential disposal options would need to be investigated to ensure disposal could be secured and to provide cost certainty.
- Securing Third Party Asset Design and Relocation - Elements for utility movements, rail possessions and design services and enhancements would require long lead-in times and incur additional costs. Early engagement of design, co-ordination and construction activities would assist in reducing the risk to the project.
- Public Utilities - Extensive public utility diversions are required, which have the potential to delay the works. Consultation with public utility companies is therefore necessary to avoid if necessary.

2.7 Programme

2.7.1 The construction programme for the Community's Preferred Route Option is estimated to be between 4 ½ and 5 years. This assumes a 6-day working week (Monday to Friday, 7am to 7pm, Saturday, 8am to 1pm, with no night-time, Sunday and bank holiday working). This would increase to between 5 ½ and 6 years if a 5-day working week was employed. Perth & Kinross Council (Environmental Health) will decide permissible working days and hours.

2.7.2 This construction duration, assuming a 6-day working week, would lead to an estimated completion date of 2028, 2 ½ years beyond the planned completion date for the A9 of 2025.

3. Development of Additional Options

3.1 General

- 3.1.1 The assessment work detailed in Section 2: Initial Assessment, Community's Preferred Route Option, has identified a number of challenges with the Community's Preferred Route Option. The dualling of the A9 will require the Scottish Government to compulsorily purchase land from private individuals. Transport Scotland must therefore be in a position to fully justify that land-take and the impacts on the individual that the dualling may create, both in the short-term and during the operation of the road. As such, and as good practice dictates that a range of options should be considered, additional options for each constituent section of the scheme have been identified, considered and comparatively assessed, as detailed in the following sections.
- 3.1.2 Inclusion of additional options in the formal route options assessment (DMRB Stage 2 assessment) simply ensures that the assessment process is robust and that decisions are made in full consideration of the choices available and that the Preferred Route Option is defensible through the planning process.
- 3.1.3 All constituent additional options were submitted by the public as part of the A9 Co-Creative Process. Furthermore, in identifying the additional options, consideration has been given to the key principles and outcomes of the A9 Co-Creative Process, as well as the community and Transport Scotland's objectives.

3.2 Murthly/Birnam Junction

General

- 3.2.1 The junction in the locality of the existing private access to Murthly Castle, incorporated within the Community's Preferred Route Option, has a number of advantages. Most notably, it does not impact the River Tay designated floodplain and it would not increase traffic flows on Perth Road through Birnam. However, as a result of concerns raised by landowners in the vicinity of the junction about the direct impact of the junction on their property, and due to concerns raised by SNH and HES on the possible impact on the River Tay (Dunkeld) NSA, the Murthly Castle GDL, Ancient Woodland and associated habitat for bats and red squirrel, two additional options have been considered.
- 3.2.2 An assessment has been undertaken to determine the most appropriate location of any additional Murthly/Birnam Junction options to address the issues raised by landowners and key stakeholders. The residential properties are directly affected by the northbound slip roads and any movement of the junction north must be clear of these properties. A clear area beyond these properties can accommodate the northbound slip roads; however, the River Tay meanders towards the A9 in this location, restricting the siting of southbound slip roads. Further north, the most appropriate place to site a junction is in the location of the existing Birnam Junction and is the location of the community's second preference at Stage 4 of the A9 Co-Creative Process. Therefore, the two additional options are proposed in this location.

Murthly/Birnam Additional Option 1

- 3.2.3 Murthly/Birnam Additional Option 1 is a grade separated junction in the locality of the existing left/right staggered priority junction with the B867 and Perth Road at Birnam. The option is similar to the community's second preference at Stage 4 of the A9 Co-Creative Process (Table 1.5, Option BN_0003), which was a grade separated, restricted movements junction with a northbound diverge slip road and a southbound merge slip road only. However, Option BN_0003 results in an increase in traffic on Perth Road of approximately 500 vehicles per day, which contradicts the community's objective to reduce current levels of noise and pollution in the villages of Dunkeld and Birnam. To prevent such a significant increase in traffic on Perth Road, a northbound merge slip road has been added to Murthly/Birnam Additional Option 1. It should be noted that the omission of a southbound

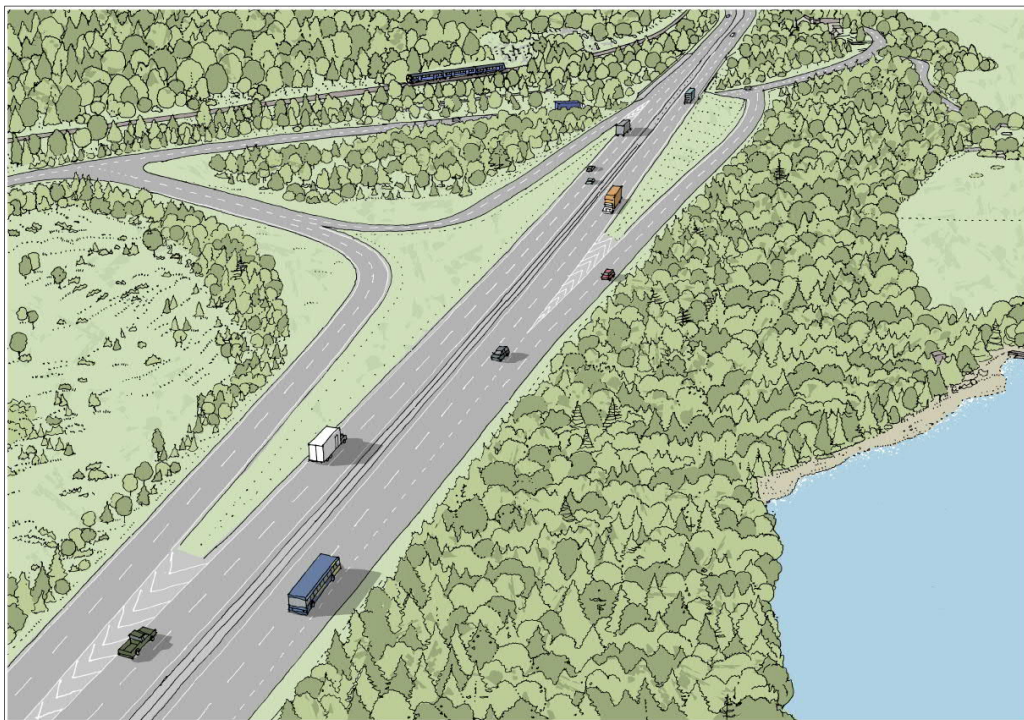
diverge slip road results in an increase in traffic on Perth Road of between 200 and 400 vehicles per day, however this is not considered significant. For reference, existing traffic on Perth Road is approximately 1,800 Annual Average Daily Traffic (AADT) (2-way) south of Station Road and approximately 2,600 AADT (2-way) north of Station Road.

3.2.4 This option has less impact on the River Tay (Dunkeld) NSA and on Ancient Woodland and associated habitat, compared to the Community's Preferred Route Option. It also has a reduced land-take from Murthly Castle GDL and does not impact the River Tay floodplain.

3.2.5 Key features of Murthly/Birnam Additional Option 1 are given below and shown in Figure 3.1.

- Grade separated junction in the locality of the existing Birnam Junction;
- Merge/diverge loops in the northbound direction and a merge slip road in the southbound direction, with no southbound diverge slip road;
- B867 and Perth Road connected, crossing the A9 via an underbridge; and
- Includes an underbridge to connect the existing private access to Murthly Castle to the B867.

Figure 3.1: Murthly/Birnam Junction, Additional Option 1



3.2.6 Further details of Murthly/Birnam Junction Additional Option 1 are given below. Additional detail is included in Appendix D.

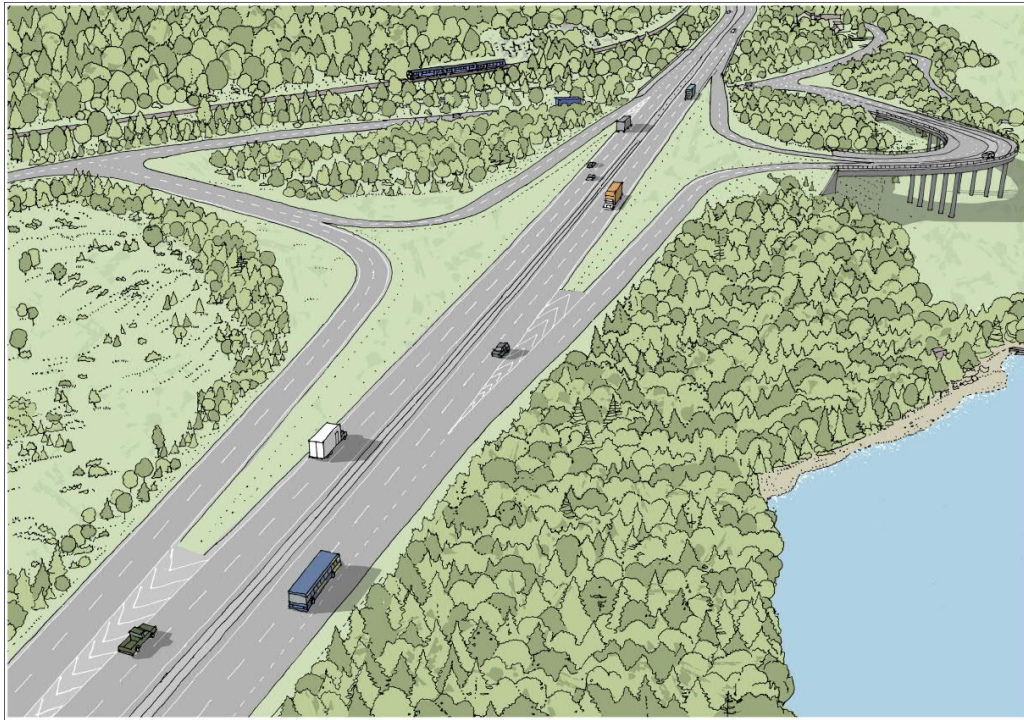
- As the junction is in the locality of the existing left/right staggered priority junction with the B867 and Perth Road at Birnam, it is in accordance with the A9 Junctions & Accesses Strategy.
- Lesser impacts on the 'Gateway to the Highlands' Special Quality of the River Tay (Dunkeld) NSA than the Community's Preferred Route Option.
- Predicted to have an adverse impact on the 'Exceptionally Rich, Varied and Beautiful Woodlands' and 'Beauty of Cultural Landscapes Accompanying Natural Grandeur' Special Qualities of the NSA, however this impact is comparable to the Community's Preferred Route Option.

- Lesser impact on the visual amenity of isolated dwellings to the south of the existing Birnam Junction than the Community's Preferred Route Option, however greater impacts on the visual amenity of residents at the southern extent of Birnam.
- Lesser impact on Ancient Woodland habitat on the AWI than the Community's Preferred Route Option.
- Reduced land-take from Murthly Castle GDL, compared to the Community's Preferred Route Option.
- Increase in traffic flows on Perth Road anticipated to be between 200 and 400 vehicles per day, which contradicts the community's objective to reduce current levels of noise and pollution in the villages of Dunkeld and Birnam.
- Addresses SNH and HES concerns over the potential landscape impacts associated with the Community's Preferred Route Option.

Murthly/Birnam Additional Option 2

- 3.2.7 Murthly/Birnam Additional Option 2 is a grade separated junction in the locality of the existing left/right staggered priority junction with the B867 and Perth Road at Birnam. The option is under consideration as an alternative to the Community's Preferred Route Option as it facilitates all vehicle movements, meeting the community's objective to provide better, safer access on and off the A9 from both sides of the road. In addition, this option does not increase traffic on Perth Road, meeting the community's objective to reduce current levels of noise and pollution in the villages of Dunkeld and Birnam.
- 3.2.8 Furthermore, this option has less impact on the River Tay (Dunkeld) NSA and on Ancient Woodland and associated habitat, compared to the Community's Preferred Route Option. It also has a reduced land-take from Murthly Castle GDL. The option impacts the River Tay floodplain, which is a concern to SEPA, however this is mitigated by constructing the southbound merge/diverge loop on a viaduct structure.
- 3.2.9 It should be noted that a number of alternative junction layouts, in accordance with the DMRB (Volume 6, Section 2, Part 1, TD 22/06: Layout of Grade Separated Junctions), were considered at Birnam and are detailed in the 'Pass of Birnam to Tay Crossing: Stage 2 Preliminary Options Review Report'. At Birnam, five grade separated junction layouts were considered and assessed in terms of environmental, engineering and economic criteria, as well as integration, accessibility and social inclusion. Those options identified as significantly disadvantageous were suspended from further consideration.
- 3.2.10 Based on the assessment undertaken by Jacobs, noted in Appendix A (Jacobs Assessment (2014 to 2016)) it was recommended that the layout shown in Murthly/Birnam Additional Option 2 be taken forward. While this option does impact adjacent constraints, most notably the Highland Main Line railway and Ancient Woodland, its environmental impact is considered less than the other options and retained earthworks solutions can be employed to address impacts on adjacent constraints. Impacts on adjacent residential properties are also avoided.
- 3.2.11 Key features of Murthly/Birnam Additional Option 2 are given below and shown in Figure 3.2.
- Grade separated junction in the locality of the existing Birnam Junction;
 - Merge/diverge loops in the northbound and southbound directions, facilitating all vehicle movements;
 - B867 and Perth Road connected, crossing the A9 via an underbridge; and
 - Includes an underbridge to connect the existing private access to Murthly Castle to the B867.

Figure 3.2: Murthly/Birnam Junction, Additional Option 2



- 3.2.12 Further details of Murthly/Birnam Junction Additional Option 2 are given below. Additional detail is included in Appendix D.
- As the junction is in the locality of the existing left/right staggered priority junction with the B867 and Perth Road at Birnam, it is in accordance with the A9 Junctions & Accesses Strategy.
 - Viaduct structure proposed for the southbound loop to reduce the impact on the River Tay floodplain, addressing concerns from SEPA. The viaduct structure will be approximately 170 metres long and the structure will be curved, adding to the complexity.
 - Lesser impacts on the 'gateway to the Highlands' Special Quality of the River Tay (Dunkeld) NSA than the Community's Preferred Route Option.
 - Predicted to have an adverse impact on the 'Exceptionally Rich, Varied and Beautiful Woodlands' and 'Beauty of Cultural Landscapes Accompanying Natural Grandeur' Special Qualities of the NSA, which is greater than the Community's Preferred Route option.
 - Lesser impact on the visual amenity of isolated dwellings to the south of the existing Birnam Junction than the Community's Preferred Route option.
 - Lesser impact on Ancient Woodland habitat on the AWI than the Community's Preferred Route Option.
 - Land-take from Murthly Castle GDL comparable to the Community's Preferred Route Option.
 - Does not increase traffic flows on Perth Road, addressing the community's objective to reduce current levels of noise and pollution in the villages of Dunkeld and Birnam.
 - Addresses SNH and HES concerns over the potential landscape impacts associated with the Community's Preferred Route Option.

3.3 A9 Dual Carriageway

General

- 3.3.1 The Community's Preferred Route Option incorporates a 1.5 kilometre cut and cover tunnel, commencing at its southern extent in the locality of the existing left/right staggered priority junction with the B867 and Perth Road at Birnam and terminating at its northern extent approximately 300 metres south of existing right/left priority junction with the A923 and A822 at little Dunkeld. The cut and cover tunnel has a number of advantages in that it allows the reconnection of Station Road to Dunkeld & Birnam Station, helping to preserve the integrity of the Category A Listed station building and improving accessibility to the station. It also reduces noise levels and visual impact for local residents over the extent of the cut and cover tunnel and provides an opportunity to establish new planting or possibly amenity space on top of the cut and cover tunnel, which would benefit the local community.
- 3.3.2 However, the Community's Preferred Route Option has a number of challenges, the most significant being the construction complexity within a constrained corridor, which results in a construction duration of approximately 4 ½ to 5 years, which will cause notable disruption and is a concern for residents living immediately adjacent to the A9. Some residents have also noted concerns that property may be damaged as a result of piling works. Another challenge is the significant scheme cost, which is between £1 billion and £1.6 billion. In addition, ongoing maintenance and inspection of the tunnel will be required, incurring significant ongoing costs. Provision of a cut and cover tunnel will also involve works to lower Inchewan Burn, which will have significant environmental impacts. Both SEPA and SNH have raised concerns with regards the impact on the natural characteristics of the burn and sediment transfer.
- 3.3.3 As a result of the challenges identified, two additional options have been considered.

A9 Dual Carriageway Additional Option 1

- 3.3.4 A9 Dual Carriageway Additional Option 1 is an A9 dual carriageway generally at-grade throughout but lowered into a 150-metre long underpass structure in the locality of Dunkeld & Birnam Station. This option was voted third (of twelve) at Stage 4 of the A9 Co-Creative Process (Table 1.3, Option MO_0002) and was considered at Stage 5 of the A9 Co-Creative Process, finishing fourth overall (Paragraph 1.2.10). A9 Dual Carriageway Additional Option 1 allows the reconnection of Station Road to Dunkeld & Birnam Station, maintaining a key principle of the Community's Preferred Route Option. While it does include implementation of approximately 860 piles of large 1.2 metre diameter to a depth of approximately 15 metres, it does reduce the degree of construction complexity, compared to the Community's Preferred Route Option. The option also permits a 70 miles per hour speed limit throughout.
- 3.3.5 Additional Option 1 partially addresses concerns from some local residents, businesses and key stakeholders on the construction complexity and duration, with an expected construction duration of between 4 and 4 ½ years. This construction programme is based on 2 piling rigs and working 6 days per week. This estimated construction duration would increase if a lesser number of plant were utilised and if working hours were restricted. The option involves lowering Inchewan Burn by approximately 6 metres and will therefore have similar environmental impacts to the Community's Preferred Route Option.
- 3.3.6 Additional Option 1 has an estimated cost of between £500 million and £800 million.
- 3.3.7 Key features of Additional Option 1 are given below and shown in Figure 3.3.
- A9 dual carriageway lowered into a 150-metre long underpass structure in the locality of Dunkeld & Birnam Station. Generally at-grade outwith this section;
 - Largely following the horizontal alignment of the existing A9;
 - Reconnection of Station Road to Dunkeld & Birnam Station;

- Replacement car park facility provided on top of the structure;
- Speed limit of 70 miles per hour throughout; and
- Inchewan Burn lowered by approximately 6 metres to accommodate the A9 dual carriageway.

Figure 3.3: A9 Dual Carriageway, Additional Option 1



3.3.8 Further details of the A9 Dual Carriageway Additional Option 1 are given below. Additional detail is included in Appendix D.

- Alignment permits a 70 miles per hour speed limit throughout, consistent with the overall A9 Dualling Programme, encouraging traffic to remain on the A9 dual carriageway rather than divert to Perth Road.
- No restrictions on use.
- Restricted extent of A9 lowering addresses many of the drainage challenges of the Community's Preferred Route Option.
- Significantly less complex to construct than the Community's Preferred Route Option, with a reduced construction duration, expected to be between 4 and 4 ½ years.

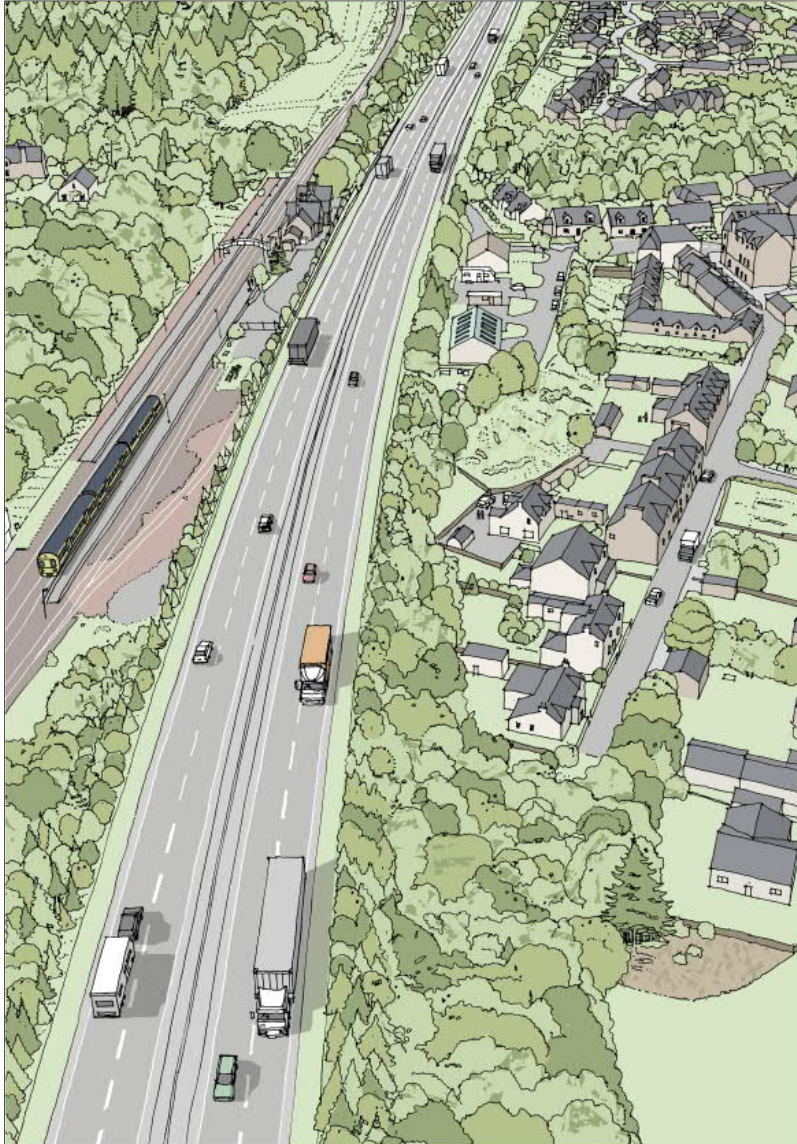
- Does not require a 24-hour manned control room, nor does it require fire safety apparatus and ventilation equipment.
- Significantly reduced volume of excavated material for disposal.
- Adverse impacts on the 'Exceptionally Rich, Varied and Beautiful Woodlands' Special Quality of the NSA, compared to the Community's Preferred Route Option as less opportunity to provide new planting and integrate the option into the landscape.
- Predicted greater visual impacts for residents in Birnam, compared to the Community's Preferred Route Option.
- Significant impact to Inchewan Burn, impacting the burns characteristics, comparable to the Community's Preferred Route Option.
- Reconnection of Station Road would significantly improve the physical connection between Dunkeld & Birnam Station and Birnam, with a beneficial impact on the setting of the Category A Listed station building.
- Lesser disruption impacts for residents and businesses during construction than the Community's Preferred Route Option and less likelihood that residents may require to be relocated during acute periods of construction.
- Significant adverse construction noise and vibration impacts expected for residents immediately alongside the A9. Construction would be undertaken over a shorter duration than the Community's Preferred Route Option.
- Beneficial noise impacts expected, although less than the Community's Preferred Route Option.
- Partially addresses construction concerns raised by residents that live directly alongside the A9, due to reduced construction duration and extent of piling works.
- HES has noted a preference for an option that lowers the A9 in the locality of Dunkeld & Birnam Station, primarily due to the positive impact on the station building.
- Addresses emergency services concerns over a safe operation of a cut and cover tunnel, ability to manage incidents and response times.
- Addresses Transport Scotland (Standards Branch and Network Maintenance) concerns over the implications of breakdowns and the future maintenance of the Community's Preferred Route Option.

A9 Dual Carriageway Additional Option 2

- 3.3.9 A9 Dual Carriageway Additional Option 2 is an at-grade A9 dual carriageway throughout, including in the locality of Dunkeld & Birnam Station. This option was voted seventh (from twelve) at Stage 4 of the A9 Co-Creative Process (Table 1.3, Option MO_0001). While this option does not allow the reconnection of Station Road to Dunkeld & Birnam Station, which is a key principle of the Community's Preferred Route Option, it does eliminate construction complexities, limits construction noise and vibration, significantly reduces construction duration, to between 2 ½ to 3 years, and addresses key concerns noted by local residents and key stakeholders. A9 Dual Carriageway Additional Option 2 also reduces the estimated scheme costs to between £300 million and £500 million.
- 3.3.10 Furthermore, A9 Dual Carriageway Additional Option 2 does not involve works to Inchewan Burn and Dunkeld & Birnam Station is unlikely to be significantly impacted during construction, addressing concerns raised by SEPA and SNH, and Network Rail respectively. It should be noted however that A9 Dual Carriageway Additional Option 2 would impact the existing station car park and railway sidings.
- 3.3.11 Key features of A9 Dual Carriageway Additional Option 2 are given below and shown in Figure 3.4.
- A9 dual carriageway largely following the horizontal and vertical alignment of the existing A9; and

- Speed limit of 70 miles per hour throughout.

Figure 3.4: A9 Dual Carriageway, Additional Option 2



3.3.12 Further details of the A9 Dual Carriageway Additional Option 2 are given below. Additional detail is included in Appendix D.

- Alignment permits a 70 miles per hour speed limit throughout, consistent with the overall A9 Dualling Programme, encouraging traffic to remain on the A9 dual carriageway rather than divert to Perth Road.
- No restrictions on use.
- Addresses many of the drainage challenges of the Community's Preferred Route Option.
- No significant construction complexities anticipated, with a construction period anticipated to be between 2 ½ and 3 years.
- No significant volume of excavated material for disposal.
- Lesser impacts on the 'Gateway to the Highlands' Special Quality of the River Tay (Dunkeld) NSA than the Community's Preferred Route Option.

- Potentially greater impacts on visual amenity for residents, compared to the Community's Preferred Route Option.
- Lesser impact on Inchewan Burn.
- Adverse impact on the setting of the Category A Listed station building, compared to the Community's Preferred Route Option.
- Would not provide full connectivity between Dunkeld & Birnam Station and Station Road, compared to the Community's Preferred Route Option.
- Would not provide any opportunity to establish community/recreation area associated with the Community's Preferred Route Option on top of the cut and cover tunnel.
- Lesser disruption impacts for residents and businesses during construction.
- Significantly reduced impacts from construction noise and vibration for residents immediately alongside the A9.
- Slight beneficial noise impacts expected, although less than the Community's Preferred Route Option.
- Addresses construction concerns raised by residents that live directly alongside the A9, due to reduced construction duration and complexity.
- Addresses SEPA concerns over the impacts of lowering Inchewan Burn.
- Addresses emergency services concerns over a safe operation of a cut and cover tunnel, ability to manage incidents and response times.
- Addresses Transport Scotland (Standards Branch and Network Maintenance) concerns over the implications of breakdowns and the future maintenance of the Community's Preferred Route Option.

3.4 Dunkeld & Birnam Station

General

- 3.4.1 The Community's Preferred Route Option has a number of advantages with regards Dunkeld & Birnam Station. Most notably, it provides car parking on top of the cut and cover tunnel to replace that lost as a result of A9 dualling and facilitates the reconnection of Station Road to Dunkeld & Birnam Station, helping to preserve the integrity of the Category A Listed station building. However, there is potential for damage to the station building during construction, given the close proximity of the works and the scale of construction, which has been noted as a concern by HES. In addition, maintaining access to the station during construction will be difficult, which is a concern to Network Rail. However, a number of options, including temporary extension of the existing platform and pedestrian bridge could be utilised to avoid lengthy closures of the station. As a result, two additional options have been considered. It should be noted that these additional options would only be used with an at-grade dual carriageway.

Dunkeld & Birnam Station Additional Option 1

- 3.4.2 Dunkeld & Birnam Station Additional Option 1 is a relocated station to an area of land immediately north of Inchewan Burn. This option was considered as part of the A9 Co-Creative Process and was voted sixth (of eleven) at Stage 4 (Table 1.8, DS_0004). This option does not allow reconnection of Station Road to Dunkeld & Birnam Station, opposing a key principle of the Community's Preferred Route Option. As such, it may impact the future viability of the Category A Listed station building. The option also involves works to the Highland Main Line railway, however these works would likely be constructed prior to the main A9 works, therefore the station could remain open for the duration of construction with pedestrian and vehicular access maintained. The relocated station would be designed to comply with current, relevant accessibility and disability legislation, addressing

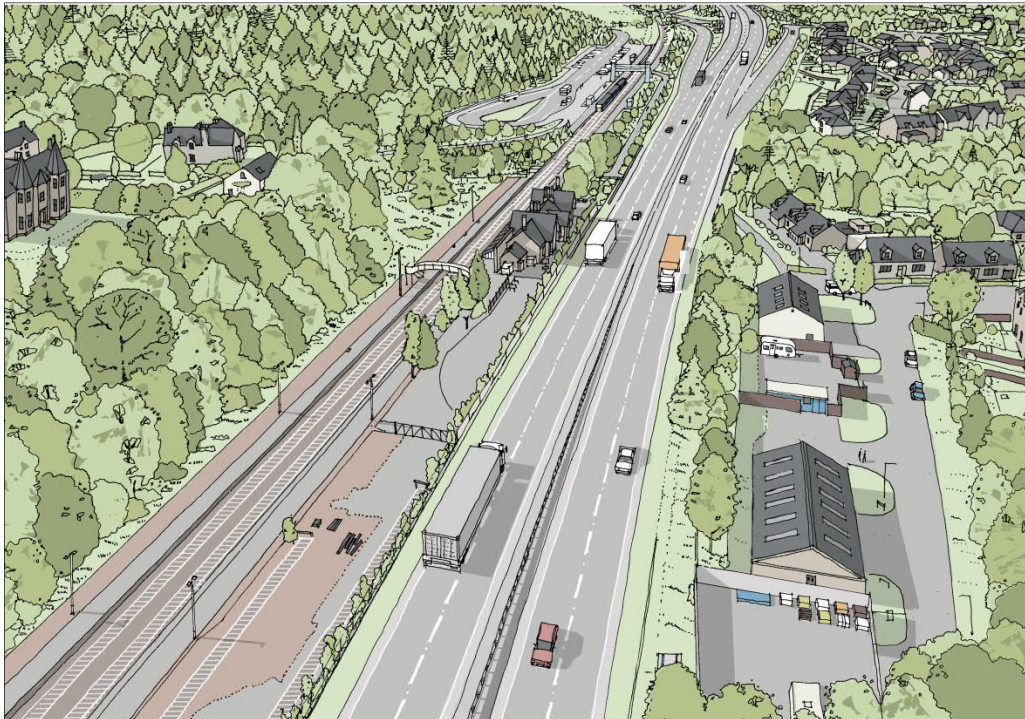
accessibility issues with the existing station. Station relocation was identified as a non-spatial idea (NS_0011) at Stage 1 of the A9 Co-Creative Process, as shown in Appendix B.

3.4.3 Dunkeld & Birnam Station Additional Option 1 would have an impact on visual amenity for residents of Telford Gardens and Stell Park and will impact Ladywell Landfill site, with potential to encounter contaminated soils and groundwater. This is comparable to the Community's Preferred Route option that includes an access road in this locality for access from the A822 for properties on Birnam Glen.

3.4.4 Key features of Dunkeld & Birnam Station Additional Option 1 are given below and shown in Figure 3.5.

- Relocated station to the north, to an area of land immediately north of Inchewan Burn;
- Extension of existing rail passing loop to the north to accommodate the relocated station, which will require signalling works;
- Provision of new platforms and associated station infrastructure, including shelters;
- Implementation of lighting, platform communications and Customer Information System equipment;
- Vehicular access to station from the A822, immediately west of the current railway underbridge, which is the tie-in point for the works associated with Dunkeld Junction;
- New car parking facility, which will include approximately fifty spaces, incorporating an appropriate number of disabled spaces, a vehicle pick-up drop-off and potentially provision for a bus stop and bus turning;
- Relocated station will include a pedestrian footbridge, incorporating either lifts or ramps to allow access between platforms;
- NMU access maintained from Birnam Glen with a new structure constructed across Inchewan Burn;
- Suitable footpaths, in accordance with current relevant accessibility and disability legislation, will link to the platforms and station facilities; and
- No public vehicular access direct to the existing station platforms and Category A Listed building. A left-in left-out junction will be provided immediately south of the existing station junction. This access would be for Network Rail personnel only with a gate likely erected to prevent unauthorised entry. Measures may also be taken to make the access inconspicuous to road users.

Figure 3.5: Dunkeld & Birnam Station, Additional Option 1



3.4.5 Further details of Dunkeld & Birnam Station Additional Option 1 are given below. Additional detail is included in Appendix D.

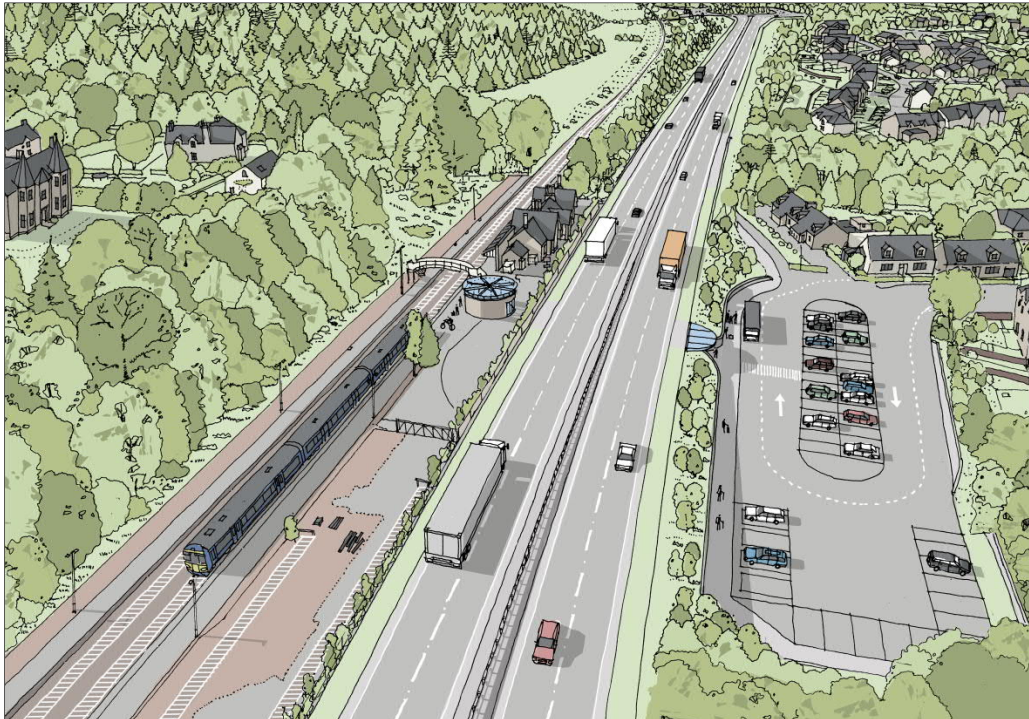
- Station relocation could be undertaken as an advanced work, therefore the relocated station would be operational prior to the A9 dualling construction works and access to the station in its current location, in a constrained area of the site, would not be required.
- New section of track and associated signalling works required to increase the length of the existing passing loop, expected the majority of this work can be undertaken without railway closures.
- Increased loss of woodland would result in greater impacts on the 'Exceptionally Rich, Varied and Beautiful Woodlands' Special Quality of the River Tay (Dunkeld) NSA.
- Greater impact on the visual amenity for residents of Telford Gardens and Stell Park, compared to the Community's Preferred Route Option.
- Lesser impacts on residents of Station Road, compared to the Community's Preferred Route Option.
- Adverse impacts on the setting of the Category A Listed station building, which would be severed from Dunkeld & Birnam Station, leaving it isolated with limited potential for it to be kept in use.
- Potential provision for a bust stop and bus turning facility, supporting enhanced public transport links.
- Potential for localised noise impacts due to the relocated station, although this is not anticipated to result in significant adverse noise impacts when considered alongside the A9 dual carriageway.
- Minor increase in traffic on the A822 to access the relocated station, approximately 100 vehicles per day, which is not anticipated to have a significant adverse impact.
- Addresses local community concerns over the existing accessibility issues with the current station.

- Does not address concerns from HES and Perth & Kinross Council who have noted issues over the severance of the Category A Listed station building with the station itself, which may impact the long-term preservation of the building.

Dunkeld & Birnam Station Additional Option 2

- 3.4.6 Dunkeld & Birnam Additional Option 2 is to retain Dunkeld & Birnam Station in its existing position and utilise Birnam Industrial Estate, at the western extent of Station Road, as a replacement car parking facility. A new pedestrian underpass, beneath the A9, would link the proposed car park with the station. This option was voted fifth (of eleven) at Stage 4 of the A9 Co-Creative Process (Table 1.8, DS_0006). Dunkeld & Birnam Station Additional Option 2 maintains the principle of improved station connection, which is a key principle of the Community's Preferred Route Option, allowing access in accordance with relevant accessibility and disability legislation to Platform 1 (southbound). This option provides greater opportunity for sustainable re-use of the station building, although not as effectively as the Community's Preferred Route Option. Indeed, this option would have an adverse impact on the setting of the Category A Listed station building, compared to the Community's Preferred Route Option as there is limited open space in front of the building.
- 3.4.7 Access to Dunkeld & Birnam Station is likely to be maintained during construction with this option.
- 3.4.8 Key features of Dunkeld & Birnam Station Additional Option 2 are given below and shown in Figure 3.6.
- Existing Dunkeld & Birnam Station maintained in its current position;
 - Birnam Industrial Estate acquired, and the land utilised to construct a station car park facility, which will include car parking provision (including an appropriate number of disabled spaces) for approximately fifty vehicles, a vehicle pick-up drop-off point and potentially provision for a bus stop. The new car park will be accessed from Station Road;
 - Current arrangements for access to the station via Birnam Glen, utilising existing stairs remains;
 - A new pedestrian underpass structure constructed below the proposed A9 dual carriageway, linking the new car park with Platform 1 (southbound) of the station;
 - The underpass structure will incorporate lifts and stairs to facilitate NMU access from the underpass level to the station;
 - No works proposed to the existing station infrastructure, including platforms, pedestrian overbridge and track; and
 - No public vehicular access direct to the station platforms and Category A Listed building. A left-in left-out junction would be provided immediately south of the existing station junction. This access would be for Network Rail personnel only, with a gate likely erected to prevent unauthorised entry. Measures would also be taken to make the access inconspicuous to road users.

Figure 3.6: Dunkeld & Birnam Station, Additional Option 2



3.4.9 Further details of Dunkeld & Birnam Station Additional Option 2 are given below. Additional detail is included in Appendix D.

- No works necessary to existing track and station layout.
- Existing buildings within Birnam Industrial Estate demolished.
- New underpass and lifts to connect to station level will improve accessibility to the station for NMUs.
- No impact on Inchewan Burn.
- Adverse impacts on the setting of the Category A Listed station building as road is move closer and there is limited open space in front of the building.
- Pedestrian underpass would improve the opportunity for sustainable re-use of the station building, although not as effectively as the Community's Preferred Route Option.
- Potential provision for a bust stop and bus turning facility, supporting enhanced public transport links.
- Traffic flows on Station Road expected to increase by approximately 100 vehicles per day, although this is not expected to result in a perceptible difference in road traffic noise.
- Residents on Station Road have expressed concerns regarding the increase in traffic and landscape, noise and visual impacts of the new car park at Birnam Industrial Estate.
- Partially addresses HES and Perth & Kinross Council concerns over the severance of the Category A Listed station building with the station itself.

3.5 Dunkeld Junction

General

3.5.1 The Community's Preferred Route Option includes an at-grade roundabout at Dunkeld. This conflicts with the A9 Dualling programme aim that the route should be a Category 7A all-purpose dual

carriageway with grade separated junctions. A roundabout may also introduce delays for A9 and side road traffic, particularly during peak traffic periods and increases the likelihood of low severity accidents. However, it does have a number of advantages, including reduced construction complexity in the Dunkeld Junction area, construction risk and time benefits, reduced landscape and visual impacts, primarily due to reduced footprint, earthworks and structures and reduced impact on residential and commercial properties to the west and the Highland Main Line railway to the east and has an overall reduced land-take. While the local community has expressed a clear preference for an at-grade roundabout at Dunkeld, key stakeholders, including emergency services and freight organisations have noted concerns. As a result of these concerns, and to offer an option that complies with the overarching A9 objective for a Category 7A all-purpose dual carriageway, an additional option has been considered.

Dunkeld Junction Additional Option 1

- 3.5.2 Dunkeld Junction Additional Option 1 is a grade separated junction, which is in accordance with the A9 Dualling Programme aim that the route should be a Category 7A all-purpose dual carriageway with grade separated junctions and therefore provides consistency throughout the route. It also addressed the concerns noted by key stakeholders over the effective operation of a roundabout and reduces the likelihood of low severity accidents. It should be noted that this option was voted fifth (from thirteen) at Stage 4 of the A9 Co-Creative Process (Table 1.6, DN_0004).
- 3.5.3 This option facilitates all vehicle movements and would not introduce queuing traffic, thereby complimenting the community's objective to provide better, safer access on and off the A9, and meeting Transport Scotland's objective to improve the operational performance of the A9 and improve safety. However, Dunkeld Junction Additional Option 1 has a greater landscape and visual impact compared with a roundabout. In addition, it requires more land-take than the Community's Preferred Route option, resulting in the loss of additional areas of existing woodland. It also requires a large retaining wall approximately 10 metres high immediately adjacent to the tennis club and bowling green.
- 3.5.4 Key features of Dunkeld Junction Additional Option 1 are given below and shown in Figure 3.7.
- Grade separated junction, variation of diamond layout;
 - All vehicle movements facilitated;
 - Connection of the A822 and A923, crossing the A9 on an underbridge structure;
 - Priority junction connecting the road to Inver with the realigned A822/A923;
 - Northbound slip roads, incorporating taper merge and diverge. Northbound diverge slip road linking to the realigned A822/A923. Northbound merge slip road linking to the road to Inver;
 - Southbound slip roads, incorporating taper merge and diverge, linking to the realigned A822/A923; and
 - Northbound and southbound merge and diverge slip roads.

Figure 3.7: Dunkeld Junction, Additional Option 1



3.5.5 Further details of Dunkeld Junction Additional Option 1 are given below. Additional detail is included in Appendix D.

- Facilitates all vehicle movements and does not result in queues, thereby complementing the community's objective to provide better, safer access on and off the A9, and meeting Transport Scotland's objectives to improve operational performance and improve safety.
- Increased construction complexity, compared to an at-grade roundabout, within a narrow corridor, with potential increased impact on adjacent residential properties.
- Short lengths of low height retaining wall required alongside residential properties on Stell Park Road, Telford Gardens and King Duncan's Place to avoid encroachment.
- New crossing of the River Braan, wider and at an elevated height, which results in a new retaining wall immediately adjacent to the tennis club and bowling green.
- Provides NMU crossing facility, addressing concerns from cycle groups and Perth & Kinross Council.
- Greater adverse impact on landscape and visual amenity and loss of additional areas of Ancient Woodland.
- Greater impact on Ancient Woodland habitat on the AWI than the Community's Preferred Route Option.
- Improved journey times compared to the existing condition by approximately 15 to 25 seconds. No queuing or delays on the A9 and associated side roads.
- Addresses concerns from a small number of local residents who have expressed a preference for a grade separated junction.
- Contradicts the results of the A9 Co-Creative Process where approximately 40% of the local community voted for an at-grade roundabout. (Note: 217 ranking cards were submitted in relation to Dunkeld Junction at Stage 4 of the A9 Co-Creative Process.)
- Addresses emergency services concerns over the potential for accidents at roundabouts and increased response times.

- Addresses Transport Scotland (Network Maintenance) concerns over the safe operation of the cut and cover tunnel and roundabout in unison and the potential for minor accidents on the roundabout to escalate quickly, impacting the cut and cover tunnel and resulting in significant queues on the A9.

3.6 The Hermitage / Dalguise Junction

- 3.6.1 As noted in Appendix A (Jacobs Assessment (2014 to 2016)), previous assessment undertaken prior to the A9 Co-Creative Process suggested a northbound left-in left-out junction as the preferred option at The Hermitage, which is a National Trust for Scotland site. The A9 Co-Creative Process also identified a left-in left-out junction as the preference at this location (Table 1.9). As previous assessment and the local community preference is consistent, it is not proposed to investigate additional junction options at The Hermitage.
- 3.6.2 Similarly, at Dalguise Junction, Jacobs assessment identified a grade separated junction, with a roundabout on the east of the A9 connected to the B898 via an underbridge, with a northbound loop arrangement and merge and diverge southbound slip roads. Through the A9 Co-Creative Process the community identified this option as their preference (Table 1.7). As such, it is not proposed to investigate additional options at Dalguise Junction.

3.7 Initial Options Assessment

- 3.7.1 As detailed in Section 2, the initial assessment work completed on the Community's Preferred Route Option identified a number of challenges, which led to the consideration of the additional options detailed in Section 3.
- 3.7.2 Two additional options were considered for Dunkeld & Birnam Station and initial assessment undertaken.
- Relocated Dunkeld & Birnam Station, with access to the station from the A822; and
 - Birnam Industrial Estate car park with new pedestrian underpass incorporating stairs and a lift.
- 3.7.3 Based on this initial assessment, detailed in Section 3.4, it is recommended that the relocated Dunkeld & Birnam Station option should be removed from further consideration and not included in the Whole Route Options. The reasons for this are given below.
- Does not meet a key principle from the A9 Co-Creative Process to re-connect Station Road to the station;
 - Involves works to track, signalling and platforms, that would impact the operation of the Highland Main Line railway, adding to the scheme complexity;
 - Adverse impact on the Category A Listed station building, which may impact the future viability of the building;
 - Greater changes to the landscape character, impacting the visual amenity for residents of Telford Gardens and Stell Park Road;
 - Impact on Ladywell Landfill site, with potential to encounter contaminated soils and groundwater.
- 3.7.4 The level of assessment undertaken in the initial assessment was unable to eliminate other options.

4. Options for DMRB Stage 2 Assessment

4.1 General

- 4.1.1 Utilising the disaggregated options and the outcome of the initial assessment, detailed in Section 3, Whole Route Options have been constructed. This has considered how the constituent options fit together naturally, the key principles of the A9 Co-Creative Process and the community's and Transport Scotland's objectives. The placement of options in the public vote at Stages 4 and 5 of the A9 Co-Creative Process has also been considered, as well as how the Whole Route Options address concerns of local residents and key stakeholders.
- 4.1.2 Based on the initial assessment work undertaken to date, there are not significant differences (in engineering, environment and traffic) between the three options considered for Murthly/Birnam Junction. As a result, all three junction options are included in the Additional Whole Route Options and will be considered and assessed as part of the DMRB Stage 2 assessment.
- 4.1.3 These additional options will be considered alongside the Community's Preferred Route Option as part of the DMRB Stage 2 assessment. Details of the options are given in Sections 4.2 to 4.5.
- 4.1.4 Each option includes the same junction option at The Hermitage and Dalguise, as detailed in Section 3.6.
- 4.1.5 Plans of the options are included in Appendix E.

4.2 Community's Preferred Route Option

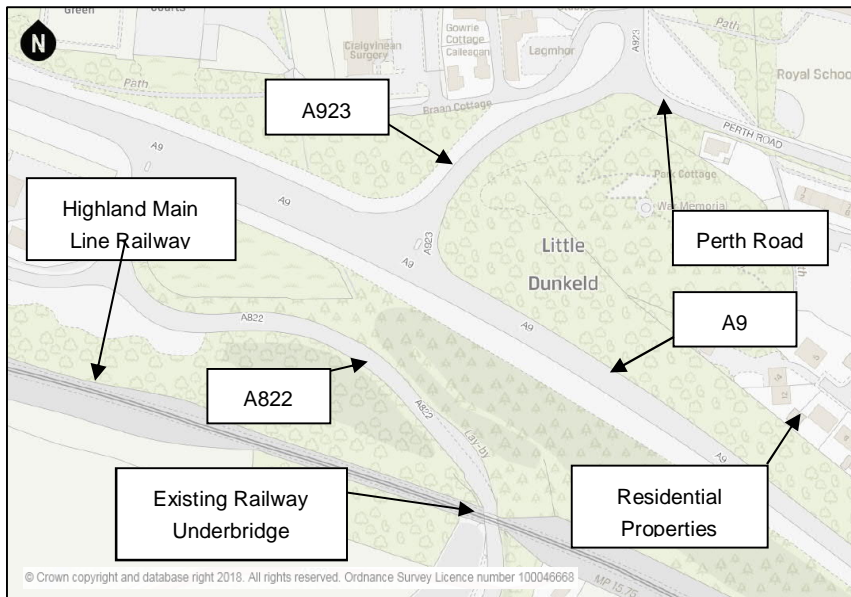
- 4.2.1 The commitment from the A9 Co-Creative Process is that the Community's Preferred Route Option will be subject to a DMRB Stage 2 assessment and submitted to Scottish Ministers for consideration.
- 4.2.2 A summary of the Community's Preferred Route Option is given below.
- On-line route, largely following the alignment of the existing A9 single carriageway.
 - A9 dual carriageway lowered into a cut and cover tunnel for approximately 1.5 kilometres, commencing at the southern extent in the locality of the existing Birnam Junction and terminating at its northern extent approximately 300 metres south of the existing Dunkeld Junction.
 - Dunkeld & Birnam Station retained in its current position with Station Road re-connected to the station with replacement car parking provision on the structure.
 - Speed limit of 50 miles per hour required between the southern extent of the scheme and proposed Dunkeld Junction. 70 miles per hour speed limit north of proposed Dunkeld Junction.
 - Murthly/Birnam Junction:
 - Grade separated junction in the locality of the existing private access to Murthly Castle;
 - Diamond layout, facilitating all vehicle movements, with northbound and southbound merge and diverge slip roads. An overbridge is provided across the A9 linking to the B867; and
 - Requires a connection of the B867 and Perth Road in the locality of the existing Birnam Junction, crossing the A9 at the southern extent of the cut and cover tunnel.
 - Dunkeld Junction:
 - At-grade roundabout in the locality of the existing junction at Dunkeld, including a segregated left-lane between the A923 and A9 south; and
 - Provides connections to the A9 (north and south), A923, A822 and road to Inver.
 - The Hermitage:

- Left-in left-out junction on the northbound carriageway.
- Dalguise Junction:
 - Grade separated junction south of the existing junction with the B898;
 - Loops in the northbound direction and slip roads in the southbound direction, facilitating all vehicle movements; and
 - Realigned B898 crosses the A9 on an underbridge, connecting to a roundabout on the east of the A9, which also connects to the southbound slip roads.

4.3 Additional Whole Route Option 1

- 4.3.1 A key principle of the Community's Preferred Route Option is the reconnection of Station Road to Dunkeld & Birnam Station, which can only be achieved by lowering the A9 dual carriageway. The Community's Preferred Route Option, which incorporates a 1.5 kilometre cut and cover tunnel has significant construction complexity within a narrow, sensitive corridor, which has been noted as a significant concern by local residents and key stakeholders. Lowering the A9 dual carriageway into a 150-metre-long underpass at Dunkeld & Birnam Station still has considerable construction complexity, however, largely due to the reduced length of retaining walls, it is less complex and maintains the principle of re-connecting Station Road to the station. This option also helps meet Transport Scotland's objective to improve integration with Public Transport facilities and the community's objectives to reduce current levels of noise and pollution and preserve and enhance the integrity of the unique and rich historical and cultural features, i.e. the Category A Listed station building. This option permits a 70 miles per hour speed limit, which is consistent with the overall A9 Dualling Programme and has no restrictions on use. Furthermore, a 24-hour manned control room and other infrastructure associated with a tunnel is not required.
- 4.3.2 It should be noted that this A9 dual carriageway option was voted third at Stage 4 of the A9 Co-Creative Process (Table 1.3, Option MO_0002) and was therefore included in Stage 5. At Stage 5, the option finished fourth (Paragraph 1.2.10).
- 4.3.3 As the at-grade roundabout at Dunkeld obtained approximately 40% of the public vote at Stage 4 of the A9 Co-Creative Process, it has been included in Additional Option 1. This option has a number of advantages over a grade separated junction, most notably reduced construction complexity, landscape and visual impacts, and reduced impacts on residential properties. However, this option does not meet the requirements of a Category 7A dual carriageway or Transport Scotland's objectives to improve safety for motorised and NMUs and improve the operational performance of the A9. It also does not fully meet the community's objective to provide better, safer access on and off the A9.
- 4.3.4 Provision of a grade separated junction at Dunkeld, to replace an at-grade roundabout, in tandem with a 150-metre-long underpass structure at Dunkeld & Birnam Station, would introduce significant engineering complexities within a constrained area. To limit the impact on surrounding infrastructure the realignment of the side roads, which involves connection of the A822 and A923, is restricted to the section between the existing railway underbridge on the A822 to the west, and the existing junction with Perth Road on the A923, as shown in Figure 4.1. The side road is therefore realigned over a length of only 275 metres.
- 4.3.5 A lowered A9 dual carriageway at Dunkeld & Birnam Station does not allow a safe, compliant alignment that travels over the realigned A822 and A923 as a result of the vertical geometry appropriate for the Design Speed. As a result, the A9 dual carriageway would cross below the realigned side road. To avoid encroachment towards the Highland Main Line railway to the west and properties on Stell Park Road, Telford Gardens and King Duncan's Place to the east, retaining wall structures would be necessary. These walls would be significant in size, extending to approximately 8.5 metres on the west side adjacent to the railway, provided the 5-metre-high earthwork bund between the road and railway is removed. Otherwise walls would be up to 18 metres in height. On the east side, walls up to 12.5 metres in height would be required.

Figure 4.1: Dunkeld Junction Constraints



- 4.3.6 A bored pile cantilever retaining wall would be possible to the west, however the heights of the retaining walls would be at the limit of what is possible with a cantilever wall, as overturning moments in the piled wall would be significant and may affect its stability. To overcome these forces ground anchors would traditionally be considered. However, ground anchors would extend beyond the highway boundary into Network Rail's track support zone and Network Rail is unlikely to allow implementation of such a system. As an alternative to ground anchors, a bored pile wall with counterforts could be constructed. Counterforts would encroach to a lesser degree on the track support zone. Such a solution would however, incur significantly greater costs, lengthen the construction period and encroach on the track support zone.
- 4.3.7 The only likely solution to form the retaining walls on the east side is to use a caisson wall, formed as either a secant piled wall or diaphragm walls comprising two parallel walls constructed several metres apart, with perpendicular stiffening sections linking those walls together. Construction of such a solution would be complex and challenging in such a constrained corridor, especially given the large items of plant required to form a caisson wall of this type and size.
- 4.3.8 To reduce the size of retaining walls necessary, the proposed A9 dual carriageway could be raised approximately 5 metres higher than existing carriageway levels. However, to accommodate the appropriate headroom clearance, the realigned A822/A923 side road would also require to be lowered by approximately 4 metres. As the current A822 rises steeply to the west, the realigned side road would be in an earthwork cutting slope for a significant length. At places, the proposed side road level would be approximately 25 metres below existing ground levels. A new underbridge structure would be required on the realigned side road to accommodate the Highland Main Line railway, replacing the existing railway masonry structure.
- 4.3.9 Given the construction complexity, risks and the impact on adjacent topography a grade separated junction at Dunkeld for Additional Whole Route Option 1 has not been considered.
- 4.3.10 A summary of Additional Whole Route Option 1 is given below.
- On-line route, largely following the alignment of the existing A9 single carriageway.
 - A9 dual carriageway lowered into a 150-metre-long underpass in the locality of Dunkeld & Birnam Station.
 - Dunkeld & Birnam Station retained in its current position with Station Road re-connected to the station with replacement car parking provision on the structure.

- Speed limit of 70 miles per hour throughout.
- Murthly / Birnam Junction, three options under consideration:
 - Option 1:
 - Grade separated junction in the locality of the existing private access to Murthly Castle;
 - Diamond layout, facilitating all vehicle movements, with northbound and southbound merge and diverge slip roads. An overbridge is provided across the A9 linking to the B867; and
 - Requires a connection of the B867 and Perth Road in the locality of the existing Birnam Junction, crossing the A9 at the southern extent of the cut and cover tunnel.
 - Option 2:
 - Grade separated junction in the locality of the existing Birnam Junction;
 - Merge/diverge loops in the northbound direction and a merge slip road in the southbound direction, with no southbound diverge slip road;
 - B867 and Perth Road connected, crossing the A9 via an underbridge; and
 - Includes an underbridge to connect the existing private access to Murthly Castle to the B867.
 - Option 3:
 - Grade separated junction in the locality of the existing Birnam Junction;
 - Merge/diverge loops in the northbound and southbound directions, facilitating all vehicle movements;
 - B867 and Perth Road connected, crossing the A9 via an underbridge; and
 - Includes an underbridge to connect the existing private access to Murthly Castle to the B867.
- Dunkeld Junction:
 - At-grade roundabout in the locality of the existing junction at Dunkeld, including a segregated left-lane between the A923 and A9 south; and
 - Provides connections to the A9 (north and south), A923, A822 and road to Inver.
- The Hermitage:
 - Left-in left-out junction on the northbound carriageway.
- Dalguise Junction:
 - Grade separated junction south of the existing junction with the B898;
 - Loops in the northbound direction and slip roads in the southbound direction, facilitating all vehicle movements; and
 - Realigned B898 crosses the A9 on an underbridge, connecting to a roundabout on the east of the A9, which also connects to the southbound slip roads.

4.4 Additional Whole Route Option 2

- 4.4.1 The Community's Preferred Route Option has significant construction complexity, likely to generate noise and vibration, with the potential to affect residential properties in the locality of the works. The significant construction duration for the Community's Preferred Route Option, largely as a result of the piling works required for the cut and cover tunnel, has been noted as a concern for both local residents and key stakeholders, including the emergency services. These construction issues are eliminated by an A9 dual carriageway that is at-grade throughout. An at-grade A9 also eliminates works to Inchewan Burn, addressing possible impacts on water quality, geomorphology and species,

noted by SEPA and SNH. A 24-hour manned control room and other infrastructure that would require routine maintenance is not required. As such, Additional Whole Route Option 2 incorporates an at-grade A9 throughout. Such an option also permits a 70 miles per hour speed limit, which is consistent with the overall A9 Dualling Programme and has no restrictions on use.

- 4.4.2 As the initial assessment undertaken on the station options recommended that the relocated Dunkeld & Birnam Station option be removed from further consideration (see Section 3.7), Additional Whole Route Option 2 utilises Birnam Industrial Estate for a new station car park with a new pedestrian underpass incorporating lifts and stairs providing access to the station.
- 4.4.3 The PES commission concluded that the proposed A9 will be a Category 7A all-purpose dual carriageway, in accordance with the DMRB (Volume 6, Section 1, Part 1, TD 9/93: Highway Link Design). The standard recommends that only grade separated junctions are provided on the route for safe access and egress to the A9 and at-grade roundabouts should not be provided. The Community's Preferred Route Option incorporates an at-grade roundabout, which is a departure from the overall A9 dualling strategy for a Category 7A dual carriageway.
- 4.4.4 To ensure compliance with the overall A9 dualling strategy for a Category 7A dual carriageway and provide the highest standard available, Additional Whole Route Option 2 incorporates grade separated junctions throughout, facilitating full movements. This satisfies Transport Scotland's objectives to improve the operational performance of the A9 and improve safety for all users. In addition, this option also meets the community objective to provide better, safer access on and off the A9 from both sides of the road.
- 4.4.5 Assessment undertaken by Jacobs, noted in Appendix A (Jacobs Assessment (2014 to 2016)) considered a number of alternative junction layouts at Dunkeld, all of which were grade separated and therefore compliant with a Category 7A all-purpose dual carriageway. After considering the environmental, engineering and economic impacts, the assessment recommended the most suitable junctions. These junctions are included in Additional Whole Route Option 2. A grade separated junction at Dunkeld does not follow a key feature of the Community's Preferred Route Option, which is to provide an at-grade roundabout. At Stage 4 of the A9 Co-Creative Process an at-grade roundabout received approximately 40% of the public vote.
- 4.4.6 A summary of Additional Whole Route Option 2 is given below.
- On-line route, largely following the horizontal and vertical alignment of the existing A9 single carriageway, although raised at Dunkeld Junction to accommodate a grade separated junction.
 - Generally, the same level as the existing A9 throughout.
 - Dunkeld & Birnam Station retained in its current position.
 - Birnam Industrial Estate acquired, and the land used to construct a car parking facility accessed from Station Road, incorporating approximately 50 spaces.
 - A new pedestrian underpass structure, incorporating lifts, constructed below the proposed A9 dual carriageway, linking the new car park to the station.
 - Speed limit of 70 miles per hour throughout.
 - Murthly / Birnam Junction, three options under consideration:
 - Option 1:
 - Grade separated junction in the locality of the existing private access to Murthly Castle;
 - Diamond layout, facilitating all vehicle movements, with northbound and southbound merge and diverge slip roads. An overbridge is provided across the A9 linking to the B867; and
 - Requires a connection of the B867 and Perth Road in the locality of the existing Birnam Junction, crossing the A9 at the southern extent of the cut and cover tunnel.

- Option 2:
 - Grade separated junction in the locality of the existing Birnam Junction;
 - Merge/diverge loops in the northbound direction and a merge slip road in the southbound direction, with no southbound diverge slip road;
 - B867 and Perth Road connected, crossing the A9 via an underbridge; and
 - Includes an underbridge to connect the existing private access to Murthly Castle to the B867.
- Option 3:
 - Grade separated junction in the locality of the existing Birnam Junction;
 - Merge/diverge loops in the northbound and southbound directions, facilitating all vehicle movements;
 - B867 and Perth Road connected, crossing the A9 via an underbridge; and
 - Includes an underbridge to connect the existing private access to Murthly Castle to the B867.
- Dunkeld Junction:
 - Grade separated junction in the locality of the existing Dunkeld Junction.
 - Variation of a diamond layout, facilitating all vehicle movements.
 - A822 and A923 connected, crossing the A9 via an underbridge.
- The Hermitage:
 - Left-in left-out junction on the northbound carriageway.
- Dalguise Junction:
 - Grade separated junction south of the existing junction with the B898.
 - Loops in the northbound direction and slip roads in the southbound direction, facilitating all vehicle movements.
 - Realigned B898 crosses the A9 on an underbridge, connecting to a roundabout on the east of the A9, which also connects to the southbound slip roads.

4.5 Additional Whole Route Option 3

4.5.1 Additional Whole Route Option 3 is the same as Additional Whole Route Option 2, apart from at Dunkeld Junction. Given the level of support indicated during the A9 Co-Creative Process for an at-grade roundabout, it has been included to replace the grade separated junction. As noted previously, this does not meet the requirements of a Category 7A dual carriageway.

4.5.2 A summary of Additional Whole Route Option 3 is given below.

- On-line route, largely following the horizontal and vertical alignment of the existing A9 single carriageway.
- Generally, the same level as the existing A9 throughout.
- Dunkeld & Birnam Station retained in its current position.
- Birnam Industrial Estate acquired, and the land used to construct a car parking facility accessed from Station Road, incorporating approximately 50 spaces.
- A new pedestrian underpass structure, incorporating lifts, constructed below the proposed A9 dual carriageway, linking the new car park to the station.
- Speed limit of 70 miles per hour throughout.

- Murthly / Birnam Junction, three options under consideration:
 - Option 1:
 - Grade separated junction in the locality of the existing private access to Murthly Castle;
 - Diamond layout, facilitating all vehicle movements, with northbound and southbound merge and diverge slip roads. An overbridge is provided across the A9 linking to the B867; and
 - Requires a connection of the B867 and Perth Road in the locality of the existing Birnam Junction, crossing the A9 at the southern extent of the cut and cover tunnel.
 - Option 2:
 - Grade separated junction in the locality of the existing Birnam Junction;
 - Merge/diverge loops in the northbound direction and a merge slip road in the southbound direction, with no southbound diverge slip road;
 - B867 and Perth Road connected, crossing the A9 via an underbridge; and
 - Includes an underbridge to connect the existing private access to Murthly Castle to the B867.
 - Option 3:
 - Grade separated junction in the locality of the existing Birnam Junction;
 - Merge/diverge loops in the northbound and southbound directions, facilitating all vehicle movements;
 - B867 and Perth Road connected, crossing the A9 via an underbridge; and
 - Includes an underbridge to connect the existing private access to Murthly Castle to the B867.
- Dunkeld Junction:
 - At-grade roundabout in the locality of the existing junction at Dunkeld, including a segregated left-lane between the A923 and A9 south; and
 - Provides connections to the A9 (north and south), A923, A822 and road to Inver.
- The Hermitage:
 - Left-in left-out junction on the northbound carriageway.
- Dalguise Junction:
 - Grade separated junction south of the existing junction with the B898.
 - Loops in the northbound direction and slip roads in the southbound direction, facilitating all vehicle movements.
 - Realigned B898 crosses the A9 on an underbridge, connecting to a roundabout on the east of the A9, which also connects to the southbound slip roads.

5. DMRB Stage 2 Assessment

5.1 General

- 5.1.1 A DMRB Stage 2 assessment will be undertaken on the Community's Preferred Route Option and Additional Whole Route Options 1, 2 and 3. The assessment will identify the environmental, engineering, traffic and economic advantages and constraints associated with each route option. The results of this assessment, and community and stakeholder feedback, will be presented to Scottish Ministers for consideration and a Preferred Route Option will be selected. The Preferred Route Option will be taken forward for further development as part of the DMRB Stage 3 assessment.
- 5.1.2 It should be noted that as an initial stage in the DMRB Stage 2 assessment, consideration will be given to the options for the Murthly/Birnam Junction, to identify the most suitable junction layout.

5.2 Level of DMRB Stage 2 Assessment

- 5.2.1 The options under consideration as part of the DMRB Stage 2 assessment will involve significant construction works within a constrained corridor, impacting adjacent environmentally sensitive sites and residential and commercial properties. Aspects of the design and assessment more commonly developed at later stages will have a significant impact and will heavily influence the identification of the Preferred Route Option. As a result, it is proposed that key aspects of design will be assessed in greater detail than is normal at this stage, as part of the DMRB Stage 2 assessment. Undertaking additional analysis of these elements will provide a more robust DMRB Stage 2 assessment that will be more defensible if challenged. Furthermore, it will also provide additional information for Scottish Ministers, who will decide on a Preferred Route option.
- 5.2.2 Key elements of design to be assessed further at DMRB Stage 2 are given below. It should be noted that the assessment will consider the community's objectives where appropriate, identifying where options meet or conflict with the objectives.
- Constructability Assessment
 - The A9 corridor is the strategic link between Central Scotland and the Scottish Highlands and is utilised by a combination of vehicles, including passenger vehicles, coaches, HGVs and tourist traffic. As a result, Transport Scotland has an aspiration to maintain two-way traffic flows on the A9 during construction. Construction of the options, while maintaining traffic on the A9, will be challenging given the sensitive and constrained nature of the project.
As noted in Sections 2 and 3, construction will be complex for many of the options, particularly those that involve lowering the A9 and piling works. A detailed review of constructability will therefore be undertaken for the project, with greater detail included on constructability impacts, including noise and vibration, than is normal at this stage of a project. More information on Traffic Management, construction phasing and methodology, buildability and an outline construction programme to inform the DMRB Stage 2 impacts will also be included.
 - Noise & Vibration
 - A key consideration for the public, given the close proximity of the A9 to residential properties, is the impact of noise and vibration, both during and post construction. More detailed modelling will therefore be undertaken to identify residential properties that meet operational noise mitigation criteria and a determination as to what form of mitigation measures may be implemented to reduce potential adverse noise impacts at dwellings.
As a result of the construction complexity, the close proximity to residential properties and the expected duration for construction

works, consideration will be given to potential impacts arising from construction. This will involve consideration of possible measures that could be implemented by the Contractor to mitigate possible impacts. The noise and vibration assessment for operation will go beyond that normally undertaken at DMRB Stage 2 and will include consideration of potential mitigation measures both in the year of opening and future years. Identifying possible mitigation at this stage will provide a better appreciation of what may be required and the potential impact of its inclusion, which will be further developed and assessed as part of the DMRB Stage 3 assessment.

- Landscape & Visual
 - To further inform the landscape and visual assessment, conceptual landscaping will be undertaken, focussed on the central section of the route that is in close proximity to residential properties. This will also consider suitable mitigation to reduce or eliminate possible impacts. Identifying possible mitigation at this stage will provide a better appreciation of what may be required and the potential impact of its inclusion, which will be further developed and assessed as part of the DMRB Stage 3 assessment.
- Road Drainage & Water Environment / Ecology & Nature Conservation
 - Additional design work will be undertaken, including details of possible construction methods, with the aim of ensuring works can be undertaken without significant adverse impacts. A more detailed flood risk assessment will also be undertaken to evaluate the potential impacts on the water environment as a result of the options. This will be particularly important given the issues encountered on other sections of the A9, where flooding has been a significant issue. As part of the Habitats Regulations Appraisal (HRA), liaison with SNH will also be undertaken to determine whether any of the options adversely impact the River Tay SAC.
- Geology & Soils
 - Additional analysis of the ground conditions will be undertaken to identify potential contamination and possible mitigation measures.
- Well-being
 - Consideration of potential impacts on health and well-being is not normally considered as part of the DMRB scheme assessment process. However, a key message from the local community through the A9 Co-Creative Process is that any proposed scheme should carefully consider the health and well-being of local residents, which is reflected in the community's objectives.
 As there is no specific published guidance on the approach to considering health and well-being, the proposed approach will be determined using experience from other schemes, both in the UK and abroad, and a degree of professional judgement.
- Local Economy
 - The impact on local businesses from a trunk road scheme is usually considered as part of the DMRB Stage 2 assessment. At this stage, the assessment focusses on the number of residential, commercial (including farming), industrial and other properties at risk of demolition or land-take, and where a business is impacted, the assessment details the number of people employed on-site, the likely impact of the scheme and the probable effect on the business's future viability. However, a key message from the local community through the A9 Co-Creative Process is that any proposed scheme should carefully consider the impact on local businesses, which are integral to the local economy of Dunkeld and Birnam and is reflected in the community's objectives.
 As a result, both direct and indirect impacts on local commercial businesses will be considered in the assessment. Direct impacts are

those that will be included within the Compulsory Purchase Order and will therefore lose land or face demolition as a result of the scheme. Indirect impacts are defined as those that are not directly impacted but may suffer financially as a result of the construction and future operational layout of the scheme.

6. Whole Route Options Workshop

- 6.1.1 A workshop was held on 16 April 2019 to discuss the initial assessment that had been undertaken to date and the formation of Whole Route Options from the additional options identified for each constituent part. The workshop was attended by representatives from Transport Scotland and Jacobs. Meeting notes detailing the discussions are included in Appendix F.

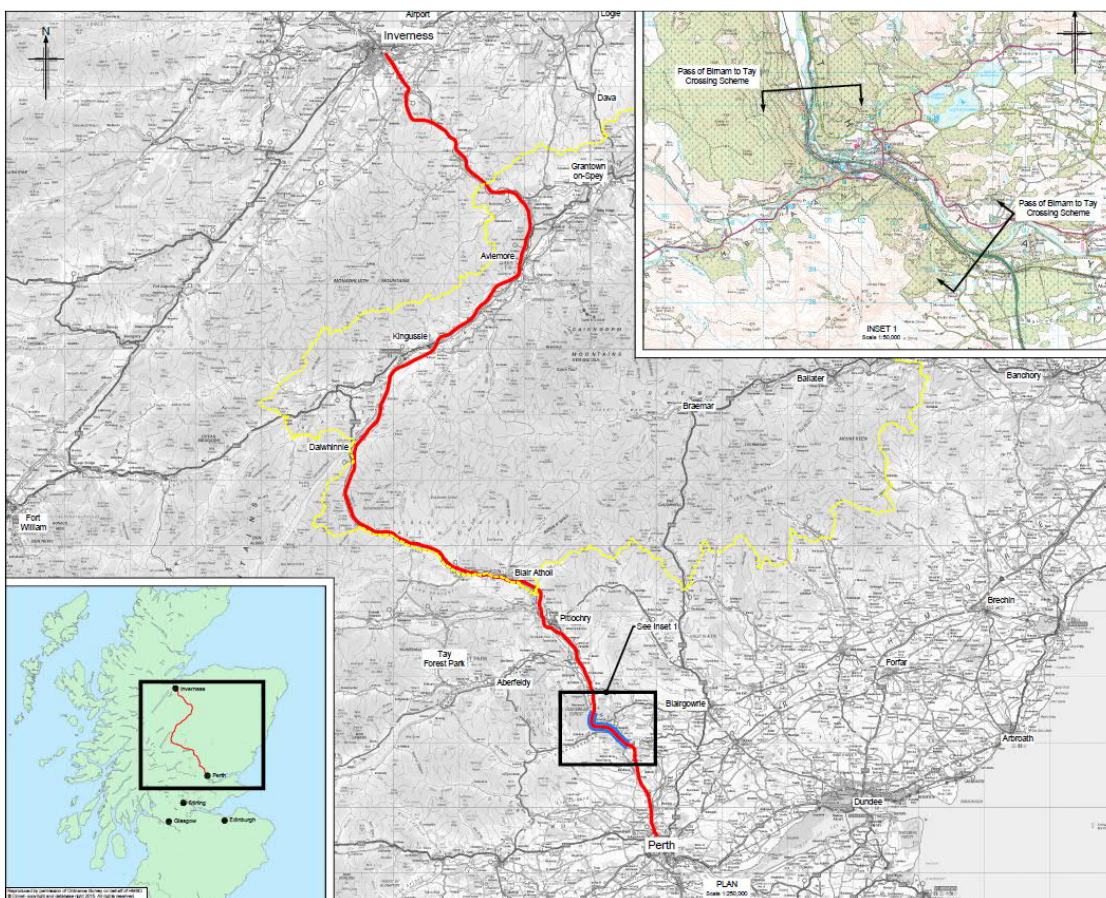
Appendix A. Project Background

Background to Dualling the A9

The Cabinet Secretary for Infrastructure and Capital Investment launched an Infrastructure Investment Plan (IIP) on 6 December 2011, which provided an overview of the Scottish Government's plans for infrastructure investment over the future decades. Contained within the plan was a commitment to complete the dualling of the A9 between Perth and Inverness by 2025.

The A9 corridor forms a strategic link between Central Scotland and the Scottish Highlands, as shown in Figure 1.1. The 177-kilometre route between Perth and Inverness consists of seven single carriageway sections interspersed between eight existing dual carriageway sections. Approximately 129 kilometres of these single carriageway sections are proposed to be dualled in order to complete the overall dualling of the A9.

Figure A.1: A9 Perth to Inverness Location Plan



Initial Scheme Assessment (2004 to 2009)

In July 2004, Transport Scotland commissioned AECOM (formerly URS / Scott Wilson) to undertake a RISS for the new A9 trunk road between Perth and Blair Atholl. This study identified Pitlochry as a definitive split in the character of the route, primarily due to the reduction in traffic volumes north of the town. The study therefore recommended upgrading of the A9 between Perth and Pitlochry to dual carriageway standard and provision of a WS2+1 layout between Pitlochry and Blair Atholl.

In 2006, the Scottish Executive published its National Transport Strategy (NTS). The strategy outlined the vision for the country's transport network and the context for transport policy for the next 20 years. One of the mechanisms for delivering the NTS was the Strategic Transport Projects Review (STPR), which outlined a programme of transport interventions for the period 2012 to 2022 and beyond.

The STPR recommended upgrading of the A9 from Dunblane to Inverness and confirmed that dualling the A9 would be expected to provide a significant contribution to the Scottish Government's purpose of:

- Increasing sustainable economic growth;
- Delivering on the national objectives of promoting journey time reductions between the Central Belt and Inverness and reducing accident rates; and
- Addressing the A9 corridor specific objectives of improving the operational effectiveness of the A9 on approach to Perth and Inverness and addressing issues of driver frustration.

The STPR also noted the following:

- Grade separation of Kier, Broxden and Inveralmond Roundabouts would remove congestion at these locations contributing to reduced journey times and improved journey time reliability and road safety;
- Dualling the A9 between Perth and Blair Atholl would have the most significant impact on reducing journey times and improving journey time reliability and would contribute to a consistent carriageway standard along this section of the route; and
- Dualling the A9 between Blair Atholl and Inverness would further reduce journey times and improve journey time reliability between Perth and Inverness, as well as provide a consistent carriageway standard along the whole of the A9 between Perth and Inverness.

AECOM Assessment (2009 to 2012)

The Pass of Birnam to Tay Crossing project commences at the northern extent of the current short section of dual carriageway at the Pass of Birnam. It extends approximately 8.4 kilometres, bypassing the towns of Birnam, Little Dunkeld and Dunkeld to the east and Inver and The Hermitage, which is a National Trust for Scotland protected site, to the west. The tie-in point with the following scheme, Tay Crossing to Ballinluig, is approximately 0.75 kilometres north of the current River Tay crossing.

In 2009 Transport Scotland commissioned AECOM to progress the development of the Pass of Birnam to Tay Crossing section of A9 dualling, considering the engineering, environmental and economic impacts of dualling options through further study, design and assessment work. The commission brief identified the main objectives for the scheme:

- Improve the operational performance and level of service and road safety on the A9 by reducing the effects of driver stress and journey times;
- Examine opportunities for integration of NMUs and public transport facilities into the solution;
- Mitigate the environmental impact of the new works and, where possible, examine opportunities for enhancing the environment;
- Achieve good value for money for both taxpayers and transport users;
- Design for ease of practical and safe maintenance;
- Minimise disruption/impact to road users, stakeholders, local community and environment during construction; and
- Be promotable / deliverable through the statutory processes.

AECOM considered an on-line corridor for a dual carriageway. Off-line corridors, both to the east and the west, were considered, however they were discounted, primarily due to the existing topography within the study area and the resultant environmental impact. It was concluded that an off-line route to the east would involve significant tunnelling works through Craig-a-Barns, and an off-line route to the west would involve significant tunnelling through Birnam Hill.

The AECOM assessment considered five alternative scheme options. Each option was based on the same A9 horizontal geometry, with differing mainline vertical profile and junction layouts at three locations (Birnam, Dunkeld and Dalguise) to facilitate turning movements and provide access to Birnam, Little Dunkeld and

Dunkeld. The five scheme options considered a reduced standard left-in left-out junction at Dunkeld & Birnam Station, with no car parking facilities. A left-in left-out junction was also provided at The Hermitage.

The five options considered are summarised in Table 1.1 and shown at the end of this appendix. Birnam Junction is located at the site of the existing left/right staggered priority junction with the B867 and Perth Road. Dunkeld Junction is located at the site of the existing right/left staggered priority junction with the A923 and A822. Dalguise Junction is located at the site of the existing priority junction with the B898.

Table A.1: DMRB Stage 2 Assessment Options Summary 2012 (AECOM)

Scheme Options	Birnam Junction	Dunkeld Junction	Dalguise Junction
1	Compact grade separated junction, compact loops, underbridge, full movements	Grade separated junction, northbound compact loop and southbound slip roads, overbridge, full movements	Grade separated junction, northbound compact loop and southbound slip roads, underbridge, full movements
2	No Junction Connection of the B867 and Perth Road, crossing the A9 on an underbridge	Grade separated junction, northbound compact loop and southbound slip roads, overbridge, full movements	Grade separated junction, northbound compact loop and southbound slip roads, underbridge, full movements
3	Compact grade separated junction, compact loops, underbridge, full movements	At-grade roundabout	Grade separated junction, northbound compact loop and southbound slip roads, underbridge, full movements
4	Compact grade separated junction, compact loops, underbridge, full movements	Grade separated junction, northbound compact loop and southbound slip roads, overbridge, full movements	Grade separated junction, northbound compact loop and southbound merge slip road (no southbound diverge slip road), underbridge, restricted movements
5	Compact grade separated junction, compact loops, underbridge, full movements	Grade separated junction, northbound compact loop and southbound slip roads, underbridge, full movements	Grade separated junction, northbound compact loop and southbound slip roads, underbridge, full movements.

The assessment of the five options was not concluded and no recommendations were provided due to the need to undertake further consultation.

Further Scheme Development (2012 to 2014)

In 2011, the Cabinet Secretary announced full dualling of the A9 between Perth and Inverness by 2025. In response, in September 2012, Transport Scotland commissioned a SEA and a PES study for the dualling of the A9 between Perth and Inverness. These commissions delivered a route-wide assessment, identifying and collating environmental and engineering constraints, issues, risks and opportunities to inform later, more detailed design. Furthermore, the SEA and PES commissions assisted in the identification of a preferred corridor and strategies to be adopted in future development work.

SEA

The SEA for the A9 Dualling Programme was published in accordance with the Environmental Assessment (Scotland) Act 2005, which requires a SEA to be prepared for all public-sector plans, programmes and strategies with the potential to present significant effects on the environment. The SEA developed a range of Strategic Environmental Design Principles in relation to landscape, water and flooding, soils and geodiversity, cultural heritage and ecology and nature conservation. A key element within the Pass of Birnam project is landscape. This includes:

- Ensure road alignment and design responds to the qualities and key characteristics of each landscape character area through which the route passes;
- Enhance the views from the road to maximise the positive traveller experience. Key views shall inform the siting of lay-bys, around appropriate opportunities to showcase natural and built heritage along the route;
- Design for low maintenance and to accommodate future change;
- Use of natural characteristics in design and encourage the use of sensitive and innovative methods to mitigate adverse environmental and visual effects, including rock cuttings, to deliver appropriately balanced solutions;
- Minimise the effect of the road on the experience of the wider landscape, including lighting and noise;
- Avoid, or reduce effects on, landscape features, retain and make best use of existing vegetation and re-use site won materials wherever possible; and
- Aim to ensure the enhanced reputation of the A9 as one of the world's great tourist routes, through landscapes of national and international importance.

PES

The PES commission undertook a preliminary engineering assessment, equivalent to a DMRB Stage 1 assessment, for the initial development and assessment of proposed corridor options and strategies for the improvement of the entire A9 to dual carriageway standards between Perth and Inverness.

The scheme objectives established by the PES commission for the A9 Dualling Programme are as follows:

- To improve the operational performance of the A9 by:
 - Reducing journey times; and
 - Improving journey time reliability.
- To improve safety for motorised and NMUs by:
 - Reducing accident severity; and
 - Reducing driver stress.
- To facilitate active travel within the corridor; and
- To improve integration with Public Transport facilities.

The PES commission concluded that the proposed A9 dual carriageway will be a Category 7A all-purpose dual carriageway, in accordance with the DMRB (Volume 6, Section 1, Part 1, TD 9/93: Highway Link Design). The standard requires that there will be no gaps in the central reserve and no at-grade minor junctions. It is also recommended that only grade separated junctions are provided on the route for safe access and egress to the A9. Isolated left-in left-out accesses may be provided in exceptional circumstances. Compact grade separated junctions and at-grade roundabouts should not be provided on Category 7A carriageways.

The PES commission developed a broad strategy for the treatment of existing junctions and accesses along the A9. The strategy states that A and B class roads that currently have direct access to the A9 will remain open, either through provision of a grade separated junction or realignment to connect to another junction, and that C class, unclassified, private and agricultural accesses will be closed unless suitable justification is provided.

In-line with the Junctions and Accesses Strategy, grade separated junctions should be provided at Birnam, where the A9 meets the B867 and Perth Road, Dunkeld, where the A9 has existing junctions with the A923 and A822, and Dalguise, where there is an existing junction with the B898.

Previous work undertaken by AECOM, assessed alternative arrangements at Birnam where an underbridge connecting the B867 and Perth Road was provided, with no access to the dual carriageway. This was not taken forward due to the reduction in economic benefits associated with the arrangement and the negative feedback received from the public, primarily as a result of increased traffic on Perth Road. Similarly, at Dalguise, a

restricted movement option removing the southbound diverge slip road was considered but eliminated following public consultation.

Off-line Route

As an initial step in the PES commission, multiple indicative corridor options were identified and investigated. The aim was to present a range of broad off-line alternative corridors for comparison with an on-line corridor option. Seven full off-line routes were developed, which are detailed below.

- | | |
|------------------------------------|---|
| A. Perth to Inverness Direct | - A direct route between Perth and Inverness. |
| B. Ballinluig to Carrbridge Direct | - A direct route between Ballinluig and Carrbridge, removing the need to travel the length of the existing A9 via the Drumochter Pass. |
| C. Tunnel at Drumochter Pass | - Tunnel option to avoid one of the highest points of the A9, regularly affected by adverse weather. |
| D. Newtonmore to Inverness Direct | - Direct route between Newtonmore and Inverness, removing the need to travel the length of the existing A9 via Aviemore and the Slochd. |
| E. Tunnel from Kincaig to Tomatin | - Tunnel option to avoid one of the highest points on the A9, regularly affected by adverse weather. |
| F. Inveralmond to Pitlochry | - Using existing road infrastructure corridors, including the A93 and the A924 via Blairgowrie. |
| G. Dalwhinnie to Inverness | - Using existing road infrastructure corridors, including the A889, A86 and the A82 via Fort Augustus. |

These corridor options were subject to a two-part sifting exercise to determine those that merited further assessment.

Part 1 of the sifting process assessed all indicative corridor options against the A9 Dualling Programme scheme objectives. Those corridor options that satisfied the criteria progressed to a more detailed assessment in Part 2, where the options were assessed against DMRB type criteria (engineering, environment and economics).

Options A, B, D, F and G were not considered to meet the scheme objectives and were therefore eliminated at Part 1. Options C and E were progressed to Part 2 where further assessment was undertaken. The results of this assessment are given below.

- | | |
|------------------------------|--|
| C. Tunnel at Drumochter Pass | - Entails a significant length (approximately 15 kilometres) of twin bored tunnel construction; |
| | - The northern entrance is located within the Drumochter Hills SAC, Special Protection Area (SPA) and Site of Special Scientific Interest (SSSI); |
| | - Tunnel ventilation shafts and construction and maintenance access tracks would be required within Drumochter Hills site, impacting designated species and habitat; |
| | - Noise and vibration from tunnelling activity would be more likely to disturb species within the Drumochter Hills site; |
| | - Tunnelling followed by road laying activity would increase the period of disturbance; |
| | - The southern end of the tunnel would be located around the Glen Garry Geological SSSI and A9 and River Garry Geological Conservation Review (GCR) sites; |

- Tunnelling would create a significant volume of excavated material that would potentially have to be treated as waste;
 - A significant length of an existing dualled section of the A9, bypassed by the tunnel, potentially becomes redundant; and
 - Tunnel management and maintenance requirements are likely to offset the benefits of improved winter resilience.
- E. Tunnel from Kincaig to Tomatin
- Entails a significant length (approximately 17 kilometres) of twin bored tunnel construction;
 - The southern end of the tunnel would be located close to the Cairngorms NSA, and the Alvie SSSI site;
 - The northern end would be located close to the Slochd SAC and the Slochd GCR site and would require a connecting tie-in with a crossing of the Highland Main Line railway;
 - Requires tunnelling under the River Spey SAC and tunnel ventilation shafts, construction and maintenance access tracks would be required within the Kinveachy Forest SAC/SPA/SSSI site, impacting designated species and habitat;
 - Noise and vibration from tunnelling activity would be more likely to disturb species within the Kinveachy Forest site;
 - Tunnelling followed by road laying activity would increase the period of disturbance;
 - Tunnelling would create a significant volume of excavated material that would potentially have to be treated as waste;
 - Bypasses Aviemore and Carrbridge providing no local improvement to the road and potentially reducing traffic volume and therefore passing trade for local business; and
 - Tunnel management and maintenance requirements are likely to offset the benefits of improved winter resilience.

The SEA determined that Options C and E would be less favourable than an online corridor option in this area. Additional aspects related to cost and engineering constraints were also considered, which resulted in the recommendation that Options C and E should not be taken forward for further consideration.

Further Off-line Routes

Further design and scoping work was undertaken as part of the SEA and PES commissions to consider off-line corridors for the Tay Crossing to Ballinluig, Tay Crossing to Blair Atholl and South of Bruar to Glen Garry sections. This was completed due to a combination of environmental, topographical and geometric standard constraints on the on-line corridor. The off-line options considered are detailed below.

1. Tay Crossing to Ballinluig (Black Option) - Off-line corridor to the west, from the vicinity of the River Tay crossing, crossing the River Tay in the locality of the point the Highland Main Line railway crosses the river, re-joining the A9 in the vicinity of the existing dual carriageway north of Ballinluig.
2. Pitlochry to Glen Garry (Pink Option) - Off-line corridor to the west, between Pitlochry and

Blair Atholl.

3. Pitlochry to Glen Garry (Green Option) - Off-line corridor to the west, including a short section from south of Bruar to south of Calvine.

The design and scoping work acknowledged issues within the online corridor, including those associated with engineering complexities, constructability and potential environmental impacts. However, it concluded that an off-line option is significantly less advantageous than an online corridor and therefore it was recommended that off-line routes were not progressed further, for the reasons detailed below.

1. Tay Crossing to Ballinluig (Black Option) -
- The topography of the off-line corridor is challenging, and significant earthworks would be required, much of it within poor ground associated with the River Tay floodplain;
 - An off-line route would be within the River Tay floodplain for a considerable length, resulting in a significant loss of floodplain. It is unlikely that compensatory storage could be provided to the extent necessary to compensate for the loss of floodplain and significant increase in flood risk would result;
 - A major viaduct, with considerable associated costs and risks, would be required to avoid extensive loss of floodplain;
 - Would result in significant loss of Ancient Woodland;
 - Would result in potentially significant landscape and visual impacts;
 - Adverse visual impact on communities of Inchmagrannachan and Dalguise; and
 - Significant cost (compared to online route).
2. Pitlochry to Glen Garry (Pink Option) -
- The topography of the off-line corridor is challenging, and significant earthworks would be required, with cuttings over 60 metres and embankments over 20 metres in height;
 - Bridge and viaduct structures, with considerable associated costs and risks, would be required to avoid significant earthworks;
 - Potential significant landscape and environmental impacts, affecting the NSA and the Pass of Killiecrankie;
 - Major structure required downstream of the Linn of Tummel waterfall, with additional costs and risks;
 - Property demolition; and
 - Significant cost (compared to online route).
3. Pitlochry to Glen Garry (Green Option) -
- New crossing of the River Garry, included in the River Tay SAC, in a currently unaffected location;
 - Additional landscape character impacts affecting the Cairngorms National Park;
 - Impact on Ancient Woodland;
 - Closer to residential properties with localised impacts; and
 - Significant cost (compared to online route).

AECOM Assessment (2012 to 2014)

Further assessment work was undertaken by AECOM to refine the previous options and take account of the route wide assessment, strategies and advice emerging from the SEA and PES commissions. This assessment developed an at-grade option, Option 6, which is a development of Option 1 from the original assessment, against a lowered alternative, Option 7, as detailed in Table 1.2. Option 6 removes the left-in left-out junction at Dunkeld & Birnam Station, with access to the station to the west of the railway tracks from the A822 via Dunkeld Junction. This option incorporated only a limited number of car parking spaces and no vehicular access to the station building. Access to the building is only via a pedestrian overbridge.

Option 7 was developed following public and stakeholder consultation in early 2012. This option involved lowering the A9 dual carriageway and a structure proposed over the A9 at existing ground level to link Station Road with the railway station. This option allows direct access to the station from Birnam and provides a parking facility on top of the structure.

Options 6 and 7, shown at the end of this appendix, incorporated compact grade separated junctions, as defined in the DMRB (Volume 6, Section 2, Part 5, TD 40/94: Layout of Compact Grade Separated Junctions), at Birnam, Dunkeld and Dalguise. Furthermore, the junctions proposed at Birnam and Dunkeld had junctions on the compact loops, which is not permitted by current standards and generates safety concerns.

Table A.2: DMRB Stage 2 Assessment Options Summary 2014 (AECOM)

Scheme Options	Birnam Junction	Dunkeld Junction	Dalguise Junction
6	Compact grade separated junction, compact loops, underbridge, full movements	Grade separated junction, northbound compact loop and southbound slip roads, overbridge, full movements	Grade separated junction, northbound compact loop and southbound slip roads, underbridge, full movements
7	Compact grade separated junction, compact loops, underbridge, full movements	Grade separated junction, northbound compact loop and southbound slip roads, overbridge, full movements	Grade separated junction, northbound compact loop and southbound slip roads, underbridge, full movements

Options 6 and 7 incorporated a left-in left-out junction at The Hermitage.

Jacobs Assessment (2014 to 2016)

In August 2014, Jacobs was awarded the commission to progress the Pass of Birnam to Tay Crossing section of A9 dualling. On appointment, Jacobs further considered Options 6 and 7, taking into account residual issues, which included:

- Access to Dunkeld & Birnam Station for vehicular traffic (Option 6);
- Consideration of the final outputs, strategies and conclusions of the SEA and PES commissions;
- Landscape and visual impacts of the options (Option 7); and
- Constructability concerns within a constrained corridor (Option 7).

Preliminary Options Review

To address the residual issues, further develop Options 6 and 7 and identify if any further viable options were appropriate, Jacobs undertook additional assessment. This assessment considered the following:

- PES and SEA Commission - The conclusions and strategies of the SEA and PES commissions were considered to ensure consistency and safety route wide, including the scheme objectives established by the PES commission and the Strategic Environmental Design

Principles generated by the SEA. Consideration of the PES conclusion that the proposed A9 should be a Category 7A high standard dual carriageway with full grade separated junctions.

- Ground Investigation (GI)
 - To further understand ground conditions and inform the constructability review.

A detailed GI with a tender value in excess of £2.5 million was undertaken in 2014/2015. The GI comprised of 300 boreholes and 200 trial pits. Generally, the boreholes and trial pits identified sands and gravels, often with cobbles and some silt and glacial till. The strength of these materials generally increases with depth.

The depth of bedrock varies significantly throughout the site. Large boulders, comparable in size to a small car, were recorded in 12 boreholes in the locality of Dunkeld & Birnam Station.
- Constructability
 - To evaluate how viable the options are from a constructability perspective.

Given the complexities of constructing the scheme in such a constrained and sensitive corridor, more detailed assessment of constructability, taking into account the findings of the GI, was required. This assessment considered the most constrained section of the scheme, which is in the vicinity of Dunkeld & Birnam Station and to the immediate north.
- Landscape and Visual
 - To evaluate the options in terms of their landscape and visual impact, taking due consideration of the Strategic Environmental Design Principles.
- Stakeholder Consultation
 - To discuss the options and identify issues that should be considered.

Stakeholder consultation was undertaken with:

 - Transport Scotland, Trunk Road and Bus Operations (TRBO) and SEPA, to discuss suitable Sustainable Drainage System (SuDS) measures proposed for the scheme to manage run-off and mitigate the impact on the receiving environment.
 - HES and Perth & Kinross Council, to discuss the impact on the Category A Listed station building at Dunkeld & Birnam Station.
 - Network Rail, to discuss possible impacts on the Highland Main Line railway and Dunkeld & Birnam Station, which are in close proximity to the works.

As the PES commission concluded that the A9 should be a Category 7A all-purpose dual carriageway, which means compact grade separated junctions are not appropriate, a number of alternative junction layouts, in accordance with the DMRB (Volume 6, Section 2, Part 1, TD 22/06: Layout of Grade Separated Junctions), were considered at Birnam, Dunkeld and Dalguise. These junctions, summarised in Table 1.3 and detailed in the 'A9 Dualling Programme, Pass of Birnam to Tay Crossing, Stage 2 Preliminary Options Review Report (November 2016)', were assessed in terms of environmental, engineering and economic criteria as well as integration, accessibility and social inclusion. A summary of the assessment is provided below.

Table A.3: Jacobs Junction Options Summary

Location	Option Reference	Option Description
Birnam Junction	A	<p>Grade separated junction, half cloverleaf layout.</p> <p>Connection of the B867 and Perth Road, crossing the A9 on an underbridge structure. Northbound loop, 50 metres radius, basic merge plus hook diverge, incorporating taper merge and diverge, linking to the realigned B867/Perth Road.</p> <p>Southbound loop, 50 metres radius, basic diverge plus hook merge, incorporating taper merge and diverge, linking to the realigned A867/Perth Road.</p> <p>Conclusion: Option A has a number of impacts on physical and environmental constraints. However, its environmental impact is considered less than other options as it does not result in direct loss of SAC habitat.</p> <p>It is therefore recommended that Option A is taken forward for further assessment.</p>
	B	<p>Grade separated junction, southbound loop arrangement and northbound slip roads.</p> <p>Connection of the B867 and Perth Road, crossing the A9 on an underbridge structure. Northbound slip roads, incorporating taper merge and diverge, linking to the realigned B867/Perth Road.</p> <p>Southbound loop, 50 metres radius, basic diverge plus hook merge, incorporating taper merge and diverge, linking to the realigned B867/Perth Road.</p> <p>Conclusion: Option B has similar impacts on environmental constraints as Option A, however the northbound merge slip road further impacts Ancient Woodland. While this option, like Option A, does not result in direct loss of SAC habitat, it does conflict with the Highland Main Line railway.</p> <p>It is therefore recommended that Option B is suspended from further consideration.</p>
	C	<p>Grade separated junction, diamond layout.</p> <p>Connection of the B867 and Perth Road, crossing the A9 on an underbridge structure. Northbound slip roads, incorporating taper merge and diverge, linking to the realigned B867/Perth Road.</p> <p>Southbound slip roads, incorporating taper merge and diverge, linking to the realigned B867/Perth Road.</p> <p>Conclusion: Option C has a greater environmental impact than Option A and Option B, resulting in direct loss of SAC habitat. Option C also conflicts with the Highland Main Line railway. Furthermore, the southbound diverge slip road will encroach closer to residential properties on Perth Road than Option A, Option B and Option D.</p> <p>It is therefore recommended that Option C is suspended from further consideration.</p>
	D	<p>Grade separated junction, half diamond layout.</p> <p>Connection of the B867 and Perth Road, crossing the A9 on an underbridge structure. Northbound slip road, incorporating taper diverge, linking to the realigned B867/Perth Road.</p> <p>Southbound slip road, incorporating taper merge, linking to the realigned B867/Perth Road.</p> <p>No provision of northbound merge or southbound diverge movements.</p> <p>Conclusion: Option D is a half diamond layout and therefore limits disturbance on previously undisturbed land. In addition, Option D does not directly impact the Highland Main Line railway or properties on Perth Road. However, like Option C, it will result in direct loss of SAC habitat, which could not be mitigated against.</p> <p>It is therefore recommended that Option D is suspended from further consideration.</p>
	E	<p>Grade separated junction, half cloverleaf layout.</p> <p>Connection of the B867 and Perth Road, crossing the A9 on an underbridge structure. Northbound loop, 50 metres radius, basic merge plus hook diverge, incorporating taper</p>

Location	Option Reference	Option Description
		<p>merge and diverge, linking to the realigned B867/Perth Road.</p> <p>Southbound loop, 50 metres radius, basic merge plus hook diverge, incorporating taper merge and diverge, linking to the realigned B867/Perth Road.</p> <p>Conclusion: Option E has less environmental impact than Options A to D as the works are a greater distance from the River Tay SAC. In addition, the works are more compact limiting the impact on previously undisturbed land and woodland, although the proposed overbridge introduces a greater visual impact. Option E does impact on properties on Perth Road and the sewage works.</p> <p>It is therefore recommended that Option E is suspended from further consideration.</p>
Dunkeld Junction	A	<p>Grade separated junction, variation of diamond layout.</p> <p>Connection of A923 and road to Inver, crossing the A9 on an underbridge structure. No direct access at this location to the A822.</p> <p>Northbound slip roads, incorporating taper merge and diverge, linking to the realigned A923/road to Inver.</p> <p>Southbound slip roads, incorporating taper merge and diverge, linking to the realigned A923/road to Inver.</p> <p>Conclusion: Option A impacts on a number of physical and environmental constraints, including the Highland Main Line railway, Dunkeld & Birnam Station and the River Braan, which is a tributary of the River Tay SAC. This option does not provide access to the A822 (Old Military Road), resulting in significant diversions on routes currently not suitable for increased traffic flows or heavy vehicles.</p> <p>It is therefore recommended that Option A is suspended from further consideration.</p>
	B	<p>Grade separated junction, variation of diamond layout.</p> <p>Connection of the A923 and road to Inver, crossing the A9 on an underbridge structure. Priority junction connecting the A822 with the realigned A923/road to Inver.</p> <p>Northbound slip roads, incorporating taper merge and diverge. Northbound diverge slip road linking to the realigned A822. Northbound merge slip road linking to the realigned A923/road to Inver.</p> <p>Southbound slip roads, incorporating taper merge and diverge, linking to the realigned A923/road to Inver.</p> <p>Conclusion: Option B differentiates from Option A by incorporating a link to the A822 (Old Military Road), therefore accommodating all vehicle movements and avoiding diversions. Option B is similar to Option F, with Option F connecting the A923 with the A822 (Old Military Road). A greater volume of traffic makes this movement (A822 (Old Military Road) to A923), therefore Option F is deemed more suitable as it reduces turning movements and therefore delays.</p> <p>It is therefore recommended that Option B is suspended from further consideration.</p>
	C	<p>Grade separated junction, half diamond layout.</p> <p>Connection of the A923 and road to Inver, crossing the A9 on an underbridge structure. Priority junction connecting the A822 with the realigned A923/road to Inver.</p> <p>Northbound slip road, incorporating taper merge, linking to the realigned A923/road to Inver.</p> <p>Southbound slip road, incorporating taper diverge, linking to the realigned A923/road to Inver.</p> <p>No provision of northbound diverge or southbound merge movements.</p> <p>Conclusion: Option C limits disturbance on previously undisturbed land. In addition, Option C does not impact on Inchewan Burn, Dunkeld & Birnam Station, residential properties on Telford Gardens and King Duncan's Place and Birnam War Memorial Site and has a reduced impact on the Highland Main Line railway. Furthermore, by eliminating the northbound diverge, potential conflict between the relocated station is reduced.</p>

Location	Option Reference	Option Description
		<p>However, the option only accommodates northbound merge and southbound diverge traffic, which increases traffic through Birnam and Dunkeld.</p> <p>It is therefore recommended that Option C is suspended from further consideration.</p>
	D	<p>Grade separated junction, two bridge roundabout.</p> <p>Skewed elongated roundabout, crossing the A9 on two underbridge structures. A822, A923 and road to Inver realigned to join the roundabout.</p> <p>Northbound slip roads, incorporating taper merge and diverge. Northbound diverge slip road linking to the realigned A822. Northbound merge slip road linking to the roundabout.</p> <p>Southbound slip roads, incorporating taper merge and diverge, linking to the roundabout.</p> <p>Conclusion: Option D caters for all vehicle movements and has similar environmental impacts to Options A and B. Option D incorporates an elongated roundabout, removing priority at-grade junctions, which may offer a safety benefit. Either two small structures or one larger open span structure is necessary for the A9 crossing, possibly adding to the building complexity and cost. This option provides the same level of accessibility as Option F, however the additional structure and increased junction area of Option D means that Option F performs better economically and environmentally, due to its reduced impact on the surrounding area.</p> <p>It is therefore recommended that Option D is suspended from further consideration.</p>
	E	<p>Grade separated junction, diamond layout.</p> <p>Connection of the A822 and A923, crossing the A9 on an underbridge structure. No direct access at this location to the road to Inver.</p> <p>Northbound slip roads, incorporating taper merge and diverge, linking to the realigned A822/A923.</p> <p>Southbound slip roads, incorporating taper merge and diverge, linking to the realigned A822/A923.</p> <p>Conclusion: Option E has less environmental impacts than other options as it does not include the access road to Inver. As a result, it does not impact Ancient Woodland and has a lesser impact on the River Braan, which forms part of the River Tay SAC. As no access is provided to Inver, significant diversions will apply on routes currently not suitable for increased traffic flows or heavy vehicles, which impacts integration, accessibility and inclusion.</p> <p>It is therefore recommended that Option E is suspended from further consideration.</p>
	F	<p>Grade separated junction, variation of diamond layout.</p> <p>Connection of the A822 and A923, crossing the A9 on an underbridge structure. Priority junction connecting the road to Inver with the realigned A822/A923.</p> <p>Northbound slip roads, incorporating taper merge and diverge. Northbound diverge slip road linking to the realigned A822/A923. Northbound merge slip road linking to the road to Inver.</p> <p>Southbound slip roads, incorporating taper merge and diverge, linking to the realigned A822/A923.</p> <p>Conclusion: Option F is similar to Option B but connects the A923 and A822 (Old Military Road) rather than the A923 and road to Inver, which facilitates the priority traffic movements. As a result, Option F is preferable to Option B.</p> <p>It is therefore recommended that Option F is taken forward for further assessment.</p>
	G	<p>Grade separated junction, variation of diamond layout.</p> <p>Connection of the A822 and road to Inver. Priority junction connecting the A923 to the realigned A822/road to Inver, crossing the A9 on an underbridge structure.</p> <p>Northbound slip roads, incorporating taper merge and diverge, linking to the A923.</p> <p>Southbound slip roads, incorporating taper merge and diverge, linking to the A923.</p> <p>Conclusion: Option G connects the A822 (Old Military Road) with the road to Inver. The</p>

Location	Option Reference	Option Description
		<p>resultant alignment will introduce Departures from Standards in horizontal alignment and SSD. As the prominent traffic movement will be from the A822 (Old Military Road) south, there will be significant turning flows at the junction with the realigned A923. Furthermore, Option G incorporates potentially significant lengths of retained earthwork solutions. It is therefore recommended that Option G is suspended from further consideration.</p>
Dalguise Junction	A	<p>Grade separated junction, northbound loop arrangement and southbound slip roads. Connection of the B898 and southbound merge slip road, crossing the A9 on an underbridge structure. An alternative means of access from the B898 to existing forestry tracks would be required.</p> <p>Southbound slip roads, incorporating taper merge and diverge, linking to the realigned B898/southbound merge slip road.</p> <p>Northbound loop, 50 metres radius, basic merge plus hook diverge, incorporating taper merge and diverge, linking to the realigned B898/southbound merge slip road.</p> <p>Conclusion: Despite the relatively low traffic flows forecast at Dalguise Junction, the connection of the southbound diverge and the realigned B898/southbound merge slip road at a priority junction may introduce a safety issue, particularly to drivers unfamiliar with the layout. Option B is similar to Option A, however a roundabout is provided to the east of the proposed A9, which is considered to offer safety benefits.</p> <p>It is therefore recommended that Option A is suspended from further consideration.</p>
	B	<p>Grade separated junction, northbound loop arrangement and southbound slip roads. Roundabout on the east of the A9, connected to the realigned B898, which crosses the A9 on an underbridge. An alternative means of access from the B898 to existing forestry tracks would be required.</p> <p>Southbound slip roads, incorporating taper merge and diverge, linking to the roundabout.</p> <p>Northbound loop, 50 metres radius, basic merge plus hook diverge, incorporating taper merge and diverge, linking to the realigned B898.</p> <p>Conclusion: Option B is similar to Option A, however the introduction of a roundabout east of the proposed A9 provides safety benefits.</p> <p>It is therefore recommended that Option B is taken forward for further assessment.</p>
	C	<p>Grade separated junction, northbound loop arrangement and southbound slip roads. Variation of two bridge roundabout layout.</p> <p>Skewed, elongated roundabout, crossing the A9 on two underbridge structures. B898 realigned to join the roundabout. An alternative means of access from the B898 to existing forestry tracks would be required.</p> <p>Southbound slip roads, incorporating taper merge and diverge, linking to the roundabout.</p> <p>Northbound loop, 50 metres radius, basic merge plus hook diverge, incorporating taper merge and diverge, linking to the roundabout.</p> <p>Conclusion: Option C is comparable with Options A and B and has similar environmental impacts. Option C will however require either two small structures or one larger open span structure, possibly adding to the construction complexity and cost. Road lighting would also be required at the roundabout. As the roundabout is elongated, this may have a more significant adverse visual effect.</p> <p>It is therefore recommended that Option C is suspended from further consideration.</p>
	D	<p>Grade separated junction northbound loop arrangement and southbound slip roads. Roundabout on the east of the A9, connected to a new road, crossing the A9 on an underbridge structure, which links to the realigned B898. The realigned B898 continues, providing access to adjacent land.</p> <p>Northbound loop, 50 metres radius, basic merge plus hook diverge, incorporating taper merge and diverge, linking to the realigned B898.</p> <p>Southbound slip roads, incorporating taper merge and diverge, linking to the roundabout.</p>

Location	Option Reference	Option Description
		<p>Conclusion: Option D incorporates a northbound loop that is relatively short in length. Although traffic flows on the junction are anticipated to be low, queuing traffic may introduce a safety issue. The B898 is diverted and a new road provided linking to the roundabout on the east side of the A9. The B898 continues, providing access to adjacent land where other options will need to provide an alternative means of access from the B898 to connect with existing forestry tracks. Although this traffic is not likely to be significant, the layout restricts the flow of predominant traffic movements. It is therefore recommended that Option D is suspended from further consideration.</p>
	E	<p>Grade separated junction, two bridge roundabout. Two bridge roundabout layout. Elongated roundabout, crossing the A9 on two underbridge structures. B898 realigned to join the roundabout. An alternative means of access from the B898 to existing forestry tracks would be required.</p> <p>Northbound slip roads, incorporating taper merge and diverge, linking to the roundabout. Southbound slip roads, incorporating taper merge and diverge, linking to the roundabout.</p> <p>Conclusion: To lessen impact from the northbound merge slip road on the new structure across the River Tay, the elongated roundabout is further south. As a result, the realigned B898, which has sub-standard horizontal alignment, is through an area of steep topography generating significant earthworks. Option E will also require two small structures or one larger open span structure, possibly adding to the building complexity and cost. Road lighting would also be required at the roundabout. As the roundabout is elongated, this may have a more significant adverse visual effect. It is therefore recommended that Option E is suspended from further consideration.</p>
	F	<p>Grade separated junction, variation of diamond layout.</p> <p>Connection of the B898 and southbound merge slip road, crossing the A9 on an underbridge structure. An alternative means of access from the A898 to existing forestry tracks would be required.</p> <p>Northbound slip roads, incorporating taper merge and diverge, linking to the realigned B898/southbound merge slip road.</p> <p>Southbound slip roads, incorporating taper merge and diverge. Southbound diverge slip road linking to the realigned B898/southbound merge slip road.</p> <p>Conclusion: Similar to Option E, Option F removes the northbound loop, replacing it with merge and diverge slip roads and the proposed skewed underbridge structure is further south to lessen the impact on the new structure across the River Tay. To comply with standards and provide an adequate junction, the northbound diverge slip is through an area of steep topography generating significant earthworks, although Departures from Standards could be implemented to reduce this impact.</p> <p>Despite the relatively low traffic flows forecast at Dalguise Junction, the connection of the southbound diverge and the realigned B898/southbound merge slip road at a priority junction may introduce a safety issue, particularly to drivers unfamiliar with the layout. It is therefore recommended that Option F is suspended from further consideration.</p>

Based on the assessment undertaken, Jacobs recommended that the junctions identified in Table 1.4 were taken forward.

Table A.4: Summary of Junction Options

Location	Option Reference	Option Description
Birnam Junction	A	<p>Grade separated junction, half cloverleaf layout.</p> <p>Connection of the B867 and Perth Road, crossing the A9 on an underbridge structure.</p> <p>Northbound loop, 50 metres radius, basic merge plus hook diverge, incorporating taper</p>

Location	Option Reference	Option Description
		merge and diverge, linking to the realigned B867/Perth Road. Southbound loop, 50 metres radius, basic diverge plus hook merge, incorporating taper merge and diverge, linking to the realigned B867/Perth Road.
Dunkeld Junction	F	Grade separated junction, variation of diamond layout. Connection of the A822 and A923, crossing the A9 on an underbridge structure. Priority junction connecting the road to Inver with the realigned A822/A923. Northbound slip roads, incorporating taper merge and diverge. Northbound diverge slip road linking to the realigned A822/A923. Northbound merge slip road linking to the road to Inver. Southbound slip roads, incorporating taper merge and diverge, linking to the realigned A822/A923.
Dalguise Junction	B	Grade separated junction, northbound loop arrangement and southbound slip roads. Roundabout on the east of the A9, connected to the realigned B898, which crosses the A9 on an underbridge. An alternative means of access from the B898 to existing forestry tracks would be required. Southbound slip roads, incorporating taper merge and diverge, linking to the roundabout. Northbound loop, 50 metres radius, basic merge plus hook diverge, incorporating taper merge and diverge, linking to the realigned B898.

Options Considered

As a result of the findings of the GI, constructability review, landscape and visual assessment and further stakeholder consultation, Jacobs developed Options A and B as refined versions of AECOM Options 6 and 7. The proposed changes to AECOM Options 6 and 7 are summarised in Table 1.5.

Table A.5: Amendments to Design Options

Option	Alterations
A	<ul style="list-style-type: none"> Amendments to the horizontal alignment to minimise the number of design elements and remove reverse curves and compound curves, resulting in a smoother alignment; Compact grade separated junctions, in accordance with the DMRB (Volume 6, Section 2, Part 5, TD 40/94: Layout of Compact Grade Separated Junctions) not recommended for use in a Category 7A dual carriageway. Junction layouts altered in accordance with the DMRB (Volume 6, Section 2, Part 1, TD 22/06: Layout of Grade Separated Junctions); Vertical profile raised north of Dunkeld & Birnam Station to reduce the height of retaining wall structures, lessening building complexities. As a result, the vertical profile is closer in level to the Highland Main Line railway to the west and residential properties to the east; As the vertical profile is raised, an underbridge structure is proposed at Dunkeld Junction, as opposed to an overbridge; and Increase in the vertical level through the junction results in a new retaining wall immediately adjacent to Dunkeld Bowling Club and Dunkeld & Birnam Tennis Club.
B	<ul style="list-style-type: none"> Amendments to the horizontal alignment to minimise the number of design elements and remove reverse curves and compound curves, resulting in a smoother alignment; Compact grade separated junctions, in accordance with the DMRB (Volume 6, Section 2, Part 5, TD 40/94: Layout of Compact Grade Separated Junctions) not recommended for use in a Category 7A dual carriageway. Junction layouts altered in accordance with the DMRB (Volume 6, Section 2, Part 1, TD 22/06: Layout of Grade Separated Junctions); Vertical profile lowered north of Dunkeld & Birnam Station to satisfy necessary headroom clearance requirements for grade separated junction at Dunkeld Junction; and Lowered vertical profile and introduction of slip roads for the grade separated junction at Dunkeld results in

Option	Alterations
	increased height of retaining walls.

A description of Options A and B is given in Table 1.6. A further option, Option C was also developed by Jacobs. This option was developed to be closer to existing ground levels beyond Dunkeld & Birnam Station, which may have constructability benefits over Options A and B. Option C is also included in Table 1.6. The options, shown at the end of this appendix, followed the same horizontal alignment and differed only in vertical alignment within the central section of the route, in the locality of Dunkeld & Birnam Station.

Table A.6: DMRB Stage 2 Assessment Options Summary (Jacobs)

Scheme Options	Birnam Junction	Dunkeld Junction	Dalguise Junction
A	Grade separated junction, northbound and southbound loops. Connection of the B867 and Perth Road, crossing the A9 on an underbridge.	Grade separated junction, variation of diamond layout. Connection of the A822 and A923, crossing the A9 on an underbridge. Connection to Inver and northbound and southbound merge and diverge slip roads.	Grade separated junction with roundabout on the east of the A9, connected to the B898, crossing the A9 via an underbridge. Northbound loop with merge and diverge southbound slip roads.
B	Grade separated junction, northbound and southbound loops. Connection of the B867 and Perth Road, crossing the A9 on an underbridge.	Grade separated junction, variation of diamond layout. Connection of the A822 and A923, crossing the A9 on an overbridge. Connection to Inver and northbound and southbound merge and diverge slip roads.	Grade separated junction with roundabout on the east of the A9, connected to the B898, crossing the A9 via an underbridge. Northbound loop arrangement with merge and diverge southbound slip roads.
C	Grade separated junction, northbound and southbound loops. Connection of the B867 and Perth Road, crossing the A9 on an underbridge.	Grade separated junction, variation of diamond layout. Connection of the A822 and A923, crossing the A9 on an underbridge. Connection to Inver and northbound and southbound merge and diverge slip roads.	Grade separated junction with roundabout on the east of the A9, connected to the B898, crossing the A9 via an underbridge. Northbound loop arrangement with merge and diverge southbound slip roads.

To address accessibility issues with Dunkeld & Birnam Station within a narrow corridor, Options A and C proposed to relocate the station north of the Inchewan Burn, with access provided via the A822 to the west of the Highland Main Line railway.

For Option B, the A9 is approximately 8 metres below existing ground level in the locality of Dunkeld & Birnam Station and a 150-metre-long structure proposed over the A9 at-grade. This arrangement allows Station Road to be extended across the structure providing direct access from the communities of Birnam and Dunkeld to the station. A replacement car park is provided on the structure.

Options A, B and C incorporated a left-in left-out junction at The Hermitage.

Further Options Assessment, At-Grade Roundabout

An at-grade roundabout option at Dunkeld Junction was originally considered by AECOM (AECOM Assessment (2009 to 2012)). This option was however removed from further consideration with public feedback and economic performance two of the main differentiators, which negatively impacted the assessment of the roundabout. At that time, the at-grade roundabout was favoured by only 30% of those that expressed a preference, with 70% expressing a preference for a grade separated junction providing full movements.

In view of concerns raised from public consultation over the potential impact of a grade separated junction at Dunkeld, further assessment was undertaken by Jacobs for an at-grade roundabout. While such an option does not comply with the DMRB for a Category 7A all-purpose dual carriageway and, as such, creates consistency issues with the other A9 dualling schemes, an at-grade roundabout may provide a number of benefits in such a constrained site. A summary of the key benefits and dis-benefits for provision of an at-grade roundabout at Dunkeld Junction are given in Table 1.7.

Table A.7: Summary of Key benefits and Dis-benefits of an At-grade roundabout

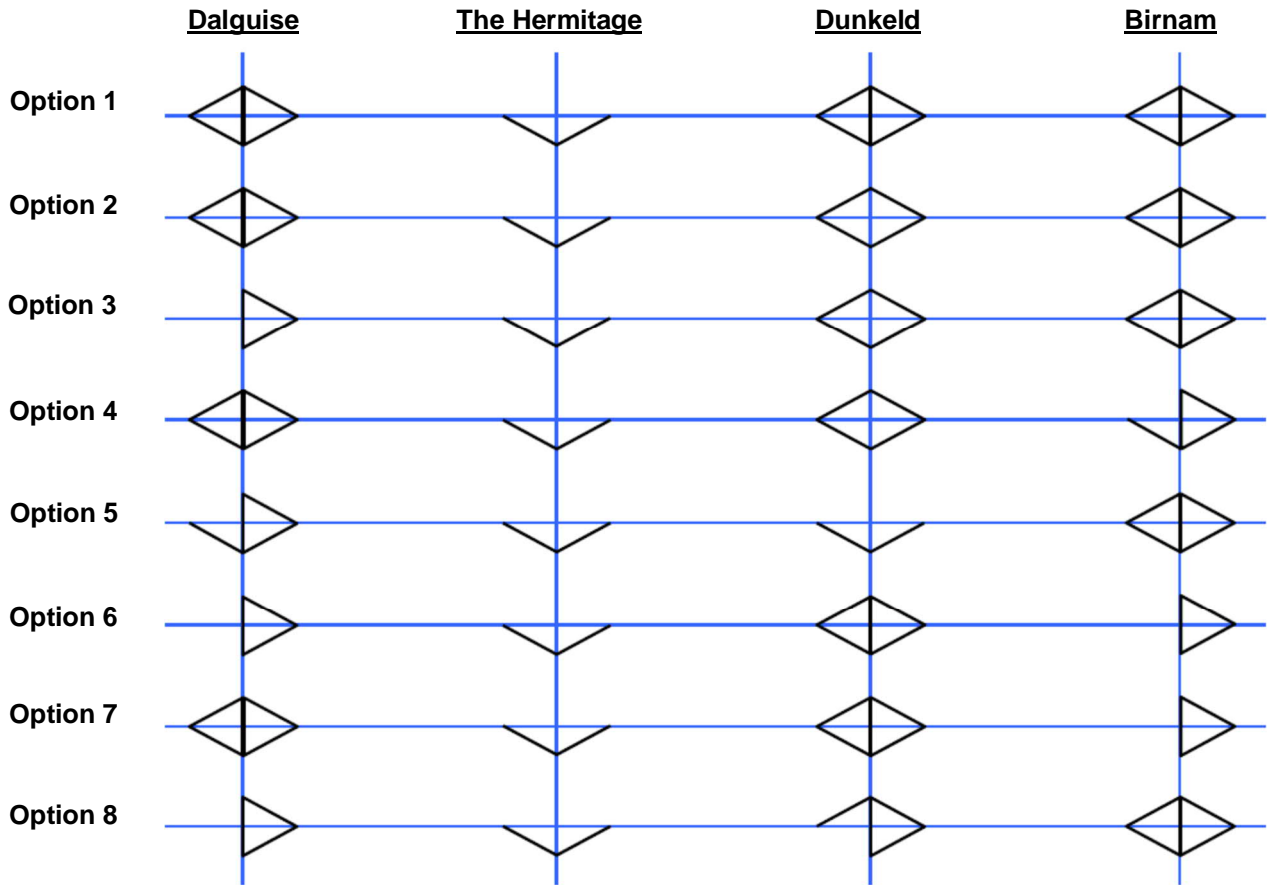
Benefits	Dis-benefits
<ul style="list-style-type: none"> • Removes Relaxations and Departures from Standards associated with a grade separated junction; • Potential for reduced scheme construction cost of between £40 million and £60 million; • Significant reduced construction complexity in the Dunkeld Junction area; • Construction programme risk and time benefits (in this location only); • Reduced landscape and visual impacts, primarily due to reduced footprint, earthworks and structures; • Reduced land-take; • Reduced impact on residential and commercial property on the west of the A9; and • Reduced impact on the Highland Main Line railway. 	<ul style="list-style-type: none"> • Conflicts with the A9 Dualling Programme aim that the route should be a Category 7A all-purpose dual carriageway with grade separated junctions. Inclusion of the at-grade roundabout will require a Departure from Standards; • Inconsistency of route standards; • Reduced economic benefits; • Reduced operational performance; • Geometric delay for mainline and side road traffic leading to queues on side roads; • Road lighting required; • Does not provide segregated NMU crossing facility of the A9; • Increased likelihood of low severity accidents; • Increased driver stress; and • Localised increase in emissions of pollutants affecting air quality in the vicinity of the roundabout.

Further Options Assessment, Restricted Movement Junction Arrangements

In March 2014, AECOM considered a range of junction layout option combinations for the Pass of Birnam to Tay Crossing project and assessed the value of benefits of each. This assessment considered various combinations of full and restricted movement junctions within the project.

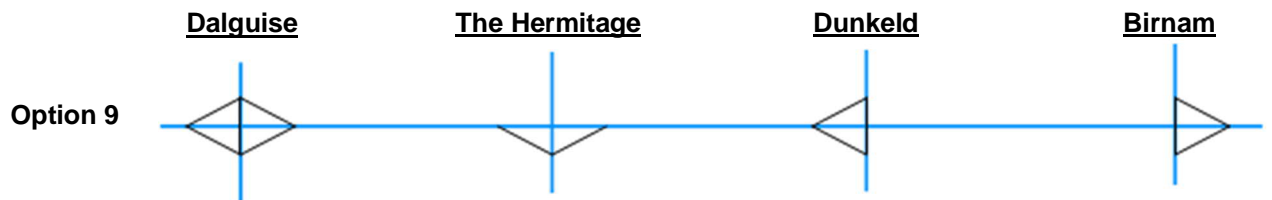
The combinations considered are shown in Figure 1.2 and all options include a left-in left-out junction, in accordance with the DMRB (Volume 6, Section 2, Part 6, TD 42/95: Geometric Design of Major/Minor Priority Junctions) at The Hermitage.

Figure A.2: Full and Restricted Movements Junction Options



Following Jacobs appointment in 2014 further development was undertaken, which included a further option, as shown in Figure 1.3. Jacobs considered the equivalent economic assessment of the benefits of the junction layout option combinations.

Figure A.3: Full and Restricted Movements Junction Options, Additional Option



The assessment concluded that Options 1 and 6 generated the highest Present Value of Benefits (PVBs). Option 6, which does not include a northbound merge slip road or southbound diverge slip road at Birnam Junction and Dalguise Junction, is slightly higher than Option 1. When the Pass of Birnam to Tay Crossing section is considered in isolation, few vehicles utilise these slip roads. As a result, their removal does not have a significant negative impact on PVB. However, at Birnam Junction, traffic is diverted a short distance to Dunkeld Junction and is therefore likely to increase traffic on Perth Road, compared to Option 1, by up to approximately 1,100 vehicles (Annual Average Daily Traffic (AADT), 2041, Do-Something Model). In addition, under the A9 Dualling Programme, full movements are required at Dalguise Junction to accommodate turning traffic utilising the left-in left-out junctions proposed on the Tay Crossing to Ballinluig section, which is immediately north of the Pass of Birnam to Tay Crossing section and The Hermitage. This is not reflected in the economic modelling of the option. Therefore, whilst Option 6 performs well in terms of economics when considered in isolation, it is an unviable option when operational factors across the wider A9 corridor are taken into account.

The PVB for Options 7, 8 and 9 do not differ significantly from Option 1. Option 7 does not include a northbound merge slip road or southbound diverge slip road at Birnam Junction. As a result, traffic will be diverted to Dunkeld Junction and is therefore likely to increase traffic on Perth Road, compared to Option 1, by up to approximately 1,100 vehicles (AADT, 2041, Do-Something Model). Option 8 does not include a northbound merge slip road at Dunkeld Junction or a northbound merge slip road and southbound diverge slip road at Dalguise Junction, which is required to accommodate turning traffic utilising the left-in left-out junctions proposed in the Tay Crossing to Ballinluig section and The Hermitage. Option 9 does not include a northbound merge slip road and southbound diverge slip road at Birnam Junction and a northbound diverge slip road and southbound merge slip road at Dunkeld Junction. Therefore, traffic will be diverted through Birnam, resulting in a likely increase in traffic on Perth Road, compared to Option 1, of up to 4,000 vehicles (AADT, 2041, Do-Something Model).

The benefits for Options 2, 3, 4 and 5 are significantly lower than Option 1.

The assessment concluded that, although marginal, restricted movement junctions provide fewer economic benefits than junctions that incorporate full movements. Further analysis of options where restricted movement junctions were provided also identified that operational impacts on the A9 corridor associated with implementing these restrictions would reduce the benefits of those options or make them unviable when they are considered in a wider context. Furthermore, restricted movement junctions at Birnam and Dunkeld Junctions would likely increase traffic considerably on Perth Road.

Subsequent assessment work completed for the wider A9 Dualling Programme has since identified a requirement for left-in left-out junctions, in accordance with the DMRB (Volume 6, Section 2, Part 6, TD 42/95: Geometric Design of Major/Minor Priority Junctions), on the Tay Crossing to Ballinluig section, immediately north of this project. The junction and access strategy for that section requires the inclusion of a full movement junction at Dalguise, as this junction, and Ballinluig Junction to the north, will be used as turning points for local traffic utilising the left-in left-out junctions. This junction will also be used as a turning point for traffic accessing and egressing The Hermitage. This further validates the decision to remove a restricted movement junction at Dalguise from further consideration. It should be noted that full movements are required at Dunkeld Junction as this junction will also be used as a turning point for traffic accessing The Hermitage.

Public Feedback on Jacobs Options

A public consultation exercise on Jacobs Options A, B and C was held in January 2016 and the local community was invited to provide feedback on the options. Many of the feedback forms submitted did not state a route preference, however of those that did, the results are listed below.

- Option A: 25%
- Option B: 29%
- Option C: 17%
- Option A or C: 25%
- Option B or C: 4%

As many of the public noted a preference for Option A or C, or Option B or C, the percentage preference for the options could vary significantly. Factoring this provides the following range of preference for each option.

- Option A: 25 - 50%
- Option B: 29 - 33%
- Option C: 17 - 46%

Dunkeld & Birnam Community Council provided a formal response to the public consultation event. The Community Council did not state a preference for an option as they suggested there was insufficient information available to make an informed decision. The Community Council stated that they believed the options did not adequately recognise the complexity of dualling this section of the A9 and they sought further meaningful dialogue with Transport Scotland to develop alternative approaches.

Stakeholder Feedback on Jacobs Options

Feedback from key environmental stakeholders on Jacobs Options A, B and C is given below.

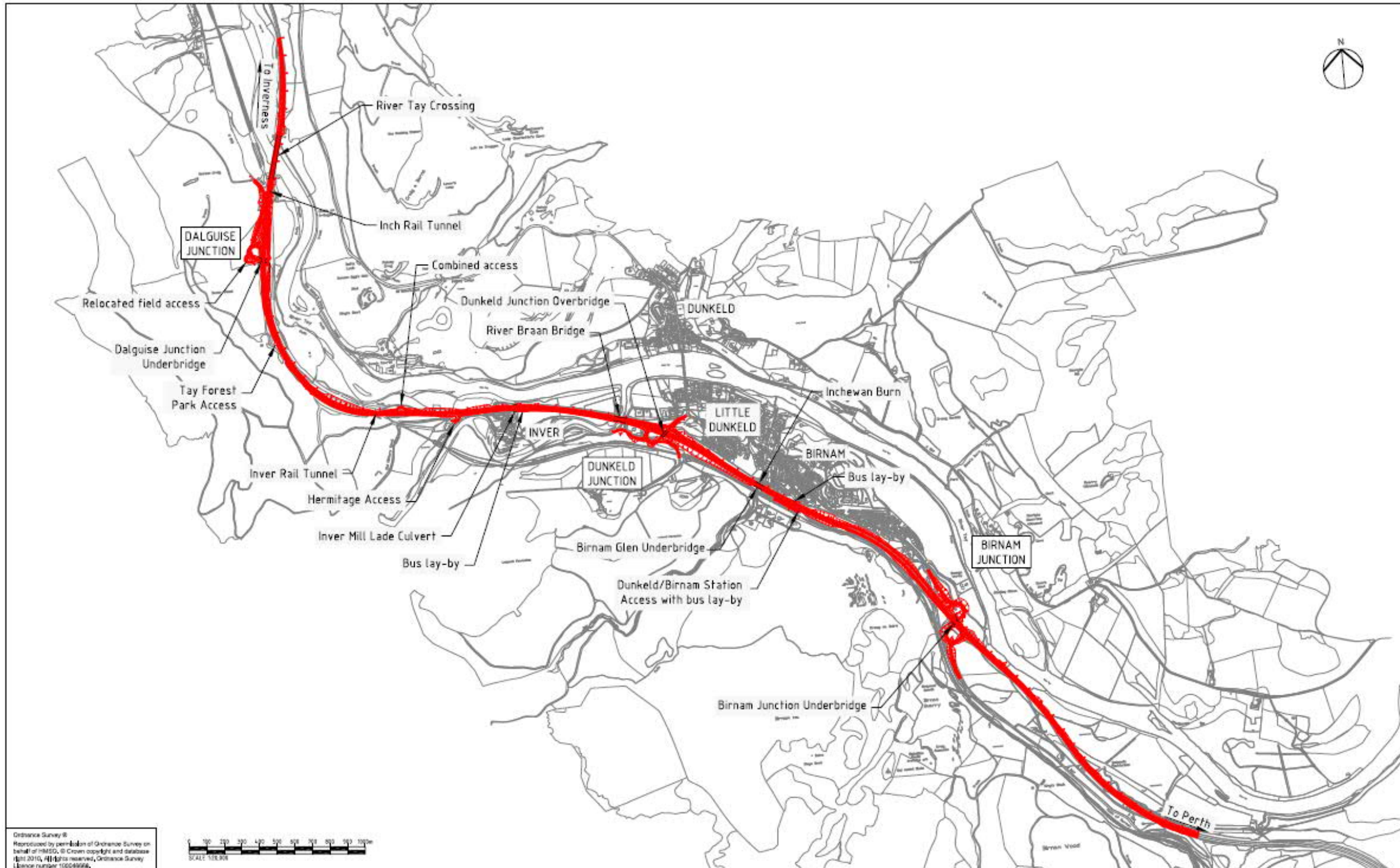
- SNH
- SNH did not indicate a route option preference.
In terms of landscape, SNH noted concerns with the impact all options would have on the River Tay (Dunkeld) NSA. SNH considered that each of the options would impose significant adverse landscape effects on the special qualities and potentially the integrity of the NSA. Significant impacts include woodland loss, disturbance from landform changes, erosion of the harmonious balance of features and dominance of large-scale features in a rural context. However, SNH acknowledges that some significant effects on the NSA are inevitable given the constrained nature of the site.
- SEPA
- SEPA did not indicate a route option preference.
SEPA noted concerns with Option B in relation to water quality as a result of the magnitude of works required in the vicinity of Inchewan Burn due to the proposed lowered A9 dual carriageway.
SEPA also noted concerns on the impact on Ladywell Landfill site, given the site was functioning prior to the Landfill Directive and potentially may contain special or hazardous waste.
In terms of flood risk, SEPA expressed serious concerns regarding the flood risk impacts of the proposed Birnam Junction. The proposals encroach on the floodplain of the River Tay, potentially increasing properties to the risk of flooding. SEPA also stated concerns that lowering the Inchewan Burn will have flood risk impacts.
- HES
- While acknowledging the significant engineering and environmental issues, HES indicated a preference for Option B, primarily due to the impacts on the Category A Listed building at Dunkeld & Birnam Station. HES suggested that Options A and C, which include station relocation, would reinforce the severance of the building with the station, while Option B would have a beneficial impact due to the reconnection of Station Road. This would likely achieve long-term preservation of the building with the greatest potential for it to be kept in use.
- Perth & Kinross Council
- While acknowledging the significant engineering and environmental issues, Perth & Kinross Council stated a preference for Option B. This was primarily as a result of impacts on Dunkeld & Birnam Station and the Category A Listed building. Option B allows the station to remain in-situ and provides reconnection of Station Road, which was seen by Perth & Kinross Council as a significant positive impact.
In terms of landscape and visual, Perth & Kinross Council stated that Option B had the least impact of the three options, albeit the option does have significant negative visual and landscape impacts to the area.
Perth & Kinross Council stated that there should be no

development on the floodplain unless no other viable options were available.

Scottish Gas Networks (SGN)

- SGN noted concerns with the proposed Birnam Junction, noting conflict with an existing local high-pressure gas main in the locality. SGN suggested that diversion works would be required due to the significant earthwork embankment that would be required for the junction, quoting a cost of approximately £14.5 million for diversionary works.

AECOM Assessment (2009 to 2012) - Scheme Options



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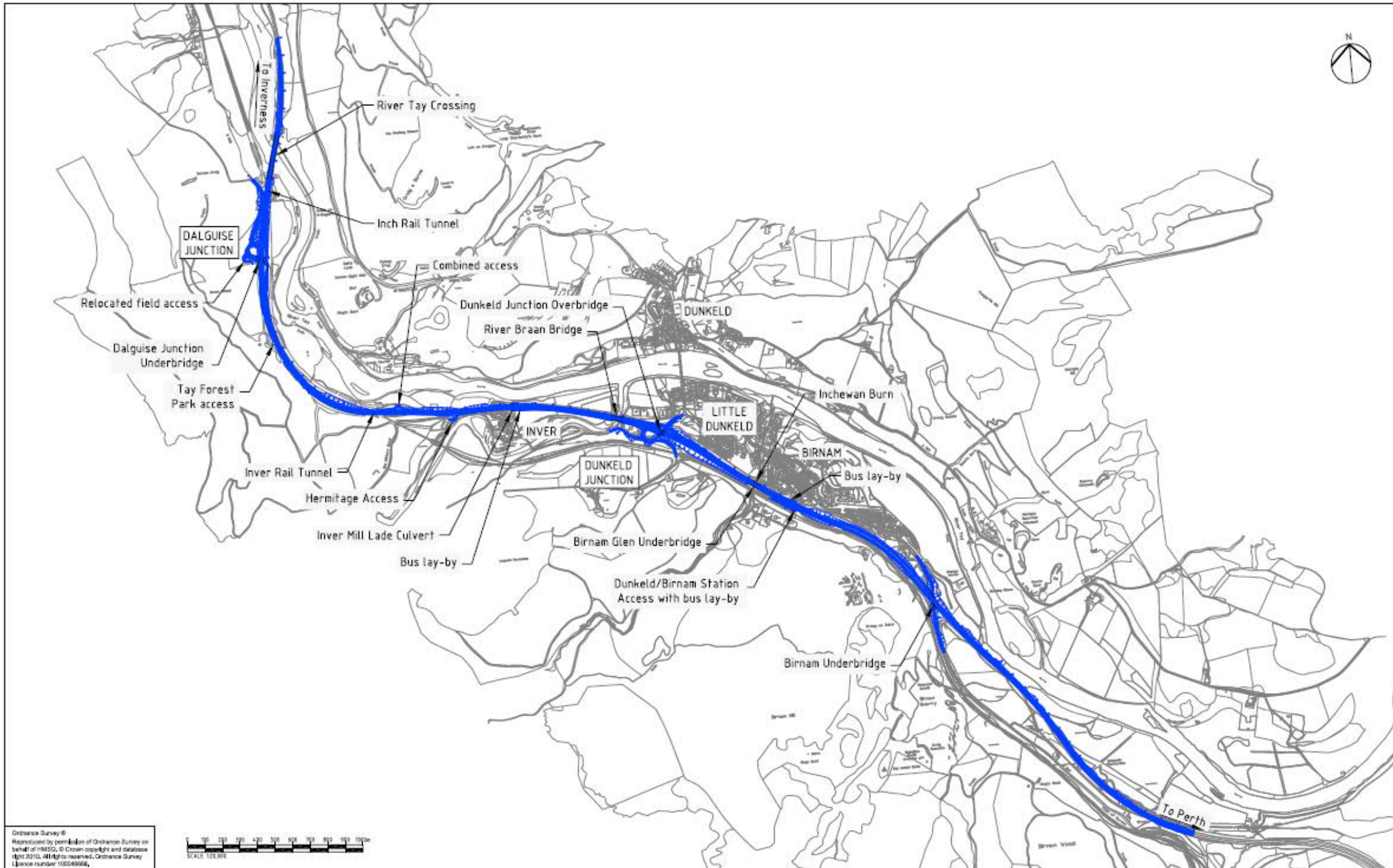
A9 Route Improvement Strategy
 Dualling of Birnam to Tay Crossing

Scheme Option 1
 General Arrangement



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Figure 3.1.1



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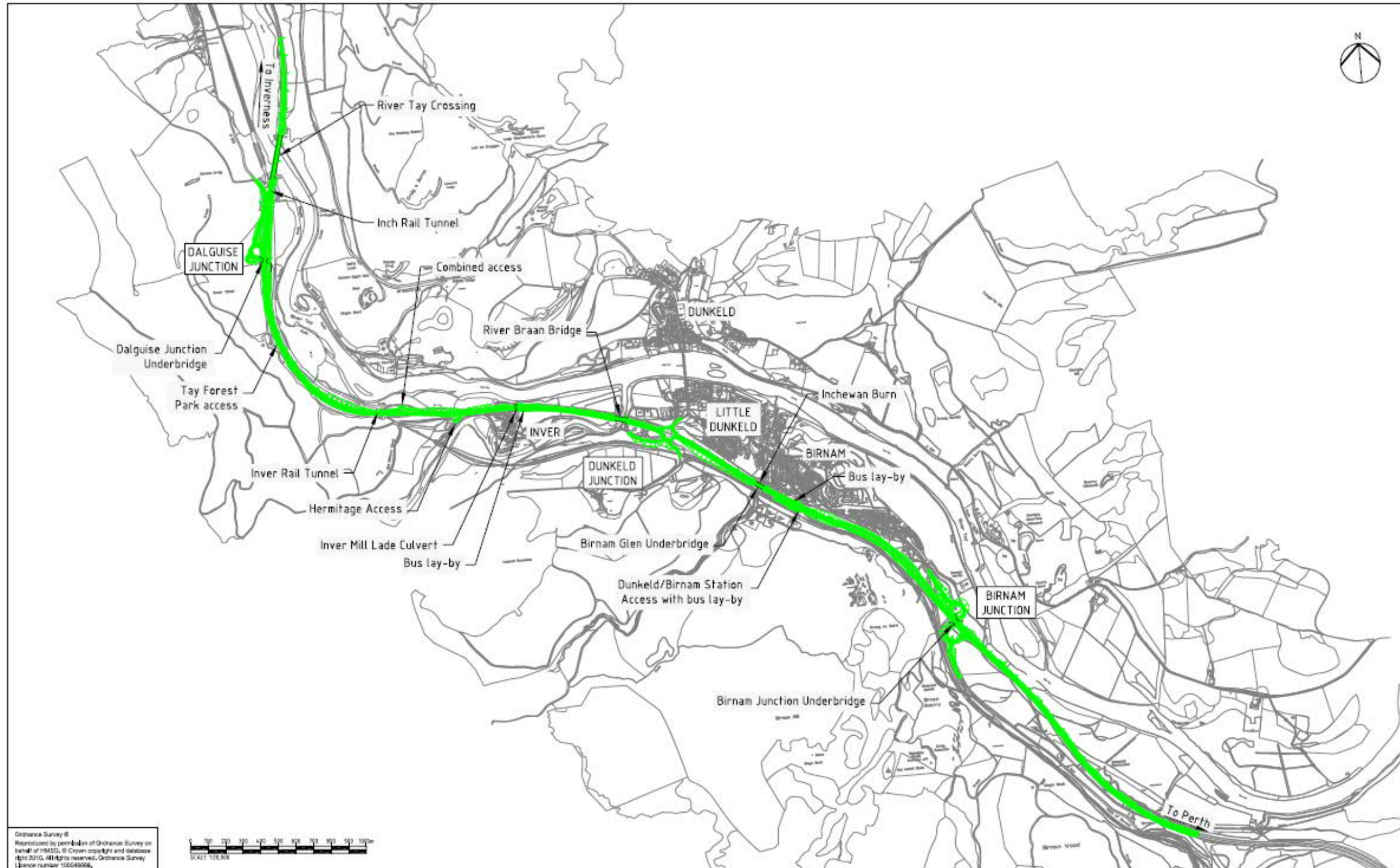
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A9 Route Improvement Strategy
 Dualling of Birnam to Tay Crossing

Scheme Option 2
 General Arrangement



Figure 3.2.1



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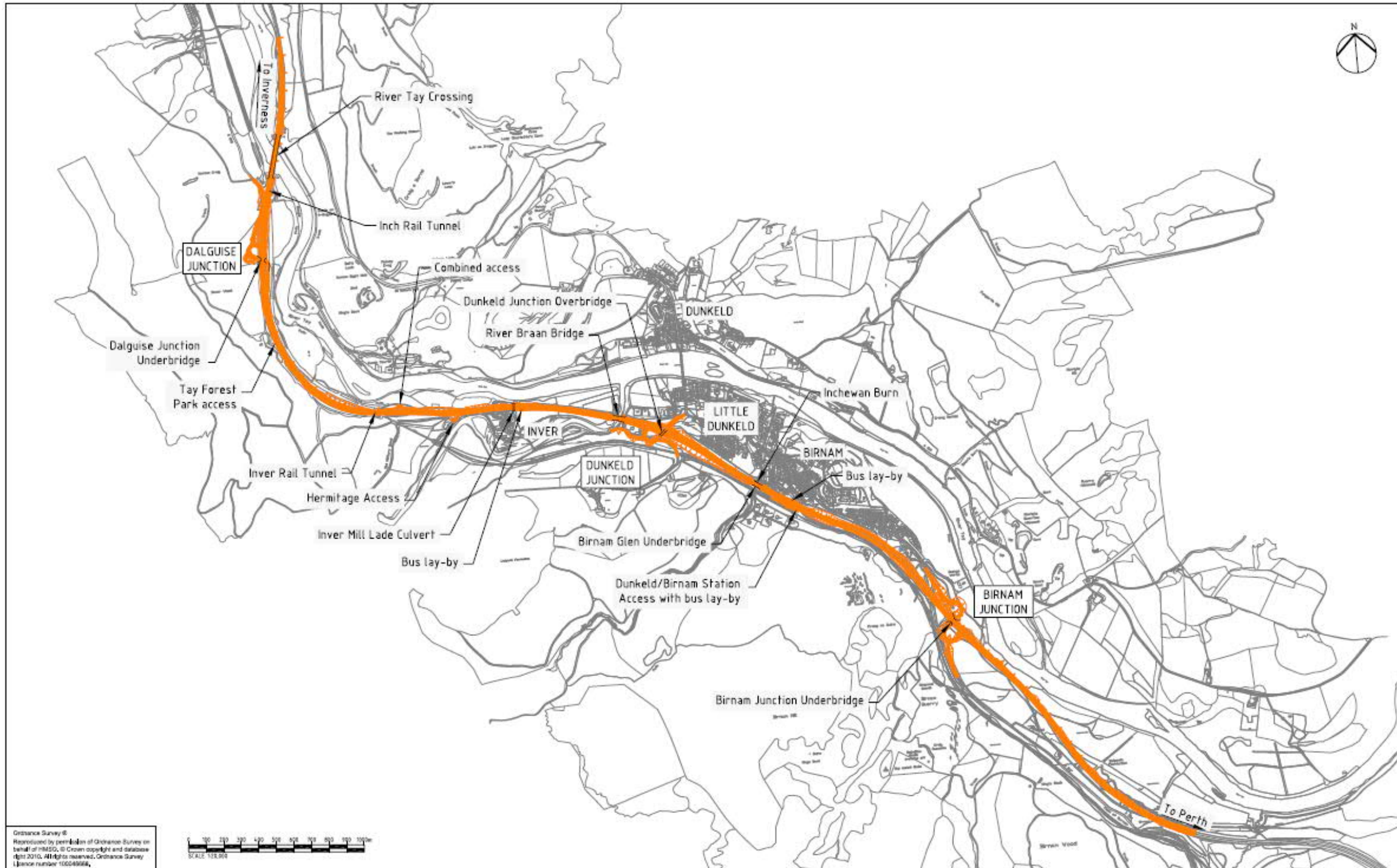
A9 Route Improvement Strategy
 Dualling of Birnam to Tay Crossing

Scheme Option 3
 General Arrangement

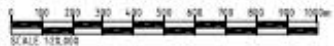


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Figure 3.3.1



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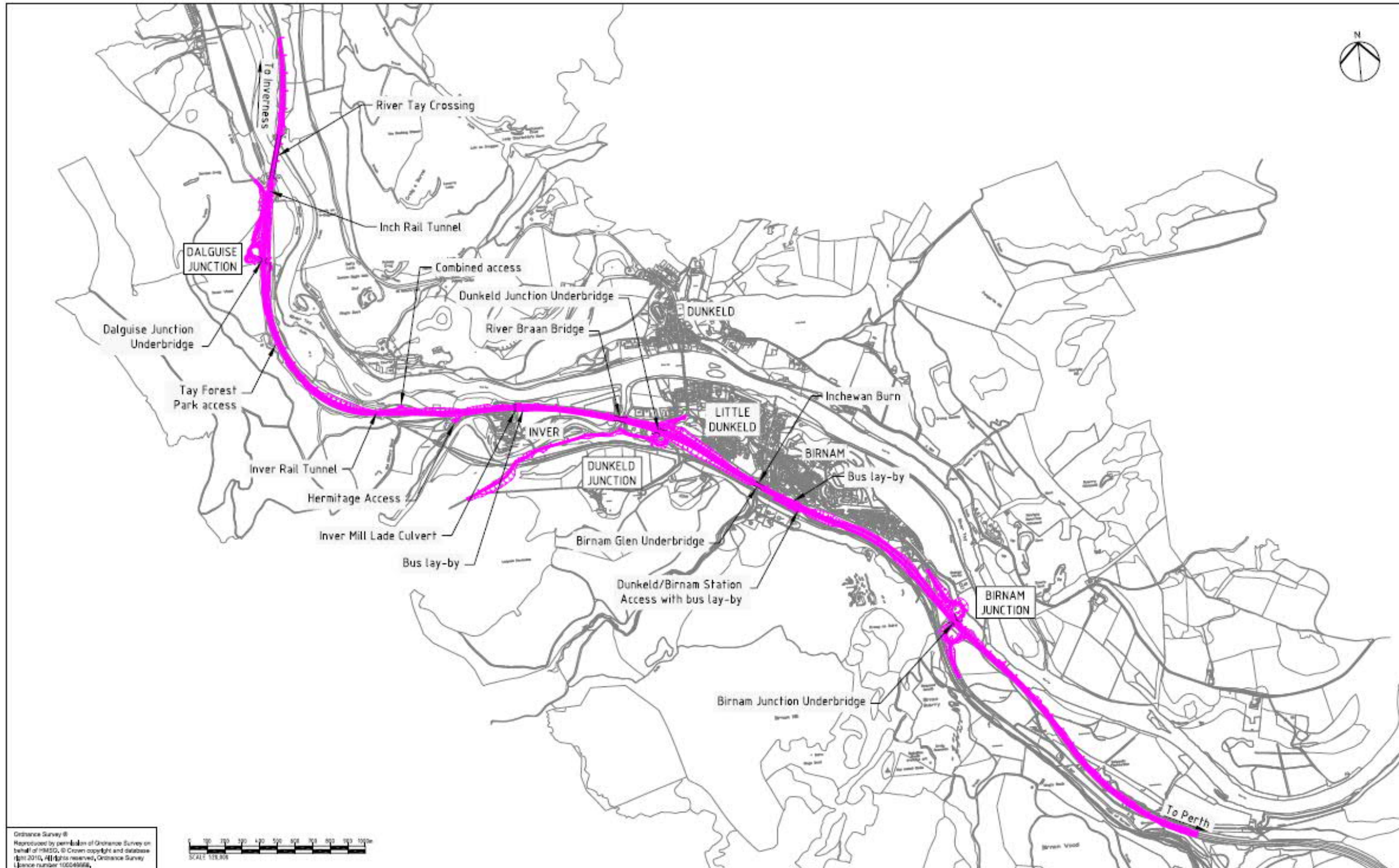
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A9 Route Improvement Strategy
 Dualling of Birnam to Tay Crossing

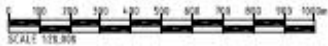
Scheme Option 4
 General Arrangement



Figure 3.4.1



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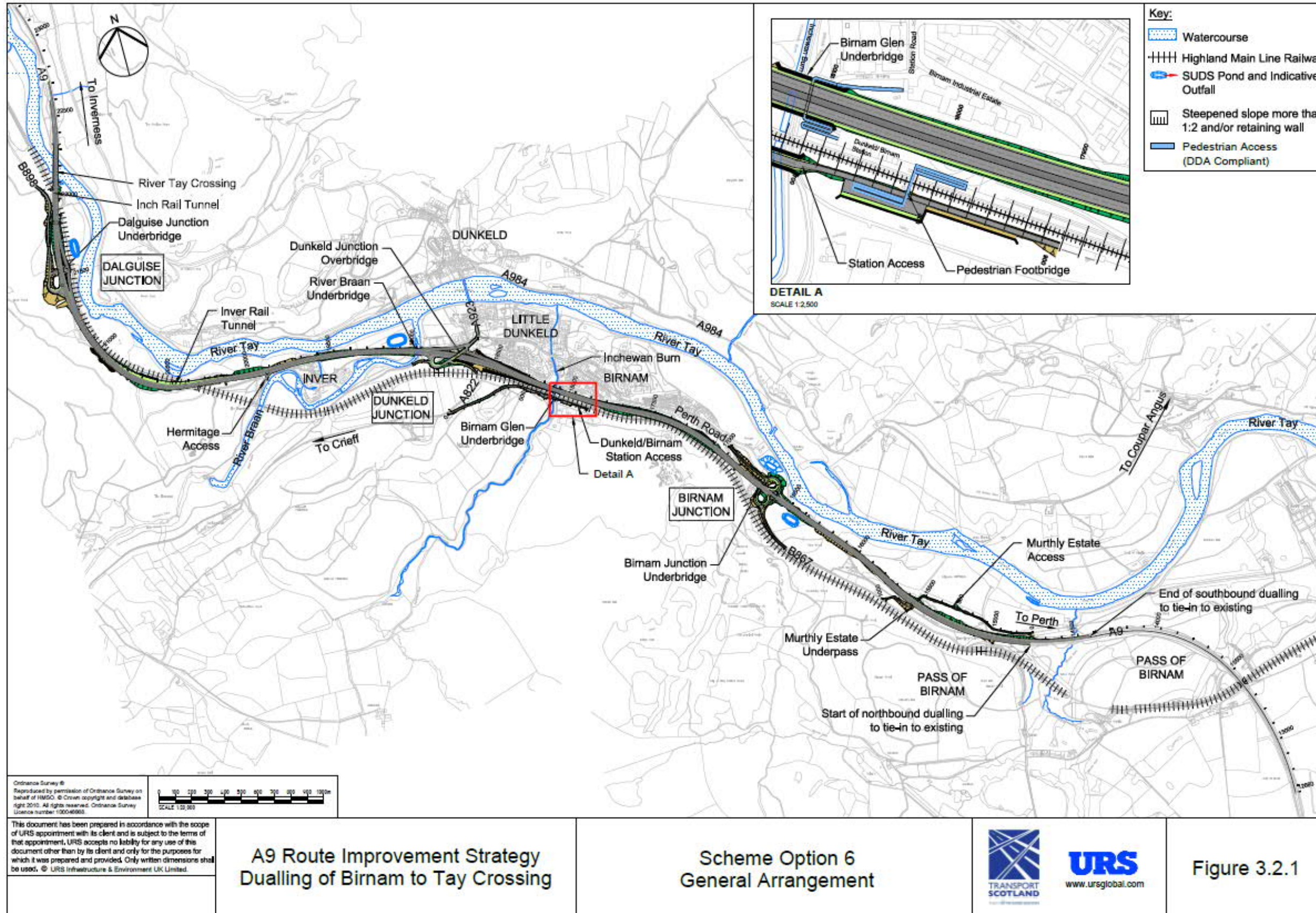
A9 Route Improvement Strategy
 Dualling of Birnam to Tay Crossing

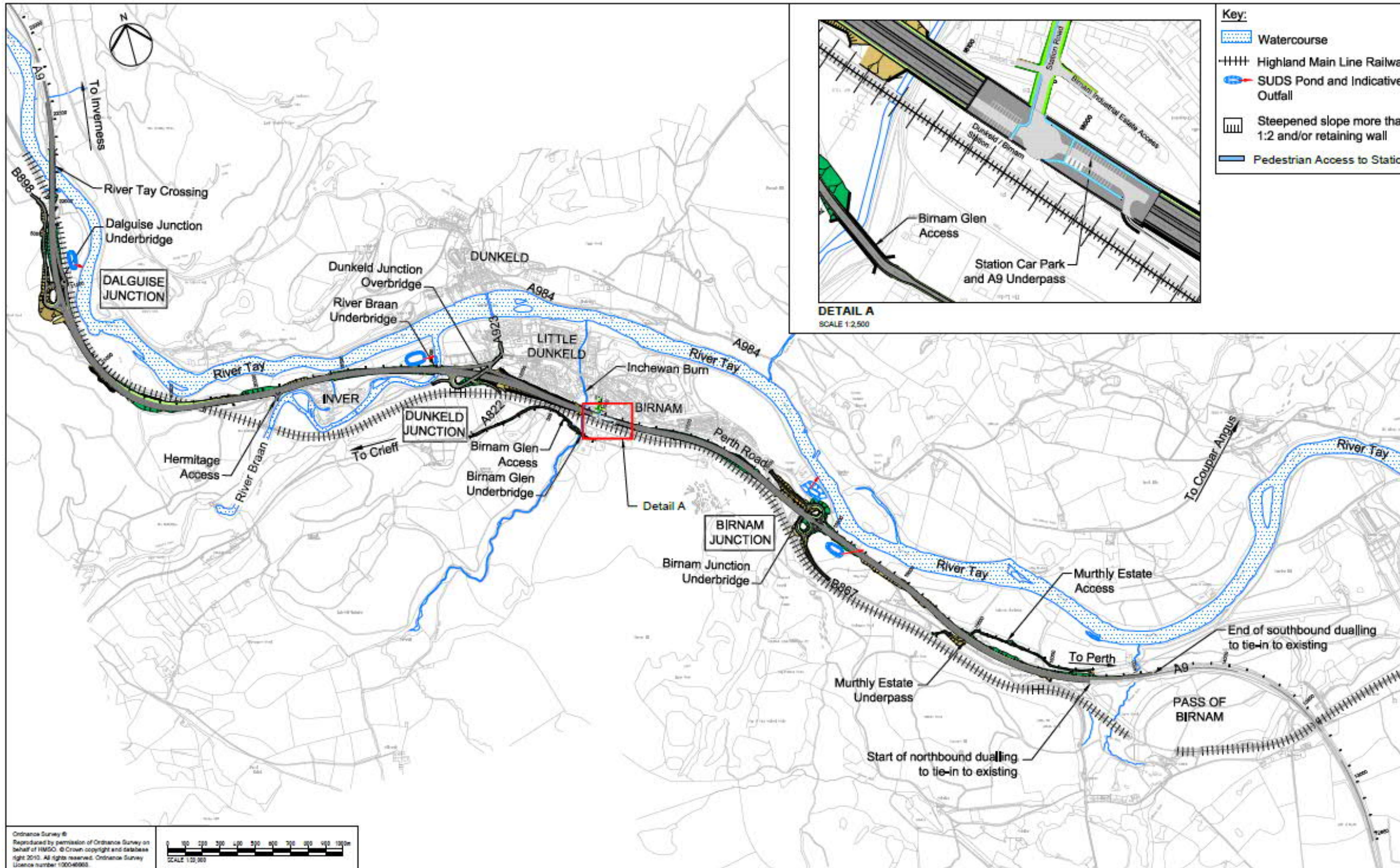
Scheme Option 5
 General Arrangement



Figure 3.5.1

AECOM Assessment (2012 to 2014) - Scheme Options





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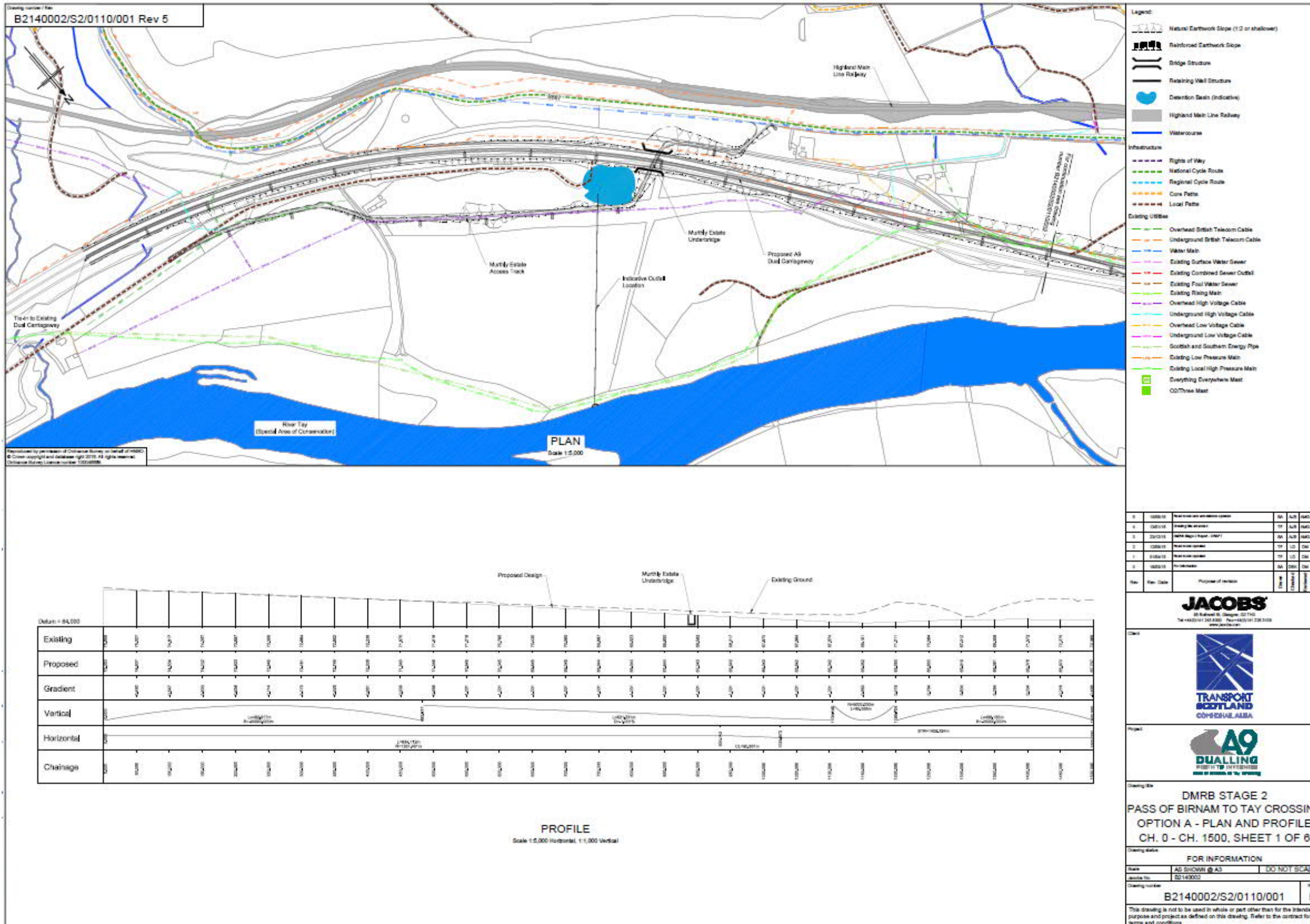
A9 Route Improvement Strategy
 Dualling of Birnam to Tay Crossing

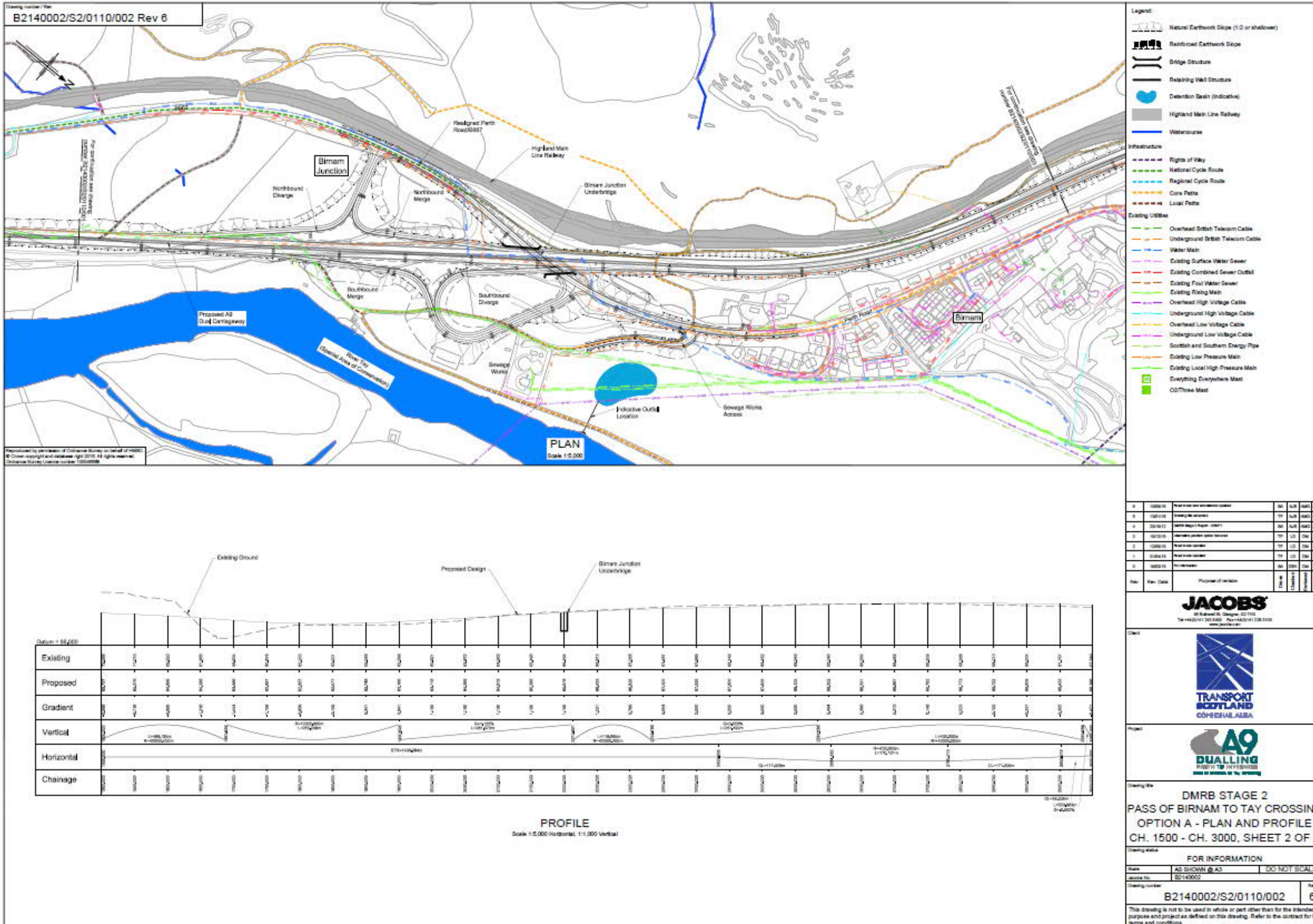
Scheme Option 7
 General Arrangement



Figure 3.3.1

Jacobs Assessment (2014 to 2016) - Scheme Options





JACOBS
 55 Leith Road, Glasgow, G2 7PL
 Tel: +44 (0)11 261 8500 Fax: +44 (0)11 261 8505
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TRANSPORT SCOTLAND
CONSIDERABLE

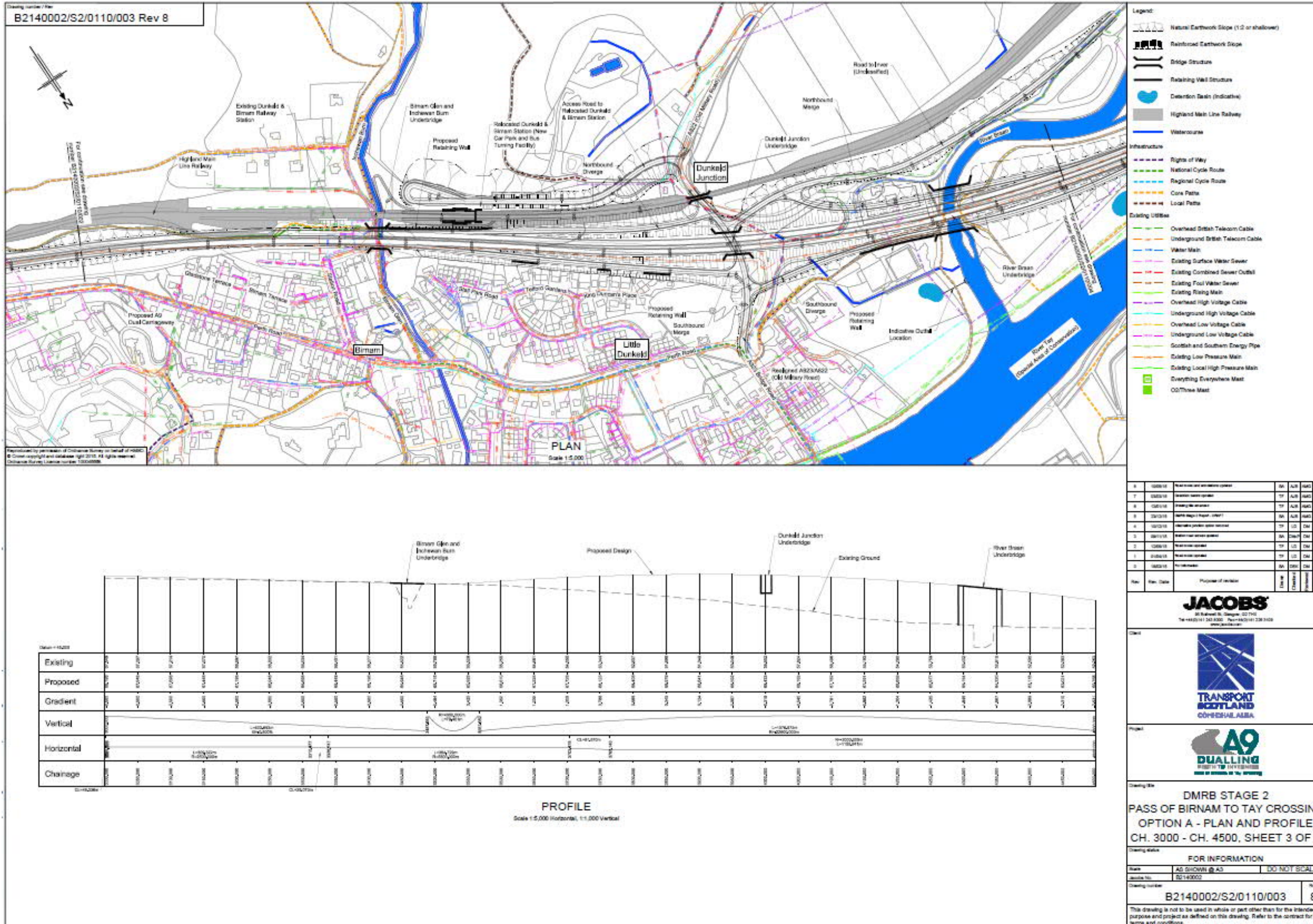
A9 DUALLING
FROM THE TAY TO THE NORTH

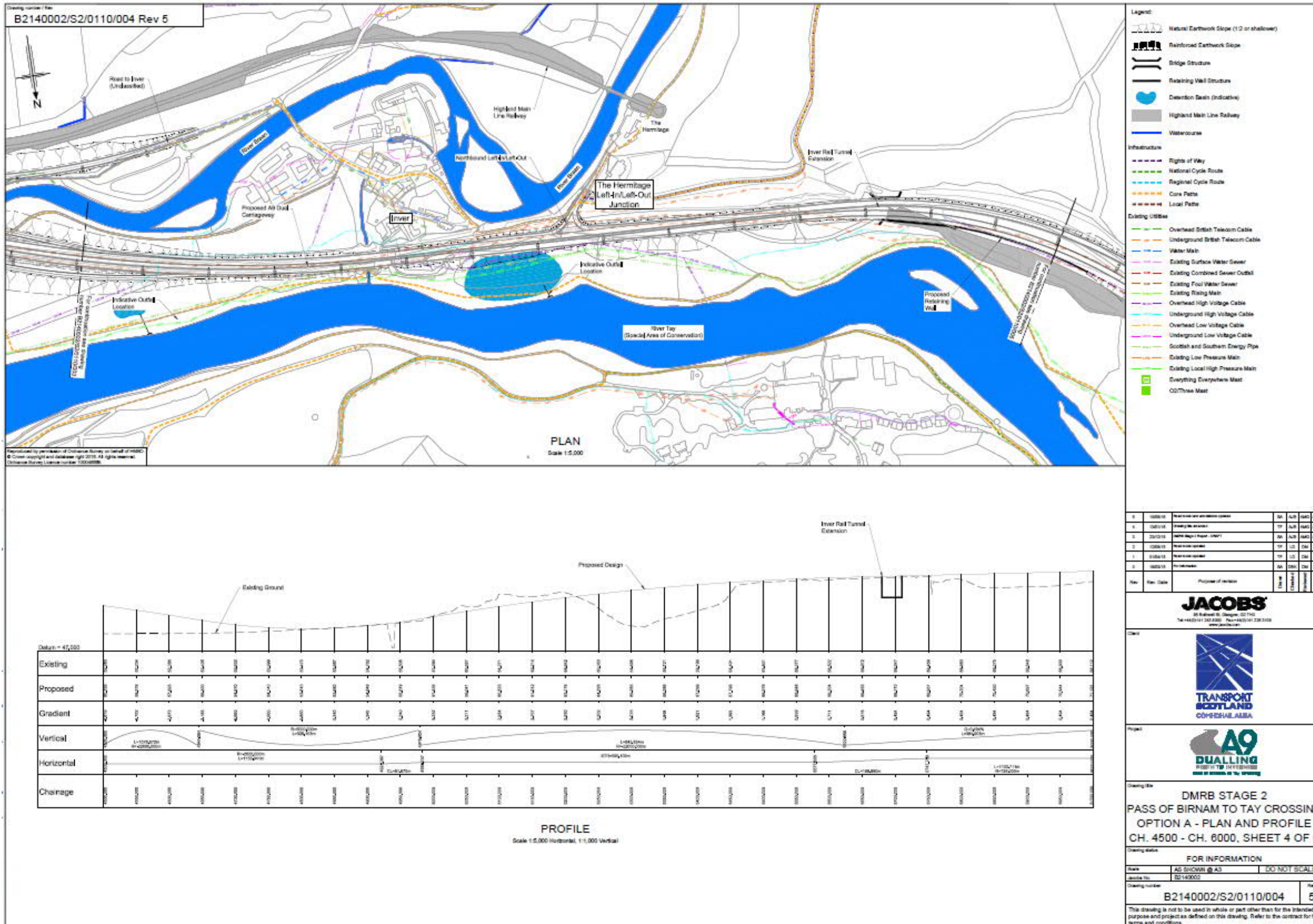
**DMRB STAGE 2
PASS OF BIRNAM TO TAY CROSSING
OPTION A - PLAN AND PROFILE
CH. 1500 - CH. 3000, SHEET 2 OF 6**

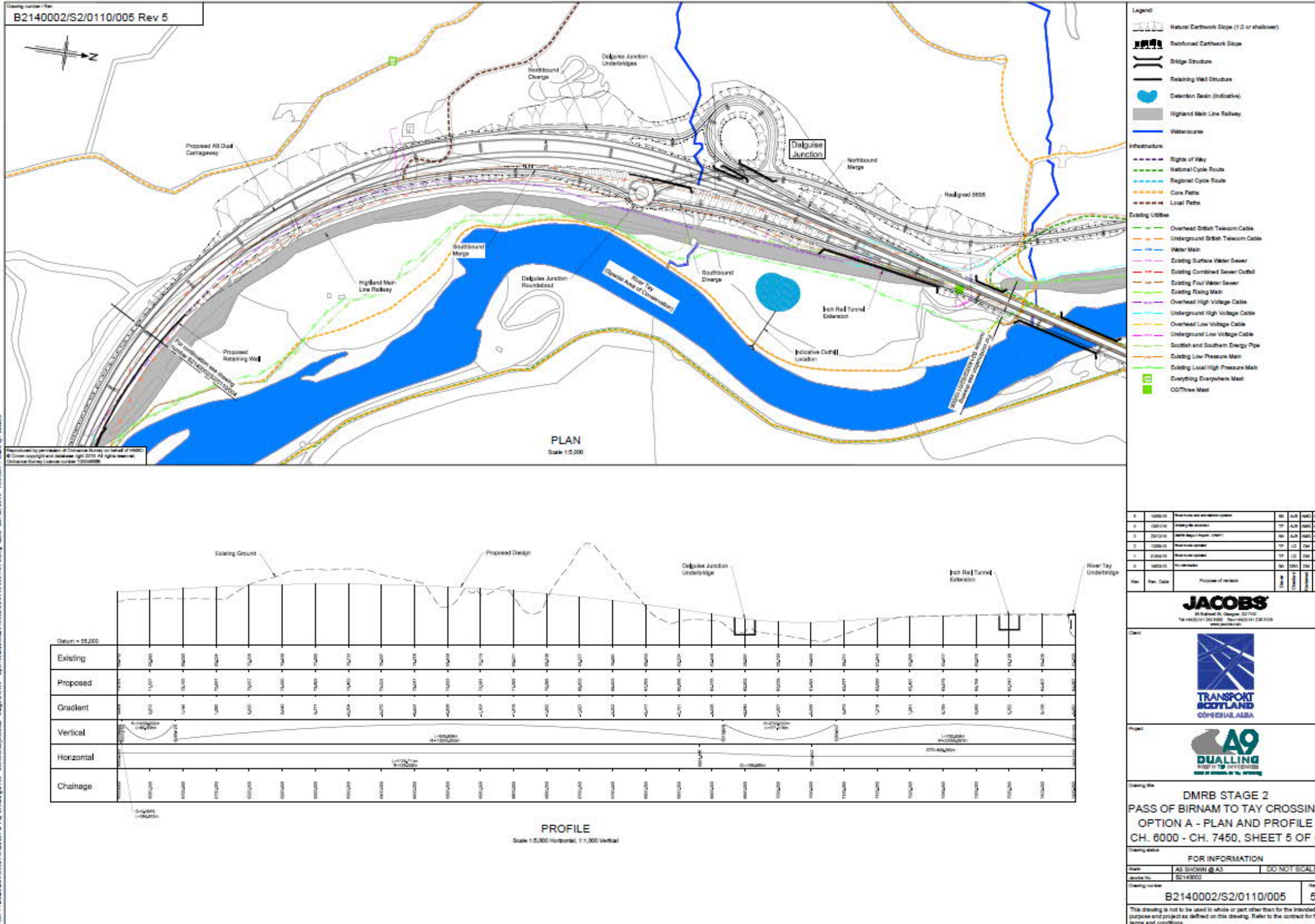
FOR INFORMATION

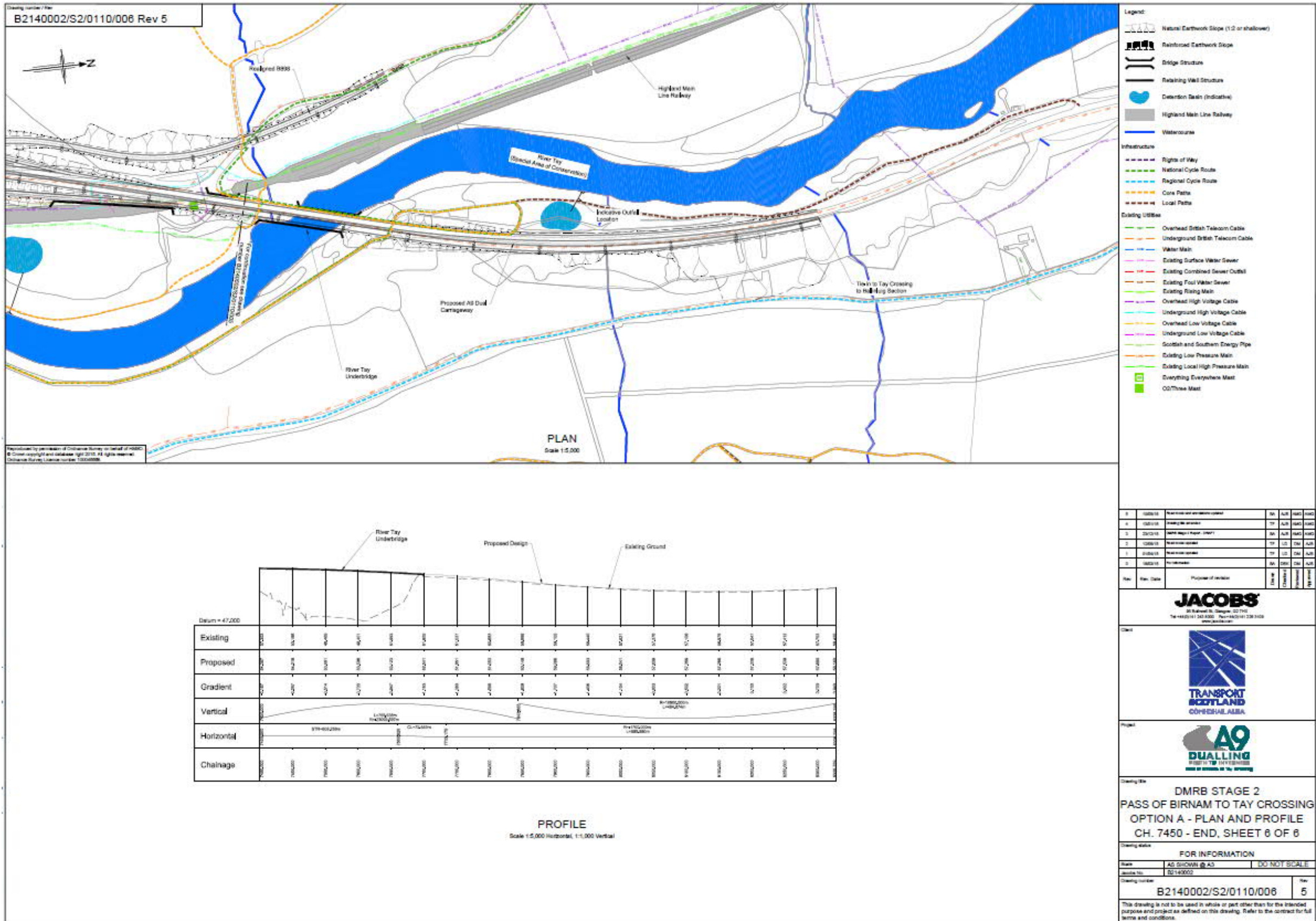
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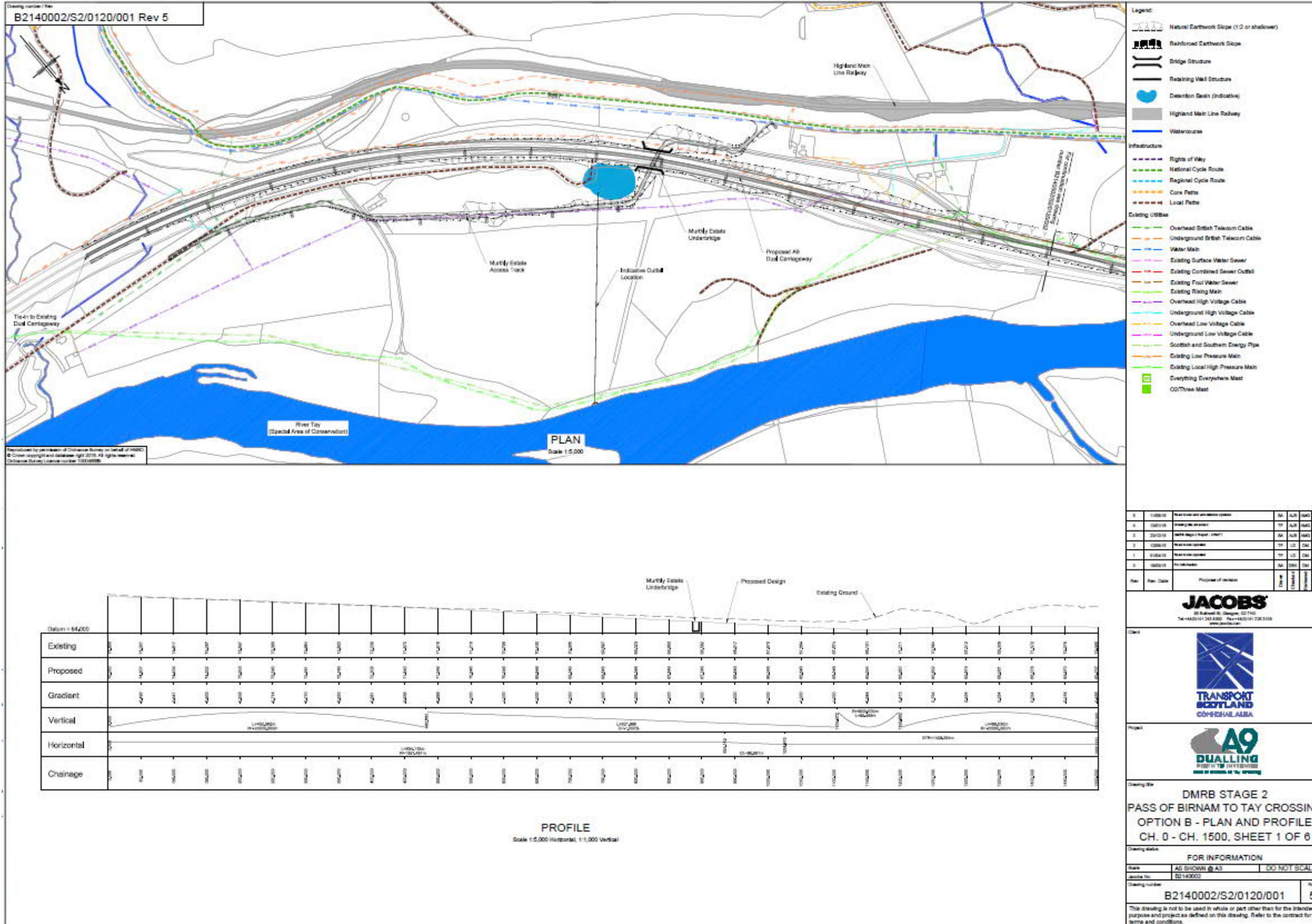
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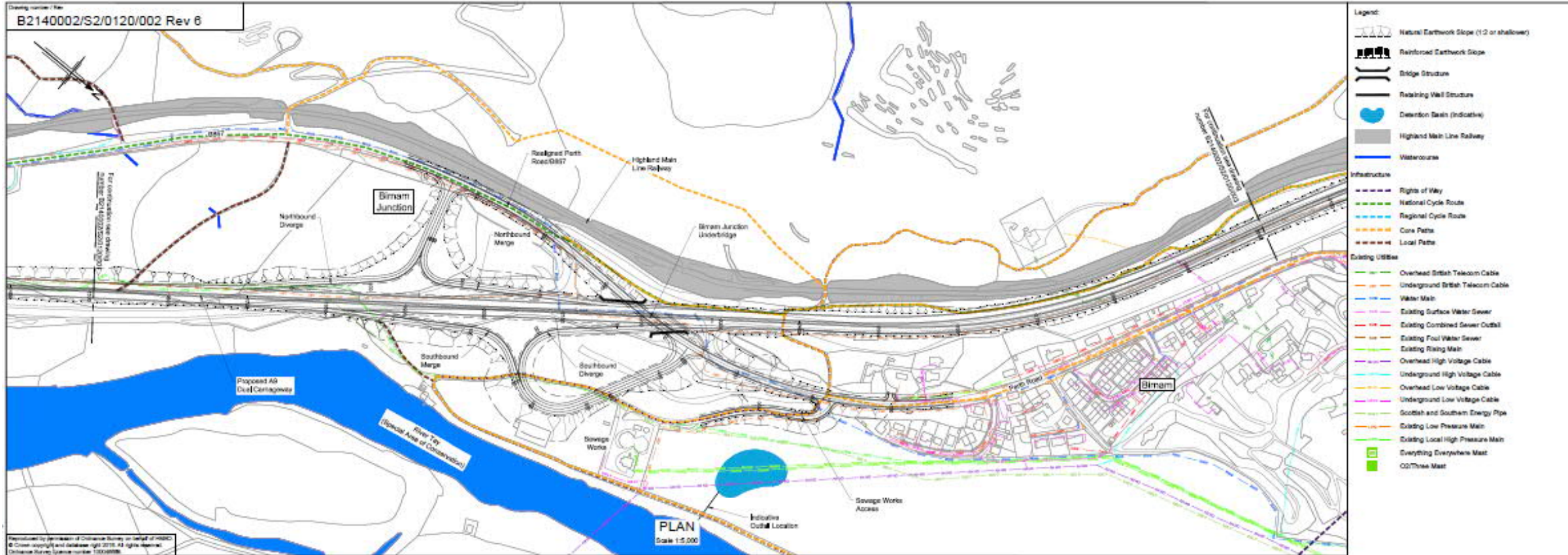








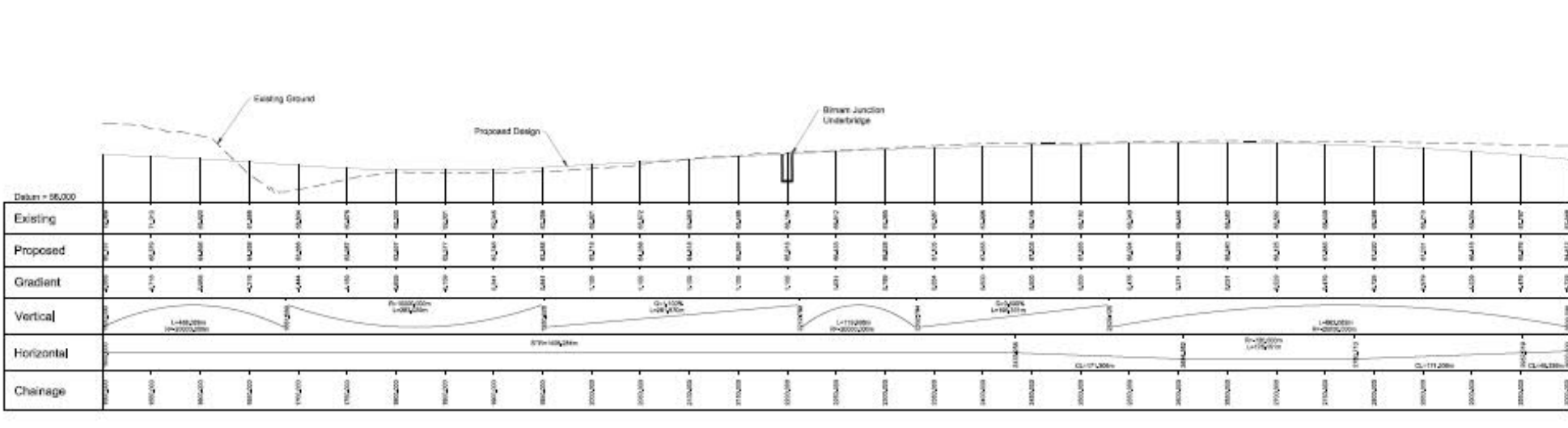




Legend:

- Natural Earthwork Slope (1:2 or shallower)
- Reinforced Earthwork Slope
- Bridge Structure
- Retaining Wall Structure
- Deerion Basin (Indicative)
- Highland Main Line Railway
- Watercourse
- Infrastructure
 - Rights of Way
 - National Cycle Route
 - Regional Cycle Route
 - Core Paths
 - Local Paths
- Existing Utilities
 - Overhead British Telecom Cable
 - Underground British Telecom Cable
 - Water Main
 - Existing Surface Water Sewer
 - Existing Combined Sewer Outfall
 - Existing Foul Water Sewer
 - Existing Rising Main
 - Overhead High Voltage Cable
 - Underground High Voltage Cable
 - Overhead Low Voltage Cable
 - Underground Low Voltage Cable
 - Scottish and Southern Energy Pipe
 - Existing Low Pressure Main
 - Existing Local High Pressure Main
 - Everything Everywhere Mast
 - ODThree Mast

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Rev	Date	Purpose of revision	Drawn	Checked	Approved
1	11/08/10	Issue for construction	SA	ALB	MAK
2	09/11/10	Issue for approval	TF	ALB	MAK
3	23/12/10	Issue for approval	SA	ALB	MAK
4	10/12/10	Issue for approval	TF	ALB	MAK
5	10/12/10	Issue for approval	TF	ALB	MAK
6	10/12/10	Issue for approval	TF	ALB	MAK
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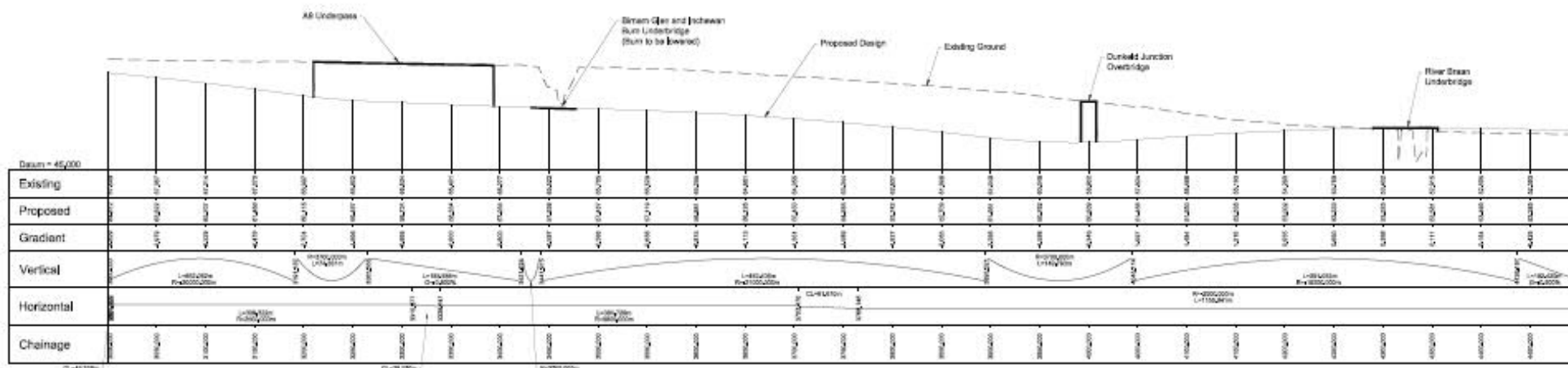
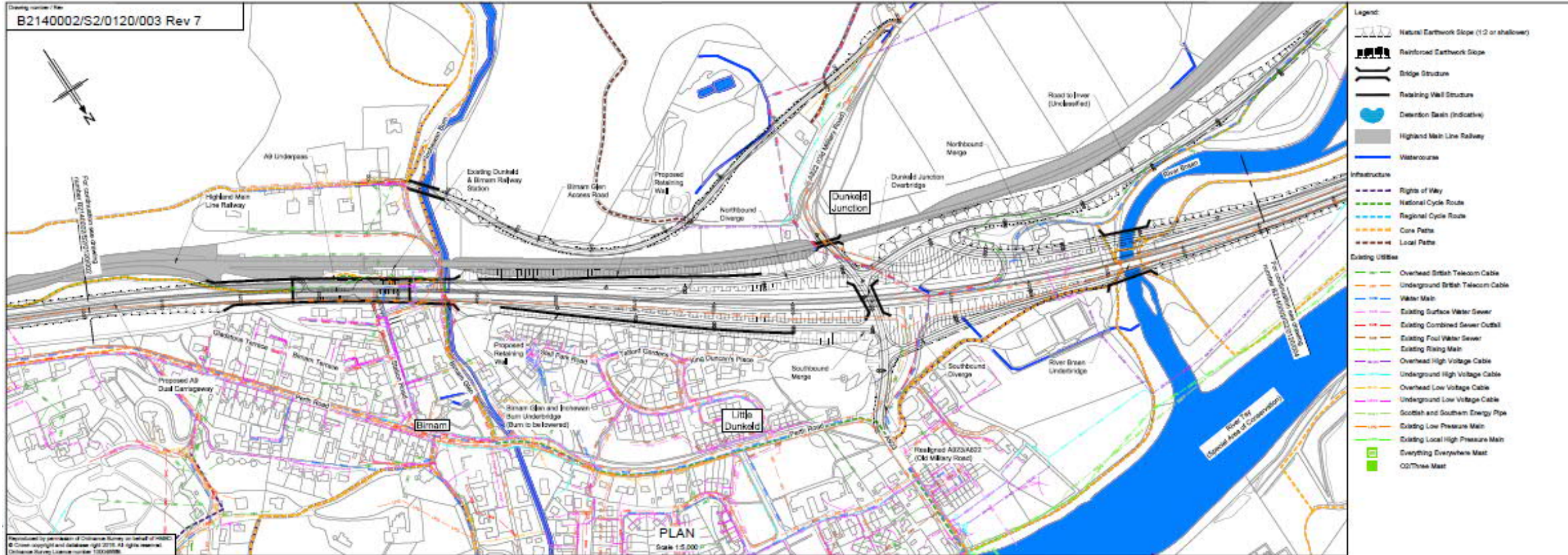


DMRB STAGE 2
 PASS OF BIRNAM TO TAY CROSSING
 OPTION B - PLAN AND PROFILE
 CH. 1500 - CH. 3000, SHEET 2 OF 6

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Drawing number	B2140002/S2/0120/002	Rev
		6

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Rev	Date	Proposed by	Checked by	Approved by
7	11/08/16
6	08/03/16
5	05/01/16
4	23/03/15
3	18/03/15
2	12/08/14
1	01/08/14
0	08/03/14

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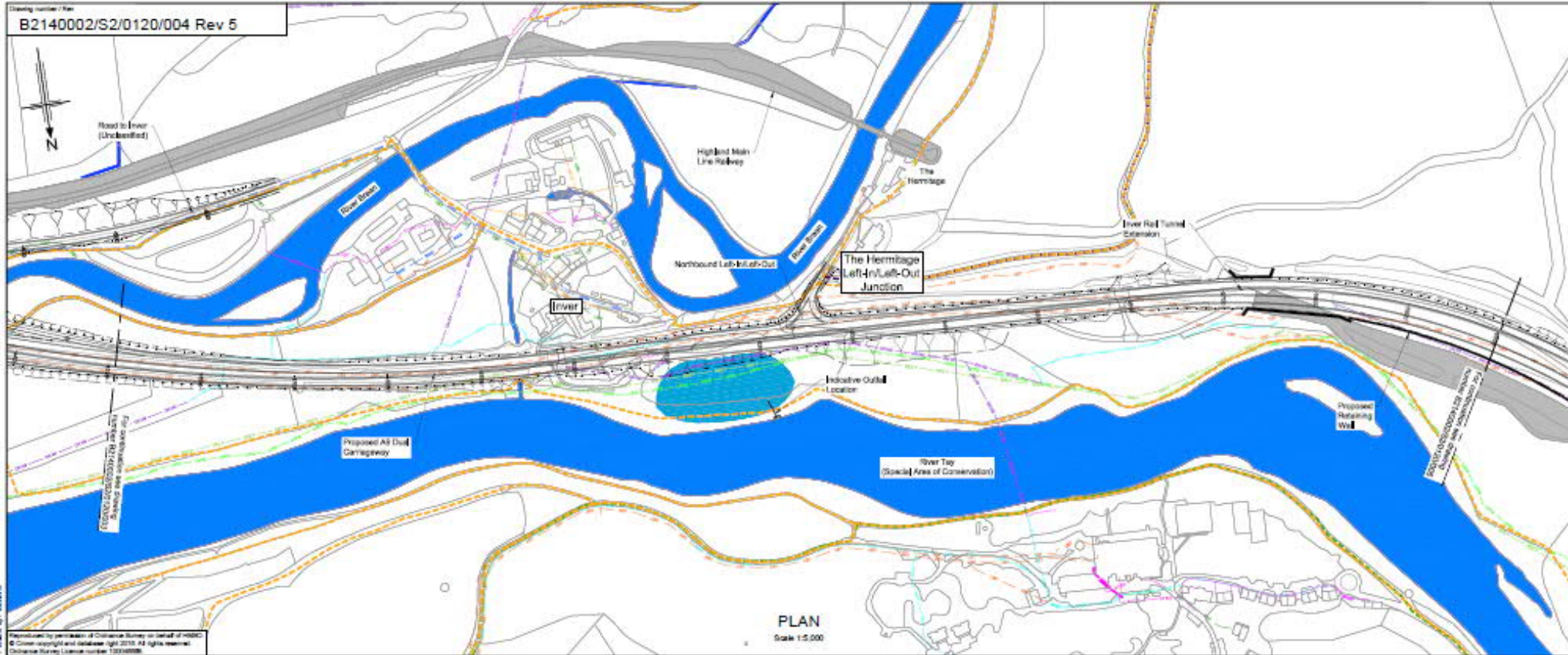
DMRB STAGE 2
PASS OF BIRNAM TO TAY CROSSING
OPTION B - PLAN AND PROFILE
CH. 3000 - CH. 4500, SHEET 3 OF 6

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Drawing No.	B2140002/S2/0120/003	Rev 7

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Drawing number / Rev
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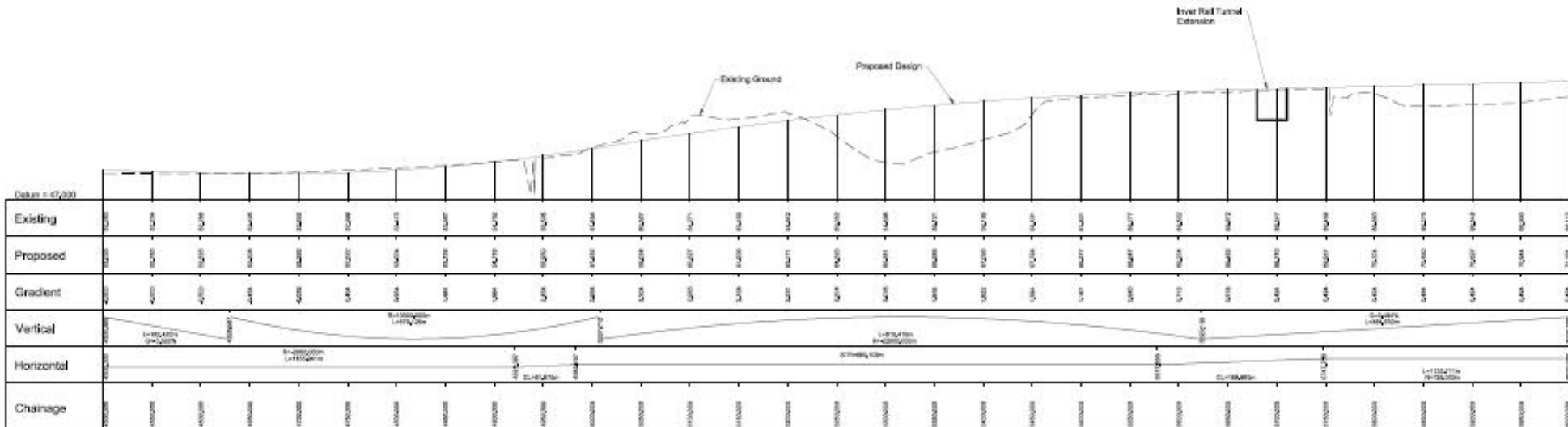


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PLAN
 Scale 1:5,000

Legend:

- Natural Earthwork Slope (1:2 or shallower)
- Reinforced Earthwork Slope
- Bridge Structure
- Retaining Wall Structure
- Detention Basin (Indicative)
- Highland Main Line Railway
- Watercourse
- Infrastructure:
 - Rights of Way
 - National Cycle Route
 - Regional Cycle Route
 - Core Paths
 - Local Paths
- Existing Utilities:
 - Overhead British Telecom Cable
 - Underground British Telecom Cable
 - Water Main
 - Existing Surface Water Sewer
 - Existing Combined Sewer Outfall
 - Existing Foul Water Sewer
 - Existing Rising Main
 - Overhead High Voltage Cable
 - Underground High Voltage Cable
 - Overhead Low Voltage Cable
 - Underground Low Voltage Cable
 - Scottish and Southern Energy Pipe
 - Existing Low Pressure Main
 - Existing Local High Pressure Main
 - Everything Everywhere Mast
 - 02Three Mast



PROFILE
 Scale 1:5,000 Horizontal, 1:1,000 Vertical

Rev	Date	Author	Checker	Appr	Rev	Date	Author	Checker	Appr
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5	12/02/10	JAC	JAC	JAC	5	12/02/10	JAC	JAC	JAC

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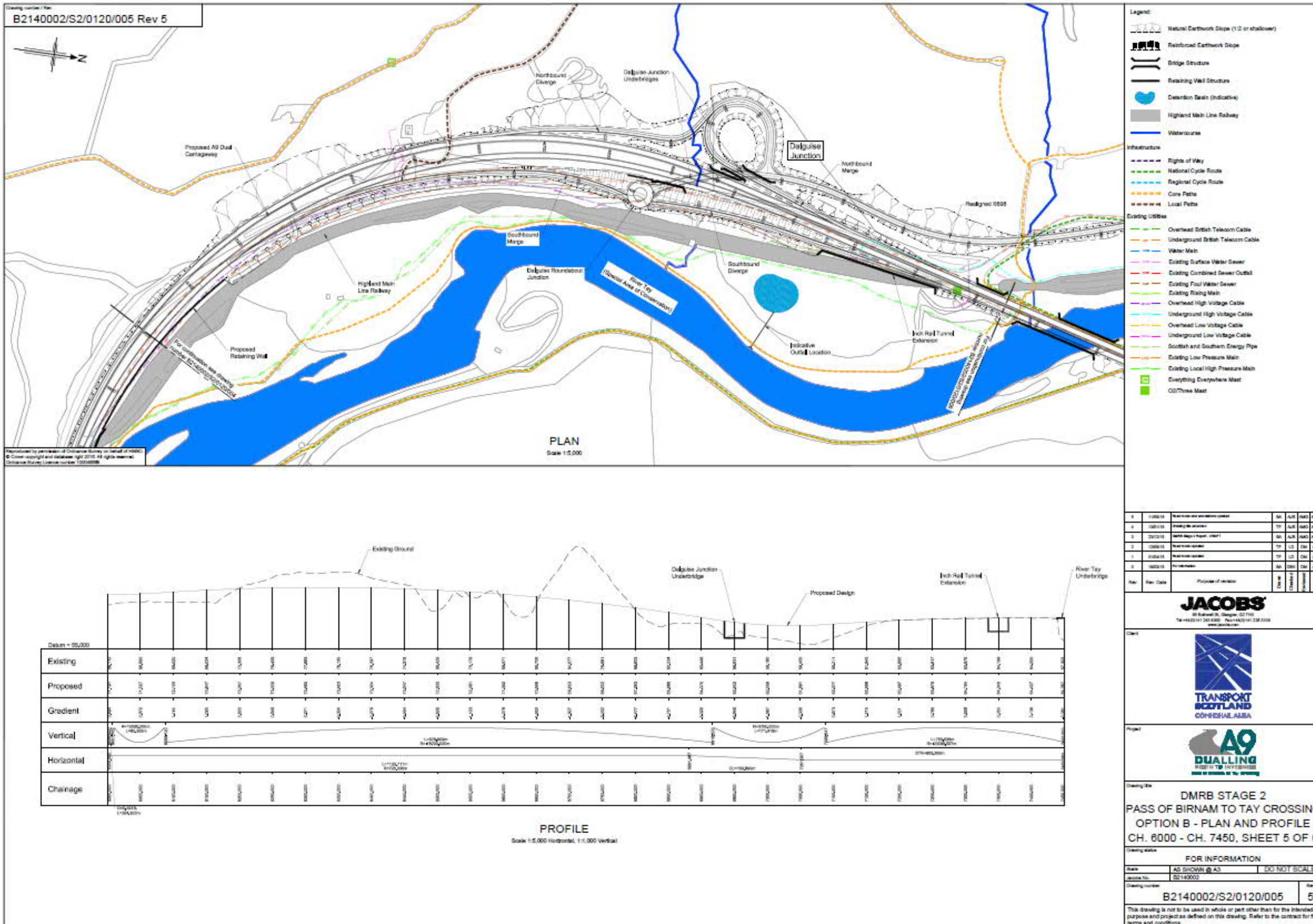
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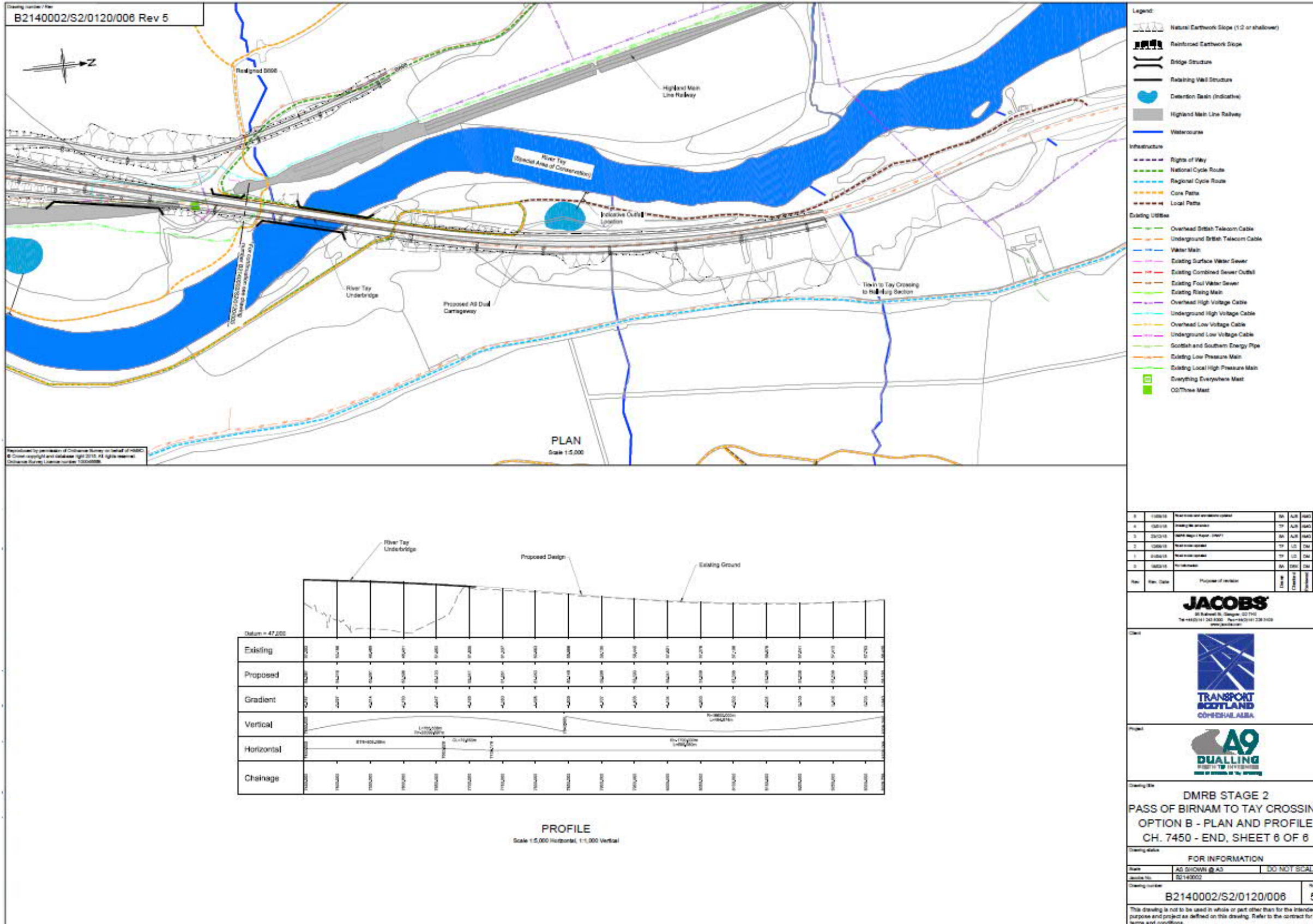
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 PASS OF BIRNAM TO TAY CROSSING
 OPTION B - PLAN AND PROFILE
 CH. 4500 - CH. 6000, SHEET 4 OF 6

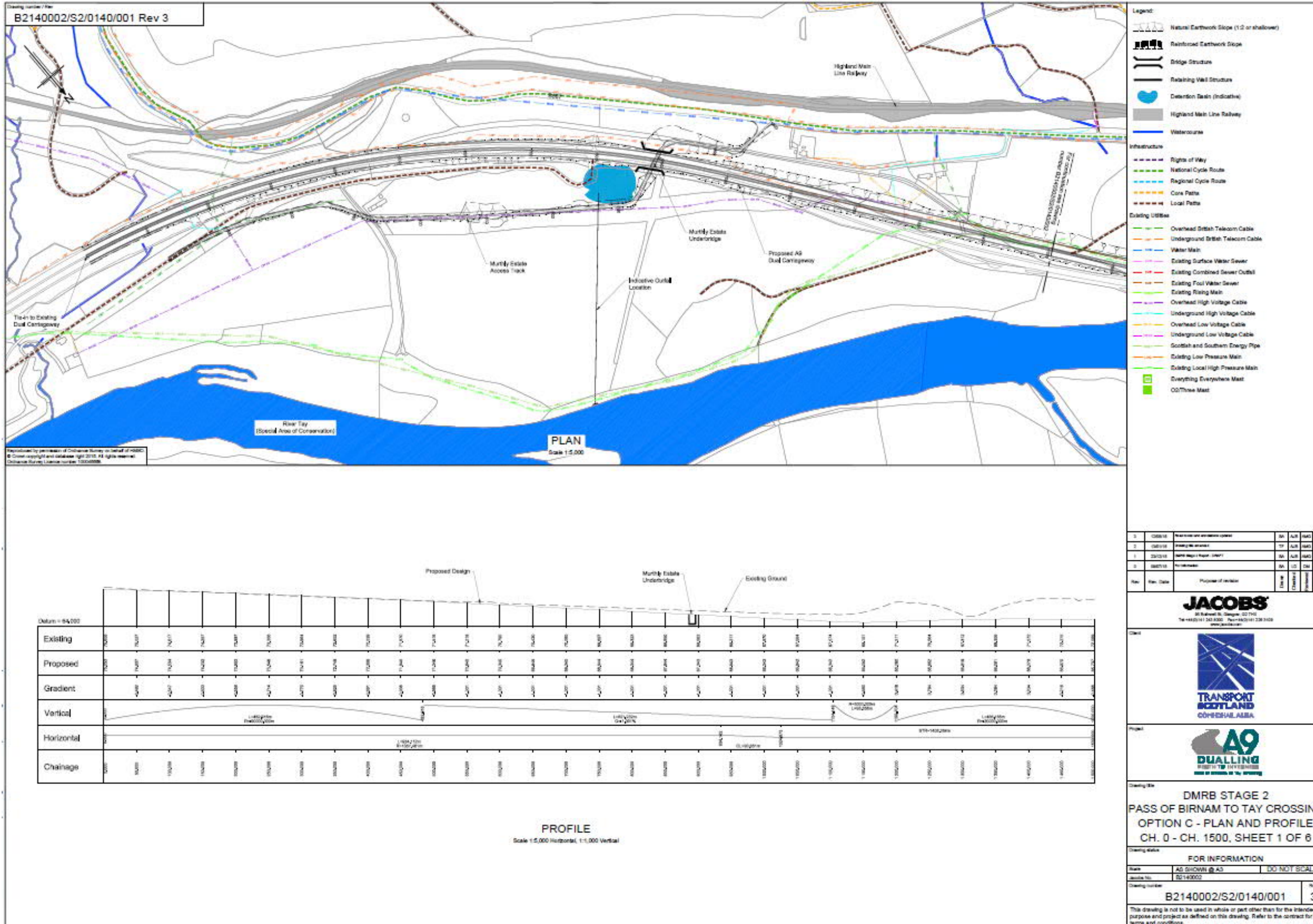
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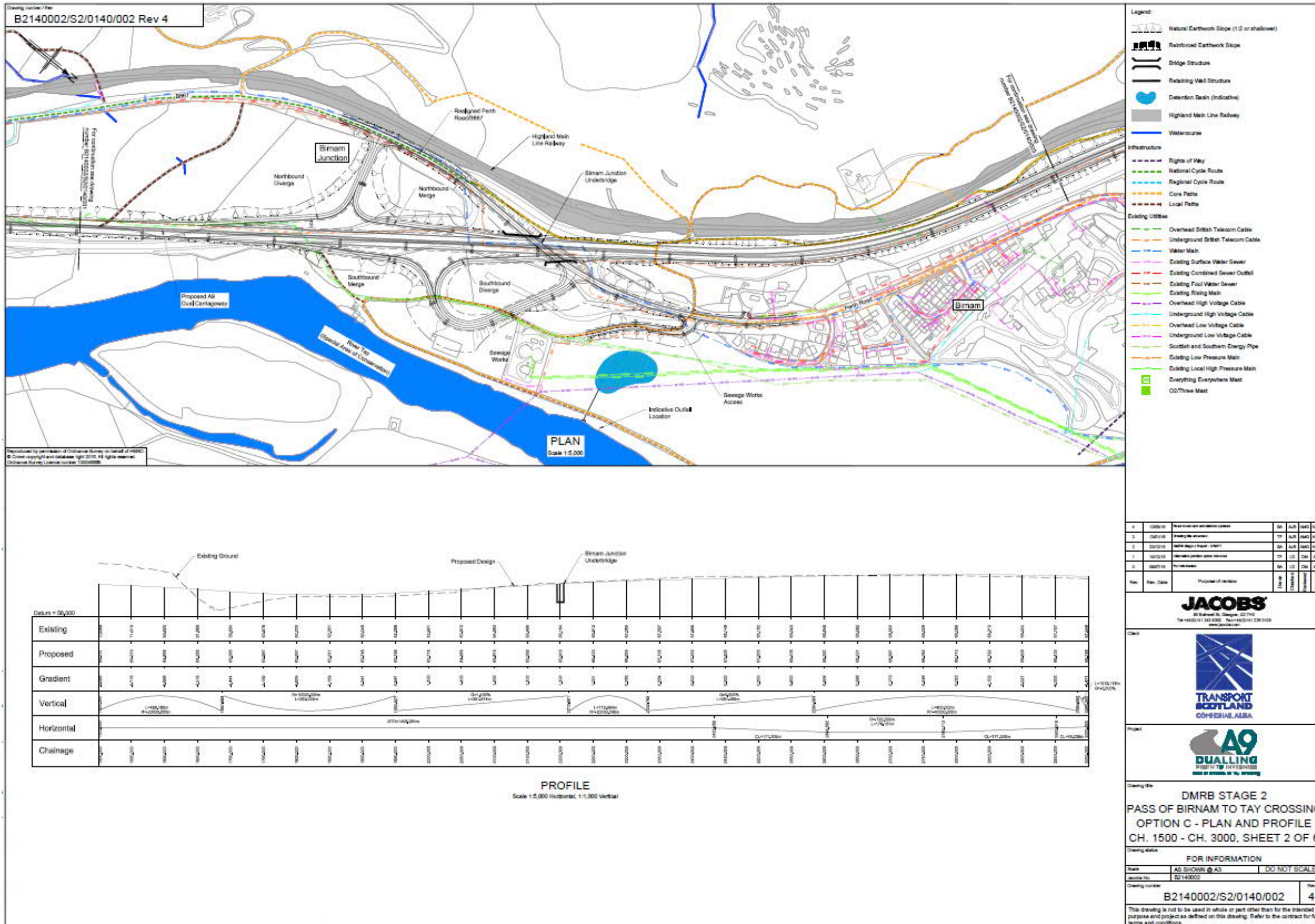
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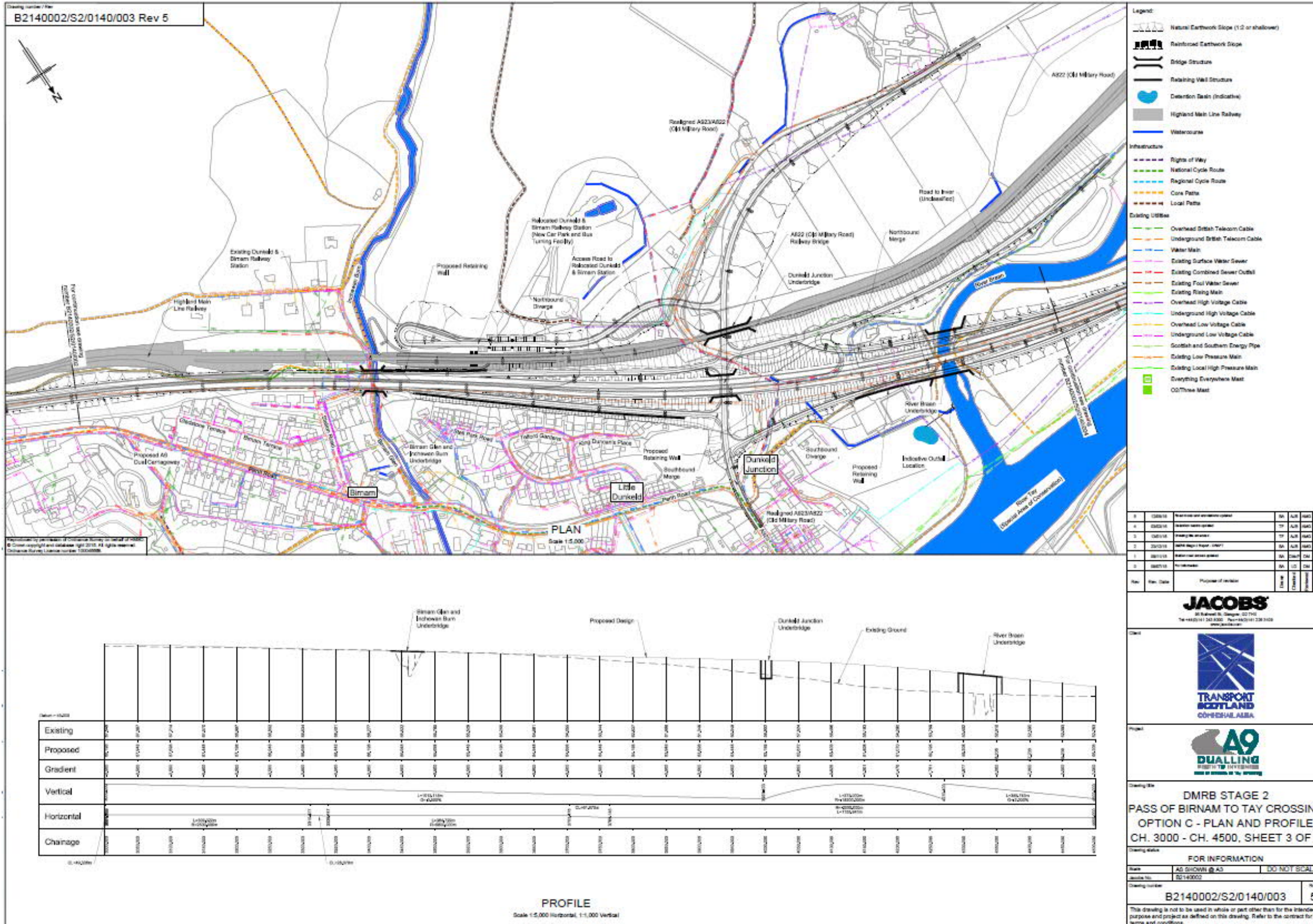
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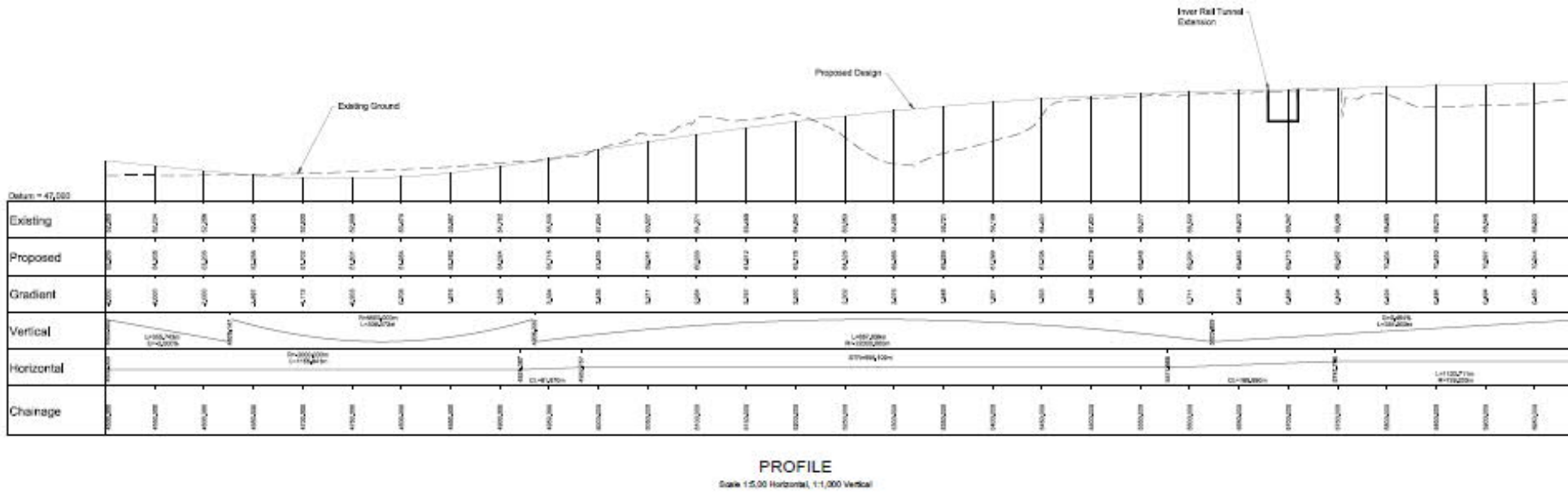
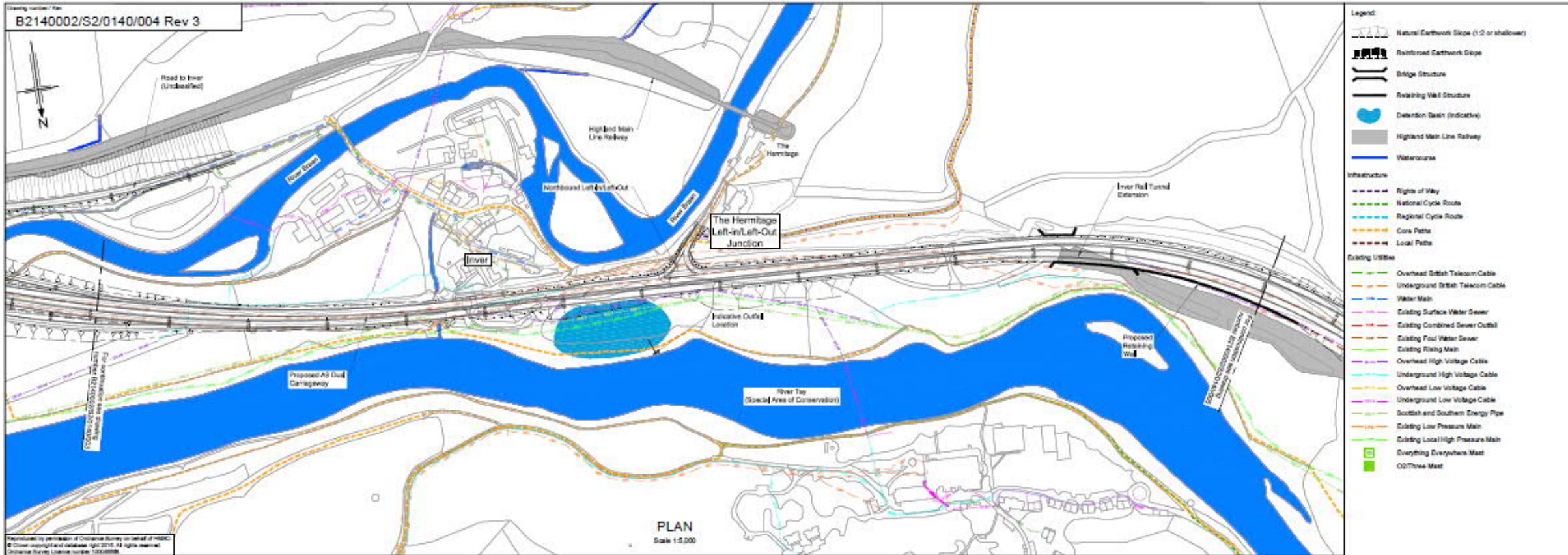












Rev.	Date	Purpose of revision	Drawn	Checked	Approved	By
3	02/01/16	Final design and construction details	SA	AJL	SAK	SAK
2	02/01/16	Final design	TP	AJL	SAK	SAK
1	22/12/15	Final design (Issue 1)	SA	AJL	SAK	SAK
0	08/07/15	Pre-design	SA	LD	SAK	SAK

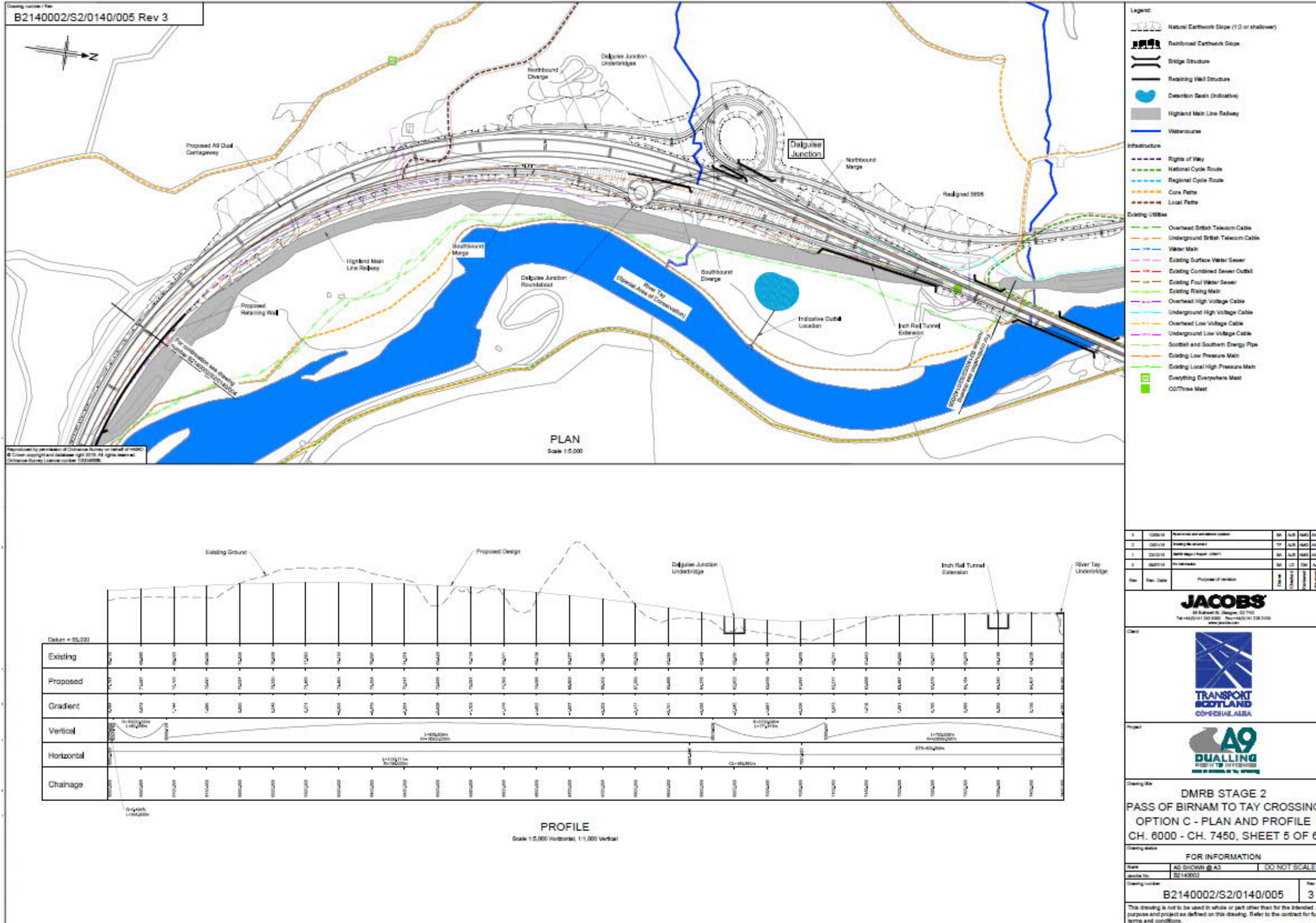


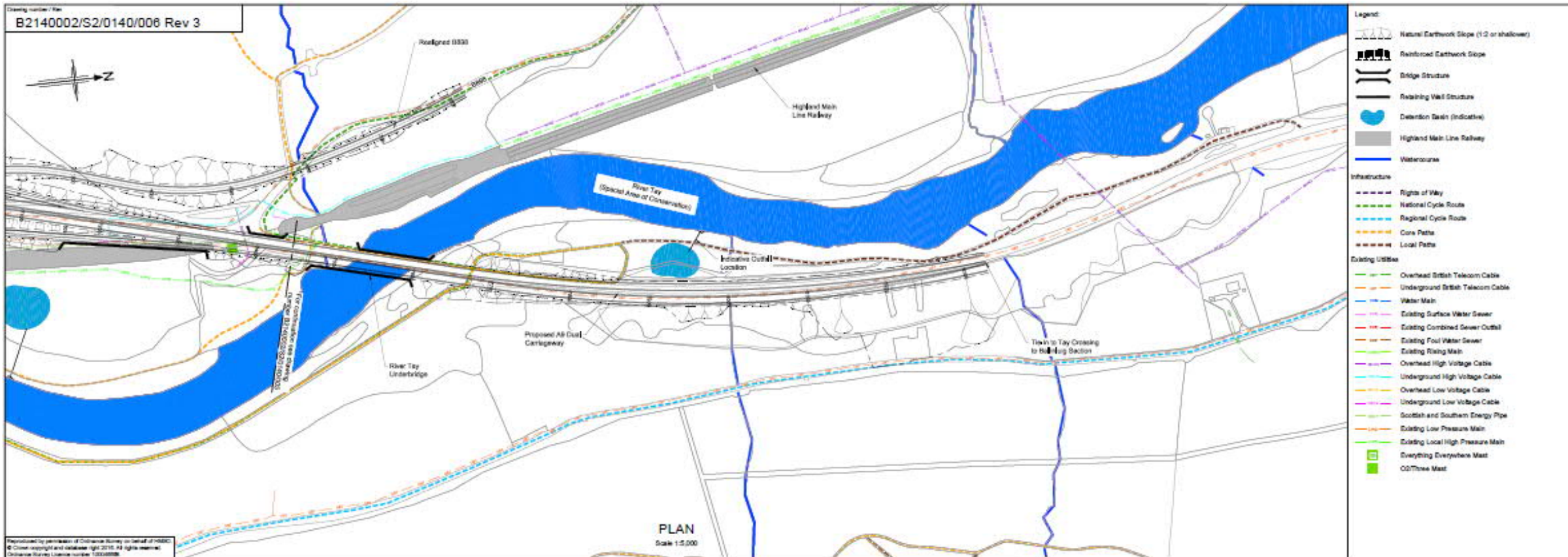
DMRB STAGE 2
 PASS OF BIRNAM TO TAY CROSSING
 OPTION C - PLAN AND PROFILE
 CH. 4500 - CH. 6000, SHEET 4 OF 6

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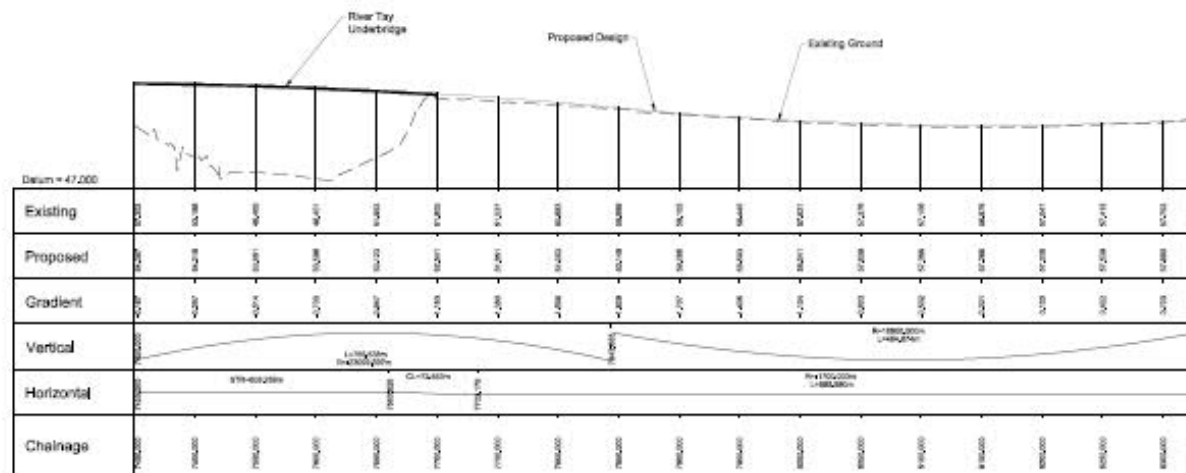
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PLAN
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PROFILE
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Rev	Date	Purpose of revision	Drawn	Checked	Approved
3	02/01/15	Revised design and construction details	SA	ALB	MAK
2	15/01/15	Design development	TF	ALB	MAK
1	22/12/14	Initial design of Phase 2 (DMR)	SA	ALB	MAK
0	08/02/14	For information	SA	ALB	MAK



DMRB STAGE 2
 PASS OF BIRNAM TO TAY CROSSING
 OPTION C - PLAN AND PROFILE
 CH. 7450 - END, SHEET 8 OF 8

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Drawing Number	B2140002/S2/0140/008	Rev
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Appendix B. A9 Co-Creative Process, Non-Spatial Options

Table B.1: Non-Spatial Ideas

Unique Reference (Stage 2)	Summary Description
NS ST2 0001	Enhanced NMU routes, including: <ul style="list-style-type: none"> • between The Hermitage and Dalguise; • between Dunkeld and the River Tay crossing; • across the A9 between Little Dunkeld and The Hermitage; • underpass across the River Tay at the northern extent of the scheme; and • adjacent to the A9.
NS ST2 0002	Reduced design standards.
NS ST2 0003	Reduced speed limit.
NS ST2 0004	Introduction of cameras to monitor speed.
NS ST2 0005	Utilise recycled materials (plastics) in road surfacing.
NS ST2 0006	Provision of HGV parking facilities on the A9.
NS ST2 0007	Sensitive and appropriate signage and street lighting, including a new sign at the southern extent.
NS ST2 0008	Create new floodplain alongside River Tay to increase wildlife habitat, landscape interest and amenity facilities.
NS ST2 0009	Provision of deer fencing throughout the extents of the scheme.
NS ST2 0010	Introduce wildlife crossings and corridors where possible.
NS ST2 0011	Relocation of Dunkeld & Birnam Station building, to accompany any relocation of the station.
NS ST2 0012	At-grade cycle facility between Dunkeld and the River Tay crossing.
NS ST2 0013	Impact on local residents (Station Road, Birnam Terrace & Gladstone Terrace) to be considered in any works undertaken in the vicinity of Dunkeld & Birnam Station, including provision of a replacement car parking facility. Consideration of Birnam Industrial Estate which provides a means of vehicular access to residential properties on Birnam Terrace.
NS ST2 0014	Low-noise road surfacing to be utilised on A9 carriageway.
NS ST2 0015	Elimination of central reserve on A9 dual carriageway to reduce land-take (with Road Restraint System)
NS ST2 0016	Provision of electric vehicle charging equipment within replacement car parking facility at Dunkeld and Birnam Station.
NS ST2 0017	Implementation of noise, visual, air and water quality mitigation if necessary, including acoustic barriers and landscape planting.
NS ST2 0018	A9 dual carriageway to be Category 7A standard (in accordance with the DMRB).
NS ST2 0019	During construction, all A9 and construction traffic prohibited from travelling through Dunkeld and Birnam.
NS ST2 0020	A9 dual carriageway to be Category 6 standard (in accordance with the DMRB).
NS ST2 0021	Increased roadside planting to prevent wildlife from encroaching within the extents of the A9.
NS ST2 0022	Anti-glare screens to be considered between adjacent carriageways.

Unique Reference (Stage 2)	Summary Description
NS ST2 0023	Overhead gantries to be constructed on the A9 to display current speed requirements.
NS ST2 0024	At-grade cycle facility over the length of the scheme.
NS ST2 0025	Appropriate measures to segregate vehicular and pedestrian traffic at The Hermitage.
NS ST2 0026	Provision of new bus lay-by in the locality of the existing priority junction with the B898 at Dalguise.
NS ST2 0027	Replacement woodland to be planted to replace that lost as a result of the A9 dualling.
NS ST2 0028	Aesthetic appearance of bridge structures to be considered.
NS ST2 0029	Alert systems for traffic issues.
NS ST2 0030	Transport hub (train, car, bus and NMUs) created at the existing Dunkeld & Birnam Station.
NS ST2 0031	Solar panels to generate electricity provided on top of the cut and cover tunnel.
NS ST2 0032	Top of cut and cover tunnel to be made available for parking, play areas, wildlife and biodiversity.
NS ST2 0033	Provision of new bus lay-bys, northbound and southbound, in the locality of Inver and The Hermitage.
NS ST2 0034	Allotments to be provided on top of the cut and cover tunnel.
NS ST2 0035	Final landscape design to enhance, beautify and integrate the dual carriageway with the surrounding environment.
NS ST2 0036	Wild flowers to be planted.
NS ST2 0037	Enhance NMU routes, including: <ul style="list-style-type: none"> • Underpass connection through the A9 to The Hermitage from the route adjacent to the River Tay; • Mountain bike facility on top of the cut and cover tunnel; • Route from Dunkeld & Birnam Station to Dalguise; • Bridge across the River Braan (to bypass section closed due to landslip); and • Overbridge across the River Tay, between Birnam and Dunkeld (due to increase in traffic through community as a result of A9 dualling).

Appendix C. A9 Co-Creative Process, Out of Scope Ideas

Table C.1: Out of Scope Ideas

Unique Reference (Stage 2)	Summary Description
SC ST2 0001	Construction of a new pedestrian crossing over the River Tay, in the locality of the existing Telford Bridge.
SC ST2 0002	HGVs and tour buses prevented from travelling through the community.
SC ST2 0003	Provision of a new Non-Motorised User (NMU) route between Dunkeld and Perth.
SC ST2 0004	Provision of temporary at-grade roundabouts on the existing A9 in the locality of the existing junctions at Birnam and Little Dunkeld.
SC ST2 0005	Improvements to existing traffic signs and road markings on the existing single carriageway.
SC ST2 0006	Highland Main Line railway moved off-line to the west, with a dualled track and a relocated station.
SC ST2 0007	Funding for improved facilities for Dunkeld and Birnam Recreational Club.
SC ST2 0008	War Memorial relocated into the village to improve accessibility (if not directly impacted by the scheme).
SC ST2 0009	Relocated Network Rail maintenance siding, to replace that lost by A9 dualling, located at Dunkeld & Birnam Station.
SC ST2 0010	Improvements to existing Birnam Glen/Inchewan Burn road underbridge and infill parapet on the A9 (existing joint is out of alignment).
SC ST2 0011	Businesses utilising Birnam Industrial Estate, relocated to an area in the locality of Dunkeld North Car Park, should the option to utilise the industrial estate as a replacement car parking facility be progressed.
SC ST2 0012	Improvement works to the existing A9 single carriageway, including provision of a central barrier or bollards to separate traffic, lighting at junctions and implementation of low noise surfacing and high friction surfacing.
SC ST2 0013	Highland Main Line railway dualled between Perth and Dunkeld.
SC ST2 0014	Works undertaken to Dunkeld and Birnam Station and the Highland Main Line railway to address current accessibility issues.
SC ST2 0015	Existing Dunkeld and Birnam Station building utilised by the local community.
SC ST2 0016	Liaise with Network Rail to ensure long-term planning period for rail travel, replacing the existing short-term timescales.
SC ST2 0017	Clear vegetation in the vicinity of the existing A9 and Highland Main Line railway.
SC ST2 0018	Reduced speed limit and traffic control measures on the side road network (30mph) and within residential areas (20mph).
SC ST2 0019	Provision of electric vehicle charging equipment within Dunkeld and Birnam.
SC ST2 0020	Live link boards at all bus stops within the community.
SC ST2 0021	At-grade roundabout in the locality of the existing junction with the A923 and Perth Road in Little Dunkeld.
SC ST2 0022	Designated safe routes to school.
SC ST2 0023	New sports facility in Birnam and Dunkeld.

Unique Reference (Stage 2)	Summary Description
SC ST2 0024	Relocation of existing tennis courts and bowling green facility (if not directly impacted by the scheme).
SC ST2 0025	Provision of a 24-hour petrol station in the locality of the existing left/right staggered priority junction with the B867 and Perth Road at Birnam.
SC ST2 0026	Implementation of noise and visual mitigation measures on the existing A9.
SC ST2 0027	Improved maintenance of A9 in winter when temperatures are low.
SC ST2 0028	Scottish and Southern Energy (SSE) and Scottish Gas Network (SGN) to relocate overhead powerlines alongside the A9.
SC ST2 0029	Conduct appropriate research into moving freight from road to rail.
SC ST2 0030	New pedestrian/cycle bridge across Inchewan Burn linking Stell Par with the station.
SC ST2 0031	Refurbish existing rail overbridge at Dunkeld & Birnam Station, new northbound platform waiting room and new station entrance with parking, bus stop, electric vehicle charging equipment bays, bike hire point and pedestrian/cycle links to the wider Birnam and Dunkeld Area.
SC ST2 0032	Road Restraint System to be installed alongside NMU routes adjacent to the existing A9 single carriageway.
SC ST2 0033	Bus services within Birnam and Dunkeld to be maintained.
SC ST2 0034	Flood prevention measures implemented in the locality of the Inchewan Burn.
SC ST2 0035	Consideration of local Small and Medium-Sized Enterprises (SME's) in developing access to the station to encourage growth and investment.
SC ST2 0036	Tourist information signs improved on current A9 single carriageway.
SC ST2 0037	Refurbish existing rail overbridge at Dunkeld & Birnam Station with lifts provided for access to Platform 2 (northbound).
SC ST2 0038	Provide access to Platform 2 (northbound) at Dunkeld & Birnam Station via lifts or ramps.
SC ST2 0039	Works to Birnam Glen to improve access to properties to the west of Dunkeld & Birnam Station (if not directly impacted by the scheme).
SC ST2 0040	Reduce carriageway cross-section of side road network.

Appendix D. Additional Options Initial Assessment

Table D.1: Murthly/Birnam Junction, Additional Option 1 Initial Assessment

Additional Options	Key Features
GRADE SEPARATED JUNCTION AT BIRNAM, RESTRICTED MOVEMENTS	
Engineering Assessment	<ul style="list-style-type: none"> As the junction is in the locality of the existing left/right staggered priority junction with the B867 and Perth Road at Birnam, it is in accordance with the A9 Junctions & Accesses Strategy. Option is in accordance with the overarching A9 objective for a category 7A dual carriageway.
Landscape & Visual	<ul style="list-style-type: none"> Comparable impacts on the character of the landscape with the Community's Preferred Route Option. Lesser impacts on the 'Gateway to the Highlands' Special Quality of the River Tay (Dunkeld) NSA, which is associated with the passage northwards through a dramatic, densely wooded landscape towards the Highlands, than the Community's Preferred Route Option. This is largely due to the inclusion of an overbridge and earthworks for slip roads associated with the Community's Preferred Route Option. It is acknowledged that all options are within the extents of the NSA. Predicted to have an adverse impact on the 'Exceptionally Rich, Varied and Beautiful Woodlands' and 'Beauty of Cultural Landscapes Accompanying Natural Grandeur' Special Qualities of the NSA, however this impact is comparable to the Community's Preferred Route Option. Lesser impacts on the visual amenity of residents of Ringwood Cottage, West Ringwood Cottage and Ink Pot Cottage than the Community's Preferred Route Option, however greater impacts on the visual amenity of residents at the southern extent of Birnam.
Ecology & Nature	<ul style="list-style-type: none"> Lesser impact on ancient woodland habitat on the AWI than the Community's Preferred Route Option. AWI is irreplaceable and its loss cannot be mitigated, although additional compensatory planting would be required.
Cultural Heritage	<ul style="list-style-type: none"> Reduced land-take, compared to the Community's Preferred Route Option, from Murthly Castle GDL. However, option will reinforce severance of the northern end of the GDL at Birnam from the majority of the GDL to the south, although this impact is comparable to the Community's Preferred Route Option.
People & Communities	<ul style="list-style-type: none"> Reduced overall land-take (woodland), compared to the Community's Preferred Route Option.
Traffic Assessment	<ul style="list-style-type: none"> Increase in traffic flows on Perth Road anticipated to be between 200 and 400 vehicles per day, which contradicts the community's objective to reduce current levels of noise and pollution in the villages of Dunkeld and Birnam.
Feedback from the Local Community & Key Stakeholders	<ul style="list-style-type: none"> Limited impact on isolated dwellings and privately-owned land to the south of the existing Birnam Junction, who have expressed concerns with the Community's Preferred Route Option. Addresses SNH and HES concerns over the potential landscape impacts associated with the junction included in the Community's Preferred Route Option in the locality of the existing access to Murthly Castle.

Table D.2: Murthly/Birnam Junction, Additional Option 2 Initial Assessment

Additional Options	Key Features
GRADE SEPARATED JUNCTION AT BIRNAM, ALL MOVEMENTS	
Engineering Assessment	<ul style="list-style-type: none"> As the junction is in the locality of the existing left/right staggered priority junction with the B867 and Perth Road at Birnam, it is in accordance with the A9 Junctions & Accesses Strategy. Option is in accordance with the overarching A9 objective for a category 7A dual carriageway. Viaduct structure proposed for the southbound loop to reduce the impact on the River Tay floodplain, addressing concerns from SEPA (Paragraph 1.6.23). The viaduct structure is also likely to address concerns over the possible impact on a local high-pressure gas main in the locality. The viaduct structure will be approximately 170 metres and the structure will be curved, adding to the complexity, particularly during construction. Measures will be required to protect the high-pressure gas main. It is noted however, that the structure can be constructed off-line, with minimal impacts to A9 and local

Additional Options	Key Features
	traffic.
Landscape & Visual	<ul style="list-style-type: none"> Greater impacts on the character of the landscape in comparison to the Community's Preferred Route Option due to changes to the landscape and increase in the influence of road infrastructure within a smaller scale landscape. Lesser impacts on the 'Gateway to the Highlands' Special Quality of the River Tay (Dunkeld) NSA, which is associated with the passage northwards through a dramatic, densely wooded landscape towards the Highlands, than the Community's Preferred Route Option. This is largely due to the inclusion of an overbridge and earthworks for slip roads associated with the Community's Preferred Route Option. It is acknowledged that all options are within the extents of the NSA. Predicted to have adverse impacts on the 'Exceptionally Rich, Varied and Beautiful Woodlands' and 'Beauty of Cultural Landscapes Accompanying Natural Grandeur' Special Qualities of the NSA. These impacts are expected to be greater than the Community's Preferred Route Option. Lesser impacts on the visual amenity of residents of Ringwood Cottage, West Ringwood Cottage and Ink Pot Cottage than the Community's Preferred Route Option, however greater impacts on the visual amenity of residents at the southern extent of Birnam.
Ecology & Nature	<ul style="list-style-type: none"> Lesser impact on ancient woodland habitat on the AWI than the Community's Preferred Route Option. AWI is irreplaceable and its loss cannot be mitigated, although additional compensatory planting would be required.
Cultural Heritage	<ul style="list-style-type: none"> Land-take comparable to the Community's Preferred Route Option from Murthly Castle GDL. However, the option would reinforce severance of the northern end of the GDL at Birnam from the majority of the GDL to the south, although this impact is comparable to the Community's Preferred Route Option.
People & Communities	<ul style="list-style-type: none"> Reduced overall land-take (woodland), compared to the Community's Preferred Route Option.
Traffic Assessment	<ul style="list-style-type: none"> Does not increase traffic on Perth Road, addressing the community's objective to reduce current levels of noise and pollution in the villages of Dunkeld and Birnam.
Feedback from the Local Community & Key Stakeholders	<ul style="list-style-type: none"> Limited impact on isolated dwellings and privately-owned land to the south of the existing Birnam Junction, who have expressed concerns with the Community's Preferred Route Option. Addresses SNH and HES concerns over the potential landscape impacts associated with the junction included in the Community's Preferred Route Option in the locality of the existing access to Murthly Castle. Incorporating a viaduct structure on the southbound loop reduces the impact on the River Tay floodplain, addressing concerns raised by SEPA over the impact on designated floodplain.

Table D.3: A9 Dual Carriageway, Additional Option 1 Initial Assessment

Additional Options	Key Features
A9 DUAL CARRIAGEWAY, LOWERED INTO 150 METRE LONG UNDERPASS	
Engineering Assessment	<ul style="list-style-type: none"> Alignment permits 70 miles per hour speed limit throughout, consistent with the overall A9 Dualling Programme. No restrictions on use (i.e. pedestrians, cyclists, motorbikes (with engines less than 50cc), animals and animal drawn vehicles are permitted). Restricted extent of A9 lowering addresses many of the drainage challenges of the Community's Preferred Route Option, allowing more opportunity to achieve two levels of treatment prior to outfall. No requirement for sump tanks to collect run-off or any maintenance above what is normal for trunk road schemes. Underpass walls would be constructed using large diameter bored piles to retain a height of approximately 8 metres. While installation will still require heavy plant in close proximity to residential properties and the Category A Listed Dunkeld & Birnam Station building, generating construction noise

Additional Options	Key Features
	<p>and vibration, it is significantly less complex than for the Community's Preferred Route Option, largely due to the reduced length of retaining walls required.</p> <ul style="list-style-type: none"> • Construction period envisaged to be less than the Community's Preferred Route Option (4 years anticipated duration). • Underpass structure does not require a 24-hour manned control room, nor does it require fire safety apparatus and ventilation equipment, significantly reducing capital, operational and maintenance costs. • Significantly reduced volume of excavated material for disposal (approximately 355,000m³), compared to the Community's Preferred Route Option.
Landscape & Visual	<ul style="list-style-type: none"> • Greater impacts on the landscape character compared to the Community's Preferred Route Option due to lesser opportunities to mitigate. • Predicted to have an adverse impact on the 'Exceptionally Rich, Varied and Beautiful Woodlands' Special Quality of the NSA. This impact is greater than the Community's Preferred Route Option as there is less opportunity to provide new planting and integrate the option into the landscape. • Predicted to have a more significant adverse impact on the 'Exceptionally Rich, Varied and Beautiful Woodlands' Special Quality of the NSA than the Community's Preferred Route Option as there is less opportunity to provide new planting and integrate into the landscape. • Predicted greater visual impacts for residents in Birnam compared to the Community's Preferred Route Option. This is largely due to the Community's Preferred Route Option removing visibility of the A9 traffic and the opportunity to establish new planting or amenity space on top of the cut and cover tunnel.
Ecology & Nature	<ul style="list-style-type: none"> • Adverse impact on migratory fish species within Inchewan Burn, which is comparable with the Community's Preferred Route Option. • Potentially significant impacts on otter due to fragmentation of habitat and the creation of barriers as a result of works required to lower Inchewan Burn. The impact would be more significant than the Community's Preferred Route Option as there is no opportunity to facilitate otter movements along Inchewan Burn post construction.
Water Environment	<ul style="list-style-type: none"> • Significant impact to Inchewan Burn, impacting the burn's characteristics, including modifying its banks and beds, altering its flow and impeding fish passage, although this is comparable to the Community's Preferred Route Option.
Cultural Heritage	<ul style="list-style-type: none"> • Reconnection of Station Road would significantly improve the physical connection between Dunkeld & Birnam Station and Birnam and will have a beneficial impact on the setting of the Category A Listed station building, improving the opportunity for its use. This is comparable to the Community's Preferred Route Option.
Geology & Soils	<ul style="list-style-type: none"> • Alterations to Waste Management License required for Ladywell Landfill site, which is comparable to the Community's Preferred Route Option. • Highly likely to encounter contaminated soils and groundwater and elevated concentrations of ground gasses, such as methane and carbon dioxide associated with Ladywell Landfill site, which is comparable to the Community's Preferred Route Option. • Changes to established groundwater flow patterns with subsequent effects on groundwater quality and quantity, which is comparable to the Community's Preferred Route Option.
People & Communities	<ul style="list-style-type: none"> • Reduced overall land-take, compared to the Community's Preferred Route Option. • Reconnection of Station Road and the 150-metre-long underpass structure provides car parking provision, replacing that lost as a result of the scheme, which is comparable to the Community's Preferred Route Option. • Maintaining access to the station during construction is challenging, however a number of options have been identified to avoid lengthy closures of the station. • Lesser disruption impacts for residents and businesses during construction than the Community's Preferred Route Option and less likelihood that residents would require to be relocated during acute periods of construction. • Would not provide any opportunity to establish new community/recreation area associated with the

Additional Options	Key Features
	<p>Community's Preferred Route Option on top of the cut and cover tunnel.</p> <ul style="list-style-type: none"> Beneficial impacts on amenity (noise) at properties near to the 150-metre-long underpass structure during operation, although this will be less than the Community's Preferred Route Option.
Noise and Vibration	<ul style="list-style-type: none"> Significant adverse construction noise and vibration impacts are expected for residents immediately alongside the A9, including those on Perth Road, Station Road, Gladstone Terrace, Birnam Terrace and Telford Gardens. While comparable to the Community's Preferred Route Option, construction would be undertaken over a shorter duration. Beneficial noise impacts are expected as a result of the 150-metre-long underpass structure, although this will be less than for the Community's Preferred Route Option.
Traffic Assessment	<ul style="list-style-type: none"> 70 miles per hour speed limit throughout will encourage traffic to remain on the A9 dual carriageway, rather than divert along Perth Road. Therefore, no increase in traffic on Perth Road is envisaged (subject to junction provision). Increase in traffic flows on Station Road anticipated to be approximately 100 vehicles per day, which contradicts the community's objective to reduce current levels of noise and pollution in the villages of Dunkeld & Birnam.
Feedback from the Local Community & Key Stakeholders	<ul style="list-style-type: none"> Partially addresses construction concerns raised by those residents that live directly alongside the A9 due to reduced construction duration and extent of piling works. Does not address SEPA concerns over possible water quality, morphology and flood risk impacts on Inchewan Burn. SNH has also noted concerns over burn lowering works. HES has noted a preference for an option that lowers the A9 in the locality of Dunkeld & Birnam Station and permits reconnection of Station Road, primarily due to the positive impact on the Category A Listed station building. Partially addresses Perth & Kinross Council concerns over a prolonged construction period and potential structural damage to residential properties alongside the A9. Addresses concerns over possible noise and air quality issues at tunnel extents. Addresses Police Scotland concerns over the safe operation of a cut and cover tunnel and ability to adequately manage road traffic accidents within the cut and cover tunnel. Partially addresses Scottish Ambulance Service concerns over a prolonged construction period and possible impacts on response times and transportation of patients. Partially addresses Freight Transport Association concerns over a prolonged construction period and the impact that may have on freight movements within the A9 corridor. Addresses concerns from Transport Scotland (Standards Branch) over the future maintenance of the Community's Preferred Route Option, possible implications and closures within the cut and cover tunnel from a fire risk perspective and reduced speed limit (50 miles per hour). Addresses concerns from Transport Scotland (Network Maintenance) over the possible implications of breakdowns in tunnels and the ongoing maintenance and equipment necessary.

Table D.4: A9 Dual Carriageway, Additional Option 2 Initial Assessment

Additional Options	Key Features
A9 DUAL CARRIAGEWAY, AT-GRADE THROUGHOUT	
Engineering Assessment	<ul style="list-style-type: none"> Alignment permits 70 miles per hour speed limit throughout, consistent with the overall A9 Dualling Programme. No restrictions on use (i.e. pedestrians, cyclists, motorbikes (with engines less than 50cc), animals and animal drawn vehicles are permitted). Addresses many of the drainage challenges of the Community's Preferred Route Option, allowing more opportunity to achieve two levels of treatment prior to outfall. No requirements for sump tanks to collect run-off or any maintenance above what is normal for trunk road schemes.

Additional Options	Key Features
	<ul style="list-style-type: none"> No significant construction complexities anticipated. Construction period envisaged to be significantly less than the Community's Preferred Route Option (2 ½ years anticipated duration). Dunkeld & Birnam Station unlikely to close during construction. No significant import of material required and reduced volume of excavated material for disposal (approximately 163,000m³), compared to the Community's Preferred Route Option.
Landscape & Visual	<ul style="list-style-type: none"> Lesser impacts on the 'Gateway to the Highlands' Special Quality of the River Tay (Dunkeld) NSA than the Community's Preferred Route Option. This is primarily due to views being curtailed by the tunneled section of the Community's Preferred Route Option. However, this would be less beneficial in terms of landscape character than the Community's Preferred Route Option as the dual carriageway will largely follow the horizontal and vertical alignment of the existing A9. Potentially greater impacts on visual amenity for residents north of Dunkeld & Birnam Station due to the loss of existing woodland screening and visibility of earthworks, structures and traffic associated with the A9. Predicted greater visual impacts for residents in Birnam compared to the Community's Preferred Route Option. This is largely due to the Community's Preferred Route Option removing visibility of the A9 traffic and the opportunity to establish new planting or amenity space on top of the cut and cover tunnel.
Ecology & Nature	<ul style="list-style-type: none"> Lesser impact on habitat, including that for migratory fish species and otter, compared to the Community's Preferred Route Option. Would not provide increased connectivity and additional habitat, associated with the Community's Preferred Route Option that is beneficial in improving connectivity for bats, reptiles and breeding birds.
Water Environment	<ul style="list-style-type: none"> Lesser impact on Inchewan Burn, compared to the Community's Preferred Route Option. Temporary impacts relating to water quality and geomorphology expected during construction, however these are not envisaged to be significant.
Cultural Heritage	<ul style="list-style-type: none"> Adverse impacts on the setting of the Category A Listed Dunkeld & Birnam Station, compared to the Community's Preferred Route Option, as no reconnection of Station Road and no likely direct public vehicular access.
Geology & Soils	<ul style="list-style-type: none"> No requirement for alterations to Ladywell Landfill Waste Management License. No direct disturbance of land within Ladywell Landfill site, therefore significantly less likelihood of contaminated soils and groundwater to be encountered, compared to the Community's Preferred Route Option. Reduced impact on groundwater quality and quantity compared to the Community's Preferred Route Option.
People & Communities	<ul style="list-style-type: none"> Reduced overall land-take, compared to the Community's Preferred Route Option. Would not provide full connectivity between Dunkeld & Birnam Station and Station Road when compared to the Community's Preferred Route Option. Less complex to maintain access to Dunkeld & Birnam Station during construction, a lesser impact when compared to the Community's Preferred Route Option. Would not provide any opportunity to establish community/recreation area associated with the Community's Preferred Route Option on top of the cut and cover tunnel. Lesser disruption impacts for residents and businesses during construction than the Community's Preferred Route option and less likelihood that residents would require to be re-located during acute periods of construction. Would provide lesser amenity benefits adjacent to the scheme than the Community's Preferred Route Option.
Noise and Vibration	<ul style="list-style-type: none"> Significantly reduced impacts from construction noise and vibration expected for residents immediately alongside the A9, including those on Perth Road, Station Road, Gladstone Terrace, Birnam Terrace and Telford Gardens, compared to the Community's Preferred Route Option.

Additional Options	Key Features
	<ul style="list-style-type: none"> Slight beneficial noise impacts are expected, although this will be less than for the Community's Preferred Route Option.
Traffic Assessment	<ul style="list-style-type: none"> 70 miles per hour speed limit throughout will encourage traffic to remain on the A9 dual carriageway, rather than divert along Perth Road. Therefore, no increase in traffic on Perth Road is envisaged (subject to junction provision).
Feedback from the Local Community & Key Stakeholders	<ul style="list-style-type: none"> Addresses construction concerns raised by those residents that live directly alongside the A9 due to reduced construction duration and no piling works. Addresses SEPA concerns over possible water quality, morphology and flood risk impacts on Inchewan Burn. SNH has also noted concerns over burn lowering works. HES has noted a preference for an option that lowers the A9 in the locality of Dunkeld & Birnam Station and permits reconnection of Station Road, primarily due to the positive impact on the Category A Listed station building. Addresses Perth & Kinross Council concerns over a prolonged construction period and potential structural damage to residential properties alongside the A9. Addresses concerns over possible noise and air quality issues at tunnel extents. Addresses Police Scotland concerns over the safe operation of a cut and cover tunnel and ability to adequately manage road traffic accidents within the cut and cover tunnel. Addresses Scottish Ambulance Service concerns over a prolonged construction period and possible impacts on response times and transportation of patients. Addresses Freight Transport Association concerns over a prolonged construction period and the impact that may have on freight movements within the A9 corridor. Addresses concerns from Transport Scotland (Standards Branch) over the future maintenance of the Community's Preferred Route Option, possible implications and closures from a fire risk perspective and reduced speed limit (50 miles per hour). Addresses Transport Scotland (Network Maintenance) concerns over the possible implications of breakdowns in tunnels and the ongoing maintenance and equipment necessary.

Table D.5: Dunkeld & Birnam Station, Additional Option 1 Initial Assessment

Additional Options	Key Features
RELOCATED DUNKELD & BIRNAM STATION	
Engineering Assessment	<ul style="list-style-type: none"> Relocated station would be designed to comply with current relevant accessibility and disability legislation, addressing many of the accessibility issues with the current station. Reduced standard left-in left-out junction provided on the northbound carriageway of the A9 for essential maintenance and emergency access to the station building, which would be left isolated by a relocated station. Station relocation works could be undertaken as an advanced work, i.e. prior to the main A9 construction works, therefore the relocated station would be operational prior to the A9 dualling construction works and access to the station in its current location, in a constrained area of the site, would not be required. Unlikely station would be closed during construction. New section of track, and associated signaling works, required to increase the length of the existing passing loop with some realignment of existing track to remove any irregularities. Expected the majority of this work can be undertaken without railway closures. Platforms and access road can be constructed with minimal disruption to rail traffic, although some disruption is anticipated when undertaking works to the tracks. Construction of the relocated station will be undertaken to accommodate future rail works, including electrification. New structure constructed across Inchewan Burn to facilitate NMU access to the relocated station from

Additional Options	Key Features
	<p>Birnam Glen. Envisaged the structure will be relatively simple in design and sympathetic to the surrounding environment.</p>
Landscape & Visual	<ul style="list-style-type: none"> • Greater change to the landscape character, compared to the Community's Preferred Route Option. This is largely due to the loss of woodland, which contributes to the landscape's high-quality character, and cut slopes on the access road from the A822. • Increased loss of woodland would result in greater impacts on the 'Exceptionally Rich, Varied and Beautiful Woodlands' Special Quality of the River Tay (Dunkeld) NSA. • Greater impact on the visual amenity for residents of Telford Gardens and Stell Park, compared to the Community's Preferred Route Option, due to the loss of woodland and cut slopes on the access road from the A822. • Lesser impacts on residents of Station Road, compared to the Community's Preferred Route Option, which results in loss of trees and introduction of a new car park.
Ecology & Nature	<ul style="list-style-type: none"> • New structure constructed across Inchewan Burn to facilitate NMU access, although no long-term impact on migratory fish species or otter anticipated.
Water Environment	<ul style="list-style-type: none"> • No lowering works proposed for Inchewan Burn. • Temporary impacts relating to water quality and geomorphology expected during construction, however these are not envisaged to be significant.
Cultural Heritage	<ul style="list-style-type: none"> • Adverse impacts on the setting of the Category A Listed station building, which would be severed from Dunkeld & Birnam Station, leaving it isolated with limited potential for it to be kept in use.
Geology & Soils	<ul style="list-style-type: none"> • Required alterations to the Waste Management License for Ladywell Landfill site, which is comparable to the Community's Preferred Route Option. • Highly likely to encounter contaminated soils and groundwater and elevated concentrations of ground gasses, such as methane and carbon dioxide associated with Ladywell Landfill site, which is comparable to the Community's Preferred Route Option. • Changes to established groundwater flow patterns with subsequent effects on groundwater quality and quantity, which is comparable to the Community's Preferred Route Option.
People & Communities	<ul style="list-style-type: none"> • Relocated station, and associated infrastructure, would be designed to comply with current, relevant accessibility and disability legislation, improving accessibility issues, compared to the existing station. • Potential provision for a bus stop and bus turning facility, supporting enhanced public transport links. • Greater land-take (predominantly woodland), compared to the Community's Preferred Route Option.
Noise and Vibration	<ul style="list-style-type: none"> • Potential for localized noise impacts due to the relocated station, although this is not expected to result in significant adverse noise impacts when considered alongside the A9 dual carriageway.
Traffic Assessment	<ul style="list-style-type: none"> • Minor increase in traffic on the A822 to access the relocated station, approximately 100 vehicles per day, which is not anticipated to have a significant adverse impact.
Feedback from the Local Community & Key Stakeholders	<ul style="list-style-type: none"> • Addresses local community concerns over the existing accessibility issues with the current station. • Some local residents living to the east of the proposed location for the relocated station have expressed concerns over increased noise and visual impacts. • Does not address concerns from HES and Perth & Kinross Council who have noted issues over the severance of the Category A Listed station building with the station itself, which may impact the long-term preservation of the building. • Addresses concerns from Network Rail that Dunkeld & Birnam Station may be closed for a significant duration during construction of the Community's Preferred Route Option.

Table D.6: Dunkeld & Birnam Station, Additional Option 2 Initial Assessment

Additional Options	Key Features
BIRNAM INDUSTRIAL ESTATE	
Engineering Assessment	<ul style="list-style-type: none"> No works necessary to existing track layout, and therefore no impact on track signaling. New underpass structure required below the A9, linking the new car park with Platform 1 (southbound). In accordance with the DMRB, the underpass is likely to provide headroom clearance of 2.6 metres to accommodate pedestrians. To enlighten the underpass with as much natural light as possible, it is likely to be around 5 metres wide. A lift shaft and stairs will be required to the west of the proposed A9 to facilitate access from the underpass to station level. Existing building structures within the extent of the Birnam Industrial Estate will be demolished. No works proposed to address current accessibility issues with the existing station. Access to Dunkeld & Birnam Station more easily maintained for both vehicular and NMU traffic during construction. Works to Birnam Industrial Estate could be undertaken prior to the main construction works. The proposed underpass would be constructed in sections as the A9 is widened. Existing NMU access via Birnam Glen maintained. New underpass and lifts to connect to station level will improve accessibility to the station for NMUs.
Landscape & Visual	<ul style="list-style-type: none"> Comparable visual impacts with the Community's Preferred Route Option for residents of Station Road, due to the station car park within the extents of Birnam Industrial Estate and the loss of woodland adjacent to the southbound carriageway.
Ecology & Nature	<ul style="list-style-type: none"> No works in the locality of Inchewan Burn, therefore no effect on migratory fish species or otter anticipated.
Water Environment	<ul style="list-style-type: none"> No lowering works proposed for Inchewan Burn. Temporary impacts relating to water quality possible during construction, however these are not envisaged to be significant.
Cultural Heritage	<ul style="list-style-type: none"> Adverse impact on the setting of the Category A Listed station building, compared to the Community's Preferred Route Option, as road is moved closer and there is limited open space in front of the building. Impact is greater, compared to the existing condition also, as the A9 encroaches closer towards the building. Pedestrian underpass would improve the opportunity for sustainable re-use of the station building, although not as effectively as the Community's Preferred Route Option.
Geology & Soils	<ul style="list-style-type: none"> No requirement for alterations to the Waste Management License for Ladywell Landfill site. No direct disturbance of land within Ladywell Landfill site, therefore less likely to encounter contaminated soils and groundwater and elevated concentrations of ground gasses, such as methane and carbon dioxide, compared to the Community's Preferred Route Option. Reduced impact on groundwater flow patterns with subsequent effects on groundwater quality and quantity, compared to the Community's Preferred Route Option.
People & Communities	<ul style="list-style-type: none"> Does not involve any works to the existing station, including platforms, to address accessibility issues. Station car park, and associated infrastructure, would be designed to comply with current, relevant accessibility legislation, improving accessibility issues, compared to the existing station. Potential provision for a bus stop and bus turning facility, supporting enhanced public transport links. Does not provide any opportunity to establish new planting or possibly amenity space associated with the Community's Preferred Route Option on top of the cut and cover tunnel.
Noise and Vibration	<ul style="list-style-type: none"> Estimated that traffic flows will increase on Station Road by approximately 100 vehicles per day, although this is not expected to result in a perceptible difference in road traffic noise on Station Road and is comparable to the Community's Preferred Route Option.
Traffic Assessment	<ul style="list-style-type: none"> Estimated that traffic flows will increase on Station Road by approximately 100 vehicles per day.

Additional Options	Key Features
Feedback from the Local Community & Key Stakeholders	<ul style="list-style-type: none"> Residents of Station Road have suggested concerns regarding the increase in traffic and landscape, noise and visual impacts of the new car park at Birnam Industrial Estate. Does not address local community concerns over the existing accessibility issues within the current station. Partially addresses HES and Perth & Kinross Council concerns over the severance of the Category A Listed station building with the station itself, which may impact the long-term preservation of the building. Addresses concerns from Network Rail that Dunkeld & Birnam Station may be closed for a significant duration during construction of the Community's Preferred Route Option.

Table D.7: Dunkeld Junction, Additional Option 1 Initial Assessment

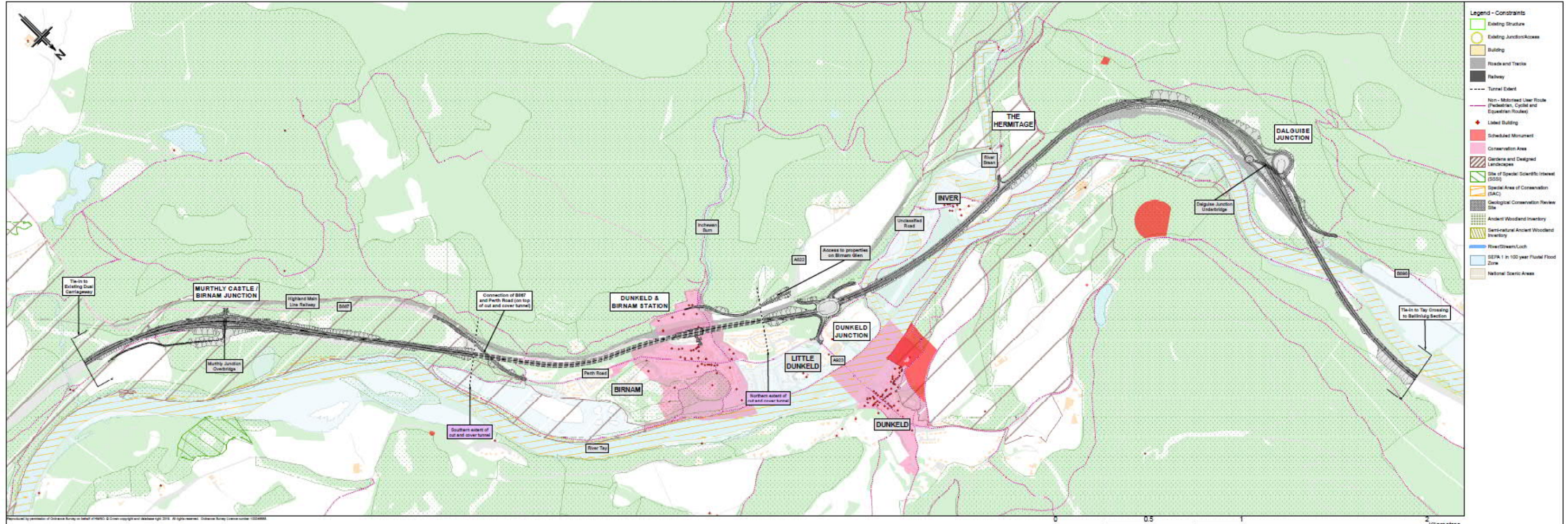
Additional Options	Key Features
GRADE SEPARATED JUNCTION	
Engineering Assessment	<ul style="list-style-type: none"> A9 dual carriageway would be raised to the north of Dunkeld & Birnam Station to provide the necessary headroom clearance at the junction. The proposed A9 dual carriageway would be higher than existing carriageway levels and closer to the level of adjacent residential properties. Increased construction complexity, compared to an at-grade roundabout, within a narrow corridor, with potential increased impact on adjacent residential properties. Short lengths of low height retaining wall required alongside residential properties on Stell Park Road, Telford Gardens and King Duncan's Place to avoid encroachment. New crossing of the River Braan, wider and at an elevated height, compared to the Community's Preferred Route Option. Increase in the vertical level through the junction results in a new retaining wall immediately adjacent to Dunkeld Bowling Club and Dunkeld & Birnam Tennis Club Provides segregated NMU crossing facility, addressing concerns from cycle groups and Perth & Kinross Council.
Landscape & Visual	<ul style="list-style-type: none"> Greater impacts on the landscape, compared to the Community's Preferred Route Option, primarily due to an increased prominence of road infrastructure to provide a grade separated junction and the formation of associated earthworks. Loss of additional areas of existing woodland, which contribute to the landscape's high-quality character, compared to the Community's Preferred Route Option. The increased loss of woodland would also result in greater impacts on the 'Exceptionally Rich, Varied and Beautiful Woodlands' Special Quality of the River Tay (Dunkeld) NSA. Greater adverse impacts on the visual amenity of residents of Telford Gardens, Stell Park Road and King Duncan's Place due to extensive earthworks, elevated A9 and junction slip roads that would encroach closer to residential properties. Greater adverse impacts on the visual amenity of visitors to Dunkeld Cathedral, due to extensive earthworks, elevated dual carriageway and loss of existing woodland.
Ecology & Nature	<ul style="list-style-type: none"> Greater impact on ancient woodland habitat on the AWI than the Community's Preferred Route Option.
Cultural Heritage	<ul style="list-style-type: none"> Comparable with the Community's Preferred Route Option.
People & Communities	<ul style="list-style-type: none"> Increased overall land-take, compared to the Community's Preferred Route Option. Demolition of a residential and commercial property at the existing junction between the A822 and A9, comparable with the Community's Preferred Route Option.
Traffic Assessment	<ul style="list-style-type: none"> Improved journey times compared to existing condition by approximately 15 to 25 seconds. No queueing or delays on the A9 and side roads.
Feedback from	<ul style="list-style-type: none"> Addresses concerns from a small number of local residents who have expressed a preference for a

Additional Options	Key Features
the Local Community & Key Stakeholders	<p>grade separated junction.</p> <ul style="list-style-type: none"> • Contradicts the results of the A9 Co-Creative Process where approximately 40% of the local community voted for an at-grade roundabout (Table 1.13). • No requirements for street lighting on a grade separated junction, addressing concerns from SNH. • Addresses Police Scotland, Scottish Ambulance Service and Scottish Fire & Rescue Service concerns over the potential for increased road traffic accidents at roundabouts and increased response times. • Addresses Police Scotland concerns over the safe operation of the cut and cover tunnel and roundabout in unison and the potential for minor incidents on the roundabout to quickly escalate, impacting the cut and cover tunnel and resulting in significant queues. • Addresses Freight Transport Association and Road Haulage Association concerns over possible excretion of pollutants from HGVs at roundabouts, primarily due to the acceleration and deceleration, which may also impact fuel economy. • Addresses Transport Scotland (Network Maintenance) concerns over the safe operation of the cut and cover tunnel and roundabout in unison and the potential for minor accidents on the roundabout to escalate quickly, impacting the cut and cover tunnel and resulting in significant queues on the A9.

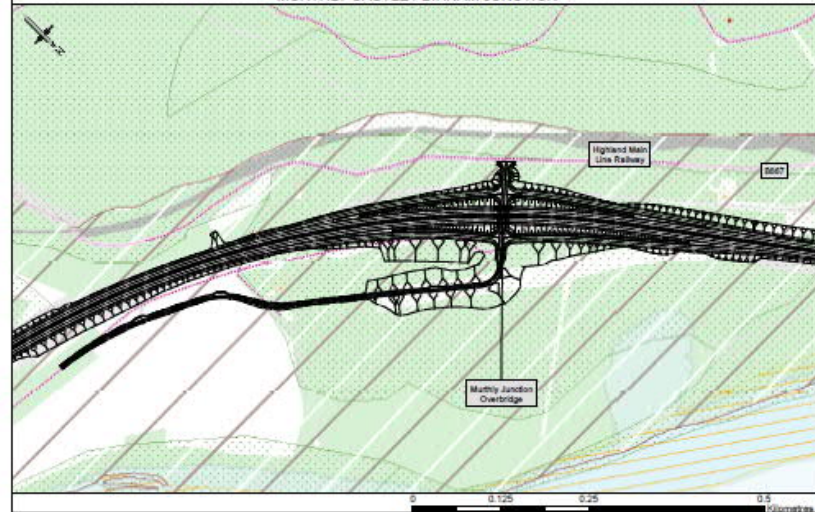
Appendix E. Options for DMRB Stage 2 Assessment

Community's Preferred Route Option (Option ST2A)

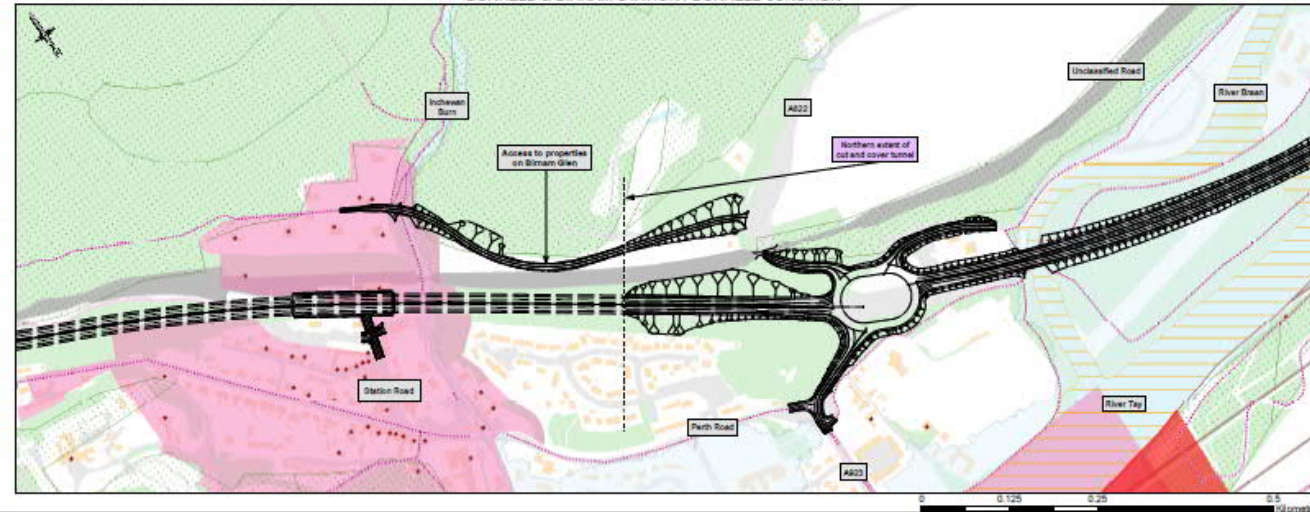
PASS OF BIRNAM TO TAY CROSSING - COMMUNITY'S OPTION



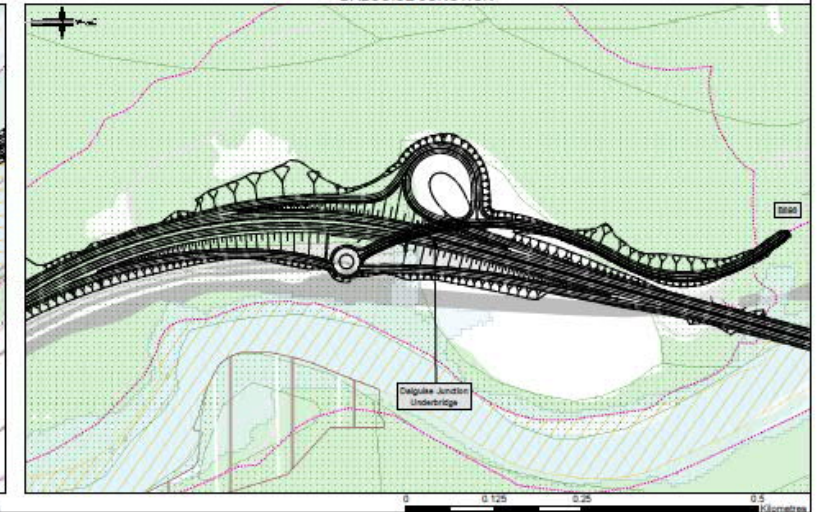
MURTHLY CASTLE / BIRNAM JUNCTION



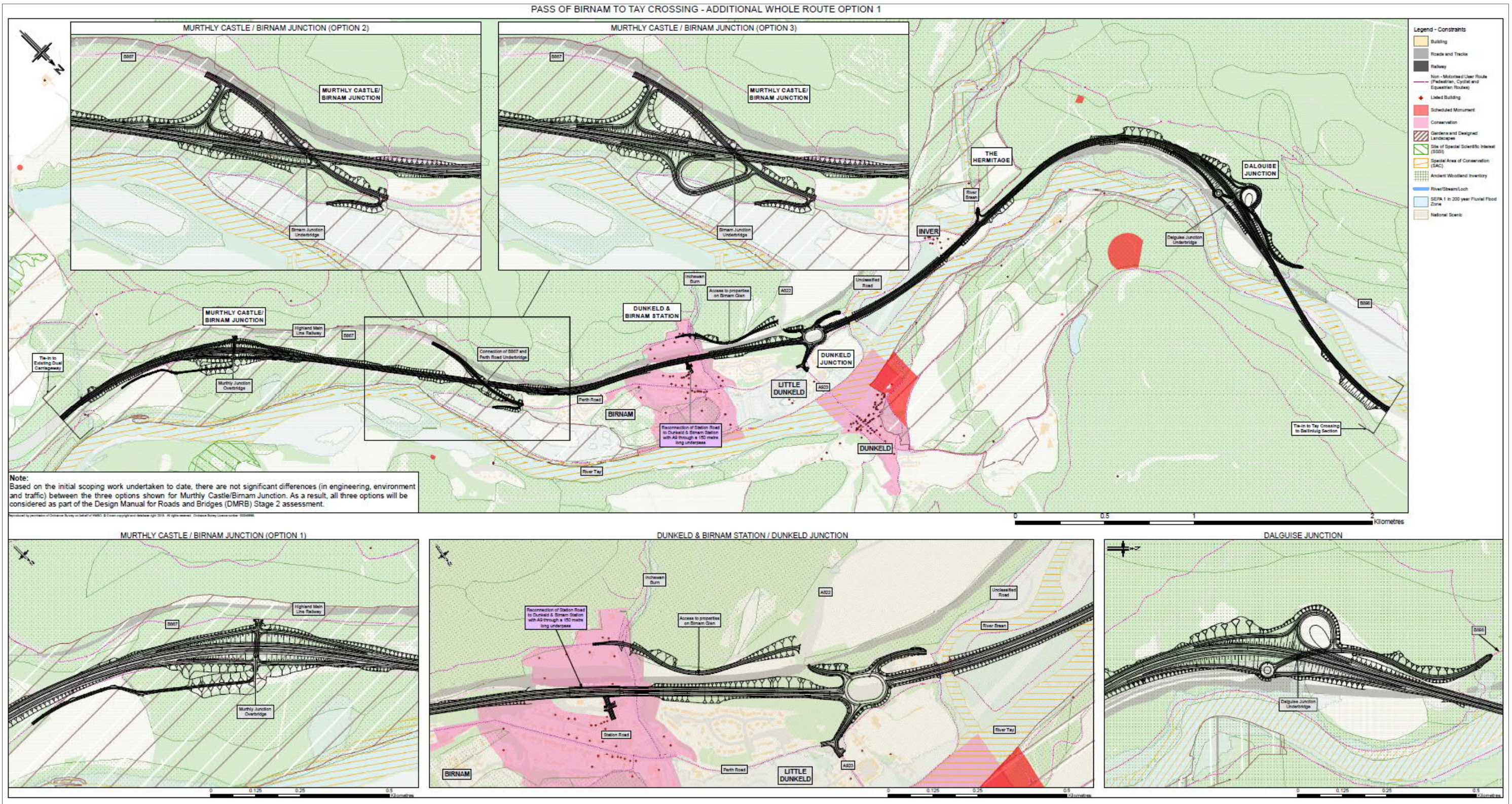
DUNKELD & BIRNAM STATION / DUNKELD JUNCTION



DALGUISE JUNCTION

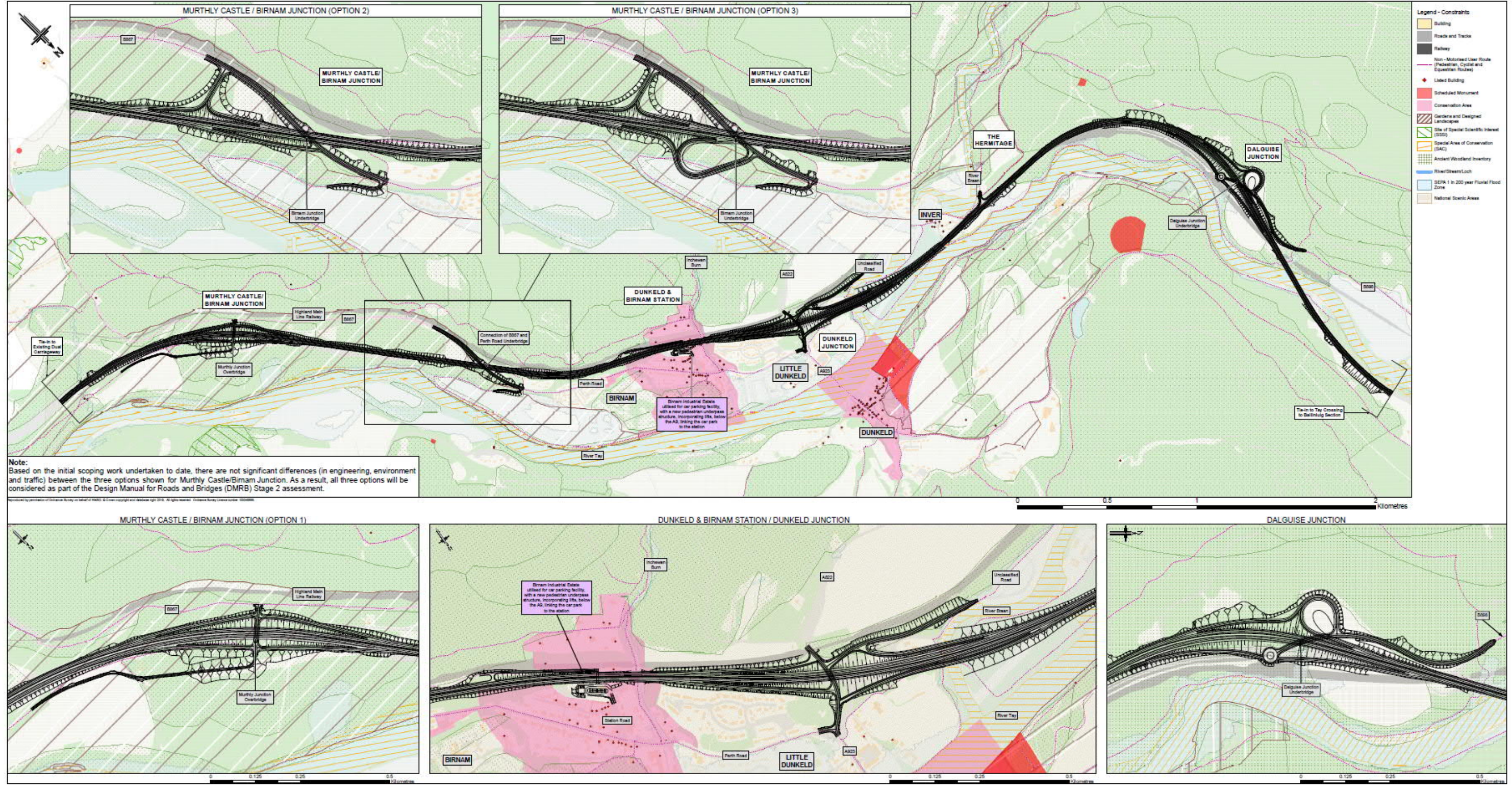


Additional Whole Route Option 1 (Option ST2B)



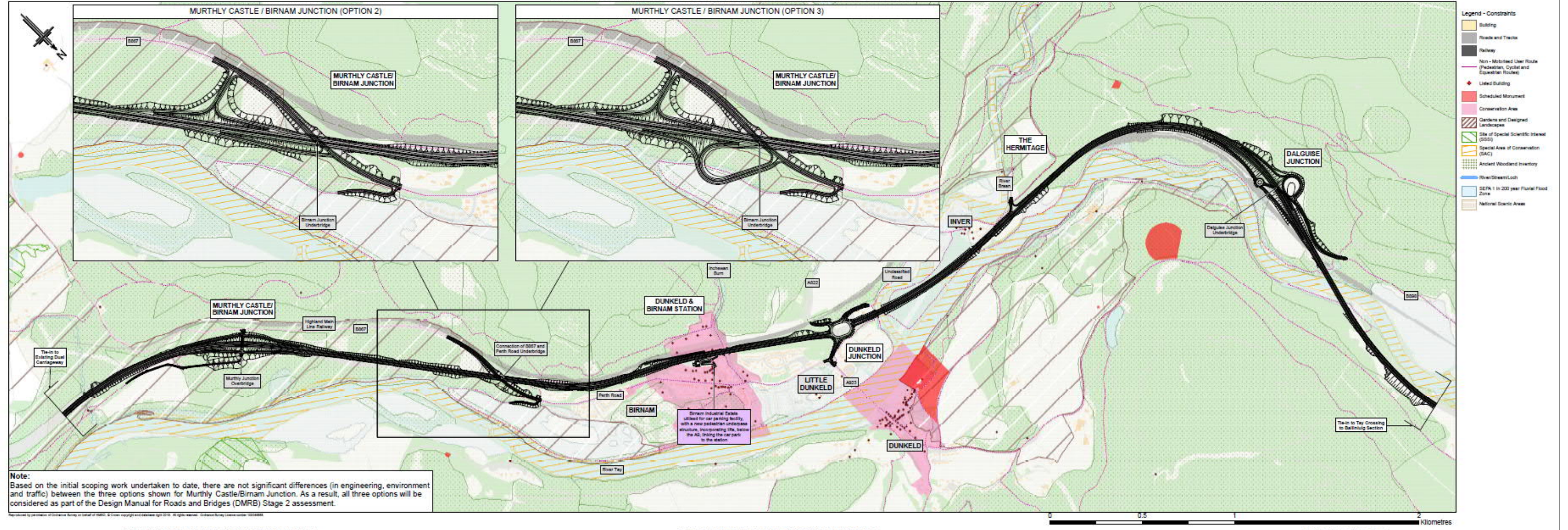
Additional Whole Route Option 2 (Option ST2C)

PASS OF BIRNAM TO TAY CROSSING - ADDITIONAL WHOLE ROUTE OPTION 2



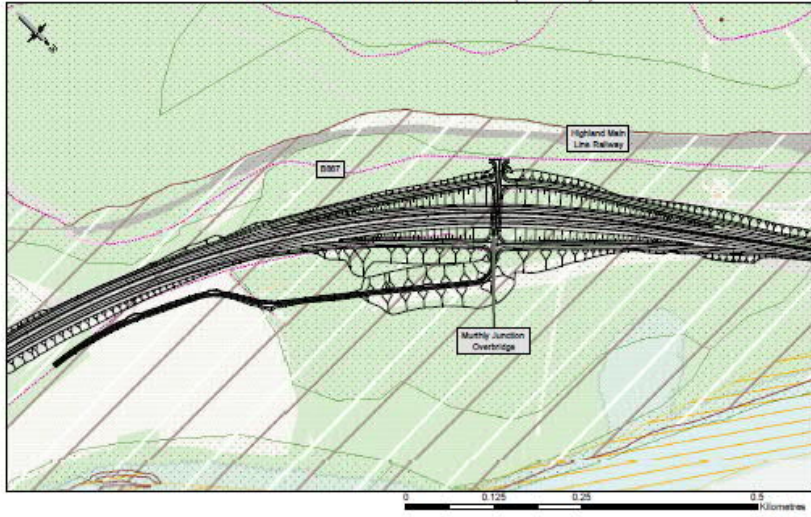
Additional Whole Route Option 3 (Option ST2D)

PASS OF BIRNAM TO TAY CROSSING - ADDITIONAL WHOLE ROUTE OPTION 3

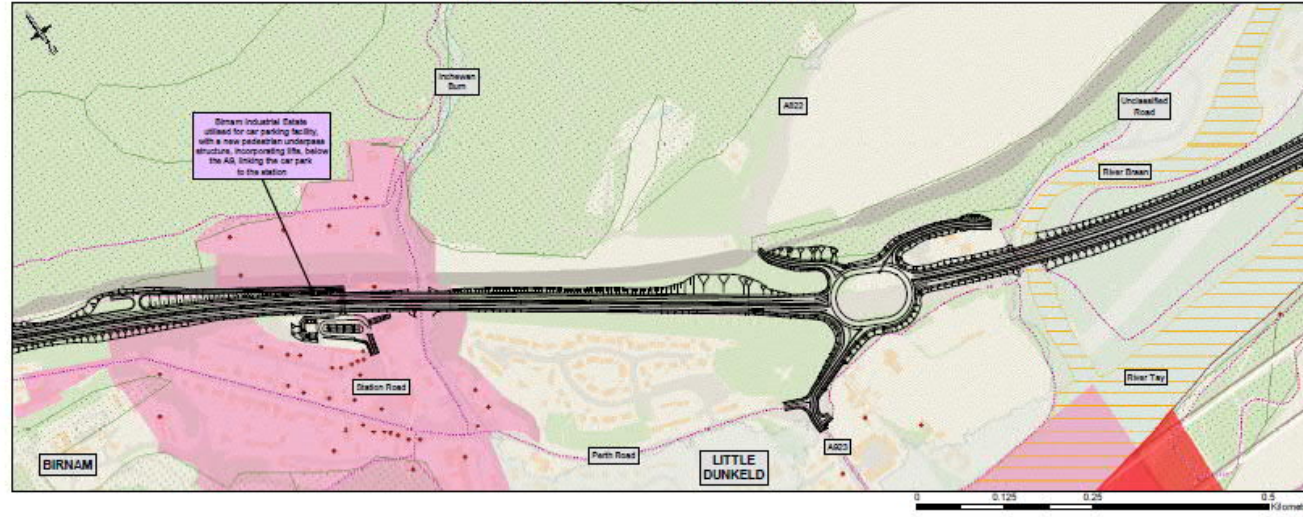


Note:
 Based on the initial scoping work undertaken to date, there are not significant differences (in engineering, environment and traffic) between the three options shown for Murthly Castle/Birnam Junction. As a result, all three options will be considered as part of the Design Manual for Roads and Bridges (DMRB) Stage 2 assessment.

MURTHLY CASTLE / BIRNAM JUNCTION (OPTION 1)



DUNKELD & BIRNAM STATION / DUNKELD JUNCTION



DALGUISE JUNCTION



Appendix F. Whole Route Options Workshop Meeting Notes



Meeting Minutes

95 Bothwell Street
 Glasgow, Scotland G2 7HX
 United Kingdom
 T +44 (0)141 243 8000
 F +44 (0)141 226 3109
 www.jacobs.com

Project	A9 Pass of Birnam to Tay Crossing	Project No	B2140002
Subject	Whole Route Options Workshop		
Prepared by	Craig Ritchie		
Location	95 Bothwell Street, G2 7HX	Date/Time	16 April 2019 / 09:00
Participants	<p><u>Transport Scotland</u> Jo Blewett (JB) Gordon Ramsay (GR) Andy Anderson (AA)</p> <p><u>Jacobs</u> Robert Cairnduff (RC) Alan Gillies (AG) Keith Sheridan (KLPS) Alan Blair (AJB) David Maley (DM) Graham Kerr (GK) Craig Ritchie (CR)</p>		
Apologies	Pauline Graham (Jacobs)		
Copies to	Sarah Morgan (Jacobs)		

Notes		Action
Introduction		
1	The aim of the workshop was to discuss the initial assessment Jacobs has undertaken on the Community's Preferred Route Option and the disaggregated options, including Murthly/Birnam Junction, A9 Dual Carriageway, Dunkeld & Birnam Station and Dunkeld Junction, and the formation of Whole Route Options that will be considered in the Design Manual for Roads and Bridges (DMRB) Stage 2 assessment.	
2	For information, Jacobs provided an overview the Community's Preferred Route Option, as voted by the community through the A9 Co-Creative Process, and the additional options for each of the disaggregated parts. A summary of key findings of the assessment was also provided.	
Murthly/Birnam Junction		
3	Jacobs noted the Murthly Junction, included in the Community's Preferred Route Option, is expected to result in a slight increase in traffic on the section of the B867 that connects the proposed junction to Perth Road. Jacobs also noted that there is potential that traffic may increase on Perth Road as drivers exit the A9 dual carriageway at the Murthly Junction, as opposed to the proposed Dunkeld Junction, due to the lower A9 speed	Jacobs

Notes	Action
<p>limit (50mph). However, this may be partly resolved at later stages by implementing an appropriate signage strategy that directs drivers to the Dunkeld Junction.</p> <p>Transport Scotland asked that Jacobs review further and be clear of the traffic implications as a result of the option, particularly in relation to Perth Road, through Birnam.</p>	
<p>4 Jacobs explained that adjacent physical and environmental constraints limit where an alternative junction at Murthly/Birnam can be located. As such, the only other viable alternative to the location of the junction in the Community's Preferred Route Option is in the locality of the existing left/right staggered priority junction at Birnam.</p> <p>Transport Scotland stated that this rationale should be made clear in any reporting, with the engineering and environmental issues clearly explained. Transport Scotland also noted that Jacobs had considered other junction forms, i.e. loops and compact loops, and stated that the reason they are unsuitable should also be made clear.</p>	Jacobs
<p>5 Jacobs stated that the initial assessment undertaken to date suggests there are not significant differences between the three options under consideration at Murthly/Birnam Junction. All options impact designated environmental sites, including the River Tay (Dunkeld) National Scenic Area (NSA), the Murthly Castle Garden and Designed Landscape (GDL) and designated Ancient Woodland. Having said that, Jacobs felt that Murthly/Birnam Additional Option 1 (3-arm junction) was perhaps the most suitable.</p> <p>Transport Scotland stated that they did not feel that the level of assessment undertaken at this stage was sufficient to eliminate options for the Murthly/Birnam Junction. As such, Transport Scotland felt that all options should be subject to further consideration as part of the DMRB Stage 2 assessment.</p> <p>It was therefore agreed by Transport Scotland and Jacobs that the Whole Route Options should include all three Murthly/Birnam Junction options. Murthly/Birnam should be taken forward. This will increase the number of Whole Route Options under consideration to ten.</p>	Jacobs
<p>6 Jacobs noted that the junction included in the Community's Preferred Route Option had been designed to accommodate a 50mph speed limit, which is required as a result of the cut and cover tunnel. Should a junction at Murthly be considered with an option that does not include a cut and cover tunnel, it would be considered for a 70mph speed limit. Jacobs stated that they had undertaken such a design to determine the likely impacts. The proposed junction slip roads would be slightly longer and to accommodate the necessary forward visibility, additional central reserve and verge widening would be required, increasing the associated land-take and further impacting the NSA, GDL and Ancient Woodland. To accommodate the widening, the southern extent of the scheme would be extended by approximately 300 metres, which would impact existing lay-bys on the existing dual carriageway section.</p> <p>Transport Scotland noted that this should be made clear in any reporting.</p>	Jacobs
A9 Dual Carriageway	
<p>7 Jacobs noted that the community is concerned that A9 dualling will increase noise. It is surmised that this may be a reason why a significant proportion of the community favoured the cut and cover tunnel. One of the additional options under consideration for the A9 dual carriageway is an</p>	Jacobs

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<p>at-grade option. Jacobs queried if Transport Scotland would consider a change to their policy of only providing noise mitigation where necessary and provide noise barriers alongside the A9 for an at-grade option. This would provide noise benefits in the locality. It was noted that there may be some landscape impacts, although the type of noise barrier could be considered to minimise this impact.</p> <p>Transport Scotland stated that Jacobs should consider what form of noise barriers would be most likely (i.e. earthwork bunds or fencing) and identify associated costs. This would be discussed within Transport Scotland at DMRB Stage 3.</p>	
<p>Dunkeld & Birnam Station</p>	
<p>8 Jacobs noted that Additional Option 2, which involves utilising Birnam Industrial Estate as a replacement station car park and providing an underpass structure to connect to the station, provides access only to Platform 1 (southbound). Transport Scotland noted that they had undertaken initial discussions with both Network Rail and Transport Scotland (Rail) and if this option is identified as the Preferred Route Option, a multi-agency approach may be taken to investigate if current accessibility issues could be resolved.</p>	<p>Transport Scotland</p>
<p>9 Transport Scotland stated that prior to identification of a Preferred Route Option, it would be beneficial to know what the future possible options were in relation to improving accessibility to the station. It should be made clear that none of the options considered would preclude works to the platforms and an idea of the possible options to improve accessibility, such as increased platform heights, should be provided.</p> <p>While this may be mentioned in the DMRB Stage 2 Assessment Report, it should be considered in more detail as part of the DMRB Stage 3 assessment.</p>	<p>Jacobs</p>
<p>10 Jacobs stated that Dunkeld & Birnam Station Additional Option 1, which involves station relocation to the north, had undergone initial assessment. While the option does have some advantages, most notably it would solve accessibility issues with the current station, the initial assessment suggests that Dunkeld & Birnam Station Additional Option 2 is more favourable, primarily as it does not involve works to track, has a reduced impact on the Category A Listed station building and provides better connection to Station Road. As such, Jacobs recommended that Dunkeld & Birnam Station Additional Option 1 be removed from further consideration.</p> <p>Transport Scotland accepted this recommendation.</p>	
<p>Dunkeld Junction</p>	
<p>11 Jacobs described the Community's Preferred Route Option, which is an at-grade roundabout, and Dunkeld Junction Additional Option 1, which is a grade separated junction. While related impacts have been considered, it is difficult to fully compare as they are considered such different junction forms.</p> <p>Transport Scotland stated that it should be made clear why other alternative grade separated junction layouts have not been considered at this time, noting previous work undertaken by Jacobs.</p>	<p>Jacobs</p>
<p>Additional Whole Route Options</p>	
<p>12 Jacobs initially presented four Additional Whole Route Options to be considered alongside the Community's Preferred Route Option. However,</p>	

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<p>as it was recommended that Dunkeld & Birnam Station Additional Option 1 was removed from further consideration, one of the additional Whole Route Options that included the option, was removed.</p> <p>13 Jacobs provided an overview of the proposed Additional Whole Route Options, highlighting how each option had been constructed considering the initial assessment, the findings of the A9 Co-Creative Process and the community's and Transport Scotland's objectives. A summary of the options is given below.</p> <p><u>Additional Whole Route Option 1</u></p> <ul style="list-style-type: none"> • A9 dual carriageway includes a 150-metre-long underpass structure in the locality of Dunkeld & Birnam Station. • Reconnection of Station Road to Dunkeld & Birnam Station. • At-grade roundabout at Dunkeld Junction. <p><u>Additional Whole Route Option 2</u></p> <ul style="list-style-type: none"> • At-grade A9 dual carriageway. • Birnam Industrial Estate utilised as a new station car park with a new pedestrian underpass across the A9. • Grade separated junction at Dunkeld Junction. <p><u>Additional Whole Route Option 3</u></p> <ul style="list-style-type: none"> • At-grade A9 dual carriageway. • Birnam Industrial Estate utilised as a new station car park with a new pedestrian underpass across the A9. • At-grade roundabout at Dunkeld Junction. <p>All options include a northbound left-in left-out junction at The Hermitage and a grade separated junction at Dalguise. It was noted that earlier assessment of these junctions and the A9 Co-Creative Process had identified a consistent preferred option.</p> <p>Transport Scotland accepted that the Additional Whole Route Options identified should be taken forward to undergo further assessment as part of the DMRB Stage 2 assessment.</p>	
<p>14 Additional Option 1 includes a 150-metre-long underpass structure in the locality of Dunkeld & Birnam Station and a roundabout at Dunkeld. Jacobs explained that a grade separated junction, incorporating an underbridge at Dunkeld is not suitable without a significantly reduced standard vertical alignment. While a grade separated junction with an overbridge could be provided, this would involve significant excavation north of the station, adjacent to the Highland Main Line railway and residential properties. The extent of the excavation would require bored piled retaining walls of significant height. To avoid the use of ground anchors, which would extend beneath residential properties and the Highland Main Line railway, a bored pile wall with counterforts could be constructed. However, such a solution would incur significantly greater costs and a lengthy construction period. A further alternative would be to lower the side road at Dunkeld Junction, allowing the A9 dual carriageway to be lowered also. However, such a solution incurs significant realignment of the A822 and will require a new railway structure. Furthermore, significant height retaining walls would still be required alongside the Highland Main Line railway and residential properties.</p> <p>Transport Scotland noted that this should be made clear in any reporting.</p>	Jacobs

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General	
<p>15 A public consultation event was held in late March 2019 that presented the disaggregated parts to the public. Transport Scotland indicated that to ensure transparency with the community, a further public consultation event should be planned for the week commencing 13th May 2019, subject to availability, to show the public the Whole Route Options.</p> <p>Transport Scotland emphasised that this event should be in the form of a drop-in and should be more informal than the previous event. Strip plans with a board explaining how the Additional Whole Route Options were formed should be prepared. Jacobs to consider and provide Transport Scotland with an outline plan.</p> <p>Transport Scotland to produce a note to Scottish Ministers advising them of the event.</p>	Jacobs
<p>16 Jacobs noted that a proposed meeting with members of the Environmental Steering Group (ESG) is scheduled for 28th May 2019. This meeting will be used to inform the group of the Additional Whole Route Options and to acquire any initial feedback they may have. This feedback, along with any previously obtained feedback will be considered in the future assessment.</p>	
<p>17 Transport Scotland stated that a report detailing the initial assessment should be prepared, explaining the process to arrive at the Additional Whole Route Options.</p>	Jacobs