A9 DUALLING
PASS OF BIRNAM TO TAY CROSSING

DMRB Stage 3 Environmental Impact Assessment Report

Non-Technical Summary

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TRANSPORT SCOTLAND
CÒMHDHAIL ALBA

A9 Dualling Programme: Pass of Birnam to Tay Crossing

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Jacobs U.K. Limited
95 Bothwell Street
Glasgow
Scotland G2 7HX
United Kingdom

Introduction

Preface

This document is the Non-Technical Summary (NTS) of the Environmental Impact Assessment Report (EIAR) for the A9 Dualling: Pass of Birnam to Tay Crossing. The project is proposed by Transport Scotland, an agency of the Scottish Government.

A copy of this Environmental Impact Assessment Report may be inspected, free of charge, during normal opening hours from 30 May 2025 to 25 July 2025 at:

- Birnam Arts, Station Road, Birnam, Dunkeld, PH8 0DS
- Transport Scotland, 177 Bothwell Street, Glasgow, G2 7ER

Please note that normal opening hours may vary during this period.

The EIAR (including NTS) and draft Orders may be viewed online on the Transport Scotland website:

https://www.transport.gov.scot/projects/a9-dualling-perth-to-inverness/a9-pass-of-birnam-to-tay-crossing/

Any person wishing to make any representations about the project and the EIAR should write to the Director of Major Projects, Transport Scotland, 177 Bothwell Street, Glasgow, G2 7ER. Representations must be received on or before 25 July 2025.

Background

The A9 Trunk Road forms a strategic link on Scotland's Transport Network, linking the Scottish Highlands and Central Scotland, and is vital to supporting the growth and development of the economy in the north of Scotland.

A Strategic Transport Projects Review (STPR) in 2009 set out the future investment programme for transport in Scotland over two decades, including the proposed upgrade of the A9. Following this review, the Scottish Government's 2011 Infrastructure Investment Plan (IIP) included the commitment to upgrade the A9 to dual carriageway standard between Perth and Inverness. The programme required to achieve this was subject to Strategic Environmental Assessment (SEA) (Transport Scotland, 2013) from 2012 to 2014 to consider the overall constraints, environmental sensitivities and opportunities for enhancement.

The Delivery Plan (Transport Scotland, 2023a) for completion of the A9 Dualling programme was announced by the then Cabinet Secretary for Transport, Net Zero and Just Transition on 20 December 2023, and involves a rolling programme of construction leading to the progressive opening of dualled sections. It is expected that nearly 50% of the A9 between Perth and Inverness will be open as dual carriageway by the end of 2030, rising to 85% by the end of 2033 and 100% by the end of 2035.

The Pass of Birnam to Tay Crossing section of the A9 Dualling Programme, hereafter referred to as 'the proposed scheme', comprises dualling of approximately 8.4 km of the A9, tying into the existing dual carriageway to the south (the previously completed Luncarty to Pass of Birnam section of the A9 Dualling programme) and the Tay Crossing to Ballinluig section to the north. The dualling of this section of the A9 will be achieved through a combination of widening and upgrades to the existing A9 carriageway and incorporates the grade separated Birnam Junction, an at-grade roundabout providing the Dunkeld Junction and a grade separated junction at Dalguise. Access to the Hermitage is provided by a left-in left-out junction and access to Dunkeld & Birnam Station is provided through a new connection at Birnam from Station Road, incorporating a replacement car park and a pedestrian underpass.

Subject to completion of the necessary statutory process for the proposed scheme, it is anticipated that main construction works would take approximately 3 to 4 years (37 months construction works) to complete.

Environmental Impact Assessment

The purpose of the Environmental Impact Assessment is to investigate and report in an Environmental Impact Assessment Report (EIAR) the likely significant effects of the proposed scheme on the biological, physical and historical environment, as well as on the climate, members of the public and on current or planned future use of the environment. The assessment is undertaken in accordance with The Design Manual for Roads and Bridges (DMRB) guidance (National Highways et al, 2025).

This NTS presents a summary of the EIAR, including key aspects of the proposed scheme and the associated beneficial and adverse impacts considered to be of particular importance in determining whether the proposed scheme can be consented under The Roads (Scotland) Act 1984 as amended by the Roads (Scotland) Act 1984 (Environmental Impact Assessment) Regulations 2017.

Further details about the likely significant effects of the proposed scheme can be found within the full text of the EIAR. The EIAR documents have been subdivided into this NTS and three further volumes for ease of use:

- Non-Technical Summary (NTS);
- Volume 1: Main Report;
- Volume 2: Appendices (Specialist Technical Reports); and
- Volume 3: Figures.

The EIA process provides a valuable opportunity to reduce potential environmental impacts and effects through design refinement. Environmental constraints and issues were identified through consultation with landowners, statutory consultees and other stakeholders, environmental surveys and technical assessments. This has informed decision-making throughout the design process, providing opportunities to address potentially significant effects where practicable, e.g. by refining the proposed scheme design or incorporating measures to avoid or reduce potential adverse environmental effects. Effects have been assessed by comparing the existing situation (the baseline conditions) to the conditions that would occur with the proposed scheme in place.

The Proposed Scheme

Need for the Scheme

The A9 is a strategic route linking central Scotland to the north of Scotland, used by both local and long-distance traffic. It is a major bus route and is used by freight traffic supporting key industries, such as food and drink, oil, waste and construction. The route is used by tourists as a means of reaching locations in Perthshire and the Highlands. It is considered that the upgrade of the A9 to dual carriageway will help assist economic growth in the north of Scotland. The A9 Dualling will improve journey times and journey time reliability, potentially saving costs for businesses, reducing driver stress and improving safety; and potentially making the surrounding areas more attractive as a short-term tourism destination.

The national context for the need for the proposed scheme has been identified within several national strategies and policy frameworks as an important national infrastructure scheme. This includes the National Transport Strategy (NTS) of 2006 (Scottish Executive, 2006); the Strategic Transport Review (STPR) in 2009, (Transport Scotland, 2009); the Infrastructure Investment Plan in 2011 (Scottish Government, 2011) and through National Planning Framework (NPF) 3 (Scottish Government, 2014) in 2014 and NPF4 (Scottish Government, 2023) in 2023. Therefore, at a national level, the proposed scheme is supported within several national strategies, in particular it aligns with the vision for Scotland's transport system for the next 20 years, as set out in NTS2 (Transport Scotland, 2020) and the long term spatial strategy provided in NPF4 to maintain a resilient road link from Inverness to Perth.

Local context considerations also support the need for the proposed scheme, supporting objectives set out in local policy such as in Perth & Kinross Council (PKC) Local Development Plan (LDP) 2 (Perth & Kinross Council, 2019) in relation to delivering sustainable economic growth and promoting the delivery of local and strategic transport infrastructure to support sustainable development, including of the wide range of businesses, tourist attractions and recreational activities found in the local area.

The proposed scheme also addresses safety issues for road users (accidents and driver stress). The existing A9 is used by a combination of different vehicle types with the mix of usage leading to relatively higher levels of driver stress. This is particularly acute during the summer months and holiday periods with long waiting times at at-grade junctions and lack of safe overtaking opportunities, both of which have led to some serious accidents including fatalities. There is also a lack of alternative diversion routes, which causes severe delays when accidents do occur. The latest accident statistics, including for the proposed scheme, are set out in the A9 Dualling Programme Outline Business Case (Transport Scotland, 2023b).

Scheme Objectives

The aim of dualling the A9 between Pass of Birnam and the Tay Crossing is to improve the operational performance and safety of this section of the A9, building on and contributing to the objectives set for the overall A9 Dualling Programme.

The STPR assessment of issues and improvement opportunities along the existing A9 led to the development of the A9 Dualling programme objectives set by Transport Scotland, which are:

1. To improve the operational performance of the A9 by:
    - reducing journey times; and

- improving journey time reliability.

2. To improve safety for motorised and non-motorised users through:
   - reducing accident severity; and
   - reducing driver stress.
3. To facilitate active travel within the corridor.
4. To improve integration with Public Transport facilities.

The environmental assessment process facilitates these objectives to be met whilst avoiding and/or reducing environmental effects, enhancing the environment and improving sustainability where possible. This is done through the inclusion of appropriate environmental measures, adherence to best practice during construction and measures 'embedded' into the design such as new footways to improve existing facilities and connectivity.

Alternatives Considered

In 2004, a Route Improvement Strategy Study (RISS) (Scott Wilson, 2004) for the new A9 trunk road between Perth and Blair Atholl was undertaken, which recommended upgrading the A9 between Perth and Pitlochry to dual carriageway standard. In 2009, the Pass of Birnam to Tay Crossing section of the scheme considered an online corridor for a dual carriageway, with offline corridors discounted due to adjacent topography (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).

Subsequent assessment of five alternative scheme options was not concluded and no recommendations were provided due to the need to undertake further consultation. A Strategic Environmental Assessment (SEA) was then undertaken of the A9 Dualling Programme from 2012 to 2014, which considered environmental constraints, issues, risks and opportunities associated with alternative approaches to achieving the broader scheme objectives. The SEA was completed in parallel with a similar consideration of engineering constraints, issues, risks and opportunities as part of a Preliminary Engineering Services (PES) commission.

Three high-level, strategic alternative dualling options were considered within the SEA for the A9 Dualling programme: online widening, a combination of online widening and offline dualling at more constrained locations, and complete offline dualling. The studies identified that online widening following the route of the existing A9 was the most suitable option.

As part of the A9 PES study, the A9 between Perth and Inverness was sub-divided into six sections (Sections A-F), with Pass of Birnam to Tay Crossing falling into Section A (Inveralmond to Tay Crossing). Sectioned indicative corridor options were considered within each of the sections, with those of geographic relevance to the proposed DMRB Stage 3 Pass of Birnam to Tay Crossing scheme comprising:

- Option A1: Online dualling between Inveralmond to Tay Crossing.
- Option A3: Online dualling to Bankfoot and thereafter offline to the south of Birnam Hill.

- Option A4: Online dualling to Bankfoot and thereafter offline to south of railway line and existing trunk road.
- Option A5: Online dualling to Pass of Birnam and thereafter offline to north of Dunkeld and Birnam.
- Option A6: Online dualling to Pass of Birnam and thereafter offline to south of railway line and existing trunk road.

Following further consideration at a sifting assessment workshop in January 2013, attended by Transport Scotland, it was agreed that Options A2, A3, A4 and A5, all of which would require a significant length of offline works with resulting environmental impacts, were significantly less advantageous than the on-line Option A1. Dualling via alternative routes to the existing A9 to provide the most direct route between the two cities (Option A: Perth to Inverness) irrespective of any constraints, was also discounted. As a result, Option A1 was to be progressed for further assessment for this section of the A9 Dualling programme.

The PES commission also developed a broad strategy for the treatment of existing junctions and accesses along the A9.

In accordance with the A9 Junctions and Accesses Strategy, it was further stated that grade separated junctions 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.

Further work was undertaken to address issues including access to Dunkeld & Birnam Station for vehicular traffic and constructability within a constrained corridor. This led to the development of three options that followed the same horizontal alignment and differed only in vertical alignment within the central section of the route, in the vicinity of Dunkeld & Birnam Station. Each had variations of junction arrangements at Birnam Junction, Dunkeld Junction and Dalguise Junction. Two options proposed to re-locate Dunkeld & Birnam Station north of the Inchewan Burn with access provided via the A822. The third option had the mainline lowered in the vicinity of Dunkeld & Birnam Station to facilitate access to the station and replacement car parking above the mainline via Station Road.

The three options (Options A, B and C) 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 an A9 Co-Creative Process, a collaboration between the community and Transport Scotland and its consultants, to identify and consider a variety of route options and scheme elements for the proposed scheme.

Following a series of community workshops in 2017, a series of community objectives were generated:

- 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.

The subsequent A9 Co-Creative Process consisted of the following five stages:

- Stage 1: Community Options Gathering
- Stage 2: Developing an All-Candidate Option List
- Stage 3: Creating a Long List
- Stage 4: Selecting a Short List
- Stage 5: Agreeing a Community Preferred Route Option

By the end of Stage 4, four whole route options that were selected for final voting were:

- three 'online' routes (Routes A, B and D) which would follow the line of the existing A9 (but partly at lower level involving a cut and cover tunnel or underpass) with junctions at Dunkeld, Dalguise and the Hermitage, and the retention of the Dunkeld & Birnam Station; and
- one 'offline' route (Route C) which consisted of a 2.8km tunnel to the west of the existing A9 with junctions at Dalguise and the Hermitage, and the retention of the Dunkeld & Birnam Station.

The online options had varying lengths of tunnel with Route A incorporating a 1.5km tunnel, Route B a 450m tunnel and Route D an underpass of up to 150m. To complete the whole route, three options for junctions at the Birnam and Murthly Castle end of this section were also offered:

- a restricted movement grade-separated junction at Birnam;
- a full movement grade-separated junction adjacent to the current access at Murthly Castle; or
- a roundabout at Birnam.

Over the voting period, between 23 June and 2 July 2018, 720 people voted online or submitted voting cards. Voting was open to the public and the number of votes received represented a very strong turnout relative to the size of the community. The rankings were aggregated into total scores for each of the four short-listed routes to determine the Community's Preferred Route Option (CPRO).

The online route (Route A) incorporating a 1.5km tunnel commencing in the area of the existing junction of the A9 with the B867 and Perth Road at Birnam and terminating in the area of the existing junction with the A923 and A822 at Little Dunkeld came out on top with the highest score, attracting 37.4% of the total of all scores across the four routes and also attracting 45% of the first place votes recorded. Routes B, C and D attracted 23%, 22.3% and 17.3% of the total of all scores respectively. The CPRO was announced on 13 August 2018.

Following completion of the A9 Co-Creative Process, initial assessment was undertaken on the CPRO. This work considered environmental, constructability and economic impacts and identified a number of key challenges. As a result, three Additional Whole Route Options were developed, and these were to be considered alongside the CPRO as part of the DMRB Stage 2 assessment (options appraisal stage) of the proposed scheme. The four Route Options considered were:

- CPRO (Option ST2A) with A9 dual carriageway lowered into a 1.5km cut and cover tunnel structure. Grade separated junctions at Murthly and Dalguise and an at-grade roundabout at Dunkeld. Dunkeld & Birnam Station Replacement Car Park on cut and cover tunnel with direct access to Birnam from Station Road.
- Additional Whole Route Option 1 (Option ST2B) with A9 dual carriageway lowered into a 150m underpass structure. Grade separated junctions at Birnam and Dalguise and an at-grade roundabout at Dunkeld. Dunkeld & Birnam Station Replacement Car Park on underpass with direct access to Birnam from Station Road.
- Additional Whole Route Option 2 (Option ST2C) on-line route, largely following the horizontal and vertical alignment of the existing A9 single carriageway. Grade separated junctions at Birnam, Dunkeld and Dalguise. Dunkeld & Birnam Station Replacement Car Park off Station Road and Pedestrian Underpass under the main alignment providing access to Dunkeld & Birnam Station.
- Additional Whole Route Option 3 (Option ST2D) on-line route, largely following the horizontal and vertical alignment of the existing A9 single carriageway. Grade separated junctions at Birnam and Dalguise and an at-grade roundabout at Dunkeld. Dunkeld & Birnam Station Replacement Car Park off Station Road and Pedestrian Underpass under the main alignment providing access to Dunkeld & Birnam Station.

Following further consultation with the Birnam to Ballinluig A9 Community Group in late 2019, further consideration was given to an option that incorporated a 450 metre long cut and cover tunnel, which was originally developed through the A9 Co-Creative Process.

It was concluded however, that although it had a reduced length of tunnel, the option would still have significant construction complexity, similar to the CPRO (Option ST2A), with an estimated construction duration of between 4 and 4 ½ years. Furthermore, it would also impact local watercourses and not fully address concerns noted from some local residents and stakeholders.

On the basis of the DMRB Stage 2 Route Option Assessment, the Emerging Preferred Route Option (Additional Whole Route Option 3 (Option ST2D)) was recommended to be taken forward as the preferred route for the proposed scheme. This was presented to Scottish Ministers for consideration. As this was different to the CPRO, (Option ST2A), this was presented to Scottish Ministers alongside the CPRO, as agreed as part of the A9 Co-Creative Process. The key reasons to support the recommendation of Option ST2D as the preferred route were as follows:

- The Emerging Preferred Route Option (Option ST2D) includes the community's favoured options, as voted through the A9 Co-Creative Process, at Dunkeld, The Hermitage and Dalguise.
- In addition, the junction option at Birnam is based on the principle of the community's second preference for a junction, which was a grade separated junction, restricted movements junction with a northbound diverge slip road and a southbound merge slip road only. However, to partly address traffic increases on Perth Road with such an option, a northbound merge slip road was added.
- The Emerging Preferred Route Option (Option ST2D) also incorporates improved access to the station, with the opportunity to enhance further, which was noted as important to the local community.

On 20 December 2023, Option ST2D was confirmed by the Scottish Ministers as the Preferred Route Option for the proposed scheme.

Iterative Design Development

The DMRB Stage 3 design for the proposed scheme is the result of approximately 18 months of design development of the preferred route option that was identified on completion of the DMRB Stage 2 assessment (Transport Scotland, 2023).

The project environmental team has influenced the design based on knowledge gained through the EIA process, working closely with the engineering teams, consultees, and Transport Scotland. Through this process, the design has been iteratively updated from the Preliminary Design to reach the refined DMRB Stage 3 Design Fix assessed in the EIAR.

A key consideration in reaching the final DMRB Stage 3 design was the development of the design to avoid any increase in flood risk at key receptors (properties and infrastructure) and the development of the design for Dunkeld & Birnam Station and the Dunkeld & Birnam Station Replacement Car Park and Pedestrian Underpass.

Flood modelling during the development of the preliminary and interim designs highlighted the potential for increased flood risk in the area around Inver where the River Braan and the River Tay meet. Initial designs included two compensatory flood storage areas and more than 20 flood relief culverts. Design development of the River Braan Bridge and the main alignment embankments and WCH provision (provision for walkers, wheelers, cyclists and horse-riders) in the section between the River Braan and Inver allowed the rationalisation of flood mitigation to one compensatory flood storage area and 14 flood relief culverts.

During the iterative design development process, in light of the ongoing proposals of Network Rail in respect of accessibility to and around Dunkeld and Birnam Station, it was identified that the pedestrian underpass proposed as part of the proposed scheme should make provision for step free access to and between both Platform 1 and Platform 2 of Dunkeld & Birnam Station, by extension of the pedestrian underpass under the Highland Main Line railway to Platform 2 and provision of lifts and stairs to both platforms. The design of the Dunkeld & Birnam Station replacement car park, the associated pedestrian underpass, and the platform level buildings containing lifts and stairs, has therefore been developed and refined – an artist's impression of the proposals can be seen in Image 1.

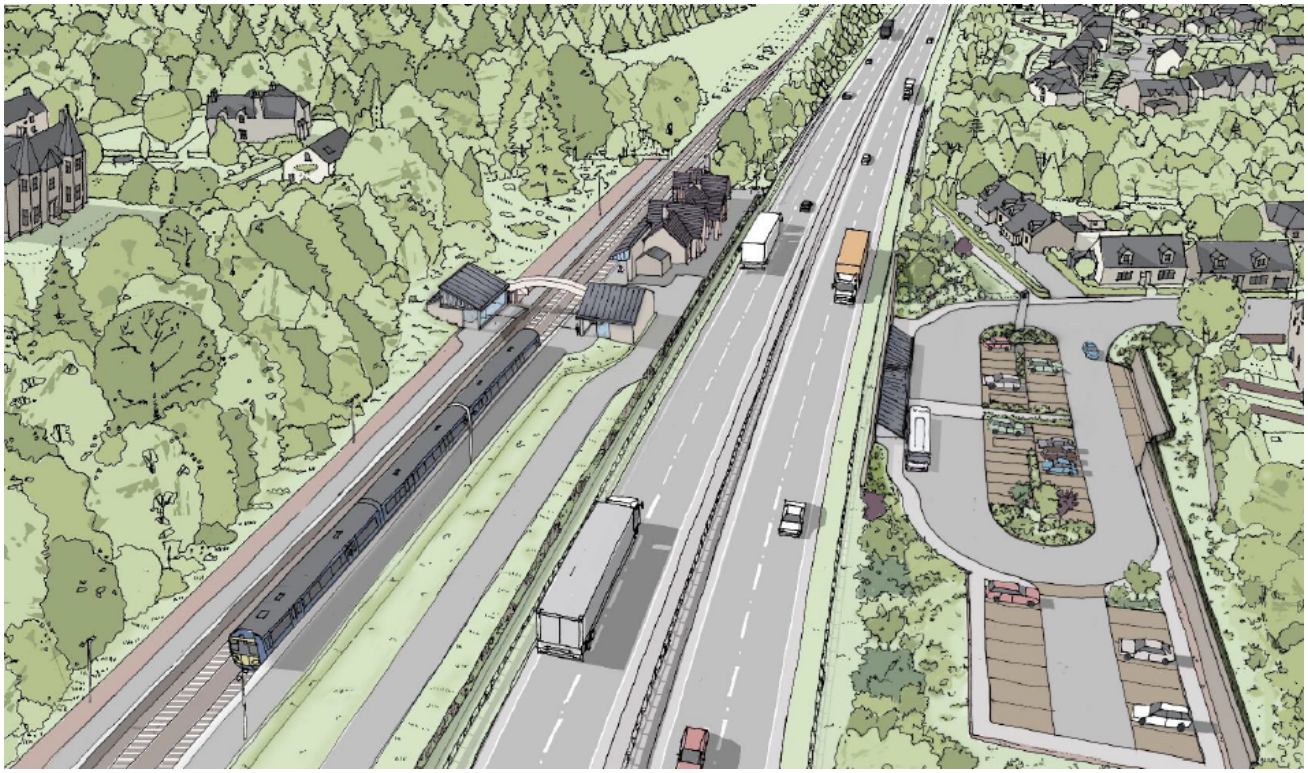


Image 1: Aerial view of Dunkeld & Birnam Station and replacement car park

Some of the other key design considerations during DMRB Stage 3 design development that avoided or reduced the potential impacts include:

- reducing loss of designated areas (River Tay SAC) for example by using retaining wall structures for local access and to protect road infrastructure;
- reducing potential impacts and effects on Key Landscape Features and Special Features of the Murthly Castle Garden and Designed Landscape through design of Murthly Estate Bridge; location, orientation and design of two of the proposed scheme's drainage elements (Sustainable Drainage Systems (SuDS) Basin A and SuDS Basin B2); and development of Birnam Junction;
- reducing/avoiding where practicable the loss of native and ancient woodland through design and providing compensatory planting, including off-site planting;
- reducing impacts on the River Tay floodplain through for example road drainage design, flood relief culverts and provision of compensatory flood storage; and
- drainage design to reduce impacts on the floodplain, habitats and River Tay SAC and whether each SuDS feature should be a dry detention basin or a pond.

Other measures embedded in the proposed scheme include noise attenuation through the use of low noise road surfacing and noise barriers. Woodland planting is also included to integrate the proposed scheme into the landscape and compensate for woodland loss as a result of the proposed scheme. Where planting is specified, native plant species will be used so as to re-establish or reinforce the character of the landscape.

Image 2: Visualisation of Murthly Estate Bridge

The Proposed Scheme

An outline design has been developed for the proposed scheme, which is referred to as the 'DMRB Stage 3 design'. This design would be used by the appointed contractor to prepare a detailed design for construction of the proposed scheme.

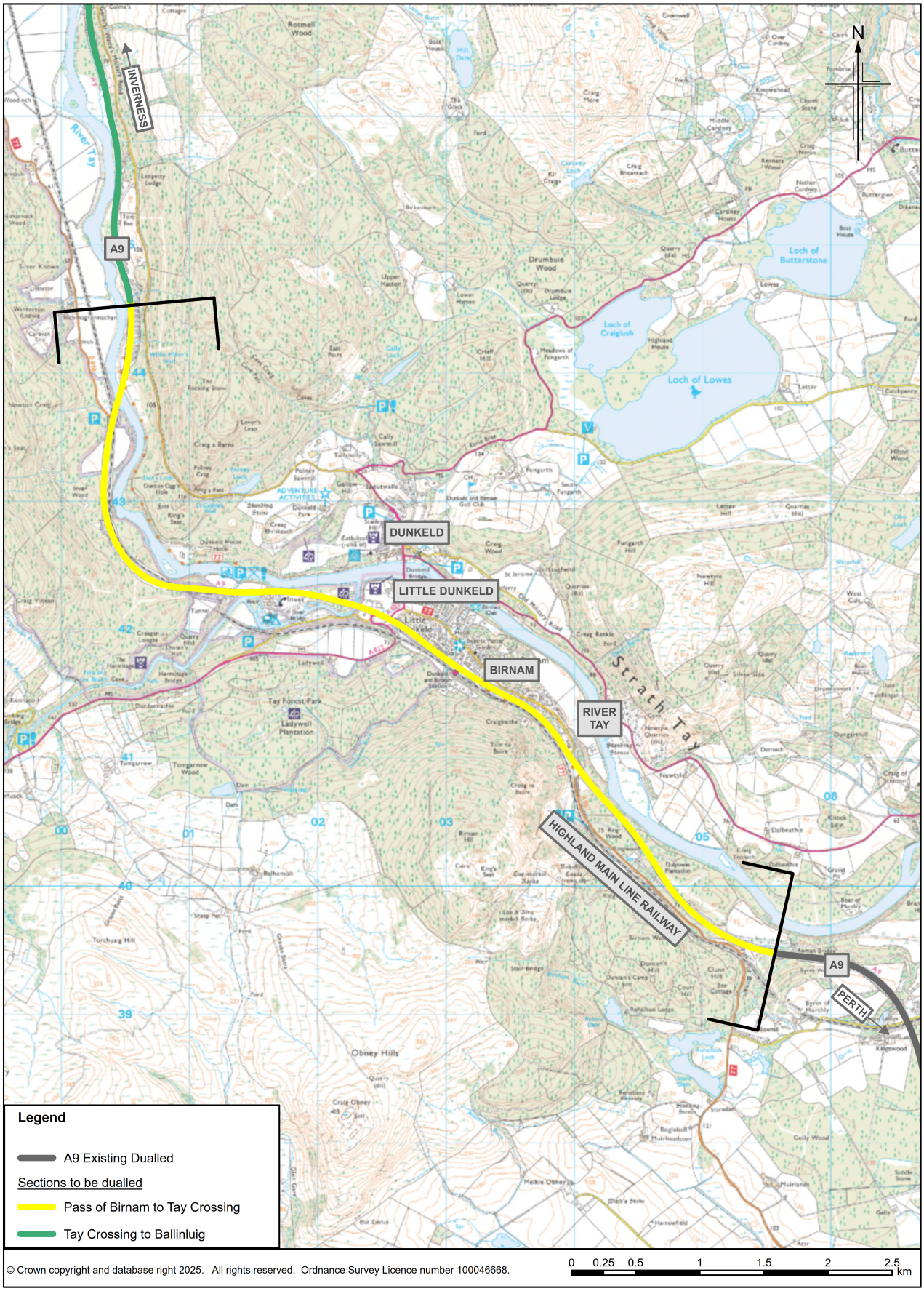
The proposed scheme commences at Pass of Birnam and extends northwards for approximately 8.4km, terminating beyond the Tay Crossing. This section of the A9 is located within close proximity to a number of designated environmental sites, including watercourses forming part of the River Tay Special Area of Conservation (SAC), which are crossed by the existing A9.

The proposed scheme extents are illustrated on Insert A, and the DMRB Stage 3 Design and key environmental features in and around the area of the proposed scheme are illustrated at the end of this document on Figures 1-6. References are made to chainages (shortened to 'ch'), which is a reference to the number of metres from the start of the proposed scheme, from south to north.

A9 Mainline Carriageway Widening

The mainline will comprise of a dual carriageway with minimum 2.5m verges and two lanes of 3.65m width in each direction, plus a 1m hardstrip to both the nearside and offside lanes in each direction and a typically 2.5m wide central reservation separating each carriageway. Both the verges and central reserve will be widened as necessary for visibility.

Insert A: The Proposed Scheme Extents



The existing A9 mainline has several direct accesses linking to side roads and to land and properties along the route, most of which will be removed to meet the desired design and safety standards for the upgraded route, with alternative access being provided by two grade separated junctions, an at-grade roundabout, three at grade left in/left out junctions, and via the existing side road and access track network.

A9 Junction Provision

Two grade separated junctions are included as follows:

- The Birnam Junction (ch1900) replacing the existing at-grade junction and providing a northbound merge, a northbound diverge and a southbound merge facilitating connection to the B867 and Perth Road.
- The Dalguise Junction (ch6800) replacing the existing at-grade junction and providing a northbound merge and diverge loop, a southbound merge and diverge facilitating full vehicle movement and connection with the B898.

It should be noted that the Dalguise junction will facilitate junction movements that, prior to construction of the proposed scheme, will be provided by the A9 Southern Tie-in Interim Roundabout on the Tay Crossing to Ballinluig project. This interim roundabout will be removed as part of the proposed scheme.

The Dunkeld Junction at-grade roundabout (ch4100) replacing the existing at-grade junction will facilitate connection to the A9 (north and south), A923, A822 (Old Military Road) and the Unclassified Road to Inver, and includes a segregated left turn lane from Dunkeld and Birnam via the A923 to the A9 southbound.

There are three left-in left-out junctions on the main alignment to be provided as part of the proposed scheme, as follows:

- A left-in left-out junction (ch3000 northbound) replacing the existing at-grade junction to Dunkeld & Birnam Station, providing only maintenance access to Dunkeld and Birnam Station Building and Network Rail assets, including the signalling box and the road/rail access point.
- Upgrade of the existing access to The Hermitage with the Hermitage left-in left-out junction (ch5200 northbound) providing access to the National Trust for Scotland beauty spot and car park.
- A new left-in left-out junction for the Inver Maintenance Access (North) (ch5500 southbound) providing access to SuDS features and farmland.

Side Road Amendments/Upgrades

Side roads will be upgraded as necessary to provide access from the existing road network to the mainline of the proposed scheme. Upgrades may involve simple resurfacing or may require realignment and other improvements.

Revised accesses to private property including farms, farmland and woodland located along the proposed scheme will tie into the existing road network or onto the A9 main carriageway via the grade separated, at-grade junctions and side road amendments.

Provision for Walkers, Wheelers, Cyclists and Horse Riders

Existing and proposed walkers, wheelers, cyclists and horse rider (WCH) route alignments are included to support one of the objectives of the A9 Dualling to *facilitate active travel within the corridor* of the proposed scheme. The proposed scheme requires the realignment and provision of new paths at 25 locations. New provision is provided at 11 of these locations linking paths to the existing path network. These include new paths that link Birnam to Dalpowie adjacent to the River Tay; Birnam to Birnam Hill/Kings Seat via Perth Road and the B867; Dunkeld and Birnam to Inver crossing the River Braan; Dunkeld, Birnam and Inver to northbound and southbound replacement bus stops at Inver and new provision on the River Tay Bridge that provides better segregation for WCH from traffic and links to paths to the north and south banks of the River Tay.

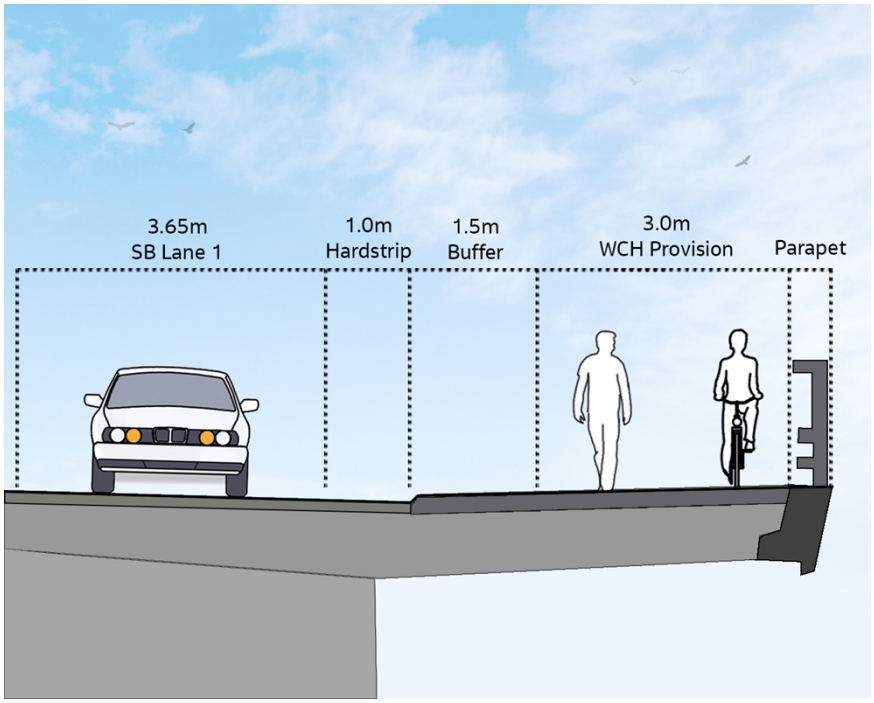


Image 3: Segregation for WCH users on the River Tay Bridge

Bus Stop Provision

Existing bus stops at Inver will be replaced by permanent bus stops (northbound and southbound) at similar locations on the main alignment, with connections provided to the existing bus stops on Perth Road. The opportunity for bus turning and bus stop facilities will also be provided at the Dunkeld & Birnam Station Replacement Car Park.

Bridges

There are 10 bridges in the proposed scheme:

- Murthly Estate Bridge (new structure providing access to Murthly Estate);
- Birnam Junction Bridge (new structure forming part of the Birnam Junction);
- Birnam Glen and Inchewan Burn Bridge (new structure supporting the main alignment crossing Birnam Glen and Inchewan Burn);

- River Braan Bridge (new structure for the main alignment with WCH provision crossing the River Braan);
- Inver Rail Bridge (extension to existing structure to cross the Highland Main Line railway);
- Dalguise Junction Bridge (new structure forming part of Dalguise Junction);
- Inverwood Access Track (North) Rail Bridge (new structure to allow vehicle and WCH access under the Highland Main Line railway);
- Inch Rail Bridge (extension to existing structure to cross over the Highland Main Line railway);
- River Tay Bridge (new structure for the southbound carriageway across the River Tay and incorporating provision for WCH); and
- River Tay Crossing (Jubilee Bridge) (existing structure maintained supporting the northbound carriageway).

Underpass Structures

The proposed scheme includes the Dunkeld & Birnam Station Pedestrian Underpass, which will connect the replacement car park at the top of Station Road to Platform 1 and Platform 2 of Dunkeld & Birnam Station. The underpass structure will include stairs and lifts to both platforms and be fully accessible for walkers, wheelers and cyclists.

Image 4: Elevated view of Dunkeld & Birnam Station Replacement Car Park and Pedestrian Underpass

Cuttings and Embankments

While the proposed scheme design aims to maintain a level as close to existing ground level as possible, where the carriageway is higher or lower than the surrounding ground level, embankments or cuttings are required. Reducing the gradient of embankments (referred to as 'grading out') has been considered

along the route to reflect local landform and aspects such as surrounding land use or other environmental constraints. Similarly, cuttings have been designed to take account of their visibility for road users and others along the A9 corridor.

Fencing and Environmental Barriers

Temporary fencing will be erected prior to the commencement of construction where appropriate. Environmental barriers are required to reduce the potential impacts of the proposed scheme to provide mitigation for mammals (including otter and badger fencing) and for noise attenuation.

Drainage Design, Flooding and Watercourse Crossings

The drainage design for the proposed scheme has been developed in accordance with Sustainable Drainage Systems (SuDS) guidance and through consultation with SEPA and Perth & Kinross Council. In certain areas along the existing A9 there are lengths of filter drain in the verges that provide initial treatment for some of the run-off from the road and/or adjacent earthworks slopes. A minimum of two levels of water treatment through SuDS features (basins, ponds and swales) will be included for all mainline outfalls in agreement with SEPA. There will also be SuDS treatment of side road drainage.

The proposed carriageway drainage system is designed to be resilient to flood events. All run-off from the proposed scheme will be collected and treated via the proposed drainage system prior to discharge.

There are 16 existing watercourses that pass underneath the existing A9 carriageway, and these crossings will generally be extended or replaced in their current location. The proposed scheme includes 14 flood relief culverts located north of where the proposed scheme crosses the River Braan. These flood relief culverts, in combination with a compensatory flood storage area adjacent to the River Braan/River Tay confluence that mitigates for floodplain lost as a result of the proposed scheme, will mean that flood risk at key receptors (property and infrastructure) is not increased.

Traffic Signs and Lighting

Traffic signs are required for the proposed scheme, including the three main junctions at Birnam Junction, Dunkeld Junction and Dalguise Junction, and for other accesses such as the three left-in left-out junctions on the main alignment, including at The Hermitage.

The existing route is currently not lit, and generally from an environmental perspective it is preferable to avoid road lighting in rural areas, as lighting can increase visual intrusion at night. Lighting will however be provided on the at-grade roundabout at Dunkeld Junction and at the replacement Dunkeld & Birnam Station car park, and will be designed to be sensitive to key receptors such as residential properties and ecological receptors (e.g. bats) at these locations.

During construction of the proposed scheme, temporary lighting may be required where night-time and/or winter morning/afternoon working is necessary, to minimise traffic disruption/diversions/lane closures, and also along temporary access roads or other locations where temporary traffic management measures require lighting for safety reasons. Temporary lighting may also be required for security and safety reasons at site compounds during morning and evening working hours in winter.

Delivering the Proposals

The design of the project may be refined further by a contractor that will be appointed by Transport Scotland. The contractor that delivers the proposed scheme must meet the requirements of the environmental assessment. Should the contractor refine the design that has been assessed at EIA, environmental review of those refinements will be undertaken, and additional mitigation proposed where required to ensure that there are no additional significant effects.

Subject to completion of the necessary statutory processes, construction is anticipated to extend from winter 2028/29 to the end of 2032. Typical working hours have been assumed to be 07:30 to 18:00 Monday to Friday and 08:00 to 13:00 on Saturdays.

Overview of the Environmental Impact Assessment Process

The environmental impact assessment has been undertaken as an integral part of the design process, informing decisions on the proposals as they were developed. Environmental constraints and issues were identified and incorporated into the decision-making process throughout. Information gathered through the extensive surveys undertaken for the proposed scheme was used in the assessment.

The aims of the environmental impact assessment are to:

- gather information about the environment of the study area and identify environmental constraints and opportunities associated with the area which may influence, or be affected by the proposed scheme;
- identify and assess potential environmental effects;
- identify and incorporate into scheme design and operation, features and measures to avoid, reduce or offset adverse impacts and effects, or in some cases to enhance beneficial impacts and effects; and
- assess the proposed scheme's residual effects (those remaining after measures are implemented to avoid or reduce potential impacts and effects).

Consultation and Scoping

As part of the design development and assessment process, a comprehensive consultation has been carried out with numerous stakeholders including Perth & Kinross Council, Historic Environment Scotland (HES), SEPA and NatureScot. In addition, potentially affected landowners were consulted. Public exhibitions and community engagement events were held in January 2024 and August 2024 as part of a programme of ongoing public engagement and consultation for the proposed scheme.

The purpose of the consultation was to:

- ensure that members of the public, statutory consultees, and other bodies with a particular interest in the environment were informed of the proposals and provided with an opportunity to comment;
- collate baseline information regarding existing environmental site conditions;
- obtain input to the identification of potential impacts and the development of appropriate mitigation;

- inform the scope of the assessments being undertaken; and
- seek consultee input to the proposed scheme design.

The project team has worked closely with key stakeholders to develop a proposed scheme that aims to reduce the overall environmental impact, for example, by avoiding sensitive features and through careful design. Stakeholder feedback was reviewed by the project team and incorporated into the assessment and design process where appropriate.

Environmental Impacts and Mitigation

Introduction

The following subsections summarise the likely significant effects of the proposed scheme on the environment, including relevant details of embedded mitigation (design measures which are integrated into the proposed scheme for the purpose of avoiding or reducing environmental effects) and essential mitigation (mitigation critical for the delivery of the proposed scheme which can be acquired through statutory powers). Full details of each assessment, including the detailed methodology, baseline conditions, potential impacts, mitigation and residual effects are presented in the individual chapters of the EIAR (Volume 1: Main Report). Chapter 22 (Schedule of Environmental Commitments) of the EIAR collates and details the mitigation measures from each technical chapter and outlines any legislative and monitoring requirements. Chapter 23 (Summary of Significant Residual Effects) collates and summarises all residual environmental effects assessed as significant following the incorporation of mitigation measures.

Air Quality

An air quality assessment based on computer modelling of current (2023) and future road traffic and air quality conditions was undertaken. In addition to other parameters, the assessment used forecast road traffic data for the base year (2023), peak construction year (2030) and proposed year of opening (2036) (year 2036 reflects the entire A9 Dualling rather than the proposed scheme completion end date of 2032). A construction risk assessment was also undertaken, which concluded that while the air quality impacts of road traffic during construction would not be significant and required no further assessment, mitigation would be required to address fugitive dust and particulate matter emissions during construction.

The local air quality assessment of road traffic impacts during operation of the proposed scheme focused on the pollutants nitrogen dioxide (NO_2) and particulate matter with a diameter of less than 10µm (PM_{10}) and 2.5µm ($PM_{2.5}$) at 28 worst-case human health receptors. A further 438 ecological receptors were modelled across 38 transects for the consideration of the potential impacts of the proposed scheme on the deposition of nitrogen at designated Ancient Woodland habitats.

The results for the operation phase show that in the proposed year of opening (2036), there would be no exceedances of Air Quality Objectives for NO_2, PM_{10} or $PM_{2.5}$ at any of the modelled worst-case locations resulting in human health impacts with or without the proposed scheme.

Potentially significant residual effects were identified for nitrogen deposition on Ancient Woodland, and impacts were consequently assessed in Chapter 12 (Biodiversity), which concludes that such residual effects are considered to be slight adverse and not significant.

Cultural Heritage

The baseline for the cultural heritage assessment comprised 134 archaeological remains, 123 historic buildings and 16 historic landscape types.

An important historic building in the baseline is Dunkeld and Birnam Station, including Footbridge, which is a Category A Listed Building. The station is currently partially severed from Birnam by the existing A9. Measures to re-integrate the station and town, and to reduce the impact on setting of the station, were embedded in the design of the proposed scheme. Measures to better integrate the

proposed scheme into Murthly Castle Garden and Designed Landscape (GDL), included on the Inventory of Gardens and Designed Landscapes, were also embedded in the design of the proposed scheme.

Image 5: Dunkeld & Birnam Station

Essential mitigation includes archaeological investigations and surveys. The resulting reports will be made available to the public through the Perth & Kinross Historic Environment Record and the National Record of the Historic Environment. Essential mitigation for Dunkeld and Birnam Station also includes measures to allow the form, materials and architectural style of the embedded mitigation measures to provide a visual connection with the station. The design of the measures will be developed in consultation with Historic Environment Scotland, Perth & Kinross Council and Perth and Kinross Heritage Trust.

With mitigation measures in place, significant residual adverse effects are predicted for Dunkeld and Birnam Station, Dunkeld and Birnam Station Signal Box (a Category B Listed Building), Birnam Conservation Area and Murthly Castle GDL. Slight beneficial effects on Dunkeld and Birnam Station and Birnam Conservation Area have also been predicted.

Interpretation boards providing information on the history of Dunkeld and Birnam Station and Murthly Castle GDL will also be provided.

Landscape

An assessment of the impact on the landscape up to 5km from the proposed scheme was undertaken following applicable guidance. Sensitive receptors were identified as sites designated for their landscape qualities including the River Tay (Dunkeld) National Scenic Area (NSA), four Landscape Character Types and four Local Landscape Character Areas.

Construction activities associated with the proposed scheme, including the removal of roadside vegetation, the alteration of existing roadside landform and rock outcrops and the construction of structures and earthworks, would have potential impacts on the landscape. Potential impacts would

also arise from the operation of the additional carriageway and associated infrastructure in addition to the changed appearance of the landscape and the associated change in the perception of the River Tay (Dunkeld) NSA.

To mitigate potential impacts, mitigation measures have been developed through the iterative design process, including the careful alignment of the proposed scheme and positioning and design of certain elements to avoid or reduce potential impacts on landscape features.

Specific mitigation measures include woodland planting to integrate the proposed scheme into the landscape. Whilst there is a focus on planting, mitigation measures will also influence the design of structures such as the River Tay Bridge, and SuDS features. Where exposure of rock cuttings is anticipated, such as between The Hermitage and Dalguise Junctions, any exposed rock faces will be sculpted to provide a rugged, naturalistic appearance to reflect the character of the surrounding rock and fit with the landscape.

Image 6: Falls of Braan at Ossian's Hall

The assessment of residual effects on landscape receptors has taken into account mitigation, considering the proposed scheme in the winter of the year of opening (when planting has been implemented but has not established) and in the summer, 15 years after opening (when the proposed planting would be reasonably established).

Direct effects from the construction and operation of the proposed scheme on four Local Landscape Character Areas, one Landscape Character Type and landscape elements of the River Tay (Dunkeld) NSA are predicted to result from carriageway widening and construction of earthworks and structures

(particularly those associated with proposed grade separated junctions) which would alter landcover and landform and result in loss of woodland along the route.

In the winter of the year of opening, it is predicted that the proposed scheme would have significant residual adverse effects on three Local Landscape Character Areas (Strath Tay: Lower Glen, Lowland River Corridor: Strath Tay, and Strath Tay: Dunkeld and Birnam (Settlement)) due to the need to create embankments and rock cuttings, road widening, structures, new junctions and other infrastructure and associated loss of natural topographic features, mature and established woodland and some farmland.

As planting establishes and the proposed scheme becomes more integrated into the landscape, it is predicted that residual adverse effects would reduce. By the summer, 15 years after opening, it is assessed that residual adverse effects on one Local Landscape Character Area (Strath Tay: Lower Glen) is predicted to remain significant after 15 years due largely to the Birnam and Dalguise junctions and cumulative losses of established woodland along the route corridor. It is predicted that the proposed scheme would have significant residual beneficial effects on one Landscape Character Type (Lowland Hills – Tayside) by the summer 15 years after opening following the establishment of areas of mixed and broadleaved compensatory woodland planting at Muir of Thorn.

There would be no significant risk to the integrity of the River Tay (Dunkeld) NSA. Significant residual effects during the winter of the year of opening are predicted on some of the NSA's Special Landscape Qualities, however, these are no longer assessed as significant by the summer 15 years after opening, following establishment of the mitigation planting.

Visual

The visual impact assessment considered the likely effects the proposed scheme would have on views experienced by people from buildings, outdoor public areas, local roads and routes used by pedestrians, cyclists and equestrians.

The existing A9 is already a notable feature in views across and along the valley of the River Tay, although established forestry plantations and mature woodland areas on either side of the valley help to provide some screening of the road and vehicles on it, while the largely wooded hills enclosing the valley generally limit more distant views towards it.

Image 8: View towards the existing A9 from NCR 77, south of the Tay Crossing

As part of the design, landscape mitigation measures were also developed to reduce visual impacts. These include embedded mitigation measures developed through the iterative design process (such as the vertical and horizontal route alignment), grading out of embankment and cutting slopes to blend with existing landforms, steepening of slopes and introduction of retaining walls to minimise woodland loss, and new planting to screen the proposed scheme and help further integrate it with the

surrounding landscape. The landscape design also considered opportunities to maintain or enhance existing open views of the surrounding landscape, where these are currently a key landscape/visual characteristic. The effectiveness of any new woodland/scrub/boundary planting is expected to increase over time as vegetation matures.

Visual effects of the proposed scheme have been compared against the existing baseline views, in which the A9 is already visible from a number of locations. Impacts would typically occur where a receptor is close to the proposed scheme, or where open views are possible towards it, for example where existing roadside planting is removed. In some locations impacts would be limited by screening provided by existing landform, built elements and vegetation. Visual impacts would generally be associated with physical aspects of the proposed scheme, or from the movement of traffic upon it.

People at 73 building locations and 35 outdoor locations are predicted to experience significant residual adverse visual effects during construction. During operation, in the winter of the year of opening, people at 43 building locations and 28 outdoor locations are predicted to experience significant residual adverse visual effects due to the loss of existing roadside vegetation and the increased prominence of new road infrastructure (including earthworks, bridges and retaining walls). There would also be significant residual effects on drivers' views from the road in the winter of the year of opening at Strath Tay: Lower Glen LLCA (ch850 to ch8280).

As with impacts on the landscape, visual impacts will reduce over time as planted vegetation matures. By the summer, 15 years after opening of the proposed scheme, mitigation planting – mostly in the form of new woodland and scattered individual trees that would have become established – is predicted to have reduced impacts such that people's views at three building locations and five outdoor locations experience significant residual adverse effects. There would no longer be significant effects on drivers' views from the road.

Biodiversity

An ecological impact assessment was undertaken in accordance with relevant published guidance to determine potential significant impacts and associated effects of the proposed scheme on biodiversity resources including terrestrial and freshwater species, habitats and ecosystems.

Biodiversity resources that could potentially be impacted by the proposed scheme include habitats, particularly the River Tay Special Area of Conservation (SAC) and ancient woodland (AWI) within the vicinity of the proposed scheme, and aquatic and terrestrial species such as freshwater pearl mussel, Atlantic salmon, lamprey species, otter, beaver, badger, red squirrel, bats and reptiles.

Through the iterative design process, mitigation measures including replacement planting, habitat creation, provision of artificial nest/roost structures, crossing structures and mammal-resistant fencing were identified to avoid or reduce potentially significant adverse effects.

Opportunities for delivering positive effects for biodiversity, and biodiversity net gain, have also been considered as part of the assessment, adopting a bespoke approach to the application of England's Statutory Biodiversity Metric for the proposed scheme.

A significant residual adverse effect is anticipated as a result of the permanent loss of 29.02ha of woodland listed on the AWI (ancient woodland) as a result of the proposed scheme. Compensatory planting of 34.58ha of ancient woodland is proposed, and whilst this cannot fully mitigate for the

permanent loss of the biodiversity and intrinsic importance of ancient woodland, it will provide larger and more connected networks of woodland along the A9.

Woodland planting extending to 16.61ha is also proposed to mitigate for permanent loss of 13.76ha of other woodland habitat and, during the growth phase of landscape planting, a significant residual adverse effect is predicted due to loss and fragmentation of habitat. However, this impact would be temporary, albeit long-term in nature and, once cover is established, no significant residual effects are predicted. Woodland will be planted as early in the construction phase as possible to reduce the delay between habitat loss and habitat creation. Planting would be undertaken in advance of the proposed scheme being constructed, where possible.

Image 9: Inver Wood, typical existing coniferous plantation on an ancient woodland site

The micro-siting of outfalls away from ecologically sensitive areas and the incorporation of robust silt and pollution controls will ensure that there will be no residual significant effects on the internationally important River Tay SAC or the critically endangered freshwater pearl mussels.

The proposed scheme will result in no net loss of biodiversity resources and is expected to deliver a net positive effect for biodiversity through habitat creation (on- and off-site), including woodland and habitat mosaics providing habitat for a range of protected species, management of non-native woodland and invasive species, and provision of additional nest sites for birds, bats, pine marten and red squirrel. Significant residual beneficial effects are also predicted on a variety of protected species, including bats, badger, pine marten and red squirrel due to the new Murthly Estate Bridge structure reducing habitat fragmentation between Dalpowie Plantation and Birnam Wood.

Geology, Soils, Groundwater and Land Contamination

The assessment has been informed by consultation and desk-based assessments, including the review of ground investigation data. This process established that no designated Geological Receptors, Sites of Special Scientific Interest (SSSI) and Geological Conservation Review sites fall within the study area. One Special Area of Conservation (SAC) was noted within the study area associated with the River Tay, although not designated for its geological features. No groundwater dependant terrestrial ecosystems (GWDTE) nor Groundwater Abstractions were identified in proximity to the proposed scheme. However, an area of bog and bog woodland was recorded at the Muir of Thorn to the south of the proposed scheme. These habitats have the potential to constitute GWDTE, however no further surveys were undertaken as these areas will not be impacted by construction activities.

The impact assessment was designed to assess the significance of both direct and indirect (groundwater dewatering) effects from the proposed scheme. Minor groundwater dewatering impacts are predicted, and as such the residual effect on groundwater flow is expected to be of Slight adverse significance. The construction of new structures and associated sheet pile walls and other piles could potentially create new vertical or horizontal flow paths for pollutant migration, as such the residual effect on groundwater quality is expected to be of Slight adverse significance. Both the superficial aquifers and bedrock aquifers may be at risk of water quality impairment due to accidental spillage during both construction and operation phases, the impact is expected to be of Slight to Large adverse significance. As part of the construction of the proposed scheme, removal of peaty soils is expected to be limited resulting in a potential impact of Slight significance. There will be direct and indirect disturbance of potential sources of land contamination, with potential impacts ranging between Moderate to Neutral significance. Following the implementation of mitigation measures, residual effects remain but none are considered significant.

In relation to land contamination issues, mitigation is expected to reduce residual adverse effects to Slight significance during construction and Neutral significance during operation. Localised adverse residual effects of Slight significance are expected on groundwater flow within superficial and bedrock deposits. Implementation of mitigation in relation to the protection of the groundwater environment against pollution incidents is expected to reduce the potential impacts on groundwater quality and associated receptors to a residual adverse effect of Slight and Neutral significance (respectively). Residual adverse effects on surface water receptors from indirect dewatering are expected to be Neutral to Slight significance.

Overall, the residual effects on geology, soils, groundwater and land contamination are predicted to be not significant.

Material Assets and Waste

This assessment considered the impact of the construction of the proposed scheme on material assets, including primary materials and manufactured construction products, and waste generation; and potential effects on available waste management infrastructure (i.e. available landfill capacity).

Potential effects on material assets and waste when the proposed scheme is operational were scoped out of this assessment as they were considered to be not significant (by quantity) in the context of the proposed scheme and DMRB guidance specifies that the environmental assessment is only to report on the first year of operational activities (i.e. proposed year of the scheme opening).

Throughout the design process, a number of mitigation measures were embedded in the scheme design to reduce the consumption and use of material assets and the production and disposal of waste.

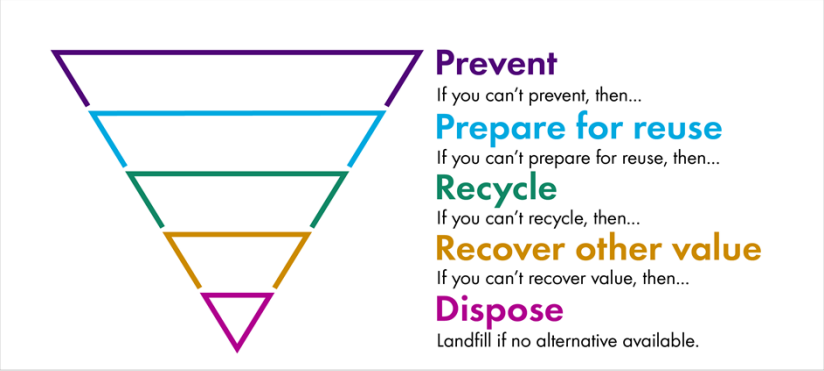


Image 10: The Waste Hierarchy (reproduced from Scottish Government, 2017)

With good practice application of responsible sourcing methods, the waste hierarchy, implementation of Site Waste Management Plans and inclusion of targets that support the delivery of the Zero Waste Plan targets, the residual environmental effects relating to the consumption and use of material assets and production and disposal of waste have been assessed as slight adverse (not-significant) and moderate adverse (significant) respectively after the application of essential mitigation measures.

The significant residual effects are due to the potential use of available non-hazardous landfill capacity in the study area, as well as the use of non-hazardous landfill capacity outside of the study area. The transportation of waste to more distant landfill locations is likely to be necessary because many more local sites are currently scheduled to have stopped accepting waste by the start of constructing the proposed scheme in 2028.

Noise and Vibration

The potential noise and vibration impacts and effects of the proposed scheme on noise and vibration sensitive receptors have been assessed.

Construction noise modelling and construction vibration calculations were undertaken at sample locations representative of the nearest noise and vibration sensitive receptors to the proposed scheme. Operational noise modelling was undertaken for all noise sensitive receptors within the operational noise study area.

As part of the assessment, a baseline noise survey was undertaken at nine locations to gain an understanding of the existing noise climate within the vicinity of the proposed scheme, validate baseline noise modelling results and to provide data for public consultation purposes.

The construction noise assessment identified six individual or groups of noise sensitive receptors which had the potential to experience significant construction noise effects. Standard mitigation measures across A9 Dualling projects have been proposed to reduce construction noise levels. With the implementation of these measures, it is anticipated that the potential for significant residual adverse construction noise effects will remain at three individual or groups of noise sensitive receptors, but these would be minimised as far as practicable.

Image 11: Noise Monitoring Equipment

The construction vibration assessment identified three individual or groups of vibration sensitive receptors which had the potential to experience significant construction vibration effects. Specific mitigation measures have been proposed to reduce vibratory compaction and sheet piling vibration levels. With the implementation of these measures, it is anticipated that no vibration sensitive receptors would experience significant residual adverse construction vibration effects.

The operational noise assessment identified five noise sensitive receptors which had the potential to experience significant adverse operational noise effects. An acoustic barrier has been proposed as a specific mitigation measure to reduce operational noise levels such that significant residual adverse operational noise effects are not experienced at four of these receptors. It is not considered practicable to reduce operational noise levels at the remaining noise sensitive receptor, and therefore a significant residual adverse operational noise effect is anticipated at one noise sensitive receptor.

The operational noise assessment identified 65 noise sensitive receptors which have the potential to experience significant beneficial operational noise effects.

Population – Land Use

An assessment of the impacts of the proposed scheme was conducted on land use resources comprising private property and housing, community assets, development land, businesses, agricultural land holdings and other land.

The assessment considered both construction impacts and operational impacts of the proposed scheme on 671 residential dwellings, 27 community assets, 130 businesses, 13 permitted planning applications, three development land allocations, and ten primary agricultural land holdings.

To mitigate potential effects, embedded, standard and project specific mitigation measures were developed through an iterative design process and included reducing land-take and developing measures to maintain access to housing and businesses, community assets, community land and agricultural holdings, with revised access arrangements and tie-ins to the road network.

Land must be acquired for the proposed scheme's construction and operation, and to provide essential mitigation, including:

- 0.06ha from three private property and housing receptors;
- 0.38ha from four community land and community asset receptors;
- 3.53ha from six business receptors including demolition of seven buildings/structures (one of which is a residential property associated to the business);
- 157.10ha from seven agricultural land holdings; and
- 0.26ha from other land.

With proposed mitigation in place, significant residual effects are reported for:

- three private property and housing receptors, with both adverse and beneficial effects assessed with further beneficial effects to other private property and housing at Birnam, Little Dunkeld and Dunkeld;
- access to private property and housing at Birnam Glen (during construction only) and which is assessed as adverse;
- two community land and community asset receptors, with both adverse and beneficial effects assessed;
- one development land receptor, which is assessed to be adverse;
- eight business receptors, with both adverse and beneficial effects assessed; and
- seven agricultural land holding receptors, all of which are assessed to be adverse.

Population - Accessibility

The assessment considered the impact of the proposed scheme on walkers, wheelers, cyclists, and horse-riders (WCH) and considered outdoor areas and paths including core paths, rights of way, National Cycle Routes (NCRs), equestrian routes and local paths within 500m of the proposed scheme. A total of 60 paths were identified as well as six crossing points where paths cross the existing A9.

The assessment took into account mitigation embedded in the proposed scheme design, such as new footways.

The proposed scheme design maintains existing use while providing safer access across the A9 for WCH within the study area. With the proposed scheme in place, significant adverse impacts have been largely avoided in key areas as a result of the provision of underpasses and maintaining existing WCH routes.

Image 12: National Cycle Route 77

During construction, significant residual adverse effects for 14 paths (including NCR77) are predicted due to a decrease in amenity value and diversion lengths. In particular, people accessing three outdoor areas (Birnam Hill, River Tay and River Braan) will experience temporary but significant residual adverse effects during construction.

Significant residual adverse effects are predicted in relation to paths and access to Ring Wood and the River Braan during operation of the proposed scheme. Significant residual adverse effects are predicted for eight paths, (including National Cycle Route (NCR)77) due to decreased amenity value and/or changes to journey length.

No significant residual effects on public transport are anticipated during construction or operation. Slight residual beneficial effects are predicted for bus services due to a decrease in traffic congestion, thereby leading to fewer delays and improved journey times on the A9.

Human Health

The assessment on human health focused on the communities of Dunkeld, Little Dunkeld, Birnam and Inver, and focussed on the following health determinants:

- community, recreational and education facilities and severance/separation of communities from such facilities;
- landscape amenity and green/open space and severance/separation of communities from such facilities;
- healthcare facilities and severance/separation of communities from such facilities;
- community identity, culture, resilience and influence;
- spatial characteristics of the transport network and usage, including the surrounding road network, Public Rights of Way (including bridleways), cycle ways, non-designated public routes and public transport routes;
- air quality;
- noise and the ambient noise environment;
- sources and pathways of potential pollution;

- road safety; and
- flood risk.

The significant negative health effects identified relate to construction impacts on noise and the ambient noise, and road safety for vulnerable groups. Disruption of the transport network could have a wider impact on people in the area through safety concerns for commuting or recreational walkers, wheelers, cyclists or horse riders (WCH). Temporary diversions of pedestrians and cyclists may increase the likelihood of collisions with traffic if not appropriately managed and the presence of construction works could also result in a reduction in perceived safety. This localised disruption to pedestrian and cycle routes, as well as to traffic on the A9 and connected road network, would potentially affect access to community, recreational and education facilities, green/open space and healthcare facilities. These are interrelated impacts on transport and access to community and recreational resources. Construction noise and traffic would also affect local amenity.

In terms of population health, construction noise impacts could result in a temporary change in quality-of-life with many of those exposed being in residential properties or those wanting to enjoy the outdoor natural heritage of the area. Vulnerable groups may include those with autism spectrum disorder or who have mental health conditions, or shift workers trying to sleep during the day, who are more likely to have a high sensitivity towards noise. The identified pathways to health outcomes from these impacts include reduced physical activity, social interaction and loss of amenity, which may have a negative impact on physical and/or mental health and social wellbeing. While the general population is relatively healthy and likely to be able to adapt, vulnerable groups may have less capacity to adapt to the construction phase impacts and are more likely to suffer adverse health outcomes in the short-term.

Mitigation for impacts on traffic, accessibility, land use, noise and air quality are identified in those topic related chapters of the EIAR, while standard mitigation in the form of the appointment of a Community Liaison Officer, a liaison team and dedicated helpline, is considered particularly important in supporting the affected communities.

For the operation phase, vulnerable groups have the potential to significantly benefit from accessibility and safety improvements to the A9 road and some local routes for WCH. These improvements are expected to reduce physical barriers as well as safety concerns, which may help vulnerable groups in particular to better access community and health facilities, and areas of recreational value. This should support better health and wellbeing. Potential negative effects of the operation stage relate to risks of windblown soil dust and fibres identified in the geology and soils assessment (Chapter 13) and an increase in flood risk for a small number of properties (Chapter 19) which would have potential consequential effects on the health and wellbeing of those affected. However, with proposed mitigation in place these impacts would be reduced to not significant, removing the likelihood of significant health effects.

While there would be significant negative effects on health during the construction stage in the short term for those most affected by noise and disruption, during operation, the significant effects are expected to be positive, relating to improved safety and accessibility.

Road Drainage and the Water Environment

Impacts of the proposed scheme on the surface water environment have been assessed, specifically considering the aspects of flood risk, hydromorphology, surface water quality and surface water supply.

The largest watercourse within the study area is the River Tay and together with parts of the River Braan forms part of the River Tay Special Area of Conservation (SAC). The proposed scheme is partially located within the functional floodplain of the River Tay, and in sections within close proximity to the River Tay. This has been a key constraining factor in the design of the proposed scheme.

The impact assessment was informed by consultation, desk-based assessments, site walkovers and surveys. Hydraulic assessments were undertaken for the 16 watercourses that cross the scheme, including hydraulic modelling of the four principal watercourses (the River Tay, River Braan, Inchewan Burn and the Mill Stream) and three minor watercourses (WF09, WF13 and WF16). Hydraulic calculations on nine other minor watercourses were undertaken to assess potential impacts on flood risk.

Image 13: Inchewan Burn

Significant potential impacts from the proposed scheme in the absence of mitigation include increases in fluvial flood risk, alterations to flows and sediment processes within watercourses and deterioration in water quality within receiving watercourses from construction and operational runoff.

Mitigation during construction would be delivered through a Construction Environmental Management Plan (CEMP), which would include measures for flood risk, hydromorphology, surface water quality and surface water supply.

With the implementation of mitigation measures during construction, residual effects on all receptors would be reduced to either Neutral or Slight adverse significance. The proposed scheme has been designed so that it would not increase flood risk at key receptors (property and infrastructure).

During the operational phase, mitigation measures include the use of Sustainable Drainage Systems (SuDS), compensatory flood storage, scour protection and erosion monitoring to protect affected watercourses.

With the implementation of proposed mitigation, residual effects during operation would be of Neutral or Slight significance. The exception to this relates to significant effects on hydromorphology on two watercourses (WF11 (River Braan) and WF13). Compensation measures of de-culverting and offsite restoration are proposed to offset these impacts.

Climate

The effects of the proposed scheme on climate, resulting from estimated changes in emissions of greenhouse gases (GHGs), as well as the potential impacts of future climate change on the proposed scheme have been assessed in accordance with DMRB guidance.

The proposed scheme is expected to result in an increase to GHG emissions both during its construction and operation phases because of the required consumption of materials, fuel and energy, as well as the disturbance or removal of carbon stores such as soil and vegetation.

The significance of the proposed scheme's potential effects on climate was assessed using professional judgement and based on the perceived likelihood of the scheme affecting either the UK or the Scottish Government's ability to meet their respective carbon emissions reduction targets. Based on a comparison of the estimated change in GHG emission as a result of the proposed scheme with the relevant UK carbon budgets and Scottish carbon reduction targets, the scheme's effect on climate is assessed to be not significant. Despite this conclusion, however, a number of measures are proposed in order to further mitigate the increase in GHG emissions associated with the proposed scheme.

The proposed scheme will potentially be affected by climate change related impacts during both its construction and operation (e.g. as a result of increased rainfall during winter and more intense rainfall events). Mitigation measures embedded within the scheme design, as well as the application of standard good practice mitigation measures during construction and maintenance operations, are considered likely to reduce the risk of disruption during the construction phase, as well as climate related impacts on the proposed scheme during its operation. With these mitigation measures in place, the effects of these impacts on climate are assessed as not significant.

Cumulative Effects

An assessment was conducted of the potential for the combined effects of a number of different environmental effects on single receptors, as well as the potential for cumulative effects of the proposed scheme in combination with other reasonably foreseeable developments.

Potential for cumulative effects due to the combined effect of a number of different environmental effects (adverse and beneficial) of the proposed scheme on a single receptor/resource were assessed, based on the findings of the topic chapters in the EIAR. Significant cumulative effects on 22 people/property receptors are expected to result from a combination of residual visual, land-take and/or beneficial noise effects of the proposed scheme. These receptors are Ballincrieff, Oakwood, Tomcroy House, Barbed Wire and Poppies, Rowanlea, Dowiestone, 6 Perth Road, Carse-na-Tay, Shian,

Wychwood, Hollybank, 1 Station Cottages, 8 Station Road, 10 Station Road (Tirohia), 12 and 13 Birnam Terrace, Sunnybank Cottage and Niel Gow Cottage (all residential properties), Dunkeld & Birnam Station, The Merryburn Hotel, Craigvinean Surgery and Dunkeld & Birnam Recreation Club.

The combination of projects forming the A9 Dualling programme from Perth to Inverness were identified as having the potential to have a cumulative effect. No other reasonably foreseeable developments were identified that may contribute to a significant cumulative effect in combination with the proposed scheme.

The potential for significant cumulative effects due to construction activities was identified at five visual receptor locations (building locations) and seven visual receptor locations (outdoor locations). Additionally, significant cumulative effects on waste were identified due to the proposed scheme's potential use of the available non-hazardous landfill capacity within the Tayside, Central and Fife Local Authority Region as well as the use of non-hazardous landfill capacity outside this area.

The potential for significant cumulative effects was identified during operation on the Strath Tay: Lower Glen Local Landscape Character Area (LLCA), the Strath Tay: Mid Glen LLCA, the River Tay (Dunkeld) National Scenic Area (NSA), five visual receptors (building locations), six visual receptors (outdoor locations) and on habitat on the Ancient Woodland Inventory (AWI). The potential for cumulative effects principally arises due to the combined effects of the proposed scheme with the A9 Dualling: Tay Crossing to Ballinluig project in the vicinity of the Tay Crossing where the two projects adjoin. Effects relate to the presence of road infrastructure, loss of vegetation and in the case of AWI habitat, the loss of irreplaceable woodland.

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DMRB Stage 3 Design and Key Environmental Features

Legend

Design

- Proposed Scheme (DMRB Stage 3)
- SuDS
- Boundaries of the Site

Proposed Landscape and Ecological Mitigation

- Existing Vegetation to be Retained
- Mixed Woodland
- Riparian Woodland
- Scrub Planting
- Broadleaved Woodland
- Species Rich Grassland
- Species Rich Visibility Splay Mix
- Species Rich Central Reserve Herbaceous Mix
- Anticipated Rock Cut
- Wet Grassland Mix
- Potential Return to Agriculture
- Native Marginal Planting
- Shrub
- Individual Trees
- Hedgerow

Constraints

- Special Areas of Conservation (SAC)

FIGURE 1

0 0.05 0.1 0.2 0.3 0.4 0.5 km

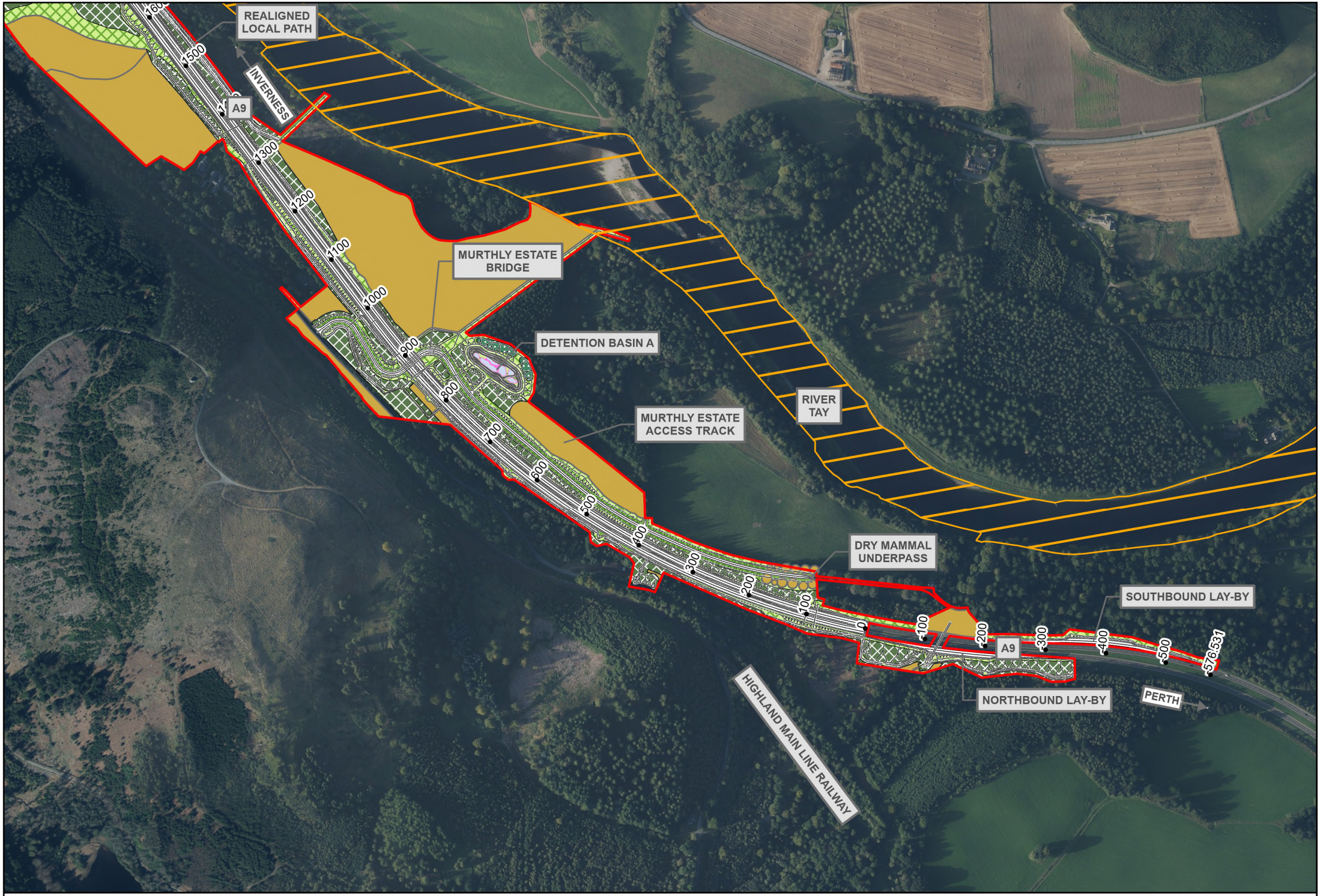

FIGURE 2

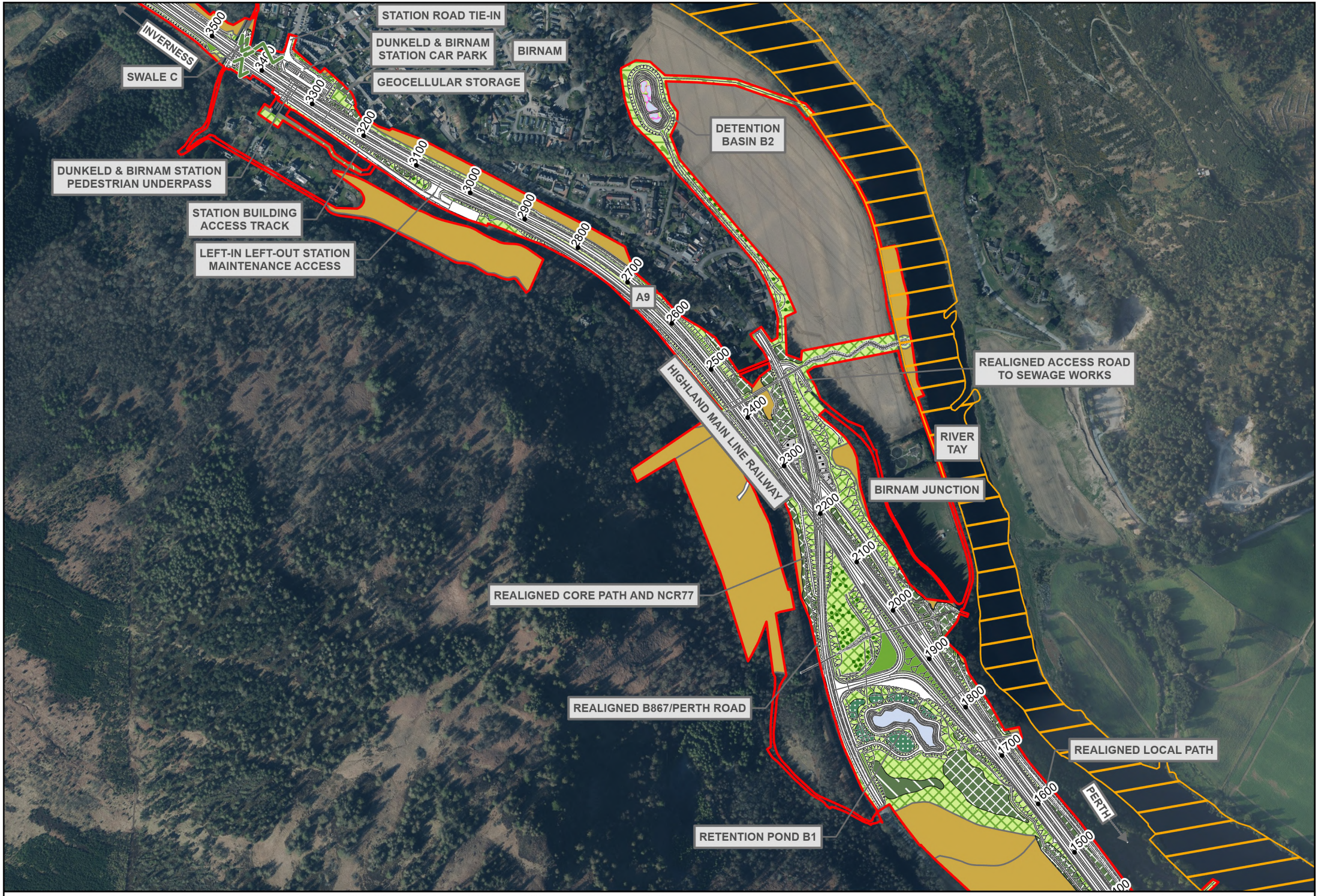

FIGURE 3

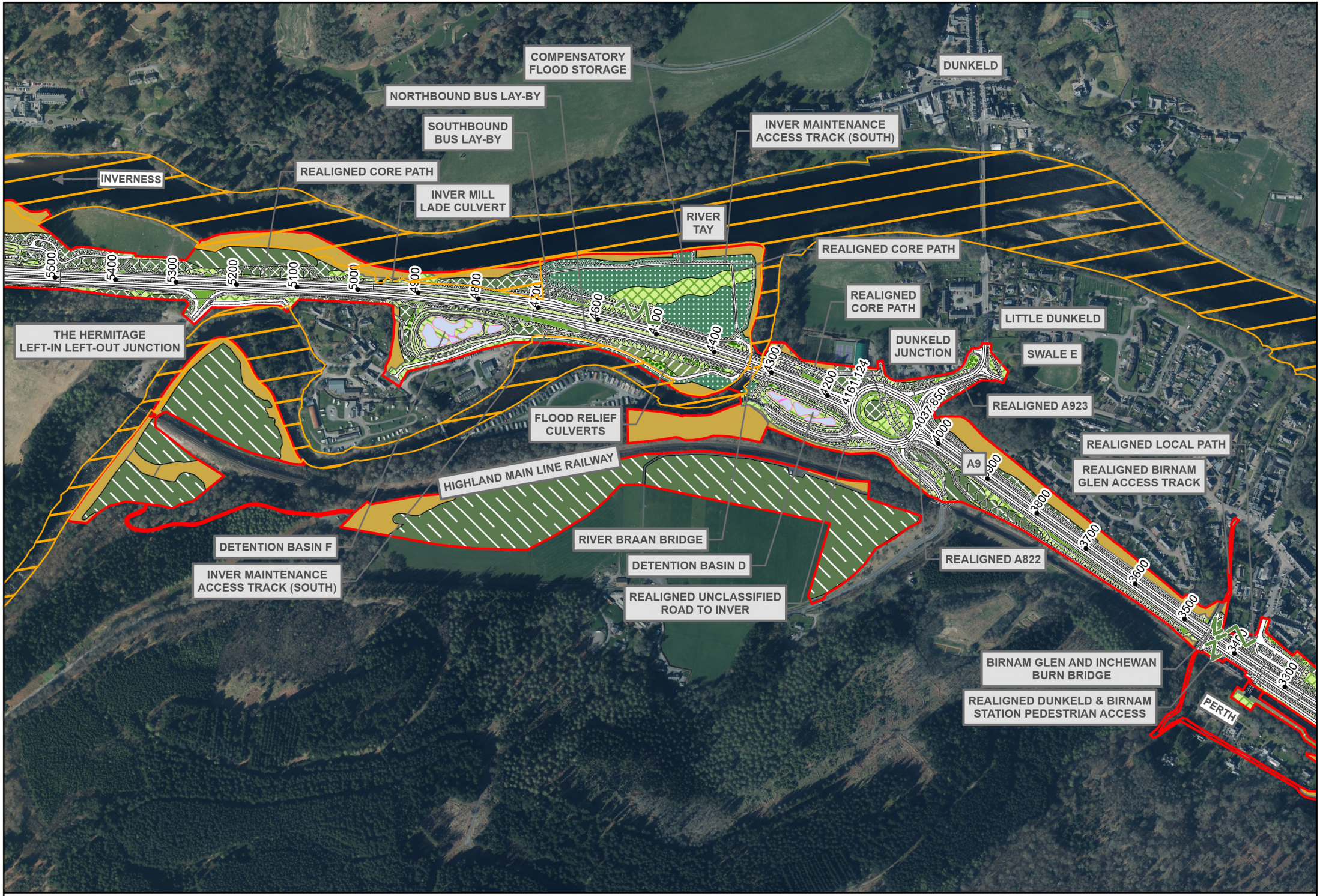

FIGURE 4

0 0.05 0.1 0.2 0.3 0.4 0.5 km

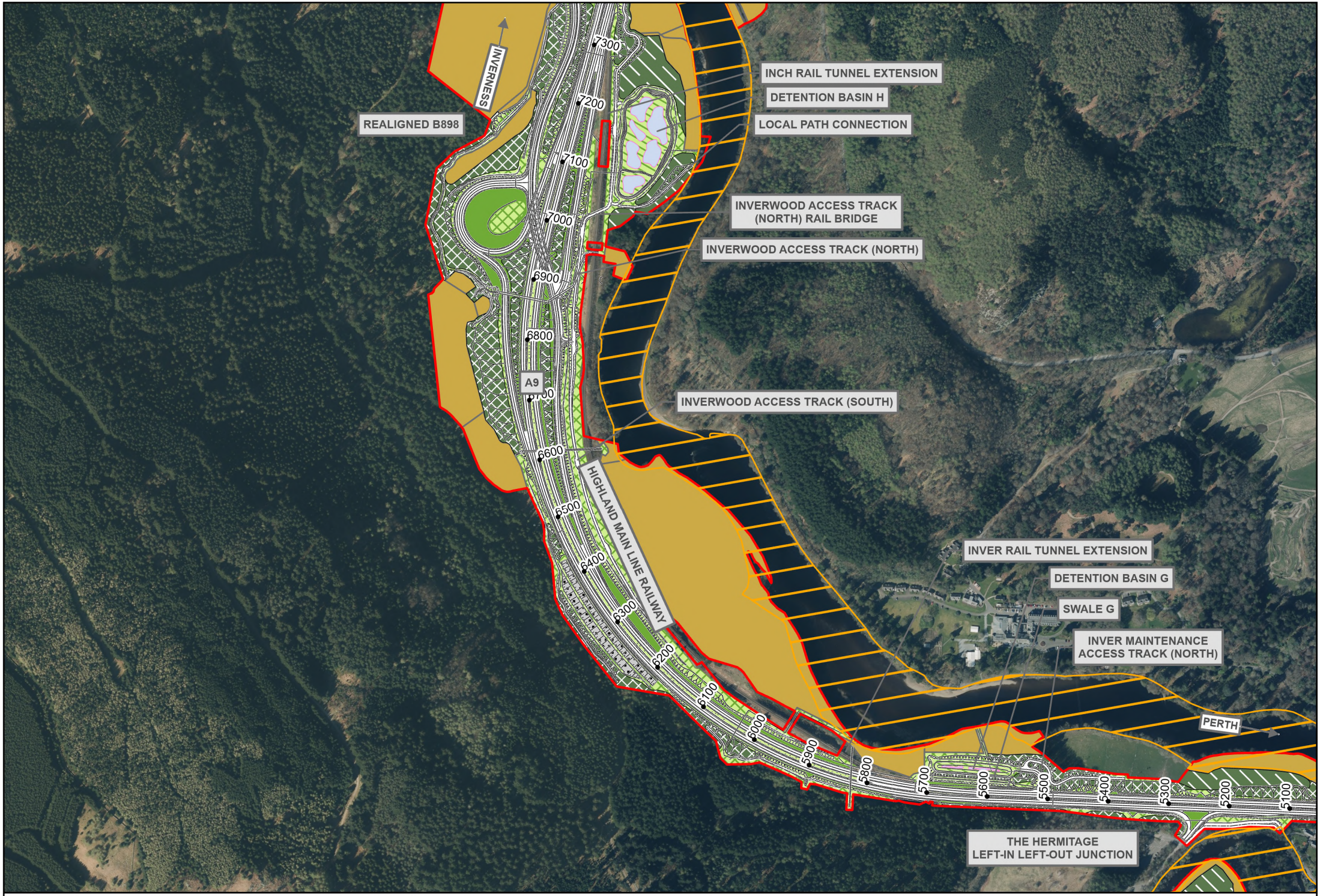

FIGURE 5

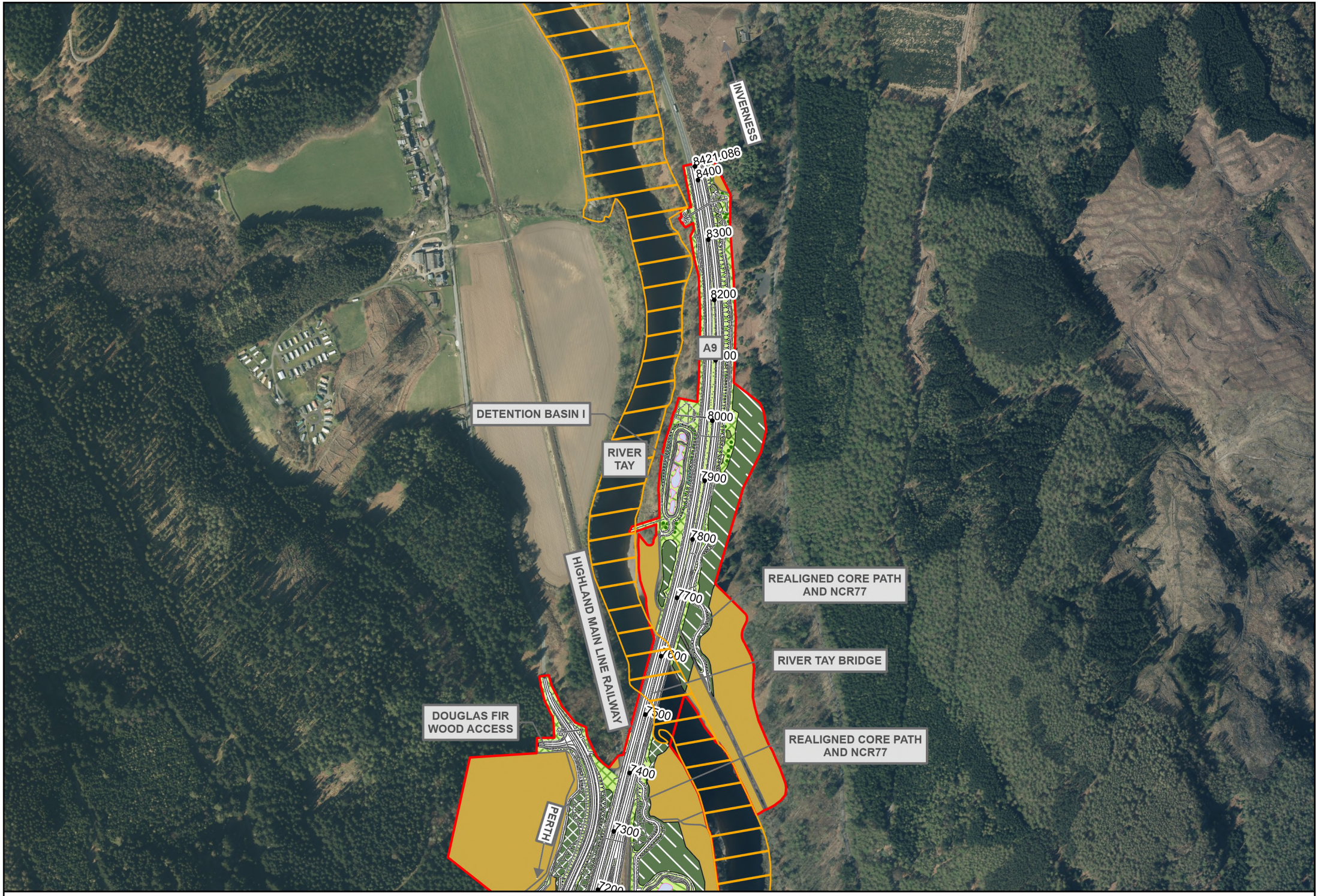

FIGURE 6


TRANSPORT
SCOTLAND
CÒMHDHAIL ALBA