CROSS TAY LINK ROAD

119046

CTLR ROUTE ALIGNMENT (A93 TO A94) COMPARATIVE ASSESSMENT REPORT DMRB STAGE 3

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Executive Summary

The CTLR forms Phase 2 of the Perth Transport Futures Project (PTFP); the PTFP has been developed over several years to address key congestion points in the road network and air pollution, and to provide essential linkages to growth areas as set out in the Local Development Plan.

Sweco was appointed by the Council in July 2017 to progress the CTLR project through DMRB Stage 3, statutory procedures, procurement and finally construction, with a completion date anticipated in late 2023/early 2024.

Through the development of the DMRB Stage 3 design, the Project Team has spoken with key stakeholders to ensure that their concerns, along with any potential opportunities and constraints, have been identified. Through this consultation process, Scone & District Community Council (SDCC) have asked for a route north of the Scone North Development (H29) to be considered. SDCC have previously raised concerns over the route of the CTLR between the A93 and A94 junctions, with their main concerns relating to road safety and air quality impacts upon the future residents of (H29).

In February 2019 the Council instructed Sweco to investigate the feasibility of an alternative northern route. An alternative route between the A93 and A94 has been developed and has been comparatively assessed against the current CTLR route using the following assessment topics:

- Engineering;
- Environmental; and
- Transport and Economic.

The comparative assessment is intended to provide sufficient information to the Council to inform the decision regarding viability of a northern route and whether further assessment is needed and/or justified.

The Engineering, Environmental and Transport and Economic assessments have all concluded that there is very little difference between the two routes, although there is a slight preference towards the current CTLR route. Therefore, there appears to be no obvious reason to take the alternative northern route forward for further assessment.

1 Introduction

1.1 Purpose

The purpose of this report is to provide a comparison of the preferred CTLR route against a potential northern route between the A93 and A94 junctions.

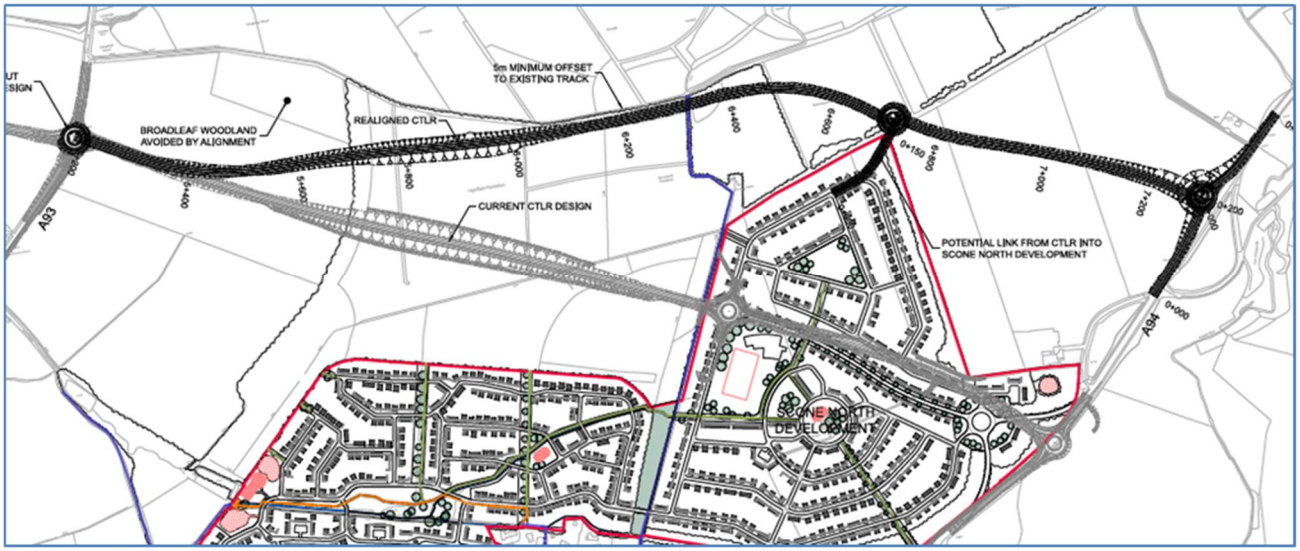


Figure 1.1: Comparison between preferred CTLR route and potential northern route

Scone & District Community Council (SDCC) have asked for a route north of the Scone North Development (H29) to be considered. SDCC have previously raised concerns over the route of the CTLR between the A93 and A94 junctions, with their main concerns relating to road safety and air quality impacts upon the future residents of H29.

The Council are considering these concerns and this report is being prepared to inform the decision regarding viability of a northern route and whether further assessment is needed and/or justified.

It should be noted that the CTLR (current route) is in the Local Development Plan and H29 has planning consent.

1.2 Background

The CTLR forms Phase 2 of the Perth Transport Futures Project (PTFP); the PTFP has been developed over a number of years to address key congestion points in the road network and air pollution, and to provide essential linkages to growth areas as set out in the Local Development Plan.

The PTFP has been split into four phases as below and will be delivered over several years. The first phase has been completed and the second phase is the subject of this comparative assessment report.

- Phase 1: A9/A85 Junction Improvement and Link Road to Bertha Park;
- Phase 2: Cross Tay Link Road (CTLR) – A9 to the A93 and A94;
- Phase 3: Bertha Park North Link to A9 (Linking Phases 1 and 2); and
- Phase 4: Associated City improvements.

The Design Manual for Roads and Bridges Stage 2 Report for the CTLR (Phase 2) was completed in 2016. The Stage 2 Report details the selection of the final preferred route of the CTLR which was subsequently approved by the Council at its meeting on 14 December 2016.

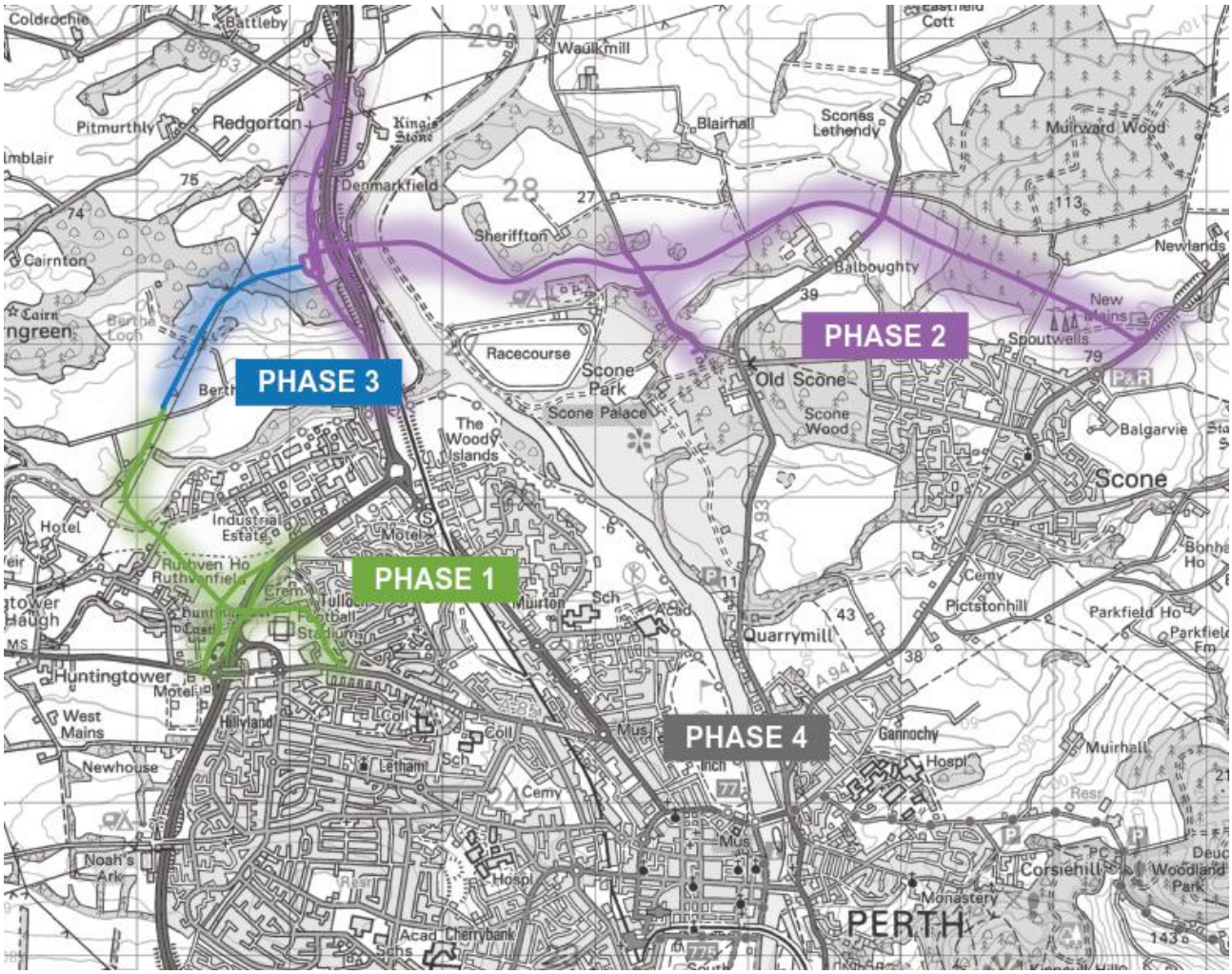


Figure 1.2: PTFP Phases

1.3 Project Update

Sweco was appointed by the Council in July 2017 to progress the CTLR project through DMRB Stage 3, statutory procedures, procurement and finally construction, with a completion date anticipated in late 2023.

Since appointment Sweco and the Council's Project Team have:

- Completed two rounds of consultation with all statutory consultees such as SEPA, SNH and HES;
- Undertaken regular liaison with all affected landowners and tenants;
- Undertaken public consultations in May and June 2018 to speak to the local communities affected by the scheme. Feedback received from these events has been considered throughout the development of the Stage 3 design;
- Held a Non-motorised User (NMU) workshop with local user groups, Council and Community Council representatives;
- Prepared a Walking, Cycling and Horse-Riding Assessment Report (WCHAR) and implemented the recommendations into the design to enhance existing and create new opportunities as part of the scheme;

- Undertaken a full land referencing exercise for the scheme and prepared the land plans for the Compulsory Purchase Order;
- Undertaken site surveys (ground investigation, geophysical and intrusive archaeological investigations, detailed drainage survey, NMU surveys, ecological surveys, noise survey, trees surveys and a bathymetric and topographical survey);
- Rationalisation of the DMRB Stage 3 design following feedback from consultees, landowners, surveys, technical advisors, contractors through ECI and the local community;
- Engaged Balfour Beatty, through the National Scape Framework, to participate in Early Contractor Involvement activities including the preparation of land take requirements and a feasibility cost estimate;
- Undertaken a Market Engagement Event on 7 & 8 March 2019 to identify interest in the delivery of the project and to inform the construction procurement strategy;
- Identified potential environmental enhancement measures; and
- Prepared a draft Specimen design (in consultation with the relevant Council teams and Transport Scotland) which is nearing completion with the view to submitting a planning application supported by an Environmental Impact Assessment Report (EIAR) in 2019.

1.4 Stakeholder Engagement

The Project Team has spoken with key stakeholders to ensure that their concerns, along with any potential opportunities and constraints, have been identified.

Due to the number of stakeholders involved in a project of this size it is necessary to take a balanced and practical approach. Where possible views from all stakeholders have been considered during the development of the Stage 3 design and associated environmental assessments.

1.4.1 Statutory Consultees

Over a period of 22 months the Project Team has engaged with all Statutory Consultees a minimum of two times and broad agreement has been reached on the Stage 3 design. Statutory Consultees engaged to date include:

- Scottish Environment Protection Agency;
- Scottish Natural Heritage;
- Historic Environment Scotland;
- Transport Scotland;
- Network Rail;
- Perth and Kinross Heritage Trust; and
- Forestry Commission.

1.4.2 Landowners and Tenants

Consultation has also been undertaken with key landowners and tenants including Mansfield Estate, Perth Racecourse, Scone Camping and Caravanning Club Site, I&H Brown, Ritchie, Filshie and AJ Stephen and have engaged positively in the design development and land acquisition processes.

The key landowners and tenants have been contacted regarding the alternative northern route. While none of the landowners contacted have objections in principle with the alternative northern route they have responded querying the reasons for deviating from the current CTLR route given the time, effort and cost to get to this stage having followed due process. They have also expressed concerns to the Council about the delay to the project should the route of the CTLR be revisited. A number of the landowners noted that committed development connected to the CTLR project in planning terms, cannot commence until the CTLR is in place.

1.4.3 Public Consultation

Consultation has been undertaken with local communities and user groups through exhibitions, meetings and digital media since commencement of DMRB Stage 3.

A summary of the feedback received during these consultations is contained in a Q&A document which was prepared and made publicly available after the events (see **Appendix A**). A detailed consultation report was also prepared and is available on the CTLR project website (https://www.perthtransportfutures.co.uk/cross-tay-link-road/).

In general, the public were supportive of the CTLR and appreciate the benefits it offers in the relief of traffic in the city centre. However, concerns were raised on some aspects of the scheme, with many of these well-considered; due consideration has been given to these concerns as previously mentioned.

1.5 Design Development

The Stage 3 Design development process recognised that the most significant project constraints (and opportunities) are located between the A93 and A94. This was also reflected in the views of the community and the feedback received. These constraints have been managed and measures to address them are included in the current Stage 3 route, as detailed below.

1. **Severance of Highfield Woods and associated tree/habitat loss**

   The extent of earthworks has been reduced to minimise tree loss and areas of compensatory planting to replace this loss have been agreed. The severance of the Highfield Woods as a habitat for ecology and recreational core paths has been addressed through the provision of a green bridge that re-establishes links to existing paths and ecological connectivity. The design of the green bridge has been optimised to provide an attractive local amenity. A further opportunity for enhancement has been identified in the potential provision of 'wayfinder' signs to make the woodland more accessible.

2. **Impact upon Scone North Development (H29)**

   It is acknowledged that this development is within the LDP and has current PPiP (planning permission in principle) consent. Accordingly, there has been close liaison between the Project Team and the Developer to ensure that the Stage 3 route considers the needs of the development, as far as is possible at this stage. Measures that have been adopted in the design include: revised road geometry to facilitate future reduction of the speed limit through the development; controlled pedestrian/cycle crossings of the CTLR; inclusion of service strips for efficient laying of utilities supply to the development and a landscape design that considers future development.

3. **Proximity to Newmains Steading**

   The project team identified a potential conflict between the location of the Stage 2 A94 roundabout and proximity to the Newmains Steading. As a result, following consultation with Newmains residents, the geometry and location of the A94 roundabout has been optimised to balance road safety, design efficiency and access to adjacent properties. We have altered the existing A94 road cross section through the removal of the existing northbound climbing lane, providing the space to include a shared

use footway/cycleway connection from Newmains to Scone. This design change combined with the extension of the existing 30mph speed limit zone to the north of Newmains has improved road safety for residents and users of the A94.

4. **Requirement for Highfield roundabout**

   The requirement for a roundabout at Highfield is to provide an access from the CTLR into H29. Through liaison with the developer it was agreed that the Highfield Roundabout would be included within the CTLR subject to developer contribution to the cost of the roundabout construction. It is acknowledged that there are several benefits to including the roundabout within the scheme including: it avoids the need to retrospectively construct the roundabout once the CTLR is in place, avoiding associated disruption to the travelling public; it future proofs the roundabout with regards to the consented development and acts as a natural traffic calming measure between the 50mph and the 30mph sections on the CTLR. This combined with the use of controlled pedestrian/cyclist crossings and a fully segregated shared use footway/cycleway ensures road safety is optimised.

Despite the measures outlined above Scone & District Community Council (SDCC) continue to raise concerns about the interaction between the H29 development and the CTLR. Consequently, they have asked for a route north of the Scone North development to be considered. It is understood that their concerns relate to road safety and air quality impacts upon the future residents of H29.

Chapter 2 of this report details the current CTLR route and alternative northern route between the A93 and A94 being considered in the comparative assessment.

2 Route Descriptions

2.1 General

The current CTLR route has been developed in accordance with the stated intentions in the:

- STAG Appraisal & CTLR Preferred Corridor (approved by Enterprise & Infrastructure Committee on 26 August 2009);
- DMRB Stage 2 & CTLR Preferred Route (approved by the Council on 14 December 2016);
- CTLR Stage 3 Consultation Report and Q & A Document (reviewed and approved by the Project Board on 22 October 2018); and
- Consultation meetings with Council teams (all recorded) and Design Statements as agreed with the Council for each discipline.

The current CTLR route and the alternative northern route between the A93 and A94 are shown in **Figure 2.1** with brief descriptions below.

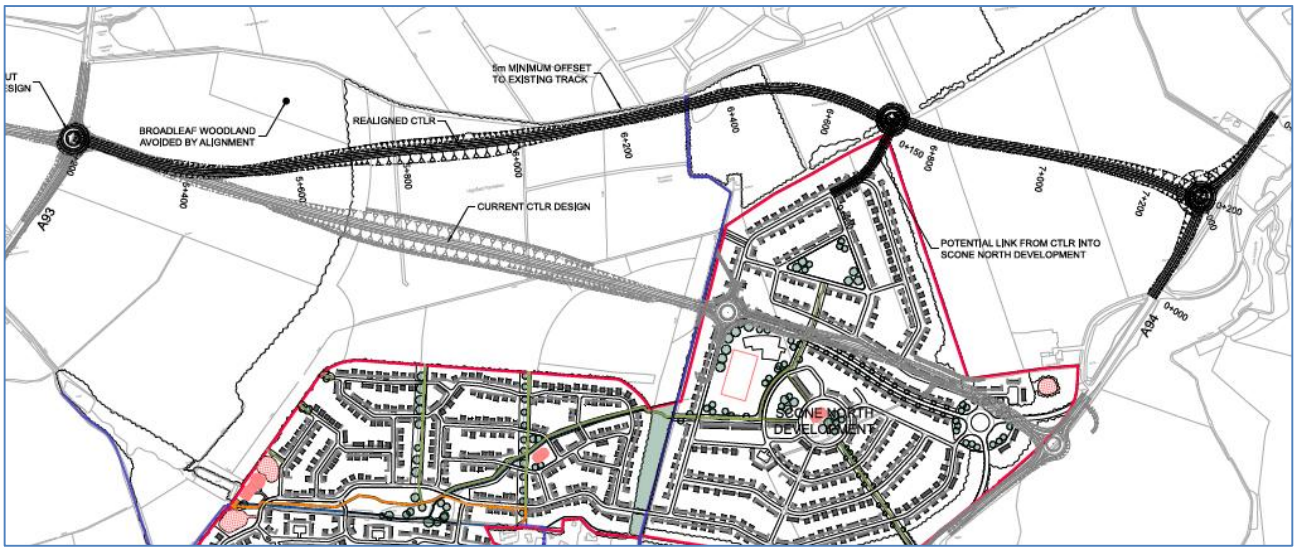


Figure 2.1: CTLR and Alternative Northern Routes between the A93 and A94

2.2 Current CTLR Route between the A93 and A94

From the proposed A93 roundabout the route heads south-east climbing up and cutting through Highfield Woods to the Highfield Roundabout located east of the Highfield track. The route leaves the Highfield Roundabout on a similar bearing and skirts around a hillside and down to the proposed A94 Roundabout on a gradual right-hand curve.

2.3 Northern Alternative Route between the A93 and A94

The alternative northern route extends from the A93 to the A94. The route follows a north-easterly direction across arable fields from the A93 and runs parallel to the Highfield forestry track (to be maintained) then crosses the northwest corner of Highfield Woods in a cutting (which is slightly shallower than the current route). It then turns towards the south-east, around the northern boundary of the proposed Scone North Development and enters the junction at Highfield which provides access to the development. The route continues south-east in a cutting down to the proposed roundabout on the A94. This roundabout would lie approximately 500m further north of the roundabout for the current preferred route.

3 Comparative Assessment of Routes

3.1 Limitations of Assessment and Methodology

The purpose of this comparative assessment is to provide sufficient information to the Council to inform the decision regarding viability of a northern route and whether further assessment is needed and/or justified.

It should be noted that the current CTLR route has been developed to a level of detail commensurate to DMRB Stage 3. The alternative northern route has been developed in enough detail to allow a comparative assessment to be undertaken but it has not been developed to the level of detail associated with a DMRB Stage 3 assessment.

As such, this comparative assessment compares both routes at a high-level using, where appropriate, assessment criteria to identify the preference of one route over another in environmental, engineering, economic and traffic terms. A full DMRB Stage 2 assessment has not been followed.

The comparative assessment has been completed for each route using various criteria relevant to the objectives of this report. The assessment criteria used are as follows:

- Engineering Assessment:
  - Design Standards;
  - Geotechnical;
  - Drainage;
  - NMU Facilities;
  - Public Utilities;
  - Constructability; and
  - Future Maintenance.
- Environmental Assessment:
  - Air Quality;
  - Cultural Heritage;
  - Landscape/LVIA;
  - Biodiversity;
  - Geology, Soils, Contamination and Hydrogeology;
  - Materials;
  - Noise and Vibration;
  - People and Communities;
  - Agriculture, Forestry and Sporting Interest;
  - Road Drainage and the Water Environment; and
  - Climate.
- Transport and Economic Assessment:
  - Transport Modelling; and
  - Economic Assessment.

The assessment criteria above have been used in an attempt to mimic the DMRB Stage 2 assessment process as closely as possible.

Sections 3.2, 3.3 and 3.4 of this report summarise the findings of the comparative assessment for each of the criteria above and where appropriate a preference of one route over the other is reported.

3.2 Engineering Assessment

3.2.1 Introduction

An outline geometric design has been prepared for the alternative northern route based on a preliminary assessment of the physical alignment constraints (e.g. woodland, public and private access requirements, cultural heritage etc.) and available aerial topographical data. The horizontal and vertical geometry was developed in accordance with the DMRB and appropriate junction locations identified. The junctions are shown as roundabouts, which is their likely form, but this would be confirmed as part of the Stage 3 design process.

This outline design for the alternative northern route has formed the basis of the comparative engineering assessment with the current CTLR route. The topics used in the engineering assessment are presented in turn in the following manner:

- Approach;
- Assessment; and
- Summary (including **an indication of preference or stating no clear preference**).

An overall summary of the engineering assessment is included at the end of this section in **3.2.9**.

3.2.2 **Design Standards**

3.2.2.1 Approach

Both the current and northern alternative between the A93 and A94 are generally in accordance with the DMRB with some Relaxations and Departures. The MX geometric design files for the current CTLR route were reviewed and compared with the northern alternative route geometry and the minor differences are explained below.

3.2.2.2 Assessment

Design Speeds

For both options the mainline is designed to an 85kph Design Speed, as defined in DMRB TD 9/93 Highway Link Design.

In the current CTLR route design, the A93 and the northern A94 links are also designed to 85kph. The A94 southern link is designed to 60kph which is consistent with a 30mph speed limit, however, prior to the H29 development the proposed speed limit is likely to be 40mph on the A94 given the rural character of this stretch of road (subject to agreement with the Council's operational safety team).

It is anticipated that the current CTLR route between the Highfield and A94 roundabouts will have a 30mph speed limit (60kph) following the construction of H29, but there is no reduction of Design Speed, to reflect the rural character of the road upon opening to traffic in advance of the implementation of H29.

In the alternative northern route, the CTLR, A93 and A94 routes are designed to 85kph. Consideration was given to reduction of the Design Speed in the southern A94 link which would allow the A94 roundabout to be raised to reduce cut volumes. However, the greater distance between the existing Scone roundabout and the proposed A94 roundabout (approximately 850m) permits higher vehicle speeds and, given the rural character of this stretch of road, actual vehicle speeds are likely to be close to 85kph.

The alternative northern route eastern section of the CTLR will remain permanently at 50mph which will avoid the potential issue of drivers not conforming to the lower speed limit when it is introduced post-development.

Alignment

The current CTLR route design is predominantly straight, turning south-eastward on its approach to the A94. There are no horizontal or vertical Relaxations or Departures included in the mainline CTLR design.

The alternative northern route is approximately 225m longer and more sinuous to avoid woodland and pass the north-eastern corner of H29. This curvature will help screen the visual impact of the deep cutting creating a "notch" in the skyline. There is currently a 1-Step Relaxation in horizontal curvature in the western arm to optimise the spacing of the arms for the Highfield roundabout, however, it is anticipated that this can be removed during subsequent design development.

Neither design provides an overtaking section between the roundabouts, due to the relatively short distances between the roundabouts and the existing topography. A climbing lane was considered but has not been provided between the A93 and Highfield roundabouts as the length available is insufficient to accommodate it safely.

Cross Section

In the current CTLR route design the CTLR cross section is a modified version of the S2 (rural single carriageway) dimensions shown in DMRB TD 27/05 Figure 4-3a. The southern verge is modified as follows: a 3m shared cycleway is provided at a 2m offset from the road to allow for drainage, with a 1m verge beyond. Between the Highfield and A94 roundabouts, the cross section through the Scone North development is based

on the SU2 (urban single carriageway) dimensions, therefore it varies from that shown below as it is kerbed without hard strips and has an additional 1.8m service strip in both verges.

The alternative northern route cross section is the modified S2 layout with shared cycleway as described above for its full length.

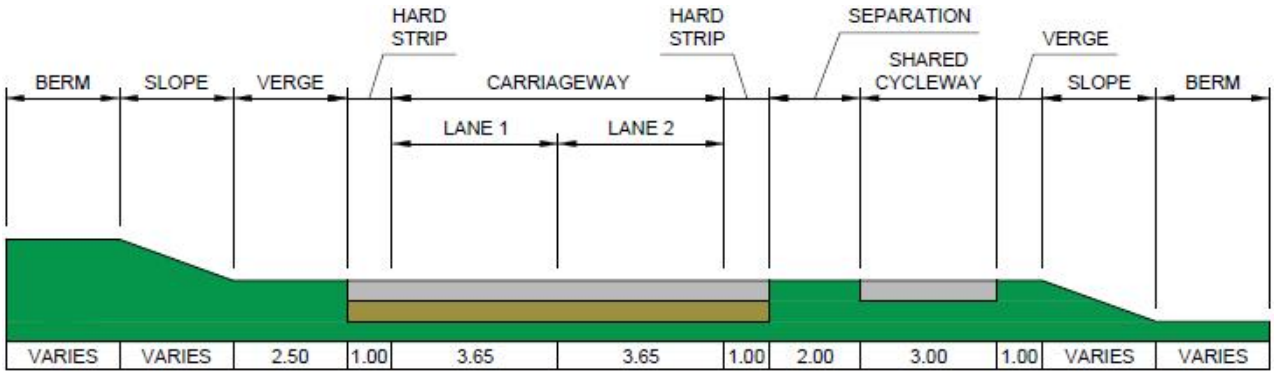


Figure 3.2.1: Dimensions of Cross-Section Components for CTLR S2

Junctions

In the current CTLR route design there are three roundabouts: at the A93, Highfield and the A94. All roundabouts currently have a 45m Inscribed Circle Diameter (ICD), though it is possible this may be reduced slightly during detailed design to achieve a 0.85 Reference Flow/Capacity ratio (RFC), considered to be the level of provision which is economically justified. The roundabout layouts have been developed to provide the appropriate approach tapers and entry / exit radii therefore the footprint of the roundabouts is realistic. The roundabouts in the current design are relatively straightforward. The 60kph design speed on the A94 southern approach permits an alignment which accommodates the constraints.

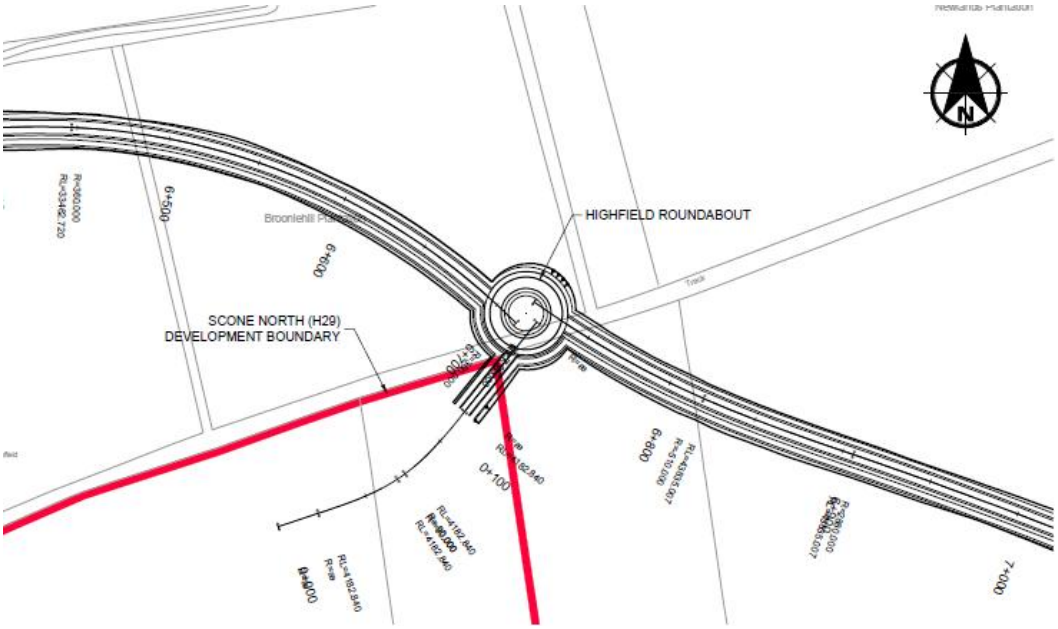


Figure 3.2.2: Highfield Roundabout (Northern Alternative Route)

The alternative northern route also contains three roundabouts: at the A93, Highfield and the A94. They also have a 45m inscribed circle diameter (ICD) and there might be scope to reduce this during detailed design.

These roundabouts have not been developed to include the appropriate tapers and entry / exit radii therefore their footprint remains to be developed. There may be an opportunity to reduce the provision to a priority junction with a ghost island for turning traffic (see TD 42/95 Figure 7/4) since there is not a crossroad arrangement, allowing through traffic to continue unobstructed. The junction location would likely be agreed in consultation with the developer and it may be possible to locate it such that it provides interim access to the Highfield property via the existing track at Chainage (Ch) 6325, and later incorporate this as a northern link into H29.

However, for the alternative northern route there are numerous constraints to the A94 roundabout and approach design which could make it difficult to achieve an optimum design. These include the:

- Muirward House access;
- Existing gradients on the A94 (approximately 3.5%); and
- Existing ground levels (the existing A94 is in cutting at this point).

The need to achieve standard approach gradients requires swinging the A94 west of its existing route, however the proximity of the Muirward access and the need to maintain a visibility splay past the property boundary limits this. It is possible that Departures will emerge during the design process, for example for stopping sight distance, horizontal alignment and vertical alignment.

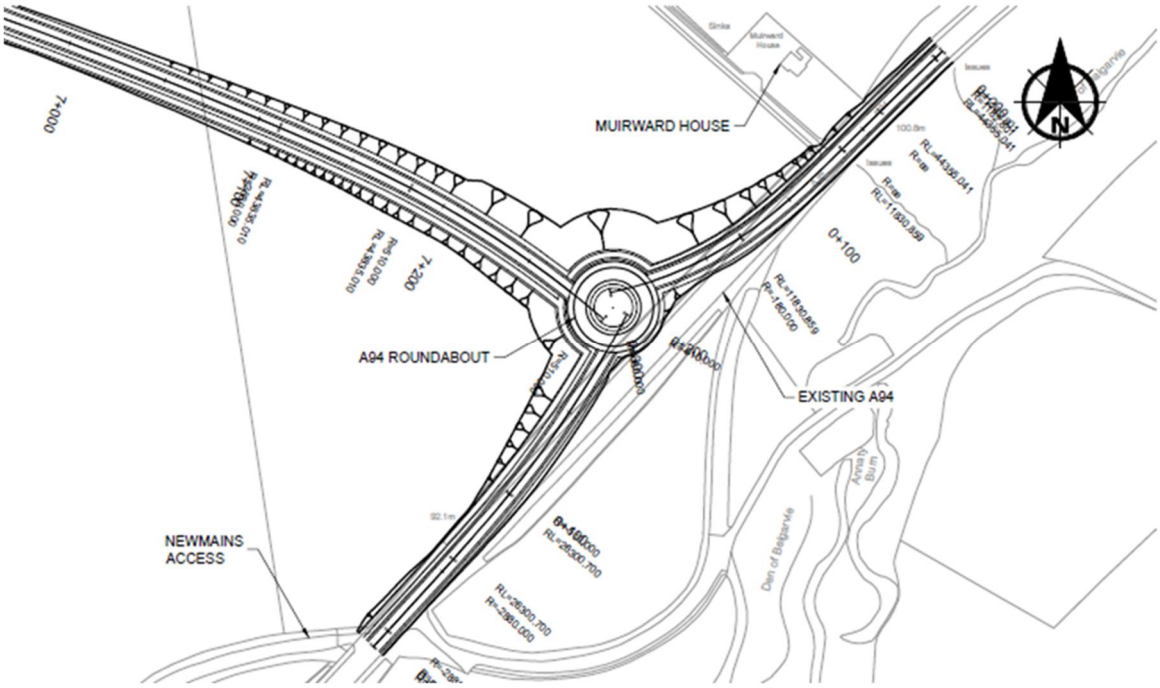


Figure 3.2.3: A94 Roundabout (Northern Alternative Route)

Departures

The A94 south link for the current CTLR route has a design speed of 60kph and it is likely that the speed limit will be 40mph between Scone and the new roundabout (subject to agreement with the Council's road safety team). This speed is consistent with a design speed of 70kph and it is a Departure from TD9/93 to have a design speed of 60kph.

The only Departure identified at this stage is similar for both route options. This Departure relates to the lack of overtaking opportunity in their overall alignment as the Full Overtaking Sight Distance (FOSD) is not achieved which is a Departure from TD9/93 Highway Link Design. This is due to a combination of the topography / road geometry and the frequency of junctions.

This is the only Departures identified to date, however, it is likely that there will be further Departures identified for both routes when the design is developed. For example, there are likely to be road restraint systems which do not achieve standard lengths of restraint in advance of the relevant hazard due to constraints. There is potentially more likelihood of Departures coming to light for the alternative northern route as it has yet to be developed to Stage 3.

Operational Safety

An operational safety review has considered the safety implications of the two proposed routes between the A93 and A94.

The main hazards identified in the current CTLR route design are as listed below:

Feature	Hazard	Description
Highfield Roundabout	Severance	The current CTLR route passes through the proposed Scone North housing development. This creates severance issues for non-motorised users, resulting in significant crossing activity and therefore collision risks.
	Roundabout Collisions	The proposed 4 arm Highfield Roundabout will increase the number of conflict points and would likely result in an increased collision risk compared with the alternative northern alignment.

Table 3.2.1 Current CTLR Route - Hazards

The main operational safety benefits associated with the current CTLR route are as follows:

Feature	Hazard	Description
Straight alignment east of A93 Roundabout	Overtaking	The eastbound alignment from the roundabout is straight as it starts the ascent on the 6% gradient. Quicker vehicles may attempt overtakes of larger slower vehicles on the ascent. The straight alignment assists with visibility for the overtaking vehicle decreasing the risk of overtaking collisions. Positioning bus laybys in this location may increase the risk.
	Overshoots	The westbound downhill gradient will add to vehicle speed and momentum approaching the roundabout, however the straight alignment will assist as the full roundabout layout ahead will be in the driver's line of sight.
Straight alignment west of Highfield Roundabout	Overtaking	Similar to above; westbound traffic will exit the Highfield Roundabout over a slight crest and the straight alignment assists with visibility for the overtaking vehicle decreasing the risk of overtaking collisions.
	Overshoots	Similar to above; the location of the Highfield Roundabout will be in the direct sight of eastbound approaching vehicles due to the straight alignment.
A94 Roundabout	Overshoots	The A94 roundabout is close to online with the existing A94 which decreases the risk of overshoots due to drivers on the approaches seeing the continuing alignment ahead and failing to follow the new alignment onto the roundabout.
Bends	Surfacing	The straight alignment decreases the level of wear on the road surface and potential maintenance requirements, which decreases road workers exposure to risk.
	Roadside furniture	The straight alignment decreases the risk of vehicles leaving the carriageway and striking roadside furniture, which decreases maintenance levels and road worker exposure to risk.

Table 3.2.2 Current CTLR Route – Safety Benefits

The table below lists additional hazards identified relating to the alternative northern route that are not present on the current CTLR route.

Feature	Hazard	Description
Bend east of A93 Roundabout	Overtaking	The eastbound alignment from the roundabout takes a left bend as it starts the ascent on the 6% gradient. There will be a temptation for quicker vehicles to attempt overtakes of larger slower vehicles on the ascent. The left bend restricts the visibility for the overtaking vehicle increasing the risk of overtaking collisions due to the blind spot created by the vehicle ahead on the bend.

		Positioning bus laybys in this location may exacerbate the situation.
	Overshoots	The westbound downhill gradient will add to vehicle speed and momentum approaching the roundabout, whilst the bend will remove the view of the crossing features and roundabout. This may increase the risk of overshoots as theses hazards may be out of the driver's direct line of sight.
Bend west of Highfield Roundabout	Overtaking	Similar to above; westbound traffic will exit the Highfield Roundabout over a slight crest and onto a left bend which would potentially mask approaching vehicles to vehicles looking to overtake slower vehicles.
	Overshoots	Similar to above; the location of the Highfield Roundabout will not be in the direct sight of eastbound approaching vehicles negotiating the right bend. This increases the risk of overshoots.
A94 Roundabout	Overshoots	The A94 roundabout is shown as an offset roundabout which increases the risk of overshoots due to drivers on the approaches seeing the continuing alignment ahead and failing to follow the new alignment onto the roundabout.
Bends	Surfacing	The introduction of the bends on the alignment increases the level of wear on the road surface and potential maintenance requirements, which increases road workers exposure to risk.
	Roadside furniture	The introduction of the bends increases the risk of vehicles leaving the carriageway and striking roadside furniture, which increases maintenance levels and road worker exposure to risk.

Table 3.2.3 Alternative Northern Route - Hazards

The review has also considered elements of the alternative northern route that would provide safety benefits as detailed in the table below:

Feature	Hazard	Description
Highfield Roundabout	Severance	The alternative northern route features the Highfield Roundabout to the north of the proposed housing development, as opposed to it being within it. This will reduce severance issues for non-motorised users, resulting in less crossing activity and therefore collision risks.
	Roundabout collisions	The proposed reduction of the Highfield Roundabout to three arms on the alternative northern route from four will reduce the number of conflict points and likely result in a reduced collision risk.
Highfield Roundabout	Roadside furniture	The reduction in arms on the roundabout decreases the level of street furniture required and therefore the maintenance liability, resulting in less exposure of risk to road workers.

Table 3.2.4 Alternative Northern Alignment – Safety Benefits

It can be concluded that the northern alternative route features more hazards than the current CTLR route although the levels of risk presented by both options to road users and workers is low with the appropriate controls (warning signing, road markings and temporary traffic management). These would be applied in the developed design.

3.2.2.3 Summary

Both routes are designed to similar standards, however there are a number of differences which have a bearing on the potentially preferred route in geometric terms:

Design speed – The current CTLR route is designed to 85kph, consistent with the 50mph speed limit applied along the CTLR (east of the River Tay) when the scheme is opened. A reduction in speed limit is proposed from 50mph to 30mph between the Highfield and A94 when the H29 development is built. The alternative northern route would have a permanent speed limit of 50mph applied throughout.

Alignment – The CTLR horizontal and vertical alignment is fully compliant for both routes. The current CTLR route contains a Departure for the A94 south link which is designed to 60kph (see '**Departures**' below).

Cross section – The modified cross section shown in **Figure 3.2.1** applies to both routes with the exception of the current CTLR route between the Highfield and A94 roundabouts.

Junctions – The three junctions provided are expected to be similar for both route options. There may be an opportunity for the alternative northern route to replace the Highfield roundabout with a ghost island T-junction which is preferable for CTLR through traffic. On the other hand the constraints at the A94 roundabout may result in a less optimised design.

Departures – Both routes have a compliant mainline, except for the lack of FOSD / overtaking opportunity. For the current CTLR route the southern A94 approach to the roundabout has a substandard design speed (60kph instead of 70kph as appropriate for the proposed speed limit of 40mph (at opening).

Operational Safety - The levels of risk presented by both route options to road users and workers is low with the appropriate controls (warning signing, road markings and temporary traffic management).

There is **no clear preference between the current and alternative northern route options from the design standards assessment**. Whilst the alternative northern route may provide an opportunity to replace the development roundabout with a ghost island T-junction the constraints associated with the A94 roundabout geometry are likely to complicate the design of the junction with the potential for Departures to emerge.

3.2.3 **Geotechnical**

3.2.3.1 Approach

The following assessment of the anticipated ground conditions underlying the two alignment options has been determined from published mapping, geological memoirs and existing ground investigation (GI) information. The published sources of information reviewed were the British Geological Survey (BGS) 1:50,000 scale paper maps (Sheet 48W Solid and Drift Editions) and digital GIS format mapping. In addition, the BGS Memoir for the Geology of the Perth and Dundee District was consulted. Relevant information from the preliminary and detailed GI's for the CTLR Scheme (undertaken by Raeburn Drilling and Geotechnical Ltd, 2013 and BAM Ritchies 2018, respectively) were also reviewed.

3.2.3.2 Assessment

General Ground Conditions

Published geological records indicates the same general stratigraphic sequence underlying both the northern alternative route and the current CTLR route: Glacial Till deposits overlying bedrock. Bedrock comprises sedimentary strata of the Lower Devonian Scone Sandstone Formation, part of the Garvock Group (Lower Old Red Sandstone Supergroup).

Localised alluvium associated with the Annaty Burn is recorded approximately 50m east of the A94 tie in with the northern alternative route, although not recorded beneath the scheme footprint, therefore, not considered to impact on the alignment.

Existing Ground Investigation Information

A detailed GI (contract value approximately £1.5million) was undertaken for the current CTLR route in early 2018. There are no existing GI records within the footprint of the northern alternative route.

Approximately 90% of the Glacial Till encountered across the current CTLR route was recorded to be fine-grained, which was typically weathered in the uppermost 2-3m and characterised by a lower strength and generally mottled appearance. Weathered Glacial Till was typically described as soft to firm (locally stiff) mottled sandy slightly gravelly CLAY with low cobble content. Fresh glacial till was generally described as stiff and very stiff slightly sandy slightly gravelly CLAY/SILT with a low cobble content.

Coarse-grained Glacial Till was typically encountered within localised pockets and generally comprised a variable mix of sands and gravels. Typical descriptions include medium dense to very dense silty gravelly fine to coarse SAND and silty/clayey sandy fine to coarse sub-angular to sub-rounded GRAVEL of mixed lithologies with low to high cobble and boulder content.

Bedrock was typically described as very weak to medium strong fine-grained SANDSTONE with occasional gravel size inclusions of mudstone. Bedding planes were recorded to be widely to very widely spaced. Bedrock becomes progressively shallower towards the eastern extents of the scheme with increasing topography, locally encountered within 1-2m below ground level (bgl).

Identified Geotechnical Constraints

The current CTLR route is to be constructed at grade or on low embankments (maximum height approximately 1m). A cutting, approximately 750m in length is proposed through Highfield Woods. The cutting extends to a maximum depth of 7.2m and at this location a 'green' bridge for NMU's and ecological connectivity is proposed. Two roundabouts are proposed to tie-in with the existing A93 and A94 roads.

The northern alternative route is to be constructed at grade or on low embankments (maximum height approximately 2.8m). A cutting, approximately 600m in length is proposed through Highfield Woods. The cutting extends to a maximum depth of 5.8m. A minor cutting is also proposed at the tie in with the A94

(maximum depth approximately 5m). Three junctions are proposed: roundabouts at the existing A93 and A94 roads and an additional junction to provide a link at Highfield to H29.

Given the anticipated similarities in ground conditions and the relative similarities in design elements, the main geotechnical constraints are generally considered to be the same for both options. Typically, shallow groundwater levels, the potential presence of Made Ground associated with the construction of the existing A94 and possible shallow bedrock encountered within the deepest sections of the cuttings.

Earthworks / Excavated Material Acceptability

All cuttings associated with the current CTLR route and alternative northern route are anticipated to be formed within Glacial Till deposits.

It is estimated that approximately 40% of weathered and 40-60% of fresh Glacial Till may be immediately re-useable as general engineering fill.

Unacceptable Material and Contaminated Land

Unacceptable materials which cannot be used in the main earthworks such as soft clays would require to be disposed of on or off-site. Although unsuitable for general fill such materials would likely be suitable for the formation of bunds and landscaping.

Contaminated land is not anticipated to be a significant issue affecting either route (refer to Section 3.3.6). However, due to the inherent variability of ground conditions there is always the potential that unidentified contamination may be encountered. If encountered, investigation would be required to determine any special measures required to address any contaminants present. This could involve in-situ treatment or removal to a licensed disposal site, depending on the nature of the contamination.

Cut/Fill Balance

For the purpose of the earthworks assessment, it is assumed that the exported material from either the current or alternative northern route requires deposition on the eastern side of the River Tay only.

Table 3.2.3 below summaries the major earthwork quantities as follows:

- Bulk Fill Material Required – the bulk earthworks fill volume as required for the mainline, side roads and junctions. This excludes the material required for capping, sub base and topsoil.
- Bulk Excavated Material – the total volume of excavated material, including acceptable and unacceptable. Excludes the topsoil strip.
- Acceptable Excavated Material – this constitutes the volume of excavated material deemed acceptable from initial investigations; and
- Cut/Fill Balance – the balance of the overall fill requirement, less the potential volume of available acceptable site won material. A negative balance is indicative of an overall surplus of material generated by the work.

Material Quantities (m3)	CTLR Route Alignment Options		
	Current CTLR Route	Alternative Northern Route	Difference
Bulk Fill Material Required	26,733	15,640	11,093
Bulk Excavated Material	115,952	128,964	-13,012
Acceptable Excavated Material	69,571	77,378	-7,807
Cut/Fill Balance	+42,838	+61,738	-18,900

Table 3.2.5 – Material Quantities

As expressed in the table above, a negative balance is indicative of an overall import requirement with the result that a volume of engineering fill will be required to be sourced and brought to site. A positive balance indicates that there will be an overall surplus of engineering fill material generated by the work.

3.2.3.3 Summary

Based on a comparative review of anticipated ground conditions, likely geotechnical constraints and current earthworks proposals, there is not considered to be a significant difference between the current CTLR route and the alternative northern route. It is therefore concluded that **in geotechnical respects there is no clear preference for either option**.

3.2.4 Drainage

The current CTLR route has three drainage catchments between the A93 and A94 roundabouts. These are; PKC-6, PKC-7 and PKC-8 (refer to Figure 3.2.4 below). The drainage strategy is: generally grass-topped filter drains in the verge collect carriageway runoff, providing the first and second levels of treatment; the SUDs ponds/basins attenuate the flow and provide the third level of treatment then the road runoff outfalls into the watercourses.

The current CTLR route affords the opportunity to relieve the barrel drain of some of the flow currently discharging to it from the existing A94 to the north of Scone. This mitigates an existing problem with this drain which at times causes flooding within Scone village.

A catchment assessment was undertaken for the alternative northern route to establish viability. The limited available aerial topographical data and ordnance survey contour mapping was used to identify the likely extents of land draining towards the road. The outfall locations were identified from mapping and the limited available watercourse surveys. This information was used along with the proposed road levels to estimate flow paths and the volumes of runoff which are to be accommodated at each outfall location in the design rainfall event. From this information it is possible to estimate an approximate footprint for the SUDs ponds / basins.

Based on the above high-level drainage strategy, the two routes were then compared on the basis of their catchment areas, network extents and outfall requirements.

The alternative northern route has two drainage catchments; Northern Catchments 1, and 2, as shown below.

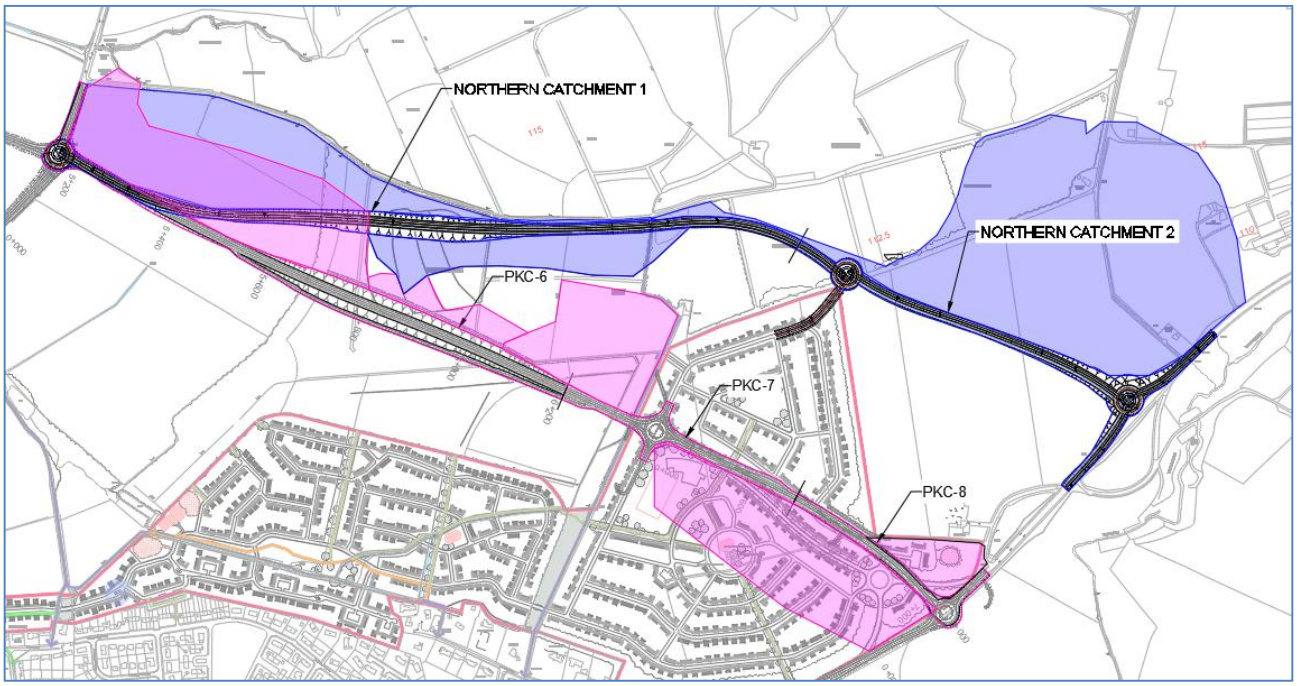


Figure 3.2.4: Indicative Catchment Areas

If the alternative northern route was taken forward the drainage design approach would be consistent with the strategy described above for the current CTLR route.

3.2.4.1 Assessment

Northern Catchment 1

Northern Catchment 1 is similar in its characteristics to PKC-6. The vast majority of the runoff falls from the east towards the A93 roundabout for both catchments. The catchment area (road and earthworks) for Northern Catchment 1 is 4.17Ha compared with 4.53Ha for Northern Catchment 2.

Considering the runoff, the potential outfall locations and access, the SUDs pond required for Northern Catchment 1 is likely to be similar to that provided for PKC-6 in terms of size and location at this stage of assessment. The PKC-6 pond layout is shown opposite.

Despite the similarities it is anticipated that Northern Catchment 1 will be more expensive than PKC-6 due to the additional length (approx. 185m) of the network. In addition to additional drains and catchpits it could also impact downstream drains which may have to be upsized and/or become deeper in comparison to PKC-6. In both cases this network will be subject to a CAR (Controlled Activities Regulations) license as it is greater than 1km long, therefore there could be a slightly increased risk in obtaining the license for the longer Northern Catchment 1.

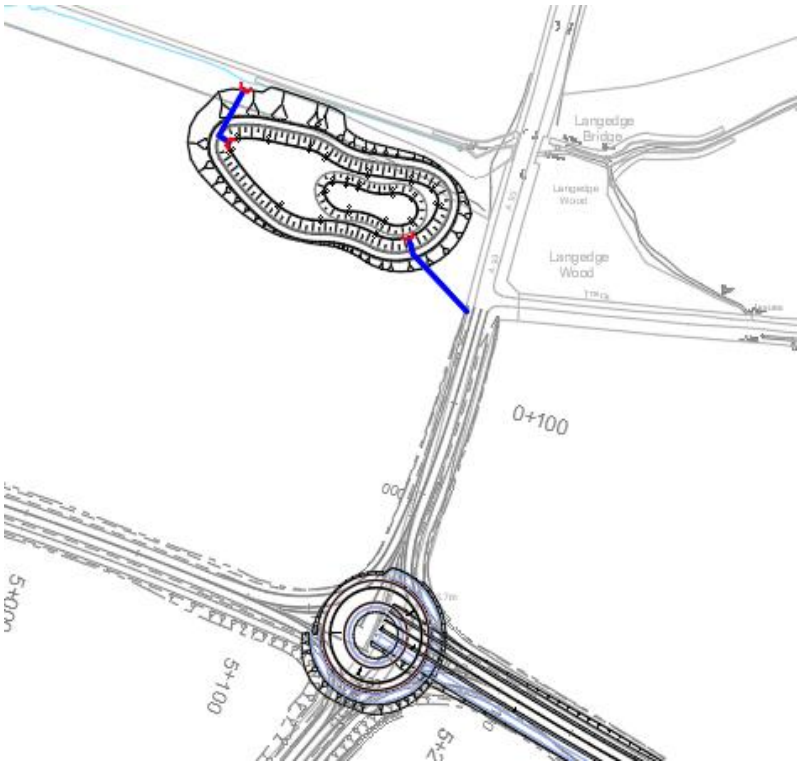


Figure 3.2.5: PKC-6 Pond Layout

The catchment areas (including pre-earthworks) have been estimated using the basic contour information available and these are indicated on Figure 3.2.4. From a preliminary assessment of the existing flow routes compared with the proposed outfall arrangements for the current and alternative northern routes, there is minimal change to the existing outfall destinations of overland flow. Therefore, SEPA should be satisfied that there is no clear preference between the two routes in relation to the diversion of overland flows.

Northern Catchment 2

Northern Catchment 2 (catchment area 2.89Ha) is effectively draining the equivalent of PKC-7 and PKC-8 (2.59Ha) on the current CTLR route. This results in one larger basin being required at the A94 roundabout in comparison to the 2 smaller basins provided in the current CTLR route at H29 and A94 roundabouts.

The topography around the A94 roundabout means that substantial cutting is required for the SUDs basin, regardless of its position. Two locations for the basin were considered, which are outlined in Figure 3.2.6 below.

At this stage, the western side is the preferred option as it facilitates maintenance access provision and avoids impacting the access to the existing property at Shianbank. Runoff collected from the mainline and northern arm of the roundabout would receive two levels of treatment, however, the southern arm of the A94 would receive one level of treatment and tie into the existing A94 road drainage. This is similar to the proposed design in the current CTLR route at the A94 roundabout. Consideration was given to keeping the pond location as per the current CTLR route to reduce the earthworks, however, this extends the network length such that it would require CAR licensing by SEPA similar to Northern Catchment 1.

It is proposed to pipe the basin outflow to the south and outfall into the Annaty Burn/ Mill Lade at the same location as the current CTLR route. This will increase the length of carrier drain required by approximately 250m.

There is a significant increase in the cut volume required for the alternative northern basin compared with the combined earthworks for PKC-7 and PKC-8 (22793m^3 versus 8084m^3). It may be possible to reduce this quantity slightly during design development; on the other hand it could increase.

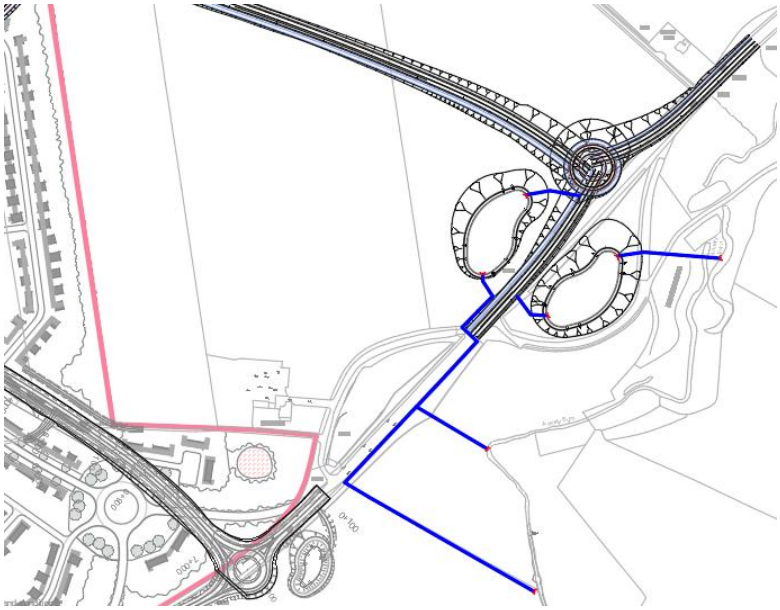


Figure 3.2.6: Indicative basin options at Muirward

The alternative northern route does not provide an opportunity to relieve the barrel drain of some of the road runoff currently discharging to it.

3.2.4.2 Summary

Overall the drainage strategy is similar for both route options with the exception that runoff is split between three outfalls for the current CTLR route and the alternative northern route has one less outfall. One larger basin is required at the A94 Roundabout rather than the two smaller ones at Highfield and A94 for the current CTLR route. The **alternative northern route is slightly less preferred in relation to drainage** mainly due to the implications of the increased earthworks for the basin (cost, environmental) and the potential for deep drainage in the vicinity of the outfall at the A94. In addition, unlike the current CTLR route, it offers no opportunity to relieve the barrel drain in Scone of some of the carriageway runoff which currently flows into it.

3.2.5 NMU (Non-Motorised User) Facilities

3.2.5.1 Approach

The design of the current CTLR Route has been informed by a Walking Cycling and Horse-Riding Assessment and Review (WCHAR) which identified opportunities for maximising the benefit derived for non-motorised users through the CTLR project. This forms the background to the assessment of the implications of the alternative northern route and its potential to derive the same or different benefits to those incorporated in the project to date. Both routes would be designed with a similar level of NMU provision, so the assessment focussed on the implications of the relocation of these facilities to the north.

3.2.5.2 Assessment

The NMU facilities provided for both routes are comparable in that the 3m shared cycleway would be provided along the south verge of the CTLR with connections at the side roads. However, the relocation of the route to the north is likely to have a significant effect on it's perceived accessibility to users from the existing Scone village and the proposed Scone North development. This is because users from the existing Scone village will be required to travel an additional 500m (approximately) to access the CTLR and cycleway therefore it would be less attractive to some users, particularly families.

A94

The proposed A94 roundabout is some 300m north of the existing park and ride roundabout at Scone and there is a proposed 3m shared cycleway between these 2 roundabouts within the scheme. For the alternative northern route whilst the proposed A94 roundabout would be at an additional 500m distance from Scone the intention is to provide a shared cycleway connection which would provide the facility within approximately 400m of the main access to Perth Airport. The benefit of the alternative northern route is that a shared cycleway would be provided from Scone virtually to the airport at additional cost. If the full 3m width is provided throughout there is also a slight risk of additional land acquisition required at Newmains and the potential for amendments to their access when the design is developed. If this were to materialise it would likely give concern to the residents, based on experience from the consultations held for the current CTLR route.

Scone North Development

As the alternative northern route will be on the northern periphery of the H29 development the future residents (depending on where they are situated within it) would use it less for both local NMU trips and to go further afield. For example, the current CTLR route which passes through the development would be preferable for residents accessing bus and other services. The facility of the current CTLR route through the heart of the H29 development is optimum for NMUs wishing to access the CTLR shared cycleway and bus services for both local and further afield travel. Indeed, the provision of bus stops on the alternative northern route may not be attractive enough to merit their provision. Stagecoach have advised that running bus services along the current route would provide a better service to local residents due to the proximity to housing, and Scone itself.

A93 to A94

There is little difference between the two routes at the A93 as the roundabout is in the same position with the same NMU provision along the A93. Between the A93 and the A94 where the alternative northern route crosses the edge of the Highfield Woods in side-long ground, the wood will be effectively curtailed. Due to the topography there is not the same opportunity to provide a green bridge. This means that whilst the current CTLR route cuts through the centre of the ancient woodland (refer to section 3.3.4 Biodiversity) it retains more of its recreational, ecological and forestry amenity with the provision of the green bridge connecting both sides of the CTLR. The severance and topography have given rise to the green bridge to connect the 2 areas of woodland for the current CTLR route, however this is not the case for the alternative northern route. In effect there will be less of the Highfield woodland accessible to NMUs for the alternative northern route than for the current CTLR route.

NMU Safety

The safety of pedestrians and other NMUs is a priority within the current CTLR route design and this would equally be the case for the alternative northern route design if this was taken forward.

Whilst the current CTLR route is closer to more residents within the H29 development there is a requirement to cross the CTLR. This could create a potential safety concern; however, this is mitigated in the design for the current CTLR route by:

- The introduction of a 30mph speed limit and appropriately landscaped streetscape when the development is introduced. The 30mph limit will be reinforced by the urban environment;
- The provision of appropriate crossing facilities. Toucan crossings are proposed on the CTLR adjacent to the Highfield and A94 Roundabouts; and
- The provision of roundabout junctions at Highfield and the A94 which will act as a natural traffic calming measure causing vehicles to slow down on approach to Scone North.

The alternative northern route to the northern periphery of H29 would have a permanent 50mph speed limit as it bypasses Scone and H29. There will remain a north / south desire line for NMUs along the A94 and at Highfield therefore provision would be made for appropriate crossings at these locations. These crossings would be provided in the context of a permanent 50mph speed limit. There would be a lesser demand on the crossings than those on the current CTLR route but it would remain steady due to the trip generators of Perth Airport on the A94 and Highfield Wood. Whilst the crossing provision would be in accordance with the appropriate design standards, on balance it is preferable that the crossing points are situated within the 30mph speed limit zone per the current CTLR route.

3.2.5.3 Summary

On balance **the current CTLR route is preferred for NMUs** mainly for the following reasons:

- It is more accessible to both current and future users from Scone;
- The lower speed limit (post development) through H29 will provide safer crossing opportunities;
- The route (and therefore H29) more likely to be served by public transport; and
- Whilst the current CTLR route cuts through the heart of the Highfield Woods it affords the opportunity to connect the remaining woodland on either side via a green bridge whereas the alternative northern route effectively curtails NMU access to the Highfield Woods at the edge of the road corridor.

3.2.6 Utilities

3.2.6.1 Approach

A long process of procuring utilities proposals and C4 cost estimates (under the New Road and Street Works Act) is ongoing in relation to the current CTLR route. There was insufficient time available to follow a similar process for the alternative northern route therefore an online utilities search was commissioned between the A93 roundabout and the A94. The comments below are based on this and our understanding of the impact of the current CTLR route on utilities.

3.2.6.2 Assessment

In this area, the Scottish Water distribution main, BT Underground apparatus and SSE LV underground mains are affected by both the current CTLR route and the alternative northern route to similar extents. Both routes cross the apparatus and there is no clear difference expected in the significance of the impact on each of the utilities. It is emphasised that no discussions have taken place with the utility providers at this stage therefore the comments in this section are based purely on observation of the presence of utilities.

SSE and O_2

The alternative northern route avoids the SSE 11kV HV overhead line that links into Highfield cottage, whereas the current design crosses the line just South of the cottage and at the A94 roadside. There are a couple of O_2 mobile masts in the field to the west of the A94 southwest of Newmains. The access to these is bisected by the current CTLR route and a new access is provided off the CTLR to provide access in advance of the mast removal for the H29 development. The alternative northern route does not affect this access.

A94

The relative positioning of the roundabouts in relation to the existing A94 varies between the two routes, with the alternative northern route option being offset to the west from the road. See **Figure 3.2.7** below for the roadside Utilities at the A94.

The utilities running along the eastern verge of the A94 may be significantly less affected due to the offset roundabout. If the solum of the existing A94 remains in the road boundary it may be possible to retain part of the existing SGN Medium Pressure Gas Main and Scottish Water Main apparatus and tie it into diverted services where required. This is based on the assumption that the A94 north link can be tied in to the existing carriageway south of the Muirward House access. This would need to be confirmed following a detailed topographical survey.

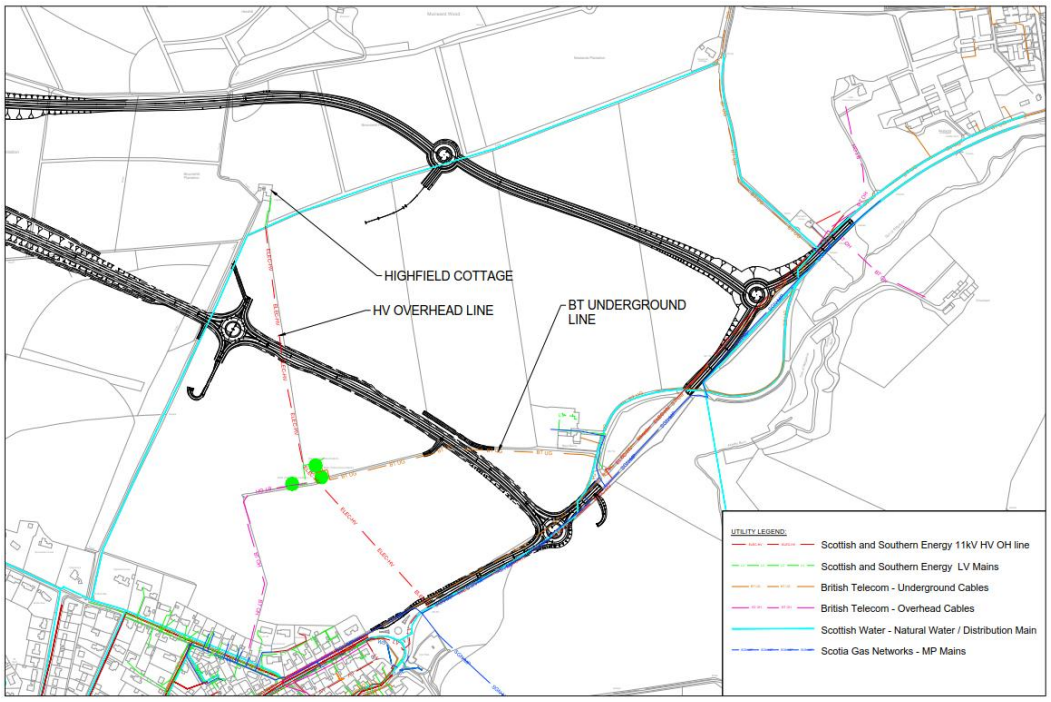


Figure 3.2.7: Existing utilities – A94

3.2.6.3 Summary

In summary there is a **slight preference for the alternative northern route as the impact on utilities is expected to be slightly less** mainly at the A94 Roundabout. Of note however, is that actual savings may not be realised when the utility providers cost out the diversions.

3.2.7 Constructability

3.2.7.1 Approach

The following assessment is informed by Sweco's experience in the role of Contractor's Designer and also based on early contractor input from Balfour Beatty during the Stage 3 design process. It focusses on the on-line areas at the tie-ins to existing roads as the majority of the CTLR will be constructed in a greenfield site which should be relatively straightforward. In particular the A94 junction is more constrained than the others (e.g. by utilities and existing accesses) and is therefore likely to have more issues with constructability.

3.2.7.2 Assessment

The main constructability issues for the project are in relation to the proposed A9 interchange and River Tay crossing due to the physical constraints of the A9, railway and River Tay and the need to keep the A9 traffic flowing at all times. The CTLR itself is relatively straightforward to construct in the mainly greenfield site with any issues focussed around the junctions with the existing Stormontfield Road, A93 and A94. These junctions have been generally kept on-line with the existing roads for both routes to minimise their impact on the surrounding environment and landowners. However, this means that the roundabouts cannot be constructed off-line therefore more temporary works are required.

The exception to this is the proposed A94 roundabout for the alternative northern route. This needs to be offline to achieve the required approach gradients and platform levels for the roundabout as the existing A94 is on an incline (approximately 3.5%). This constraint is likely to create difficulty in achieving a developed design which is readily constructible and accommodates the:

- constraints of the nearby Muirward access and garden;
- stopping sight distance on approach to the roundabout; and
- the standard geometry requirements in the vicinity of the roundabout.

Implementing significant excavations in close proximity to the Muirward property and access is identified as more of a constraint on the contractor than the A94 roundabout in the current CTLR route.

There is therefore a slight preference for the current CTLR route in relation to constructability.

3.2.7.3 Summary

The constraints associated with the proposed A94 Roundabout on the alternative northern route are likely to result in a design which presents more issues during construction than the current CTLR route. **The current CTLR route is therefore slightly preferred in terms of constructability**. The significant excavation required to form the junction and SUDs basin so close to the Muirward House access and garden would be more challenging to construct than the junctions for the current CTLR route.

3.2.8 Future Maintenance

3.2.8.1 Approach

The maintenance liability of roads tends to be directly related to aspects such as: route length, urban or rural character; drainage and lighting infrastructure; age of infrastructure; materials and products specified etc. This assessment focusses on route length, drainage and lighting provision comparisons as these are deemed to be most appropriate to the comparison of routes. Reference is also made to the differences in character between the routes in the vicinity of the H29 development. The materials and products specified are assumed to be similar for both routes.

3.2.8.2 Assessment

Route Length

Whilst the nature of the infrastructure to be maintained is common to both routes, there is an additional 300m of route associated with the alternative northern route including the CTLR and side roads. This places additional cost implications in maintaining the pavement, drainage and road markings etc. However, this is not considered significant within the scale of the project. The urban character of the current CTLR route through the H29 development will tend to increase maintenance costs slightly, including the presence of kerbs and gullies.

Green Bridge

The current CTLR route includes the provision of a green bridge. This is a structure providing ecological, NMU and landscape linkage across the CTLR at Highfield Woods. It will require regular maintenance of the structure and landscaping to ensure that the structural integrity is not at risk in any way, e.g. water or root ingress. This cost will not be incurred for the alternative northern route as a green bridge would not be proposed.

Drainage Outfalls

The alternative northern route is likely to have 2 outfalls rather than 3 per the current CTLR route. The overall quantity of drainage in the networks will be similar, however the reduced maintenance of 1 less outfall facility should save in future maintenance costs. Access would be provided to the outfall basins / ponds in the alternative northern route design similar to the current design, however, this will require significant earthworks at Muirward due to the level constraints.

Lighting

Whilst the current CTLR route design only includes lighting at the junctions, there will ultimately be lighting provided for the length of the CTLR between the Highfield and A94 Roundabouts when the H29 development is built out (the additional length of lighting to be maintained by the Council is approximately 300m). The alternative northern route is likely only to be lit at the junctions as it will effectively bypass the urban area therefore there will be less maintenance.

3.2.8.3 Summary

There is likely to be a slight increase in maintenance costs due to the additional length of road associated with the alternative northern route, however this would be offset by savings in maintenance costs for the green bridge and to a lesser extent; drainage outfalls, kerbs, gullies and lighting. Therefore, there is **no clear preference for either route option in maintenance** terms.

3.2.9 Engineering Assessment Summary

As detailed in this Section, topic specific engineering assessments have been undertaken to predict the likely impacts associated with the current CTLR route and the alternative northern route and to determine if there is any clear preference. This also determines if a northern route is viable based on the information available.

A summary of the results is provided in **Table 3.2.6**. A shaded box identifies the preference for that particular topic. Where applicable, no clear preference has also been identified. The key reason for the preference is also stated.

The following table summarises the results of the engineering assessment:

Assessment Criteria	Current CTLR route	Alternative northern route	No clear preference	Reason for preference
Design Standards				No significant difference
Geotechnical				No significant difference
Drainage				Increased earthworks required for the A94 outfall on the alternative northern route
NMUs				NMU facilities more accessible from Scone village and Scone North
Utilities				Impact on utilities expected to be slightly less
Constructability				Constraints at A94 Roundabout
Future Maintenance				No significant difference

Table 3.2.6: Engineering Assessment Summary Table

Overall in engineering terms the proposed current CTLR route is slightly preferred over the alternative northern route, particularly in relation to drainage, NMUs and constructability. Utilities is the only topic where the alternative route would be preferable.

It is emphasised that the preference for the current CTLR route over the alternative northern route in the engineering assessment is slight and that there are no criteria where either route is substantially preferred over the other.

3.3 Environmental Assessment

3.3.1 Introduction

This section of the report has compared the environmental impacts of the current CTLR route against the alternative northern route between the A93 and A94 junctions (**Figure 3.3.1**). This high level, comparative assessment has been undertaken to allow the Council to make an informed decision on whether the alternative northern route is a more viable option when compared to the current CTLR route.

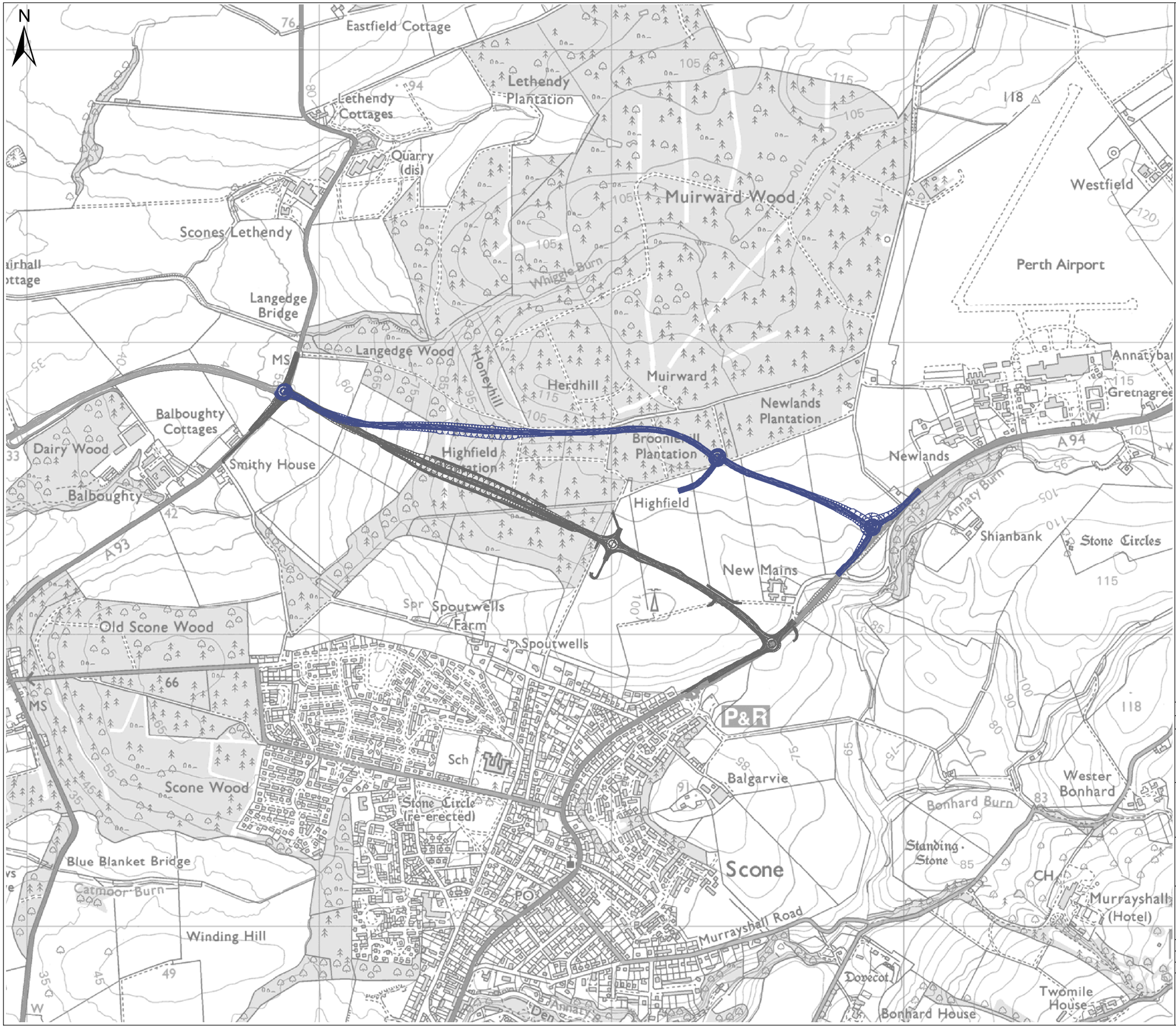
The assessments for each of the topics provide the following for each route:

- Baseline conditions and the approach to assessment;
- Findings including potential mitigation measures; and
- Summary – providing a preference to the assessment.

As discussed previously (**Section 1.5**), some of SDCC's key concerns appear to be related to air quality impacts upon the future residents of the Scone North Development (H29) (refer to **Figure 3.3.2**). This will be discussed within **Section 3.3.7 Air Quality**.

All environmental topics discussed below are in accordance with the Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017. Any potential effects regarding socio-economics factors and health, will be discussed within the relevant topics (People & Communities **Section 3.3.9,** Air Quality and Noise **Section 3.3.2 and 3.3.8)**. An assessment on Major Disasters was not thought to be applicable for this assessment. Environmental constraints in the study area are illustrated on **Figure 3.3.2.**

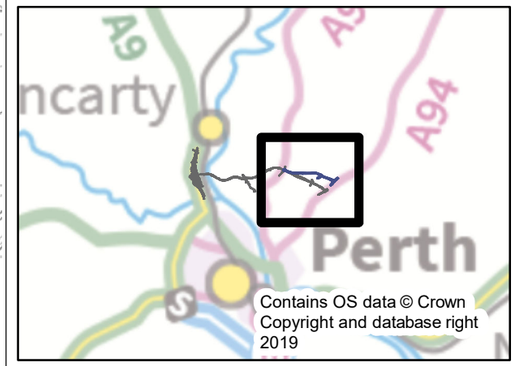
The potential cumulative effects of splitting out the road from the development have also been considered n the Landscape Chapter and as part of the overall environmental consideration set out in the Executive Summary (**Section 3.3.13**).



Legend

- Proposed Northern Alignment
- Proposed DMRB Stage 3 Alignment

0 0.25 0.5 Km



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Client

PERTH & KINROSS COUNCIL

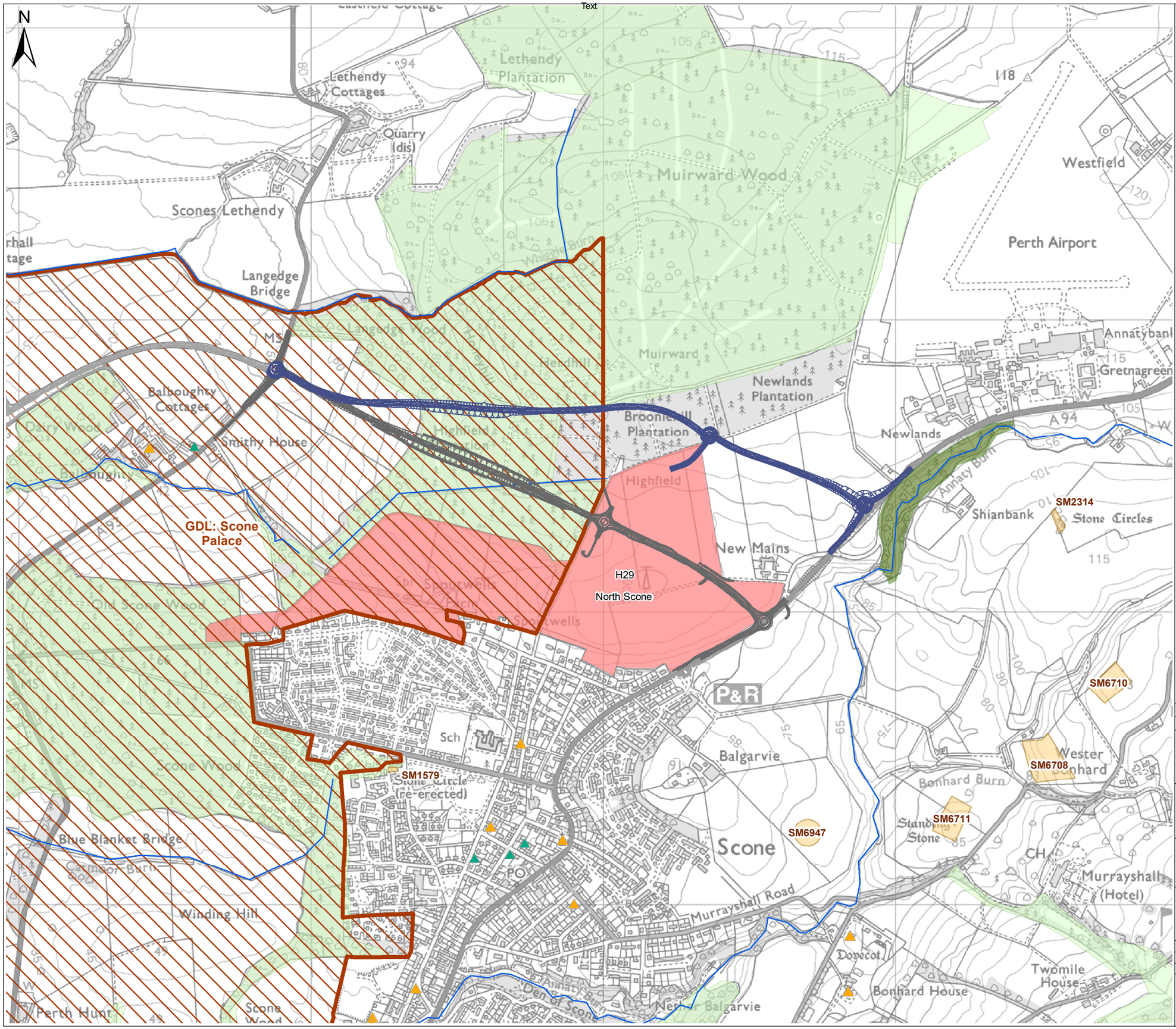
Project

Cross Tay Link Road

Drawing Title

Figure 3.3.1 - Location Plan

Scale @ A3	1:12,500	DO NOT SCALE	
Project No.	119046	Status	S2
BIM No.	119046-SWECO-EGN-000-DR-GS-20081		



Legend

- Proposed Northern Alignment
- Proposed DMRB Stage 3 Alignment
- Watercourse
- North Scone Development (LDP 2017)
- Gardens and Designed Landscape (GDL)
- Scheduled Monument (SM)

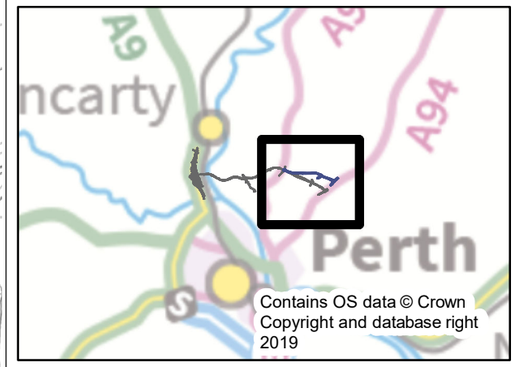
Ancient Woodland Inventory

- Ancient (of semi-natural origin)
- Long-established (of plantation origin)

Listed Building (Category)

- A
- B
- C

0 0.25 0.5 Km



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Project: **Cross Tay Link Road**

Drawing Title: Figure 3.3.2 - Environmental Constraints

Scale @ A3	1:12,500	DO NOT SCALE	
Project No.	119046	Status	S2
BIM No.	119046-SWECO-EGN-000-DR-GS-20080		

3.3.2 **Cultural Heritage**

3.3.2.1 Approach

A Cultural Heritage appraisal has been carried out to identify and assess potential cultural heritage impacts for each of the routes to inform an opinion on the most preferable route. The aim of the assessment is to determine whether there is any difference between the two routes in relation to nationally designated (i.e. Scheduled Monuments, Listed Buildings, Gardens and Designed Landscapes, Conservation Areas, Battlefields and World Heritage Sites) and non-designated assets.

Information with respect to non-designated heritage assets compiled for the EIA has been utilised. Trial trenching (as part of the archaeological contract) has been undertaken along both the possible routes, covering the unwooded areas. The area trenched was equivalent to 6% in areas advised by Perth and Kinross Heritage Trust to be of low/medium sensitivity and 10% in areas of high sensitivity.

Consultation was undertaken with Historic Environment Scotland (HES) in the early stages of developing the alternative northern route, including a meeting held on the 4 March 2019. HES noted previous extensive consultation over the current CTLR route and that they were relatively comfortable with the route. Concerns were raised as moving the route to the north might entail greater impacts on the historic environment. In particular, it was noted that a route north of the Whiggle Burn could entail impacts on the semi-natural ancient woodland in contrast with the plantation woodland that the current CTLR route passes through. Sweco has taken these concerns into consideration when designing the alternative northern route.

3.3.2.2 Assessment

Designated Heritage Assets

<u>World Heritage Sites, Battlefields and Conservation Areas</u>

There are no World Heritage Sites, Battlefields or Conservation Areas within 1km of either of the routes.

<u>Garden and Designed Landscape (GDL)</u>

Both routes run through the eastern part of the Scone Palace GDL (GDL00338) (as shown in **Figure 3.3.3**). The routes run through an area of rectilinear enclosed fields, whose original layout was probably determined during enclosure in the 18th century, and areas of plantation woodland. The alternative northern route would entail considerable extra felling of plantation woodland in Brooniehill Plantation which borders the GDL to the east and currently forms a visual extension of the plantation woodland within the GDL.

The alternative northern route has been designed to take account of HES's concerns with respect to the semi-natural woodland to the north of the Whiggle Burn, which although outside of the Scone Palace GDL does form part of the setting of the GDL.

Within the GDL, the dimensions of earthworks and areas of felling required for both routes are of a similar scale, therefore there is no material difference between the two routes in terms of potential setting impacts on the GDL.

Outside of the GDL, the alternative northern route follows more elevated ground as it leaves the plantation woodland than the current CTLR route. This may have a greater impact on the setting of the GDL, especially as viewed from the edge of Scone and the A94.

Listed Buildings

Within 1km of the current CTLR route between the A93 and A94 there are five Category B Listed Buildings and four Category C listed buildings (as shown in **Figure 3.3.3**). Four of the Category B Listed Buildings and three of the Category C Listed Buildings are within the village of Scone and would be screened from visual effects from the current CTLR route.

Within 1km of the alternative northern route there are two Category B Listed Buildings and one Category C Listed Building. One of the Category B Listed Buildings is within the village of Scone and would be screened from visual effects from the current CTLR route.

The Listed Buildings that would be intervisible with both the current CTLR route and the alternative northern route are Balboughty Steading (Category B, LB18377) and Balboughty House (Category C, LB18378).

Where the routes are closest to these assets, from their divergence at the A93 to approximately 200m east where the routes enter cuttings, the difference between the routes is very slight. On this basis it is assessed that in comparing the two routes there would be no material difference in the potential setting impact on the Listed Buildings.

Scheduled Monuments

Within 1km of the alternative northern route there are also five Scheduled Monuments. One of these, Wester Bonhard, unenclosed settlement 300m NNW of (SM6710), is additional to the Scheduled Monuments that are within 1km of the current CTLR route. It is possible that this asset may receive setting impacts from the alternative northern route (refer to **Figure 3.3.3**).

The other four Scheduled Monuments that are likely to be intervisible with both routes are:

- Balrgarvie, Unenclosed Settlement 350m ESE of, (SM6947);
- Mill of Bonhard, Unenclosed Settlement and Standing Stone, 200m S of, (SM6711);
- Bonhard Park, Unenclosed Settlement SE of, (SM6708);
- Shianbank, Stone Circles and Pillboxes, 325m E of, (SM2314).

The landscape form where these assets are located consists of undulating relief patterns that tend to break up long distance views. It is assessed that there is unlikely to be a material difference in the potential setting impacts on these Scheduled Monuments when comparing the two routes.

Non-designated Heritage Assets

Data on the non-designated heritage assets along the current CTLR route has been gathered as part of the EIA process. There are no known heritage assets within the section of the current CTLR route.

Part of the alternative northern route falls within the area for which data has already been gathered. In addition, the Pastmap on-line resource has been reviewed for those areas for which data was not available.

Non-wooded elements of both routes have been subject to archaeological trial trenching. This survey has not revealed any previously unknown archaeological remains along the current CTLR route or the alternative northern route. In addition, no archaeological assets have been previously recorded along this section of the current CTLR route or the alternative northern route. Therefore, in terms of potential direct physical impacts on non-designated heritage assets, it is assessed that there is no difference between the two routes.

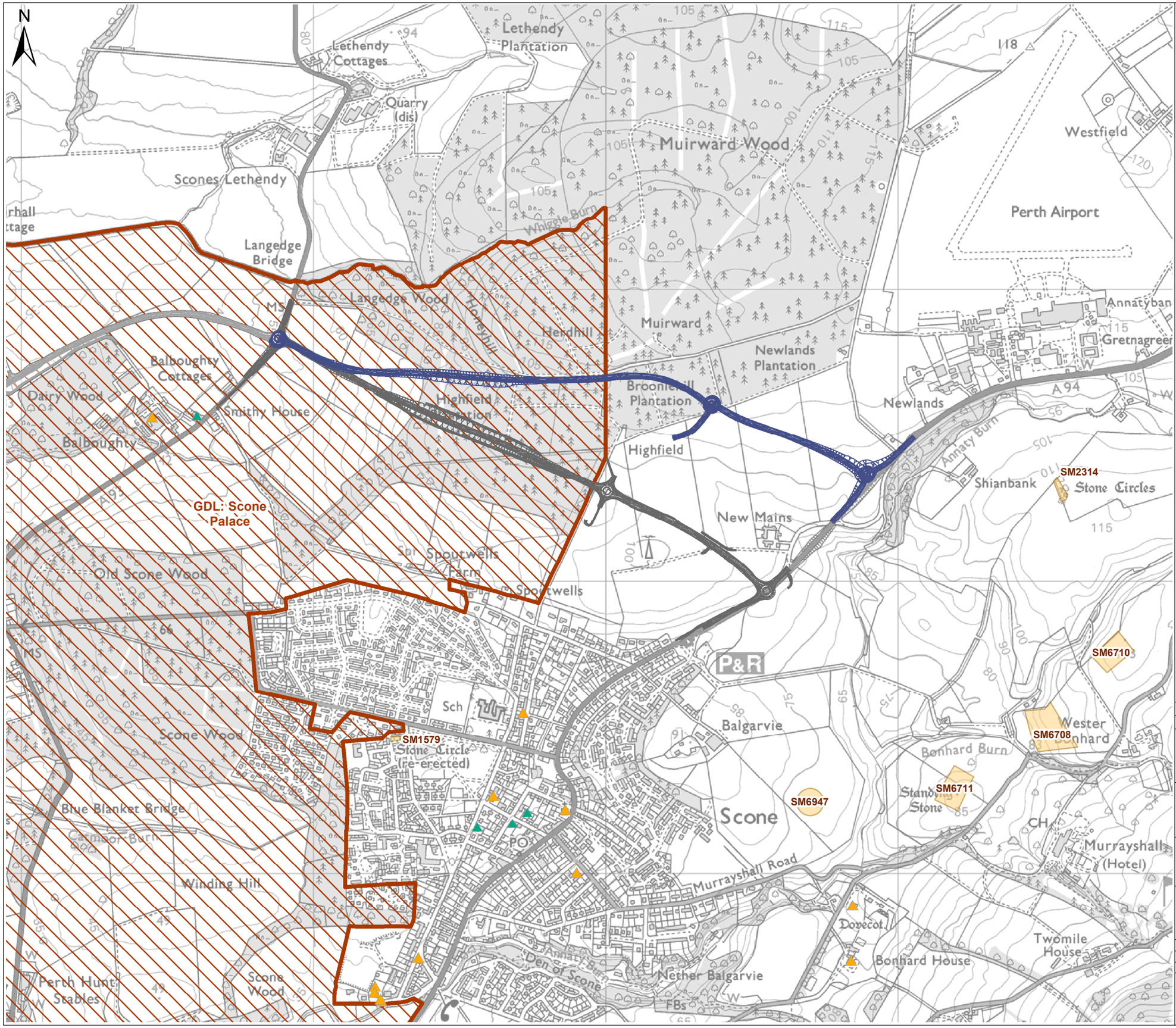
3.3.2.3 Summary

Examination of records of non-designated heritage assets indicate that there are no recorded non-designated heritage assets along the current CTLR route or the alternative northern route. The results of the trial trenching of the current CTLR route and of the alternative northern route indicates that it is highly unlikely that there are

previously unrecorded archaeological remains within either of the routes. Therefore, it is unlikely that there will be direct impacts on archaeological remains resulting from either route.

With respect to most of the designated heritage assets within visual range of the two routes there appears to be no material difference in potential setting impacts. There may be additional setting impacts on the eastern boundary of the Scone Palace GDL from the alternative northern route. There is the potential for setting impacts on Wester Bonhard, unenclosed settlement 300m NNW of, (SM6710), a Scheduled Monument from the alternative northern route.

On the basis of the potential for additional setting impacts on the historic environment from the alternative northern route, **it is assessed that on precautionary grounds the current CTLR route is the preferred option.**



Legend

- Proposed Northern Alignment
- Proposed DMRB Stage 3 Alignment
- Scheduled Monument (SM)
- Gardens and Designed Landscapes (GDL)

Listed Building (Category)

- A
- B
- C

0 0.25 0.5 Km

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Client: PERTH & KINROSS COUNCIL

Project: **Cross Tay Link Road**

Drawing Title: Figure 3.3.3 - Cultural Heritage Overview

Scale @ A3	1:12,500	DO NOT SCALE	
Project No.	119046	Status	S2
BIM No.	119046-SWECO-EGN-000-DR-GS-20082		

3.3.3 Landscape/LVIA

3.3.3.1 Approach

A landscape and visual appraisal has been carried out to identify and assess potential landscape and visual effects for each of the routes to inform an opinion on the most preferable option. A summary of the approach taken is provided in **Appendix B.**

3.3.3.2 Assessment

Policy and Designations

There are no differences between the routes in landscape policy terms, however in relation to designations the routes take a slightly different alignment through the Scone Palace Garden and Designed Landscape (GDL). The eastern extents of the GDL would be approximately 0.5km apart, however at their western extents they meet at the A93 connection point. This will be considered in the landscape assessment.

Landscape baseline summary

The routes are located within the same Local Landscape Character Areas (LLCAs). The routes share the same western tie-in point with the A93, however at their central and eastern extents the alternative northern route would be located approximately 0.5km north of the current CTLR route.

The following LLCAs will be considered in this appraisal, referring to **Figure 3.3.4** which illustrates the character area locations:

- 12 – West facing, arable and wooded slopes
- 14 – Wooded Hills
- 15 – Open, rolling arable and pastoral fields

A summary of the landscape baseline is provided in **Appendix B**.

Visual baseline summary

A summary of the visual baseline is provided in **Appendix B,** including a set of receptors which have been identified to form the basis of the visual assessment, and which are shown on **Figure 3.3.5**. However, a summary is provided of the visual baseline of the study area here:

- A subtle difference in height between the routes, combined with a slight undulation in the landscape, creates slight differences in the potential for visual effects of each route, which will be assessed in the subsequent section.
- As the central part of each route is contained within plantation woodland, the visibility of this part of each site from surrounding receptors is limited, particularly to the north as the woodland extends in this direction. However, at the eastern and western extents the routes are located within open agricultural land and these parts of the site are more visible from surrounding receptors.
- Within the woodland there are core paths used by recreational receptors. Both routes cross these paths; however, a key difference is that the alternative northern route is located close to the key east-west orientated route SCON/11 and which connects to the network of routes within the woodland. In addition, the current CTLR route crosses the north-south orientated route SCON/12 which connects Scone to the network of routes within the woodland.

- Views from residential receptors within the study area are limited to occasional isolated individual or small clusters of properties and the differences in the options emerges in relation to these receptors, particularly at the eastern extent of the sites.

Potential Landscape Effects

The following provides a summary of landscape effects in relation to the routes and key differences between them which may lead to a preference in landscape terms:

- Overall, the routes take a similar route through the LLCAs and as such the difference in landscape effects would be limited. The minor differences that have been identified relate to subtle differences in the alignment which each take through the LLCAs, with a maximum 0.5km distance between the routes, at their central and eastern extents.
- Within LLCA12, at the western extent of the routes, each route would give rise to adverse landscape effects, including cutting a 'notch' out of the western edge of the plantation woodland, which is acknowledged as providing a backdrop to this LLCA. However, the divergence in the routes from their shared connection point at the A93 is minimal and as such there would be no clear difference in the landscape effects of each route.
- Considering the central sections of the routes and their effects on LLCA14, the alternative northern route takes an interior route through the plantation woodland and therefore the LLCA. Although partially in cutting through this section, alternative northern route would conflict with key characteristics of the LLCA, i.e. 'strong characteristics of enclosure and shelter' and that it is 'predominantly rural and quiet in character and the woodland interior seems secluded.' The current CTLR route would pass through woodland cover on the lower slopes of the LLCA in partial cutting, also passing routes through the woodland and, although it would also conflict with the key characteristics of the LLCA, given its proposed position on the lower slopes of the character area it would impact the LLCA to a lesser extent than the alternative northern route and therefore give rise to a slightly lower landscape effect.
- Considering the eastern sections of the routes and their effects on LLCA15 and despite their slight separation, and the slightly higher elevation of the alternative northern route, the differences in their effects on LLCA15 are considered to be minimal and not sufficient to identify a preference in relation to this LLCA.

Potential Visual Effects

The following provides a summary of visual effects in relation to the options and key differences between the routes which may lead to a preference in visual terms (for information on receptor locations, please refer to **Figure 3.3.5**):

- The visual effects of the two routes would be similar with the key differences relating to very localised differences in effects as the routes diverge. Visual effects would largely be contained within a 0.3km distance from each route. Undulations in the local landform and the presence of woodland (mainly plantation) would screen the majority of the routes from view, with only a small number of residential and recreational receptors potentially experiencing visual effects.
- At their western extents, the difference in visual effects due to the two routes would be minimal and would therefore not influence a preference in visual terms.
- Within the plantation woodland, the alternative northern route would give rise to close-range adverse visual effects on users of SCON/11/1 to SCON/11/2 (Receptor 7). This is an enclosed path which is surrounded by tall plantation woodland. The alternative northern route would align closely within this path and would introduce road infrastructure into the views of users of the path, therefore likely having greater visual effects.

- Both routes would cross a path which emerges from Scone in a northerly direction towards the plantation woodland, SCON/12/2 (Receptor 8). In this instance, the current CTLR route would likely have slightly greater visual effects than the alternative northern route on users of the routes emerging from Scone, however it is noted that both routes would give rise to adverse visual effects.
- Views of the routes from residential receptors would be limited to occasional isolated individual or small clusters of properties, as views of the routes from the main settlement with the study area, Scone (Receptor 2), would be screened from view. Overall, effects would be limited by the landscape and woodland screening and no clear preference has been identified based on effects on residential receptors.

3.3.3.3 Summary

In summary of differences between the proposed routes:

- Both routes would have similar landscape and visual effects at their western extent, including landscape effects on the Scone Palace GDL.
- Despite the divergence of the routes by approximately 0.5km at their eastern extents, the differences in landscape and visual effects between the routes here would be limited and do not indicate a clear preference.
- At their central extents, a preference has been identified in landscape and visual terms for the current CTLR route. Both routes would pass through plantation woodland, however whereas the current CTLR route would be located on slightly lower slopes at the southern edge of the woodland, the alternative northern route would pass more centrally through the woodland, giving rise to slightly greater adverse landscape and visual effects as follows:
    - Greater adverse effects on LLCA14 as the alternative northern route would conflict fundamentally with the key characteristics of this secluded, wooded character areas; and
    - Greater adverse visual effects on users of core paths within the plantation woodland, particularly the main east-west route SCON/11 to SCON/11.

Overall, the current CTLR route is predicted to have slightly less effects on landscape and visual receptors.

When considering the potential cumulative effects of the routes and the proposed H29 development (**Figure 3.3.2**), both routes would have adverse landscape and visual effects in combination with Scone North. However, in cumulative assessment terms **a preference is identified for the current CTLR Route as this would be contained within the H29 development**, as opposed to the alternative northern route which would extend development further north into the LLCAs and within the view of more visual receptors. The 'clustering' effect of development in relation to the current CTLR Route and H29 is preferable to the option of developing the alternative northern route and therefore **the slight preference is for the current CTLR Route**, which has been identified within this appraisal, would be confirmed.

Legend

- Proposed Northern Alignment
- Proposed DMRB Stage 3 Alignment
- Proposed Alignments 1km Buffer

Local Landscape Character Areas

- 9 - Undulating, sinuous spaces between woodland belts
- 10 - Large agricultural fields framed by woodland
- 11 - Designed landscape consisting of policy trees
- 12 - West facing, arable and wooded slopes
- 13 - Old Scone grounds and woodland
- 14 - Wooded hills
- 15 - Open, rolling, arable and pastoral fields
- 16 - North west facing slopes
- 17 - Scone and fringes

0 0.5 1 Km

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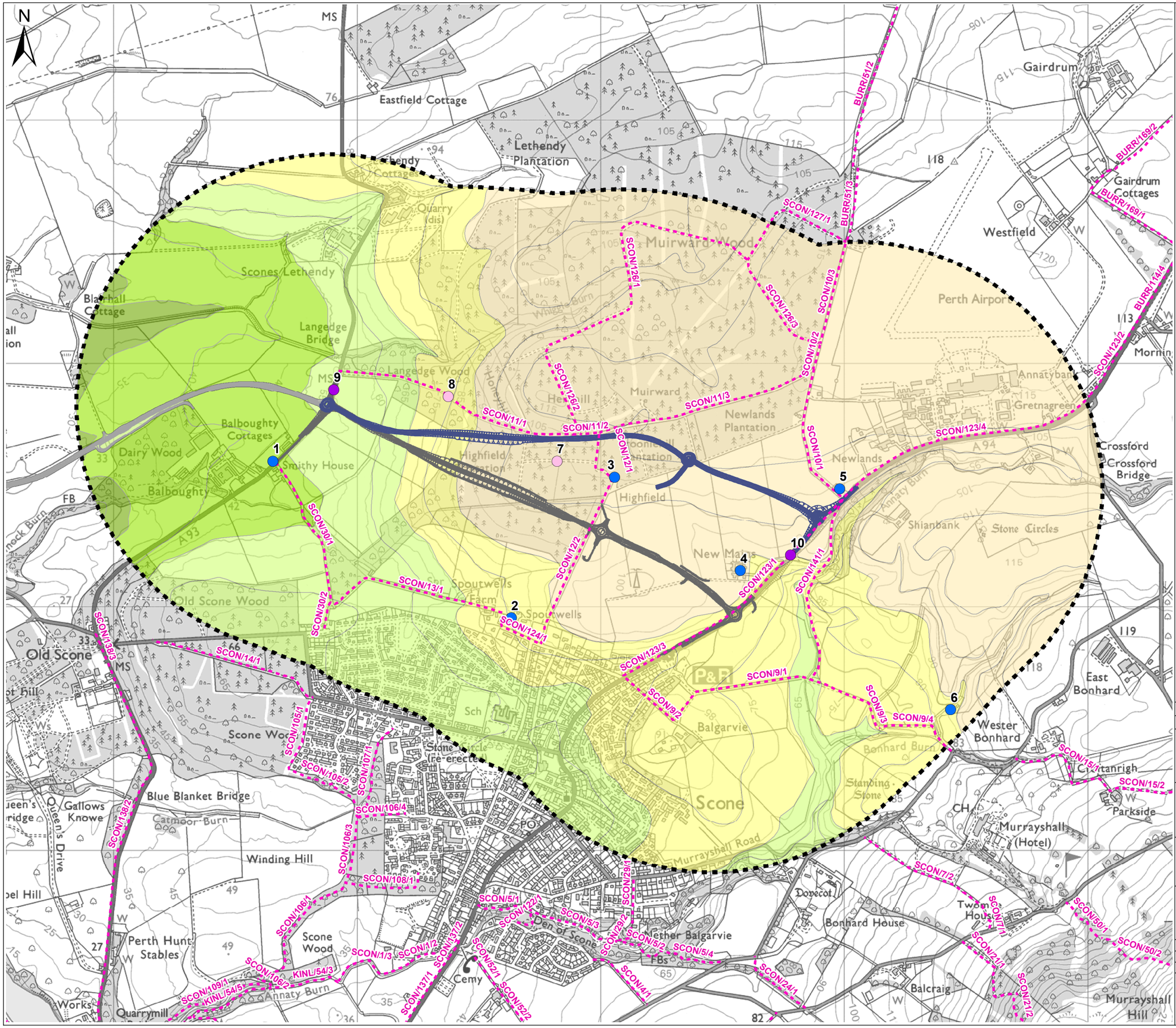
Project: **Cross Tay Link Road**

Drawing Title: Figure 3.3.4 - Landscape Context Plan

Scale @ A3	1:15,000	DO NOT SCALE	
Project No.	119046	Status	S2
BIM No.	119046-SWECO-EGN-000-DR-GS-20083		



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Project

Cross Tay Link Road

Drawing Title

Figure 3.3.5 - Visual Context Plan

Scale @ A3	1:15,000	DO NOT SCALE	
Project No.	119046	Status	S2
BIM No.	119046-SWECO-EGN-000-DR-GS-20084		

3.3.4 Biodiversity

3.3.4.1 Approach

A biodiversity appraisal has been carried out to identify and assess the potential biodiversity effects predicted for each of the routes to inform an opinion on the most preferable one. The key likely impacts as a result of the proposed routes include the loss of habitat, loss of ancient woodland and impact upon protected species. The proposed routes pass through an area of coniferous plantation woodland to the north of Scone connecting the A93 and A94, and areas of arable land to these east and west. This woodland, known as Highfield Woods, is listed on the Ancient Woodland Inventory (Plantation Origin). The areas of woodland impacted are illustrated on **Figure 3.3.2 Environmental Constraints**.

Protected species surveys have been undertaken for the current CTLR route within a series of buffer zones, some of which cover the alternative northern route. However, not all protected species and habitat surveys cover this alternative northern route and so some extrapolation of the quality of habitat and likely species assemblage within that habitat is required as part of this assessment.

This poses a limitation to the assessment as without sound and rigorously collected biodiversity data, there is a risk that ecological constraints may be present that cannot be accounted for. Other limitations include access to protected species data, and consultations with relevant statutory and non-statutory bodies.

Considering the above limitations, the level of information is still deemed suitable for a high-level comparative assessment.

3.3.4.2 Assessment

A comparative assessment has been conducted between the predicted effects of the alternative northern route and the current CTLR route on biodiversity receptors (please refer to **Figure 3.3.2**). This assessment was based on:

- desk-based information;
- the results of the surveys conducted as part of the EIA for the current CTLR route;
- high level walkover of the alternative northern route;
- the assessment of construction methods and operational activities and
- professional judgement by ecologists with experience of similar large-scale infrastructure projects.

The main predicted effects of each route are discussed below.

Overall Woodland Loss

The alternative northern route would result in a direct loss of approximately 60,441m^2 of woodland, thereby having a Moderate Adverse effect. The current CTLR route would result in the direct loss of approximately 49,252m^2 of woodland, thereby having a Moderate Adverse effect. The alternative northern route would result in approximately 11,189m^2 more woodland loss than the current CTLR route which would require more compensatory planting.

Mitigation measures would include compensatory planting of native tree species to mitigate overall woodland loss, and there will be a net gain in woodland area. There will be short term impacts from loss of mature woodland and associated impacts on woodland species.

When considering the mitigation measures, there would be a residual Minor Adverse effect to woodland loss as a result of the proposed routes.

Loss of Ancient Woodland

The alternative northern route results in the direct loss of approximately 39,062m^2 of Ancient Woodland (Long-Established (of plantation origin)) and is considered to have a significance of Moderate Adverse. The current CTLR route results in the direct loss of approximately 49,252m^2 of Ancient Woodland (Long-Established (of plantation origin)) and is also predicted to result in a Moderate Adverse effect.

Compensatory planting will mitigate for the overall loss of woodland and provide replacement habitat, however ancient woodland loss cannot be mitigated due to timescales for replacement as well as loss of soils and seed bank.

There is a poorly developed ground flora within these areas, with a relatively low ecological value. Considering this in combination with mitigation measures, the significance of predicted residual effects is Minor Adverse.

3.3.4.3 Summary

Comparing the known and likely ecological constraints associated with the current CTLR route, and the potential ecological constraints associated with the alternative northern route, there are few differentiators between the routes.

Both routes bisect the Highfield woodland, with greater overall woodland loss and compensatory planting requirements associated with the alternative northern route but less ancient woodland loss than the current CTLR Route.

Although much of the woodland under the footprint of both routes is listed on the Ancient Woodland Inventory, there are only small areas within the plantation with a well-developed ground flora typical of ancient woodland. The majority of the woodland under the footprint of both routes is equivalent, both being planted Scots Pine (Pinus sylvestris) supporting the same broad range of species. In terms of their habitat quality, there is no differentiating factor between the two routes, and both route options will result in severance of Highfield Woods, fragmenting the existing woodland habitat. The impact of fragmentation will be mitigated for by the construction of a 'green' bridge within Highfield Woods, increasing habitat connectivity. This type of bridge is planned for the current CTLR route but not for the alternative northern route, as levels on the north side of the cutting for the alternative northern route would not be conducive to an at-grade bridge crossing. Fragmentation impacts are not considered to be a differentiator between the routes.

Protected species present are likely to be common across the two options. Badger (*Meles meles*) surveys were carried out within 500m of the current CTLR route, which overlapped the alternative northern route. One badger sett was recorded to the north of the Stormontfield Road roundabout, while no other signs or setts were found within Highfield Woods, giving no route preference.

Breeding bird surveys were also undertaken within 500m of the current CTLR route, giving coverage of the alternative northern route footprint. No species of note were recorded which would differentiate between the two routes, therefore there is no preference. Due to the mobility of birds, both options will impact similarly on birds, and habitat being lost is comparable.

Red squirrel (Sciurus vulgaris) surveys were conducted within 50m of the current CTLR route and recorded a number of dreys which will be impacted, however with similar habitat present along the alternative northern route there is likely to be a similar number of dreys present, and the red squirrel population present within Highfield Woods will make use of both areas. Again, in relation to red squirrel, there is no route preference.

In addition to bisecting woodland, the routes both move through arable fields, which are of negligible ecological value and are not considered in this options assessment.

There are few differentiators associated with the route options, however there is a **slight preference for the alternative northern route due to the reduced ancient woodland loss**.

3.3.5 Geology, Soils, Contamination and Hydrogeology

3.3.5.1 Approach

The aim of the assessment is to determine whether there is any difference in geology, soils, contamination and hydrogeology that would potentially be adversely affected by the proposed routes. The key likely impacts are from sources of contamination, potential water supplies, and other sensitive groundwater uses. In general, both routes pass through rural areas, which do not have particular designations in relation to geology or soils. No potentially significant sources of contamination have been identified, and no private water supplies, or other particularly sensitive groundwater uses have been identified.

3.3.5.2 Assessment

Baseline information has been collated as part of previous and recent assessments undertaken for the current CTLR route, including desk study information, intrusive site investigation, consultation with SEPA and the Council's Contaminated Land Officer (CLO), and as reported in the following documents:

- Preliminary Sources Study Report (PSSR), Sweco, 119046-SWECO-HGT-000-RP-GE-003 Rev P04, February 2018. This report summarises all available desk-based information and walk over survey data and provides a preliminary assessment of potential geotechnical and geo-environmental constraints.
- Ground Investigation Report (GIR), Sweco, 119046-SWECO-VGT-000-RP-GE-00001 Rev P01, January 2019. This report summarises ground investigation data across the current CTLR route and presents interpretation and a risk assessment of the potential impact on receptors from encountered contamination.

The baseline information gathered from these reports was reviewed to consider potential differences in effects on geological, soil and hydrogeological receptors, and potential differences in risks associated with contamination. The assessment was completed using the following information sources:

- British Geological Society (BGS) website – Historical boreholes, geology, hydrogeology and land use information from the GeoIndex Onshore Online Maps: http://www.bgs.ac.uk;
- BGS GIS digital mapping – Groundwater Vulnerability map 1:50,000 (Sourced from the Council);
- BGS GIS digital mapping – Aquifer Productivity map 1:50,000 (Sourced from the Council);
- BGS GIS Digital mapping – Solid Geology and Superficial Deposits;
- Scotland's Environment Website – Interactive Map: http://map.environment.scotland.gov.uk;
- The Drinking Water Quality Regulator (DWQR) for Scotland Interactive Map of Private Water Supply Locations http://dwqr.scot/private-supply/information-for-pws-owners-and-users/pws-location-map/;
- BGS Hydrogeological Maps of Scotland (1988, 1:625,000 scale);
- James Hutton Institute and Soil Survey of Scotland data https://www.hutton.ac.uk/learning/natural-resource-datasets/soilshutton/soils-maps-scotland/download#soilmapdata; and
- Scotland's Soils – Interactive online mapping http://soils.environment.gov.scot/.

Due to the inherent variability of ground conditions there is always the potential that unidentified contamination or potential risks to groundwater will be encountered. This potential is greater for the alternative northern route, due to the limited availability of intrusive site investigation data. It should be noted that previous consultation requests were not updated for this assessment, although significant changes would not be expected. Additionally, no consultation specific to the alternative northern route assessment was undertaken, although

the original request buffers are considered large enough that the available information is sufficient to inform this assessment.

On the basis of the likely effects on geology, soils, hydrogeology and contamination, there is not considered to be a significant difference between the current CTLR route and the alternative northern route, and it is concluded that **there is no preference**.

3.3.6 Materials

3.3.6.1 Approach

Impacts from the use of materials and the generation of waste include:

- depletion of resources;
- energy use (embodied carbon) through plant use and transportation of materials or waste;
- energy use (embodied carbon) through manufacture of construction materials or processing of waste; and
- demand on handling / disposal capacity of regional and local waste management facilities.

To assess the likely affects from the use of materials and generation of waste for the alternative northern route, a high-level comparison of the route length, number of any major structures, extent of earthworks (material to be excavated or imported as fill) and site clearance requirements has been made.

Section 3.3.12 (Climate) provides estimates of the total paving, earthworks, fencing, kerbing, footways, road restraint systems, drainage, road signage, road marking, accommodation works, lighting and electrical requirements have been made to compare the estimated embodied carbon for the current CTLR route and the alternative northern route. No landscaping, communication or finishing requirements are included.

The current CTLR route includes the 'green' bridge at Highfield. This is not included in the alternative northern route design.

Material resource efficiency and waste reduction will reduce the magnitude of environmental impacts and the significance of their effects. This can be achieved by optimising the design of the route to:

- minimise the amount of new materials required;
- minimise the amount of earthworks required; and
- maximise the re-use of any materials derived from site (e.g. through a cut and fill balance)

3.3.6.2 Assessment

Material resource efficiency and waste reduction can be achieved by reducing route length and site clearance requirements. Although the current CTLR route is shorter, it includes the 'green' bridge. The estimates for materials (and embodied carbon), are therefore currently lower for the alternative northern route since no Highfield Green Bridge is included (information provided in Section 3.3.12).

Current estimates for cut and fill volumes for the two routes indicate a higher volume of material from cut activities and lower volume of material required for fill activities for the alternative northern route. This would mean more surplus material from excavation would be generated from the alternative northern route, thereby requiring haulage and disposal or re-use elsewhere within the CTLR scheme.

Where re-use of surplus material elsewhere within the CTLR scheme which is geotechnically and chemically suitable reduces the need to import other fill material from off-site, there is a potential benefit due to the reduced demand on other imported materials.

3.3.6.3 Summary

For materials, the northern route will generate more surplus earthworks material, however this may be able to be re-used elsewhere within the CTLR scheme. There is more material required for the current CTLR route to construct the 'green' bridge at Highfield, therefore there is a **slight preference for the alternative northern route**.

3.3.7 Air Quality

3.3.7.1 Approach

A review of the alternative northern route has been undertaken using ordnance survey mapping in GIS and considered the location of existing and future receptors in relation to the current CTLR route and alternative northern route. A review of traffic data has been undertaken and it was determined that there is no significant difference in traffic flows between the two routes, therefore it was not considered to be a differentiating factor.

3.3.7.2 Assessment

An air quality appraisal has been carried out to identify the potential air quality effects predicted for each of the routes to inform an opinion on the most preferable one. The aim of the assessment is to determine whether there is any difference in the number of properties that would be adversely affected by air quality and the magnitude and significance of that impact.

The main potential impact upon air quality from the CTLR is in relation to dust and traffic emissions. However, as neither route is within an Air Quality Management Area (AQMA) it is expected that the background concentrations would be slightly different but still well within the Air Quality Objectives.

The closest future receptors to the current CTLR route are those that will occupy the future H29 development. The closest existing receptors are those at Newmains Steading and Scone. The current CTLR route runs through H29 (between Phases 3 and 4 of the development area) (as shown in **Figure 3.3.2**). Approximately half of the Phase 3 development area and most of the Phase 4 development area is within 200m of the current CTLR route. When compared to the alternative northern route, there are fewer proposed residential receptors within 200m[1]. The northern third of Scone North development Phase 4 would be within 200m of the alternative northern route; all other development phases of H29 would be greater than 200m from the alternative northern route.

Details of the review for existing properties and the proposed properties as part of H29 are detailed in **Table 3.3.1** below. However, it should be noted as a limitation that exact property numbers are not available for the proposed development, therefore a coverage of the site has been used for this assessment.

Residential Properties	Current CTLR route	Alternative northern route
Existing properties	There are two existing residential locations within 200m of the current CTLR route, these are Highfield and Newmains farm and steadings. Closer proximity to existing residential properties in Scone.	There are two existing residential locations within 200m of the alternative northern route, these are Muirward House and Shianbank. Greater distance to existing residential properties in Scone.
Proposed properties as part of the Scone North Development		
Phase 2	The north of Phase 2 development area is within 200m of the current CTLR route.	Phase 2 is greater than 200m from the alternative northern route.
Phase 3	Approximately half of Phase 3 development area is within 200m of the current CTLR route.	Phase 3 is greater than 200m from the alternative northern route.
Phase 4	The majority of the Phase 4 development area is within 200m of the current CTLR route.	Approximately a third of Phase 4 development area is within 200m of the alternative northern route.

Table 3.3.1 Proximity to receptors

[1] In accordance with the recommended approach to Stage 1 and 2 DMRB assessments.

3.3.7.3 Summary

The detailed air quality assessment of the current CTLR route is currently being finalised. The early results indicate that the concentrations at the H29 development (with and without the current CTLR route) are predicted to be well within the Air Quality Objectives. The predicted levels would not result in any air quality concerns or issues for future residents of H29 and therefore no mitigation is proposed at this stage.

Overall, the alternative northern route would be preferable with regards to air quality due the reduced number of residential receptors within 200m of the alternative northern route compared to the current CTLR route. The alternative northern route would move the junction between the A94 and the alignment closer to existing residential properties on the A94.

Regardless of route, the CTLR will result in an improvement to air quality in the centre of Perth and Bridgend.

3.3.8 Noise and Vibration

3.3.8.1 Approach

This Chapter considers the likely significant impacts of road traffic noise associated with the section between the A93 and A94 along each of two routes. Specifically, these are referred to as the current CTLR route and the alternative northern route and are illustrated in **Figure 3.3.1.** The aim of the assessment is to determine whether there is any difference in the number of Noise Sensitive Receptors (NSR) that would potentially be adversely affected by road traffic noise and the magnitude and significance of that impact. Please refer to **Appendix C** for an expanded noise comparative assessment.

Given that the CTLR, regardless of route, will be designed to be smooth and free from any discontinuities, ground-borne vibration is therefore unlikely to constitute a significant impact and has been scoped out of this assessment.

The study assesses the likely effects of each option in the future assessment year, 15 years after opening (2038). Specifically, the assessment year scenario includes additional trips associated with future residential developments that are partially embargoed and can only be constructed in full if the CTLR is also consented and constructed.

3.3.8.2 Assessment

Baseline noise studies along the length of the routes have determined the prevailing acoustic environment. The study reveals that NSR separated from the existing roads (A93 and A94) currently experience an acoustic environment dominated by mixed sources of environmental noise (wind through foliage, birdsong, intermittent agricultural processes, aircraft overhead etc.). NSR closest to the existing roads already experience road traffic noise that is dominant in their acoustic environments; as such, the changes that would occur as a result of introducing the CTLR will typically be less than for those NSR further from existing sources of road traffic noise.

The comparison between the two routes has been facilitated using the proprietary electronic noise modelling software SoundPLAN. The output from the noise model is illustrated in the following Figures:

- **Figure 3.3.6:** Absolute noise levels (2017 base year);
- **Figure 3.3.7:** Absolute noise levels, current CTLR route (2038 future assessment year); and
- **Figure 3.3.8:** Absolute noise levels, alternative northern route (2038 future assessment year).

Absolute levels of road traffic noise at individual facades of existing NSR closest to the proposed routes have been considered. Consideration has also been given to existing and future NSR in North Scone.

There are some limitations to the assessment, specifically these include:

- The veracity of the road traffic noise flows provided by the Transportation Consultants, including any factoring and future year assumptions, and flows attributable to committed developments;
- The assumed speed profile – the eastern portion of the current CTLR route is described as having a 30mph streetscape profile. The alternative northern route maintains at a 50mph speed limit throughout. This differential has a significant effect on the output from the noise model;
- The construction and finish of the road – we have assumed a low noise finish and it is recommended that this design strategy is adopted regardless of the route selected;
- The accuracy of the positioning in all 3 axes of the route options relative to existing topography, including cut and fill etc. The details of this are likely to evolve prior to commencement of current CTLR route and this may have a significant effect;

- The mitigating effects of barriers – for the purpose of this assessment and to provide a direct comparison, no barriers have been included along either route option. It should be noted, however, that a barrier has been assessed along the current CTLR route in the EIA adjacent to Newmains Steadings on the north side of the road; and
- The outcomes of other technical assessments, for example landscape and visual, ecology etc. the recommendations of which may affect the final setting of the preferred route.

The following **Table 3.3.2** summarises the highest predicted absolute levels of road traffic noise that may affect the closest identified NSR for each of the two route options. The SoundPLAN model does not take cognisance of prevailing levels of baseline environmental noise where the dominant source is not road traffic noise; this is a relevant consideration for those locations further from the existing roads. To demonstrate prevailing levels of environmental noise and thereby to contextualise the assessment at these locations, representative measured baseline noise levels gathered as part of the ongoing EIA process have also been presented.

Address	Map NSR reference	Map	Measured representative baseline LA10,18h (dB) if NSR distant from existing road	Predicted LA10 18hr Noise Level (dBA) (Road traffic noise only)								
				All floors - most affected location			Ground floor			First floor		
				BASE 2017	Scenario 7 (No Barrier) Year 2038	Scenario 7 (No Barrier) Year 2038 - Alternate Design	BASE 2017	Scenario 7 (No Barrier) Year 2038	Scenario 7 (No Barrier) Year 2038 - Alternate Design	BASE 2017	Scenario 7 (No Barrier) Year 2038	Scenario 7 (No Barrier) Year 2038 - Alternate Design
HIGHFIELD COTTAGE, HIGHFIELD ROAD, SCONE, PERTH, PH2 6RN	179	F	53 (Location J)	41.4	52.6	55.2	40.1	51.0	53.0	41.4	52.6	55.2
2 NEWMAINS STEADINGS, SCONE, PERTH, PH2 6QF	212	G	N/A	49.3	53.8	56.0	46.6	52.2	54.9	49.3	53.8	56.0
3 NEWMAINS STEADINGS, SCONE, PERTH, PH2 6QF	213	G		49.7	54.9	56.6	48.3	53.4	55.5	49.7	54.9	56.6
1 NEWMAINS STEADINGS, SCONE, PERTH, PH2 6QF	214	G		55.8	58.1	57.2	53.2	55.7	53.8	55.8	58.1	57.2
4 NEWMAINS STEADINGS, SCONE, PERTH, PH2 6QF	215	G		54.4	57.6	58.6	52.8	56.2	57.5	54.4	57.6	58.6
5 NEWMAINS STEADINGS, SCONE, PERTH, PH2 6QF	216	G		57.5	59.7	59.9	55.6	58.2	58.6	57.5	59.7	59.9
NEW MAINS FARM, SCONE, PERTH, PH2 6NL	217	G		58.9	60.8	60.4	56.8	59.1	59.1	58.9	60.8	60.4
MUIRWARD HOUSE, SCONE, PERTH, PH2 6NL	218	G		65.0	66.9	68.1	62.9	65.2	66.7	65.0	66.9	68.1
SPOUTWELLS HOUSE, SCONE, PERTH, PH2 6RN	106	G	48-52dB (Location M)	39.7	48.2	49.6	38.6	46.7	48.1	39.7	48.2	49.6
28 HIGHFIELD ROAD, SCONE, PERTH, PH2 6RL	139	G	48-52dB (Location M)	44.5	46.7	48.5	42.8	46.7	48.5	44.5	46.7	47.9
107 ANGUS ROAD, SCONE, PERTH, PH2 6RD	201	G	N/A	66.7	66.2	66.7	66.3	64.7	65.2	66.7	66.2	66.7

Table 3.3.2 – Existing NSR

3.3.8.3 Summary

Comparison between the current CTLR route and the alternative northern route indicates that, within the limitations of the assessment, the alternative northern route may create a greater increase in cumulative road traffic noise levels by 2038 at Highfield Cottage, most dwellings at Newmains Steadings and Muirward House than the current CTLR route.

At NSR along the northernmost extent of Scone, the alternative northern route may also result in slightly higher levels of road traffic noise, however in the context of prevailing levels of environmental noise, the difference in absolute noise levels between the two routes would not be significant. When the H29 development is constructed, these future dwellings will act as a barrier to road traffic noise propagating from either route to the closest existing dwellings on the northern boundary of Scone. As such, received road traffic noise levels in situ will be less than the modelling currently indicates.

Consideration has also been given to future NSR in the H29 development. While no detailed layout is currently available, the red line boundary of the consented Planning Permission in Principle is indicated in **Figure 3.3.7 and 3.3.8** as a purple broken line. The alternative northern route creates a larger continuous area of the H29 development site that is predicted to experience absolute levels of road traffic noise that are less than 56dB LA10,18h. Developers of future NSR should include appropriate mitigation measures to ensure that good standards of indoor and outdoor residential amenity are attained close to the CTLR; this may include orientation of principle gardens and habitable rooms, local close-boarded fencing and appropriate selection of glazing and ventilation elements.

Comparison between the current CTLR route and the alternative northern route indicates that, within the limitations of the assessment, the alternative northern route may create a greater increase in cumulative road traffic noise levels by 2038 at the NSR detailed. At NSR along the northernmost extent of Scone, the alternative northern route may also result in slightly higher levels of road traffic noise, however in the context of prevailing levels of environmental noise, the difference in absolute noise levels between the two routes would be less than 1dB. No barrier effects or other mitigation has been included in this assessment, detailed consideration of this aspect may further improve outcomes for specific properties, where solutions are reasonable and practicable.

Future dwellings in the H29 development should be designed to achieve good standards of residential amenity for indoor and outdoor habitable areas; developers should include appropriate measures in their detailed designs as required. The final alignment of the CTLR should not, therefore have any significant impact on future residential amenity. Therefore, with a slightly higher level of road traffic noise predicted, there would be a **slight preference for the current CTLR route.**

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LEGEND

LA10 18h Noise Level
- Above 68 dBA
- 66 to 68 dBA
- 64 to 65 dBA
- 61 to 63 dBA
- 59 to 60 dBA
- 56 to 58 dBA
- Below 56 dBA
- Not Sensitive
- Outside Extents
- Proposed Design

- Modelled Road Network
- Rail Line

Note: Noise contours are reflective of the ground floor only (i.e. 1.8m above the local ground level), where as the buildings are shaded according to the most exposed floor on the most exposed facade.

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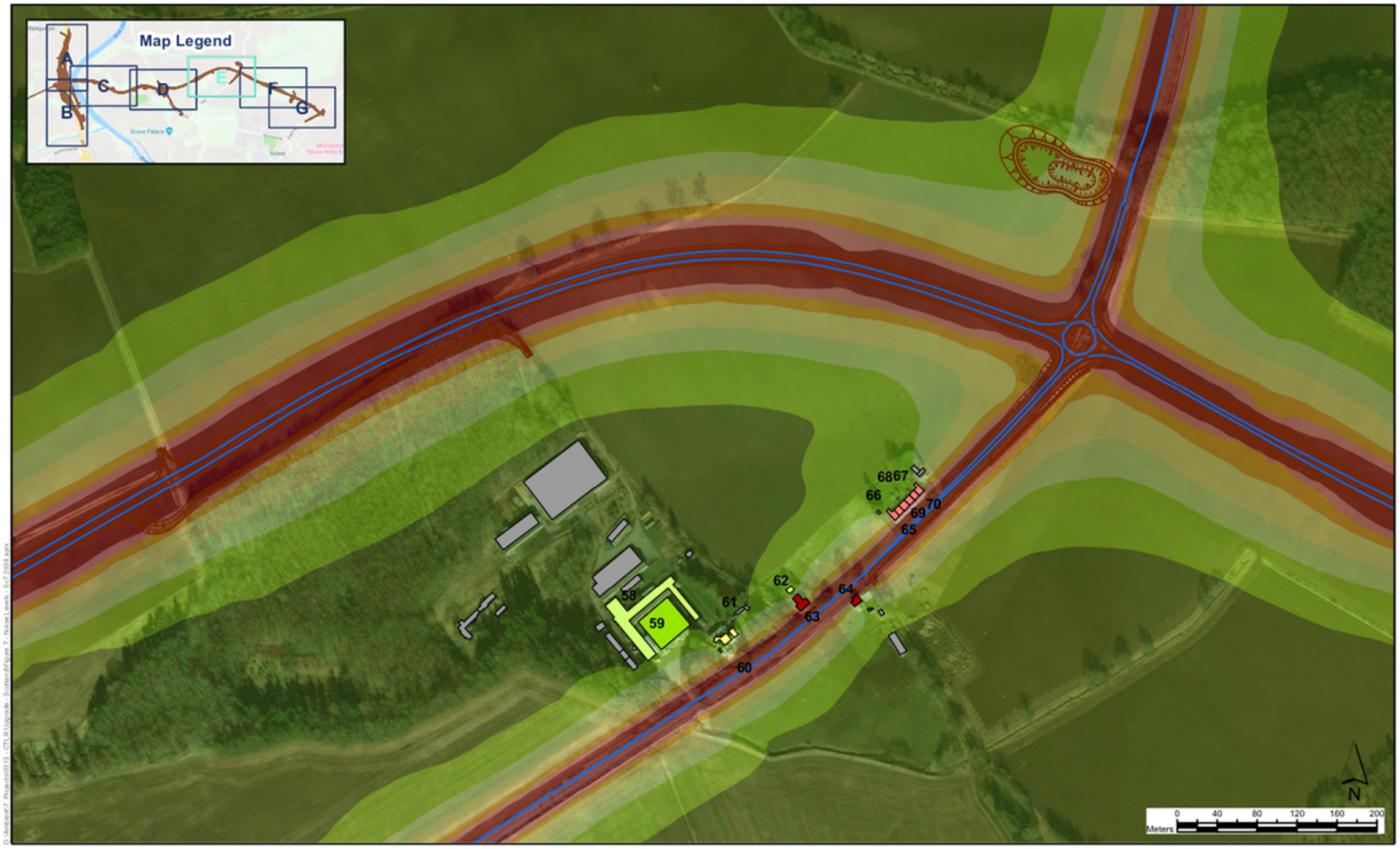
CROSS TAY LINK ROAD

Existing road network, sensitive receptors and calculated base / existing, year 2017 LA10 18hr road traffic noise levels (facade corrected)

Figure 3.3.6 - A93 Intersection



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LEGEND

LA10 18h Noise Level

- Above 68 dBA
- 66 to 68 dBA
- 64 to 65 dBA
- 61 to 63 dBA
- 59 to 60 dBA
- 56 to 58 dBA
- Below 56 dBA
- Not Sensitive
- Outside Extents
- Modelled Roads
- Proposed Design
- Scone Nth Boundary

Note: Noise contours are reflective of the ground floor only (i.e. 1.8m above the local ground level), where as the buildings are shaded according to the most exposed floor on the most exposed facade.

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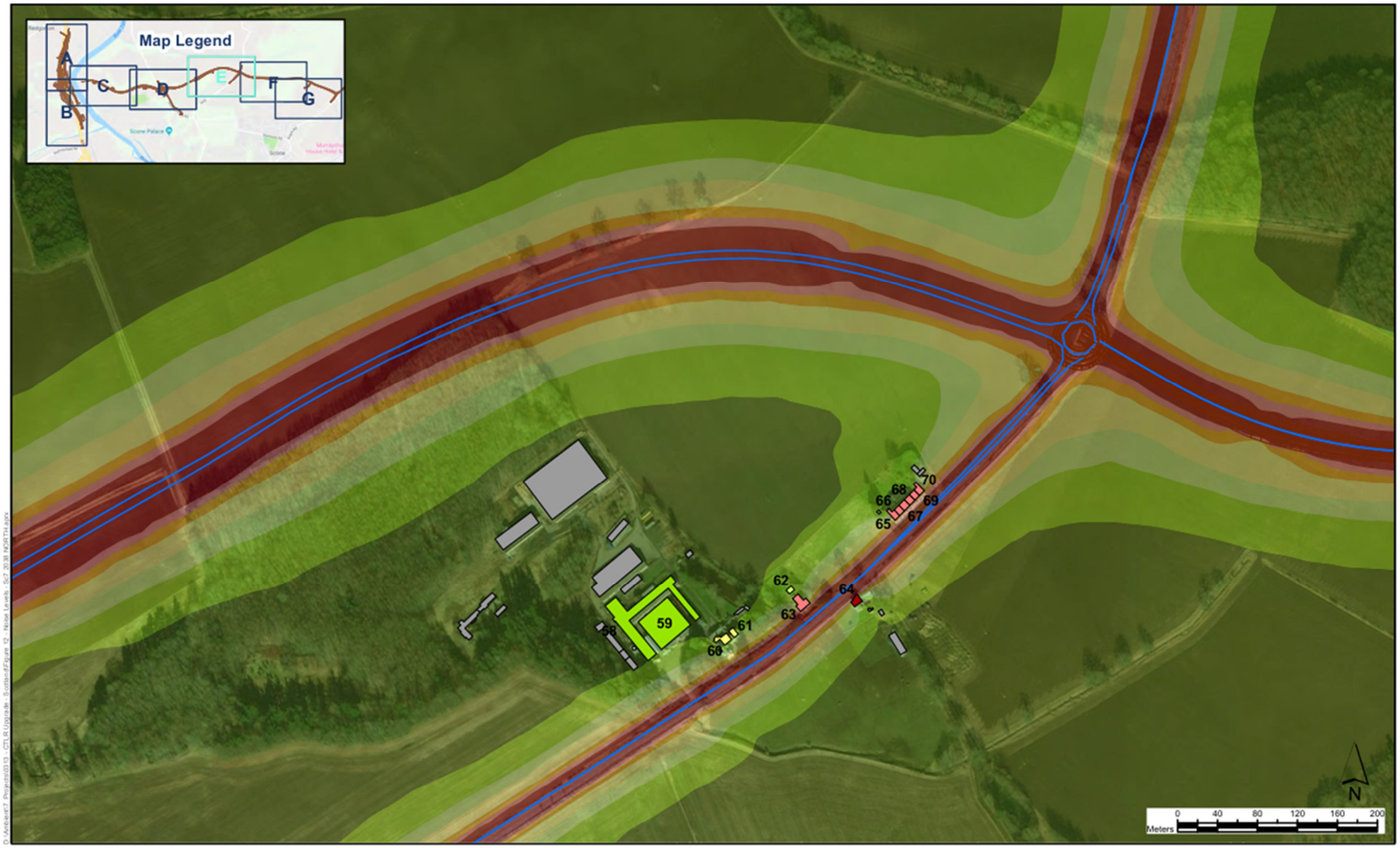
Proposed design, sensitive receptors and predicted year 2038 LA10 18hr road traffic noise levels (facade corrected) Scenario 7 - no noise barriers

Figure 3.3.7 - A93 Intersection



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Projection:	British National Grid

LEGEND

LA10 18h Noise Level
- Above 68 dBA
- 66 to 68 dBA
- 64 to 65 dBA
- 61 to 63 dBA
- 59 to 60 dBA
- 56 to 58 dBA
- Below 56 dBA
- Not Sensitive
- Outside Extents
- Modelled Roads
- Proposed Design
- Rail Line
- Scone North Boundary

Note: Noise contours are reflective of the ground floor only (i.e. 1.8m above the local ground level), where as the buildings are shaded according to the most exposed floor on the most exposed facade.

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CROSS TAY LINK ROAD

Proposed design, sensitive receptors and predicted year 2038 LA10 18hr road traffic noise levels (facade corrected)
Scenario 7 Alternate - no noise barriers

Figure 3.3.8 - A93 Intersection

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LEGEND

LA10 18h Noise Level
- Above 68 dBA
- 66 to 68 dBA
- 64 to 65 dBA
- 61 to 63 dBA
- 59 to 60 dBA
- 56 to 58 dBA
- Below 56 dBA
- Not Sensitive
- Outside Extents
- Proposed Design

- Modelled Road Network
- Rail Line

Note: Noise contours are reflective of the ground floor only (i.e. 1.8m above the local ground level), where as the buildings are shaded according to the most exposed floor on the most exposed facade.

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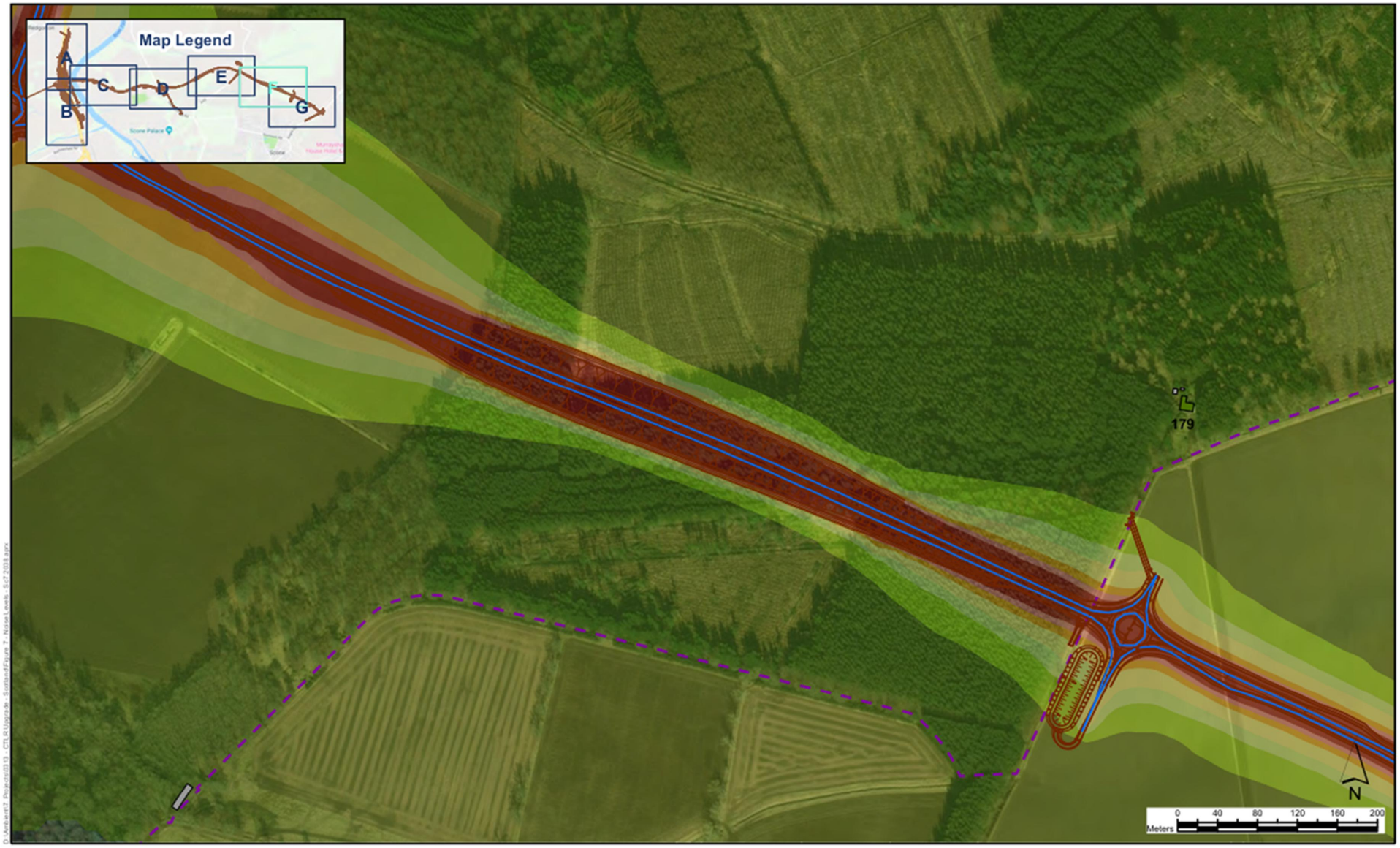
Existing road network, sensitive receptors and calculated base / existing, year 2017 LA10 18hr road traffic noise levels (facade corrected)

Figure 3.3.6 - Highfield



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LEGEND

LA10 18h Noise Level
- Above 68 dBA
- 66 to 68 dBA
- 64 to 65 dBA
- 61 to 63 dBA
- 59 to 60 dBA
- 56 to 58 dBA
- Below 56 dBA
- Not Sensitive
- Outside Extents
- Modelled Roads
- Proposed Design
- Scone Nth Boundary

Note: Noise contours are reflective of the ground floor only (i.e. 1.8m above the local ground level), where as the buildings are shaded according to the most exposed floor on the most exposed facade.

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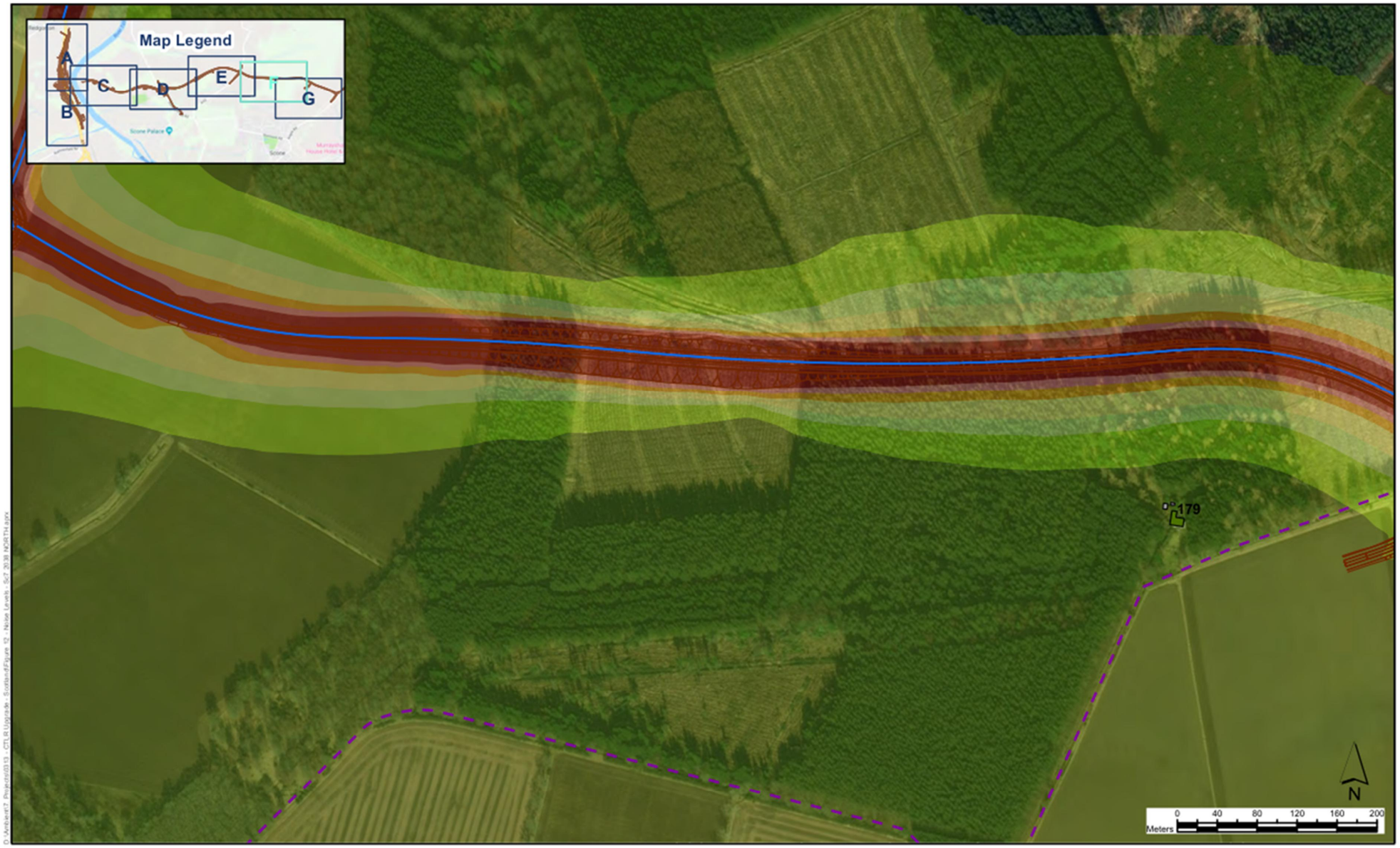
CROSS TAY LINK ROAD

Proposed design, sensitive receptors and predicted year 2038 LA10 18hr road traffic noise levels (facade corrected) Scenario 7 - no noise barriers

Figure 3.3.7 - Highfield



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LEGEND

LA10 18h Noise Level
- Above 68 dBA
- 66 to 68 dBA
- 64 to 65 dBA
- 61 to 63 dBA
- 59 to 60 dBA
- 56 to 58 dBA
- Below 56 dBA
- Not Sensitive
- Outside Extents
- Modelled Roads
- Proposed Design
- Rail Line
- Scone North Boundary

Note: Noise contours are reflective of the ground floor only (i.e. 1.8m above the local ground level), where as the buildings are shaded according to the most exposed floor on the most exposed facade.

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CROSS TAY LINK ROAD

Proposed design, sensitive receptors and predicted year 2038 LA10 18hr road traffic noise levels (facade corrected)
Scenario 7 Alternate - no noise barriers

Figure 3.3.8 - Highfield

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Projection:	

LEGEND

LA10 18h Noise Level

- Above 68 dBA
- 66 to 68 dBA
- 64 to 65 dBA
- 61 to 63 dBA
- 59 to 60 dBA
- 56 to 58 dBA
- Below 56 dBA
- Not Sensitive
- Outside Extents
- Proposed Design
- Modelled Road Network
- Rail Line

Note: Noise contours are reflective of the ground floor only (i.e. 1.8m above the local ground level), where as the buildings are shaded according to the most exposed floor on the most exposed facade.

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Existing road network, sensitive receptors and calculated base / existing, year 2017 LA10 18hr road traffic noise levels (facade corrected)

Figure 3.3.6 - A94 Intersection

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Projection:	British National Grid

LEGEND

LA10 18h Noise Level
- Above 68 dBA
- 66 to 68 dBA
- 64 to 65 dBA
- 61 to 63 dBA
- 59 to 60 dBA
- 56 to 58 dBA
- Below 56 dBA
- Not Sensitive
- Outside Extents
- Modelled Roads
- Proposed Design
- Scone Nth Boundary

Note: Noise contours are reflective of the ground floor only (i.e. 1.8m above the local ground level), where as the buildings are shaded according to the most exposed floor on the most exposed facade.

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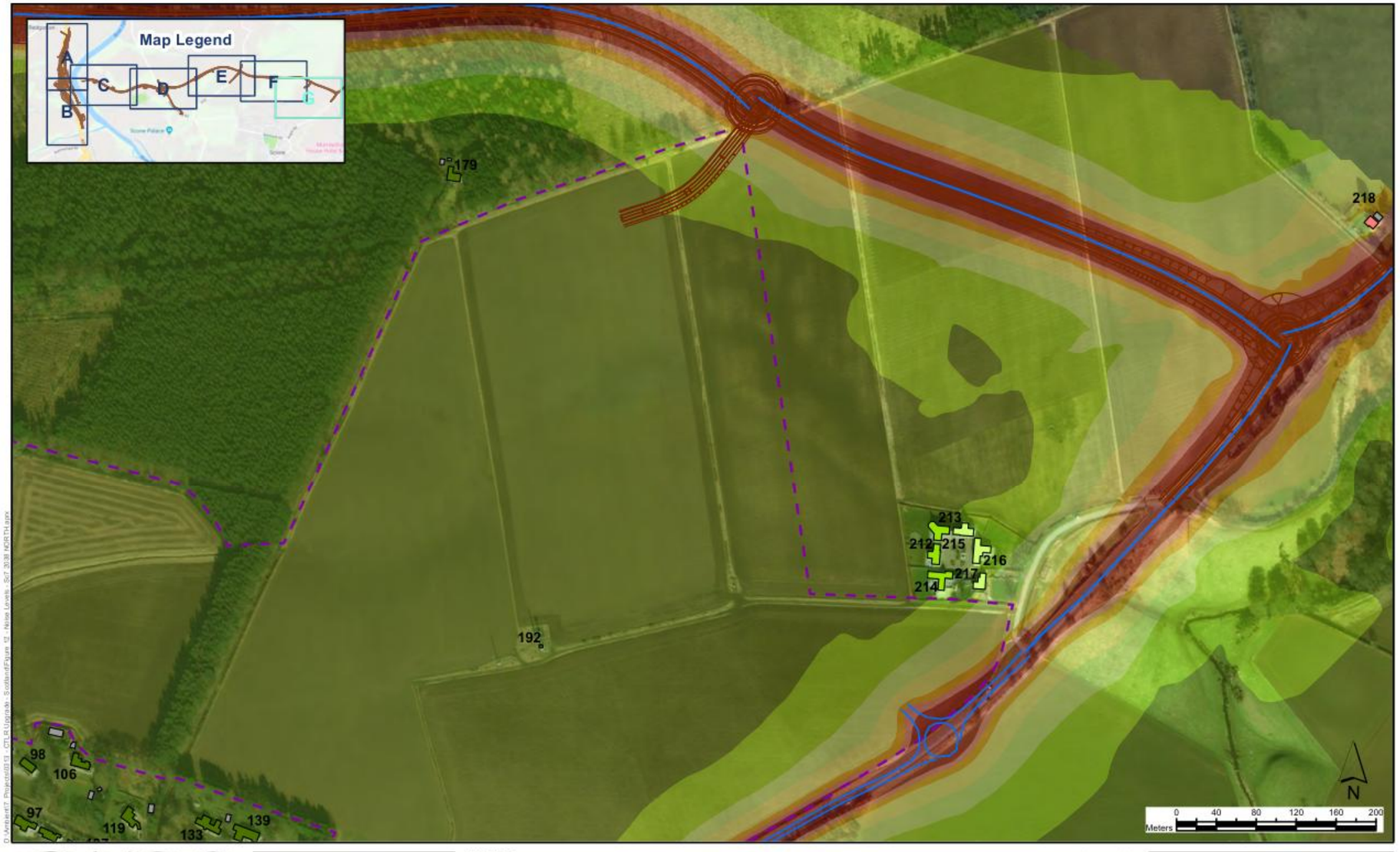
CROSS TAY LINK ROAD

Proposed design, sensitive receptors and predicted year 2038 LA10 18hr road traffic noise levels (facade corrected)
Scenario 7 - no noise barriers

Figure 3.3.7 - A94 Intersection



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LEGEND

LA10 18h Noise Level
- Above 68 dBA
- 66 to 68 dBA
- 64 to 65 dBA
- 61 to 63 dBA
- 59 to 60 dBA
- 56 to 58 dBA
- Below 56 dBA
- Not Sensitive
- Outside Extents
- Modelled Roads
- Proposed Design
- Rail Line
- Scone North Boundary

Note: Noise contours are reflective of the ground floor only (i.e. 1.8m above the local ground level), where as the buildings are shaded according to the most exposed floor on the most exposed facade.

SWECO

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CROSS TAY LINK ROAD

Proposed design, sensitive receptors and predicted year 2038 LA10 18hr road traffic noise levels (facade corrected)
Scenario 7 Alternate - no noise barriers

Figure 3.3.8 - A94 Intersection

3.3.9 People & Communities

3.3.9.1 Approach

A people and communities assessment has been carried out to determine whether there is a significant difference in the number of NMU paths, areas of community land and community facilities for the two routes to inform an opinion on the most preferable one.

The alternative northern route is located to the north of Scone, between the A93 and A94, and passes through Highfield Woods. Highfield Woods is an outdoor recreation area well utilised by the community. Within this woodland there is a network of NMU paths. The closest community facilities (i.e. schools and hospitals) are located in Scone and Perth.

There is not considered to be a significant difference between the two routes on the Driver Stress and View from the Road therefore these haven't been considered further. With regard to Public Transport, although the differences in journey times would be minimal, running bus services along the current preferred route would provide a better service to local residents due to the proximity to housing, and Scone itself.

Baseline data was gathered (using a 500m study area) through Ordnance Survey (OS) maps, Perth and Kinross Council's Core Paths Plan and consultation with ScotWays and Sustrans. A summary of the baseline data gathered is presented in **Figure 3.3.9.**

NMU surveys have been undertaken through Highfield Woods which indicated high levels of NMU usage (785 movements along Highfield Lane over the course of a week).

The alternative northern route has been compared against the current CTLR route which has embedded mitigation measures in the design. For the purposes of this assessment, it is assumed that as a minimum, a 3m shared use pedestrian/cycleway will be located along the southern side of the alternative northern route.

3.3.9.2 Assessment

A summary of the comparison between the two routes in terms of impacts on NMUs is provided below:

- There would be a higher number of Core Paths affected by the alternative northern route (6 paths) compared to the current CTLR route (2 paths);
- There would be a higher number of PRoWs affected by the alternative northern route (3 paths) compared to the current CTLR route (1 path); and
- There would be a higher number of ELRs affected by the current CTLR route (7 paths) compared to the alternative northern route (5 paths).

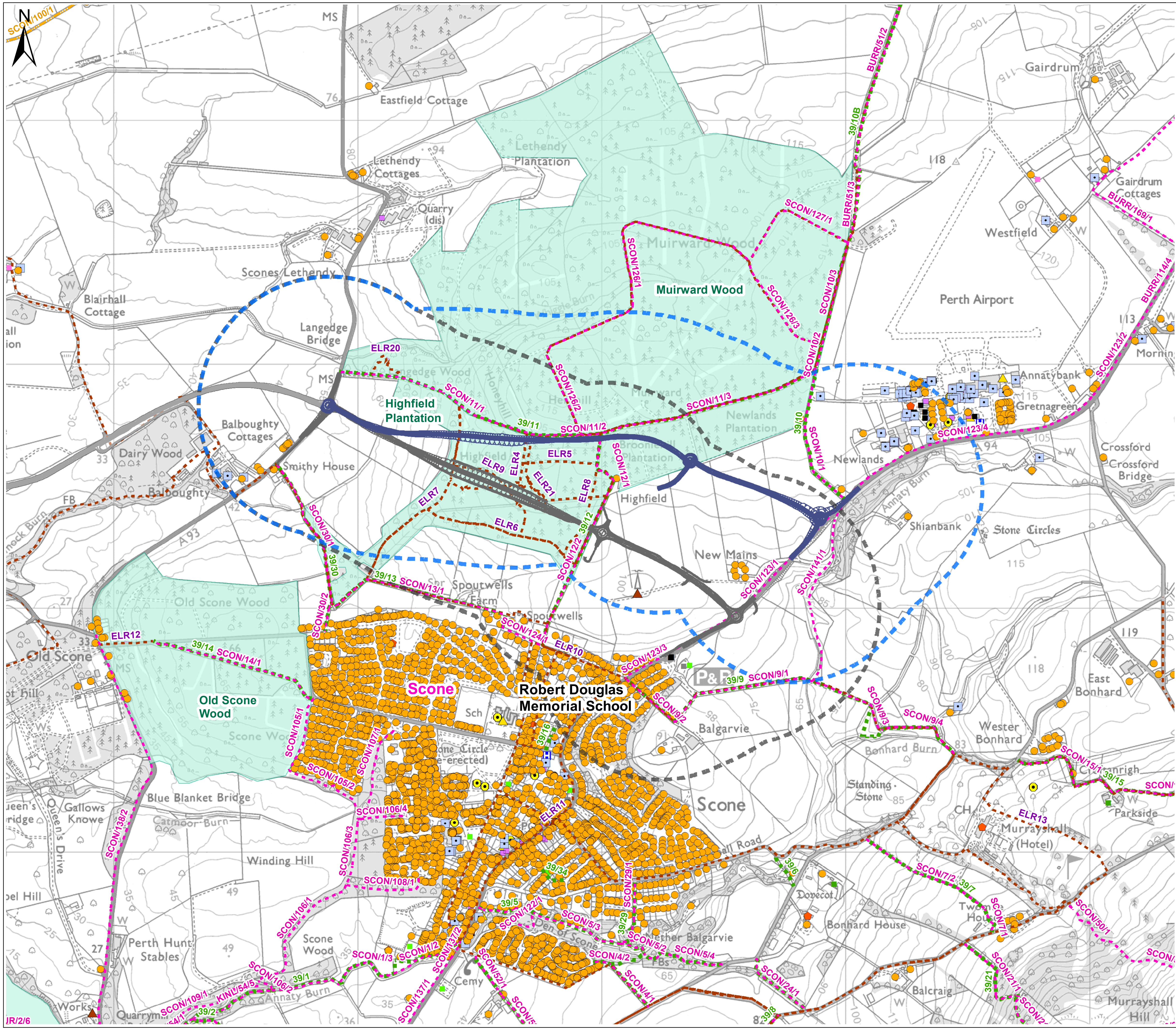
It should also be considered that NMUs wishing to access the 3m shared use pedestrian/cycleway on the CTLR would have to travel an extra 500m (approx.) to access this provision in the alternative northern route as opposed to accessing the current CTLR route from either the main road (A94) or through the H29 development (once constructed).

The alternative northern route is predicted to result in a greater impact (6ha) to community land due to increased woodland loss from Highfield Woods. The current CTLR route would result in less woodland loss (4.9ha).

A 'green' bridge is planned for the current CTLR route to reconnect paths but not for the alternative northern route, as levels on the north side of the cutting for the alternative northern route would not be conducive to an at-grade bridge crossing.

3.3.9.3 Summary

The current CTLR route would perform better for NMU paths and the impact to community land as less land is lost from Highfield Woods. The current CTLR route would also provide a better public transport service. Therefore, it is considered that the **current CTLR route is the preferred option** for People and Communities.



Legend

- Proposed Northern Alignment
- Proposed DMRB Stage 3 Alignment
- Proposed Northern Alignment 500m Buffer
- Proposed DMRB Stage 3 Alignment 500m Buffer
- Private Residential Properties
- Community Land

Non-Motorised User Routes (NMU)

- Adopted Core Path
- Public Rights of Way
- Future Potential Path Route
- National Cycle Network
- Existing Local Route

Commercial

- Commercial
- Agricultural
- Hotels - Guest Houses
- Industrial
- Leisure
- Animal welfare - rescue centres
- Storage Land
- Utilities
- Retail

Community Facilities

- Community Services
- Education
- Medical services
- Transport
- Emergency - Rescue services

0 0.5 1 Km

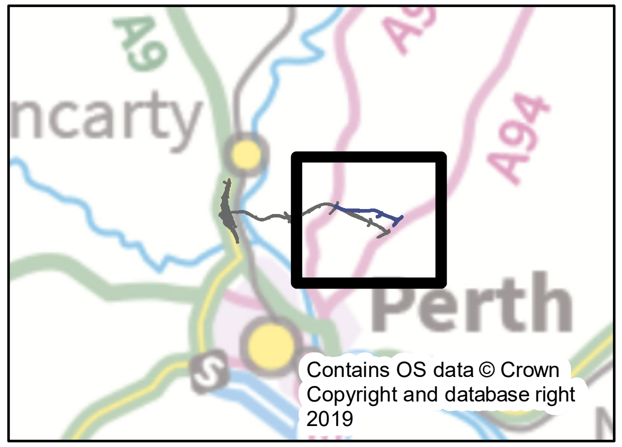


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Figure 3.3.9 - People and Communities

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Project No.	119046	Status	S2
BIM No.	119046-SWECO-EGN-000-DR-GS-20087		

3.3.10 Agricultural, Forestry and Sporting Interests

3.3.10.1 Approach

This section presents a comparative assessment of the potential impacts of the alternative northern route on agriculture and forestry interests against the current CTLR route.

The impact of the proposed routes on sporting interests, within the context of agriculture and forestry land interests, has been scoped out at this stage and would be assessed if the alternative northern route was to be taken forward. This is due to land use in the study area focussing mainly on agriculture and forestry operations, with sporting interests (shooting only, no fishing in this area) being a smaller element of land use. The assessment of land-take and disruption to agriculture and forestry through severance of fields, forest and access is considered to provide sufficient differentiation between the proposed routes for the purposes of this comparative assessment.

3.3.10.2 Assessment

In respect of agriculture and forestry land, the main areas covered in the assessment are specified as:

- Land-take in relation to the quantity and quality of agricultural and forestry land (**Figure 3.3.10**);
- Type of land use affected (arable, grassland, area of mature forest);
- Severance, including the number of fields or area of forest affected; and
- The need for major accommodation works beyond that which are embedded in the route designs and which would be developed should the alternative northern route be taken forward.

Limitations to Assessment

Agricultural baseline information has been determined on data available at the time of the assessment and through a desk-based assessment. Should the alternative northern route be taken forward, further site visits and landowner/tennant consultation would be undertaken to inform the baseline further.

Baseline Conditions

The predominant land use in the study area is agriculture and forestry. The agricultural land supports arable based agricultural systems.

Figures 3.3.10 and **3.3.11** show the LCA and soil series for this study area. The predominant LCA in the study area is Class 3.1, which is capable of producing high yields of a narrow range of crops and/or moderate yields. **Figure 3.3.13** identifies the age-class of the forest crops.

Within the study area four land interests have been identified that are affected by either one or both of the proposed routes. All land interests operate arable farming systems and location can been seen in **Figure 3.3.12.**

All forestry within the study area is of a commercial nature and belongs to one land owner. It comprises a combination of recently restocked (young) plantation and mature plantation, as well as the main access road itself for the entire plantation **(Figure 3.3.13 and 3.3.14).**

Mitigation measures with respect to agricultural and forestry interests would be developed further should the alternative northern route be taken forward with the aim of protecting the agricultural capability of land and soils and the maintenance of the viability of farming units.

Summary of Routes

Agriculture

Table 3.3.3 provides a summary of the potential impacts on agricultural land. This includes a summary of total land-take (as prime and non-prime land), the number of fields and land interests potentially affected. Significance of effects has been determined through consideration of the area of land-take and number of fields that are impacted, which provides an indication on potential severance and disruption of agricultural activity.

Potential impacts	Current CTLR route	Alternative northern route
Prime land-take (ha)	4	4.42
Non-prime land-take (ha)	0.09	0
Total Land-take (ha)	4.09	4.42
No. land interests affected	4	2
No. fields affected	8	6

Table 3.3.3 Summary of potential impacts on agricultural land

Both routes are relatively similar with regard to agricultural land take, with the majority being prime land and the same significance of effect for both routes. The alternative northern route affects fewer land owners and individual fields. In addition, the location of the alternative northern route travelling through land interest 5 offers the potential for reduced severance of fields in comparison to the current CTLR route.

Forestry

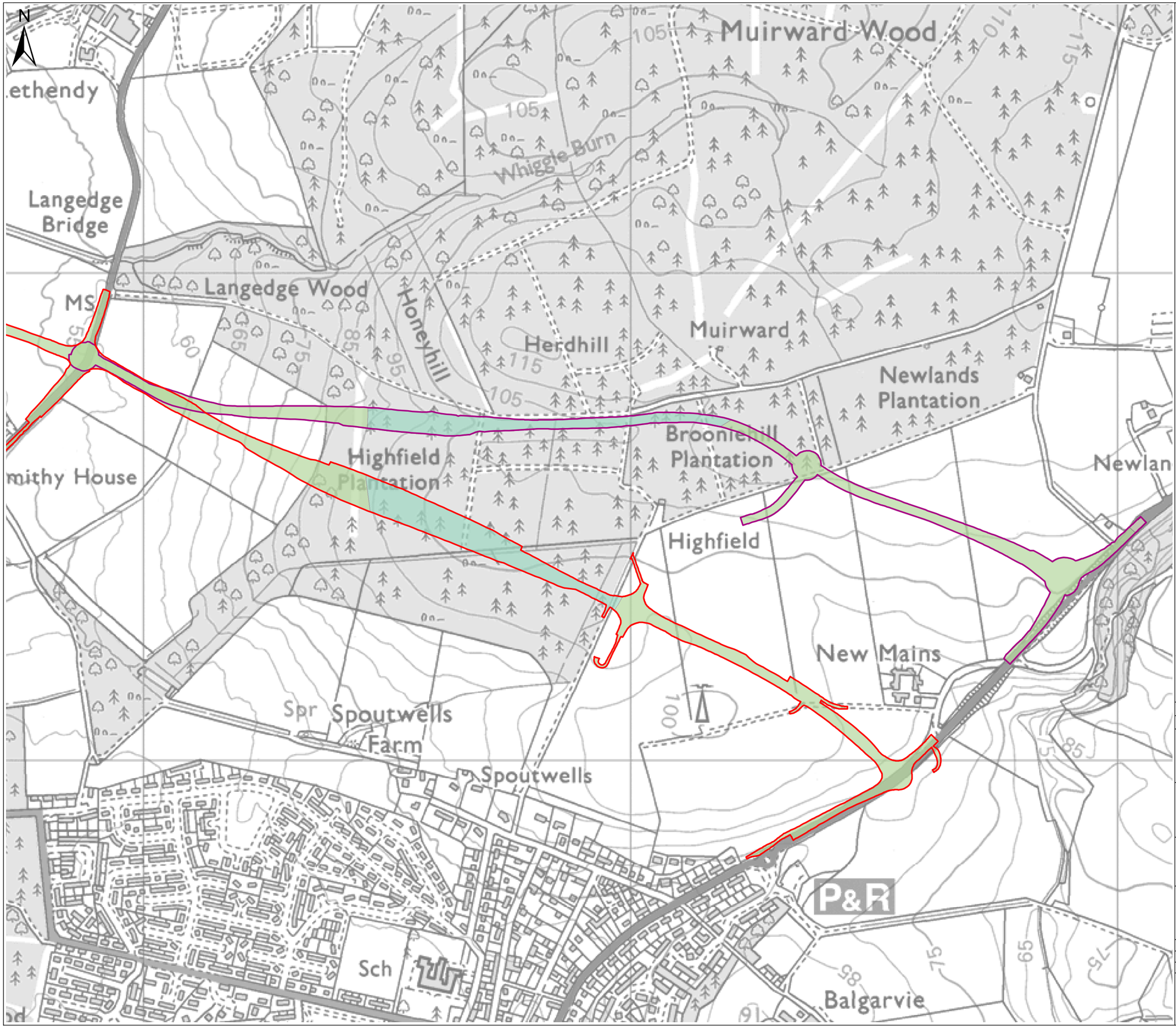
Table 3.3.4 summarises the potential impacts on forestry of both the current CTLR route and the alternative northern route. Significance of effects (determined via land take, loss of mature crop, and isolation) between routes is lower for mature crop, but land take and isolation are higher on the alternative northern route, plus there is a greater loss of access. Area of isolation increases but this is linked to a beneficial improved economy of scale for continued working of the area.

Potential impacts	Current CTLR route	Alternative northern route
Land-take (ha)	5.41	7.05
Loss of mature crop (ha)	4.48	2.31
Isolation (ha)	18	39.07
Loss of access	0	390m

Table 3.3.4 Summary of potential impacts on forestry

3.3.10.3 Summary

Therefore, while both routes are similar, and despite a larger land take and loss of forest access track which could be mitigated against, **the preferred option for agriculture and forestry is the alternative northern route** as it affects fewer land owners, has less field severance and has a reduced size of mature forest crop lost.



Legend

- Proposed Northern Alignment Footprint
- Proposed DMRB Stage 3 Alignment Footprint

Land Capability for Agriculture

- 3.1
- 4.2
- Unclassified Land

0 0.25 0.5 Km

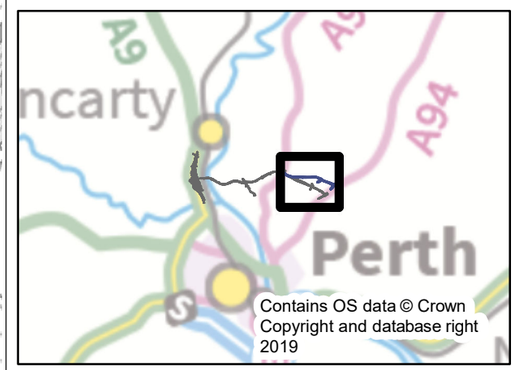


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Figure 3.3.10 - Land Classification

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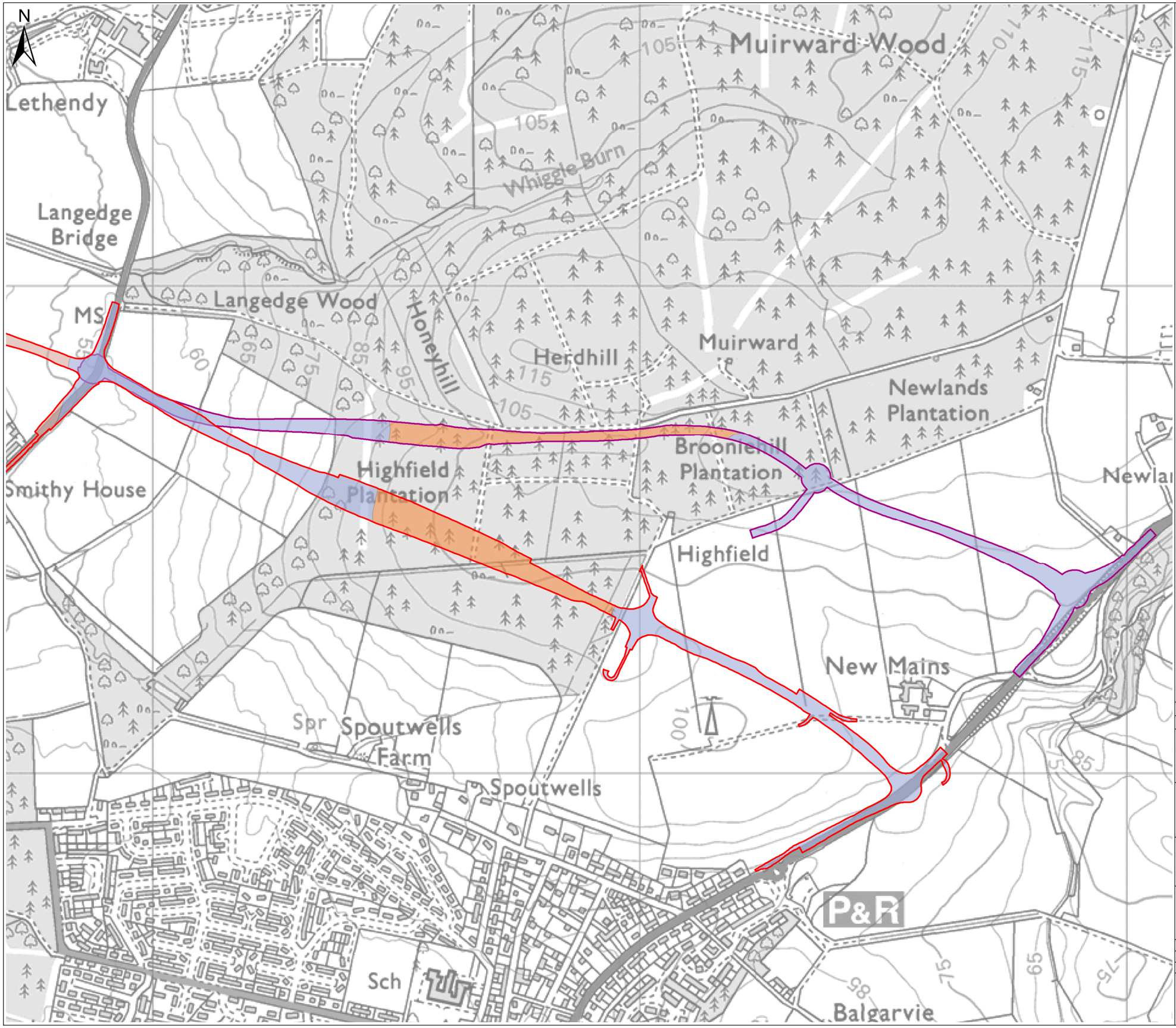
BIM No.	119046-SWECO-EGN-000-DR-GS-20088		



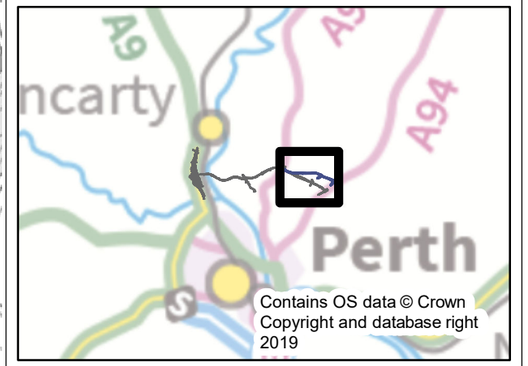
Legend

- Proposed Northern Alignment Footprint
- Proposed DMRB Stage 3 Alignment Footprint

Soil Map (25K)

- Balrownie
- Buchanyhill
- Lour

0 0.25 0.5 Km



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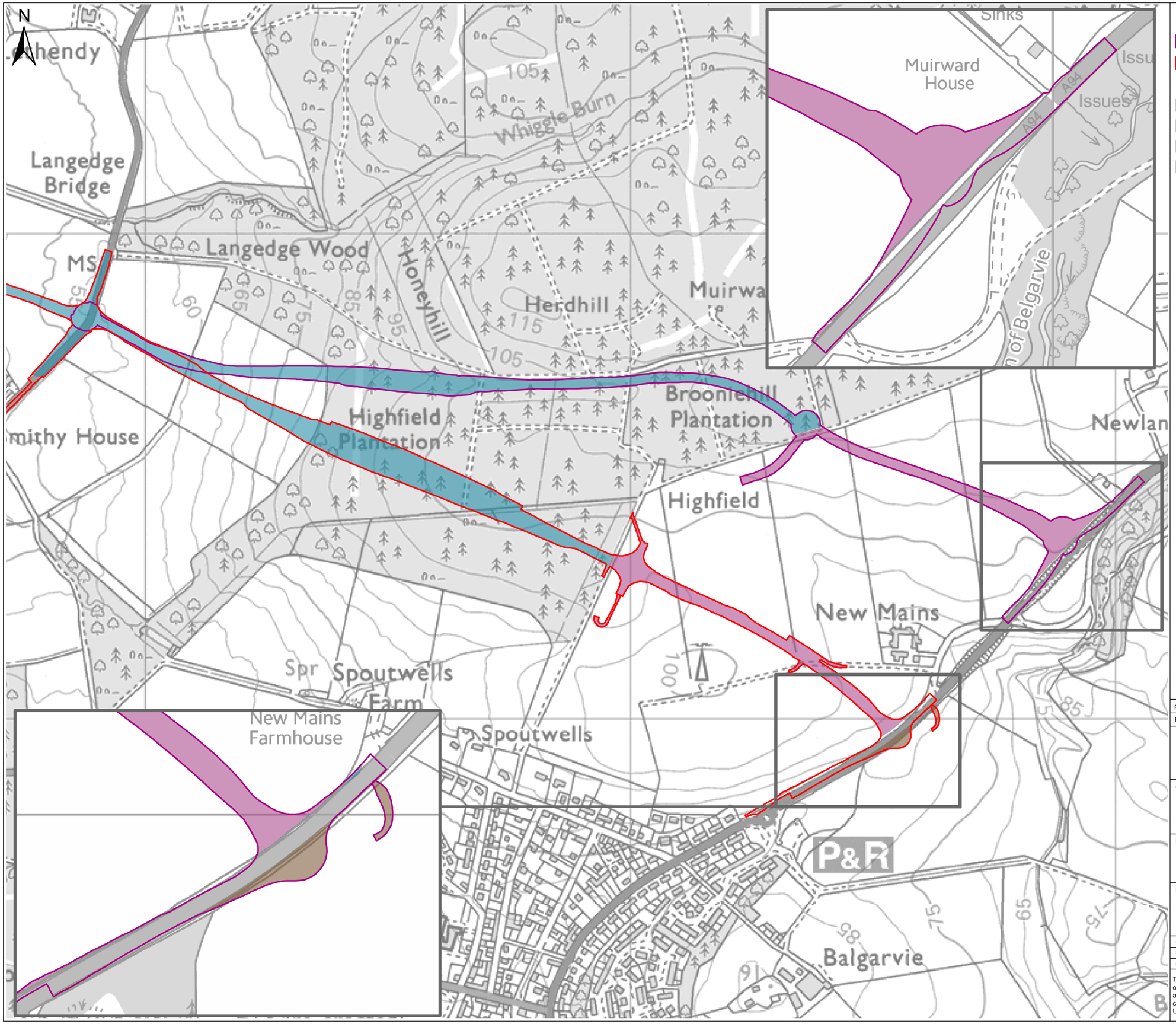
Project: **Cross Tay Link Road**

Drawing Title: Figure 3.3.11 - Soil Series

Scale @ A3	1:7,500	DO NOT SCALE	
Project No.	119046	Status	S2
BIM No.	119046-SWECO-EGN-000-DR-GS-20089		



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Project

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Drawing Title

Figure 3.3.12 - Agriculture Landowner Boundaries

Scale @ A3	1:7,500	DO NOT SCALE	
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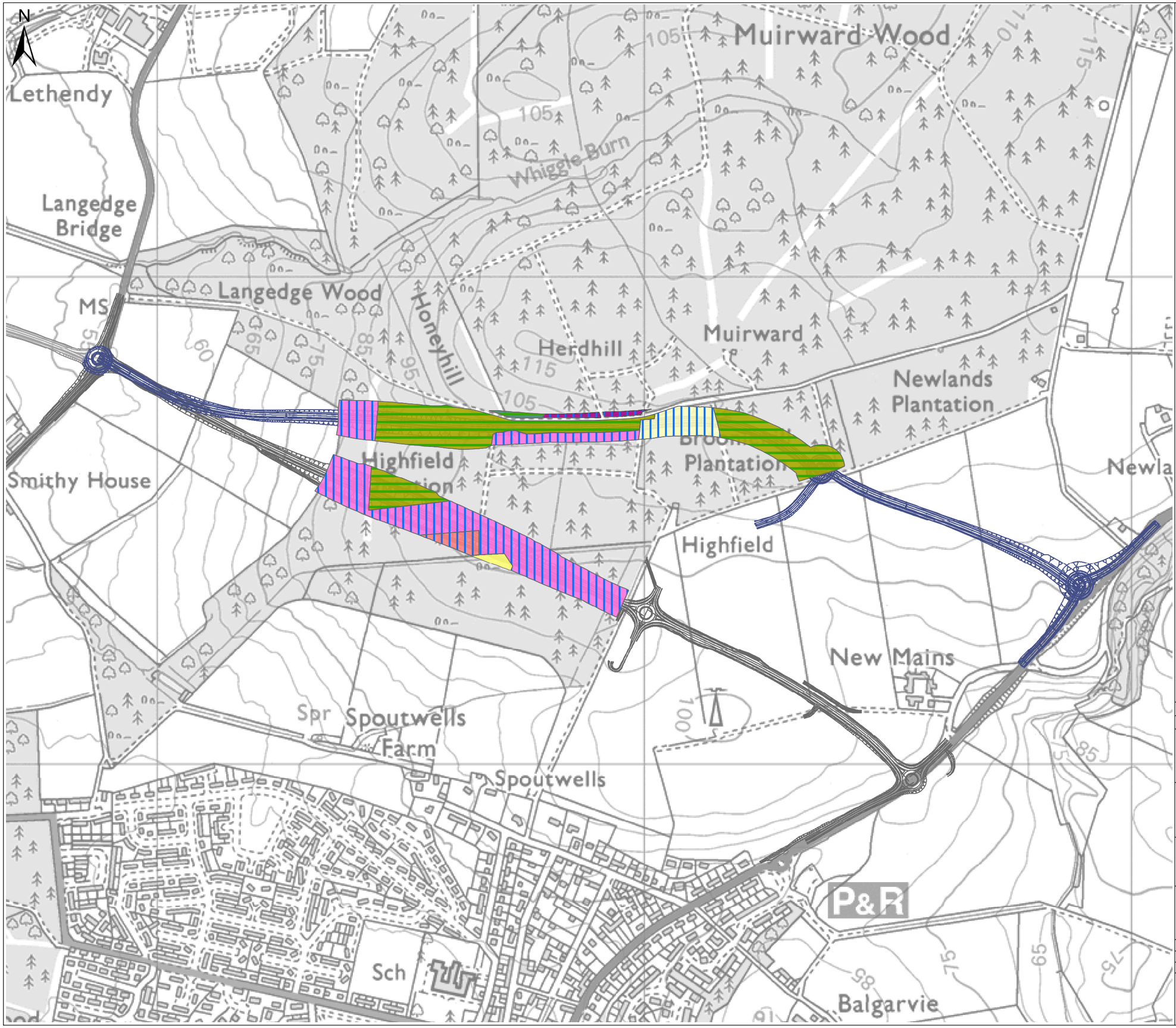
BIM No.	119046-SWECO-EGN-000-DR-GS-20090		



Legend

- Proposed Northern Alignment
- Proposed DMRB Stage 3 Alignment

Tree Age

- Mature
- Young

Tree Species

- Broad Leaved
- Mixed Coniferous
- Noble Fir
- Norway Spruce
- Open Ground
- Scots Pine
- Sitka Spruce

0 0.25 0.5 Km

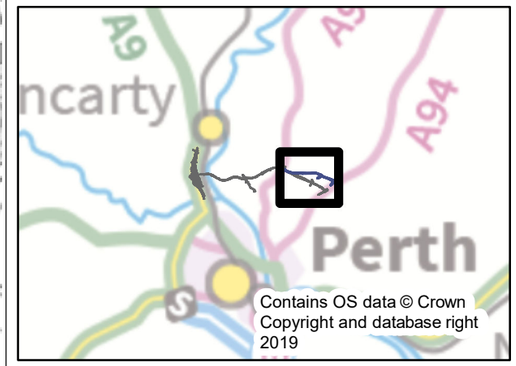


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Figure 3.3.13 - Forestry Baseline

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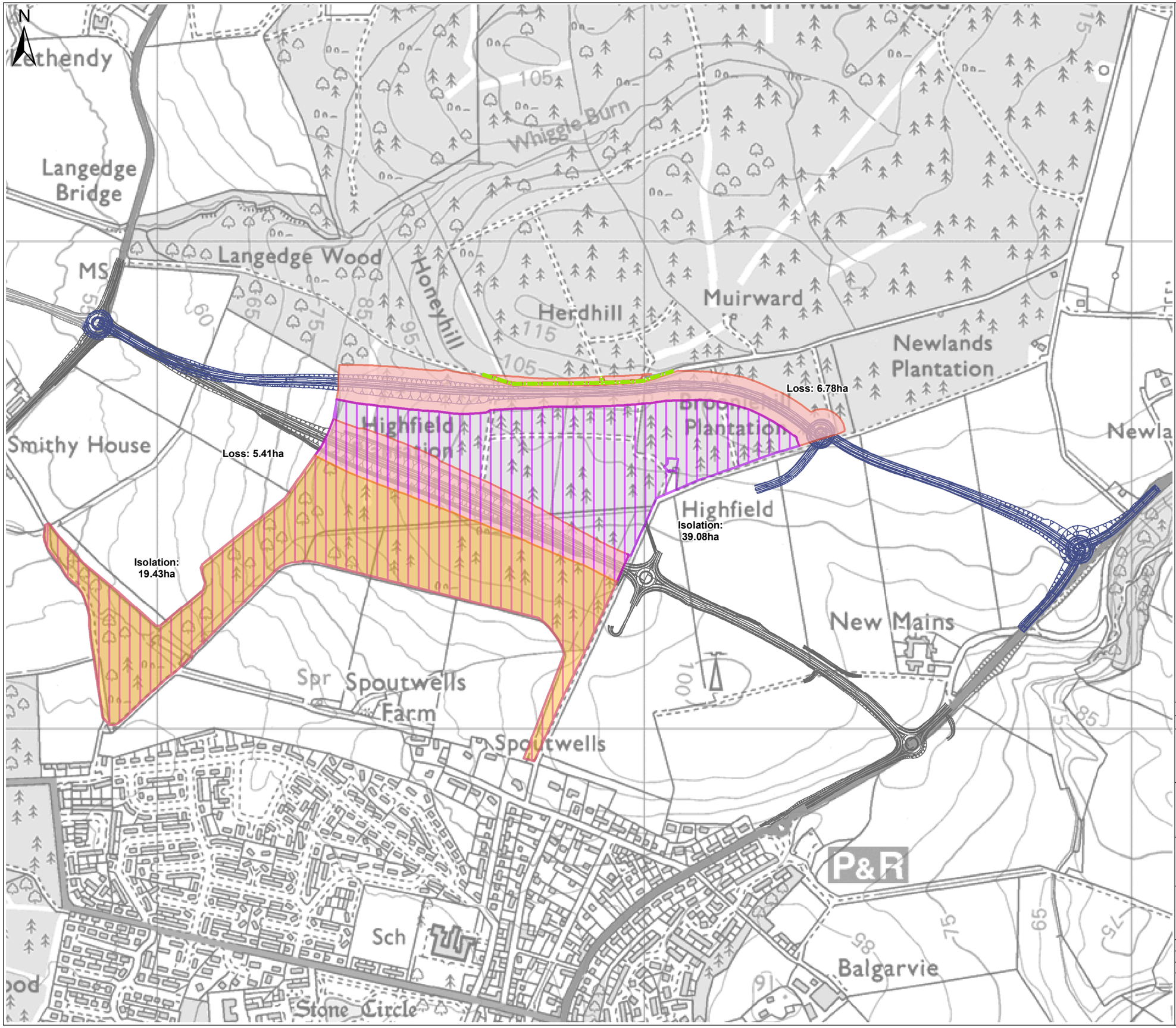
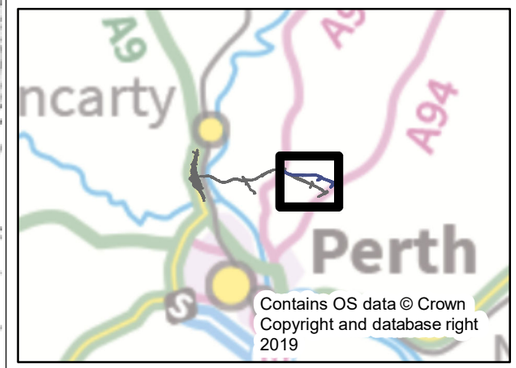


Legend

- Proposed Northern Alignment
- Proposed DMRB Stage 3 Alignment
- Northern Alignment Isolated Woodland
- DMRB Stage 3 Alignment Isolated Woodland
- Tree Loss
- Access Loss

0 0.25 0.5 Km



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Project: **Cross Tay Link Road**

Drawing Title: Figure 3.3.14 - Forestry Effects

Scale @ A3	1:7,500	DO NOT SCALE	
Project No.	119046	Status	S2
BIM No.	119046-SWECO-EGN-000-DR-GS-20092		

3.3.11 Road Drainage and the Water Environment

3.3.11.1 Approach

The aim of the assessment is to determine which route would have the greatest impact on the water environment; namely hydrology and flood risk, fluvial geomorphology, water quality and drainage.

A desk-based qualitative exercise was undertaken to assess the potential effects on surface water receptors, using online sources such as SEPA's Flood Risk Management Maps (http://map.sepa.org.uk/floodmap/map.htm) and Ordnance Survey (OS) mapping.

Hydraulic modelling was undertaken in Infoworks ICM software, using existing topographic and culvert survey data, to assess any flood risk impacts (changes in flood levels and extents) on the Whiggle Burn as a result of more development in the Whiggle Burn catchment up to the 0.5% Annual Exceedance Probability (AEP) (1:200 year) flood event. A 20% uplift for climate change was incorporated into the design event in line with published guidance. A site visit was also carried out in February 2019 to inform the flood modelling work.

The drainage design for the alternative northern route has not been developed and therefore potential changes in the drainage provision within and across catchments has only been inferred in this assessment.

3.3.11.2 Assessment

The current CTLR route and alternative northern route between the A93 and A94 junctions do not cross any major watercourses (**Figure 3.3.16**). However, the alternative northern route is positioned further north, closer to the Whiggle Burn. SEPA online flood mapping predicts flooding downstream of Langedge Bridge (A93 road crossing over Whiggle Burn) for the 0.5% Annual Exceedance Probability (AEP) (1:200 year) flood event, however the flood extent does not extend as far south as either route. The Whiggle Burn is assessed to be of low sensitivity (for flood risk and fluvial geomorphology) and medium sensitivity (for water quality).

Both routes cross Highfield Woods, which contains several artificial drains which drain to the Cramock Burn. These drains are assessed as low sensitivity for the water environment, due to the following reasons:

- No previously recorded incidents of flooding and no nearby sensitive residential/commercial receptors, being located in isolated areas surrounded by agricultural land and woodland.
- Straightened, uniform channels with minimal morphological diversity.
- Ephemeral (only contain temporary flows during/after rainfall) and do not support any protected aquatic habitats/species.

The 1D-2D hydraulic model predicted that flows would remain within the upper banks of the Whiggle Burn for the 0.5% AEP (1:200 year) (including climate change) flood event. Sensitivity testing analysis indicated that, even if the culvert under Langedge Bridge was 50% blocked with debris, water would remain within the immediate channel. A secondary river terrace along the southern bank of the Whiggle Burn was identified which would intercept any floodwater should the immediate channel be breached, thereby protecting any sensitive receptors to the south.

The connection between the alternative northern route and the A94 is approximately 300m further north compared to the current CTLR route. SEPA flood mapping indicates that the alternative northern route is located outside of the predicted 0.1% AEP (1:1000 year) flood extent of the Annaty Burn (see **Figure 3.3.15**). Therefore, there is predicted to be no change in the flood risk classification of the Annaty Burn, which is assessed to be of low sensitivity for flood risk.

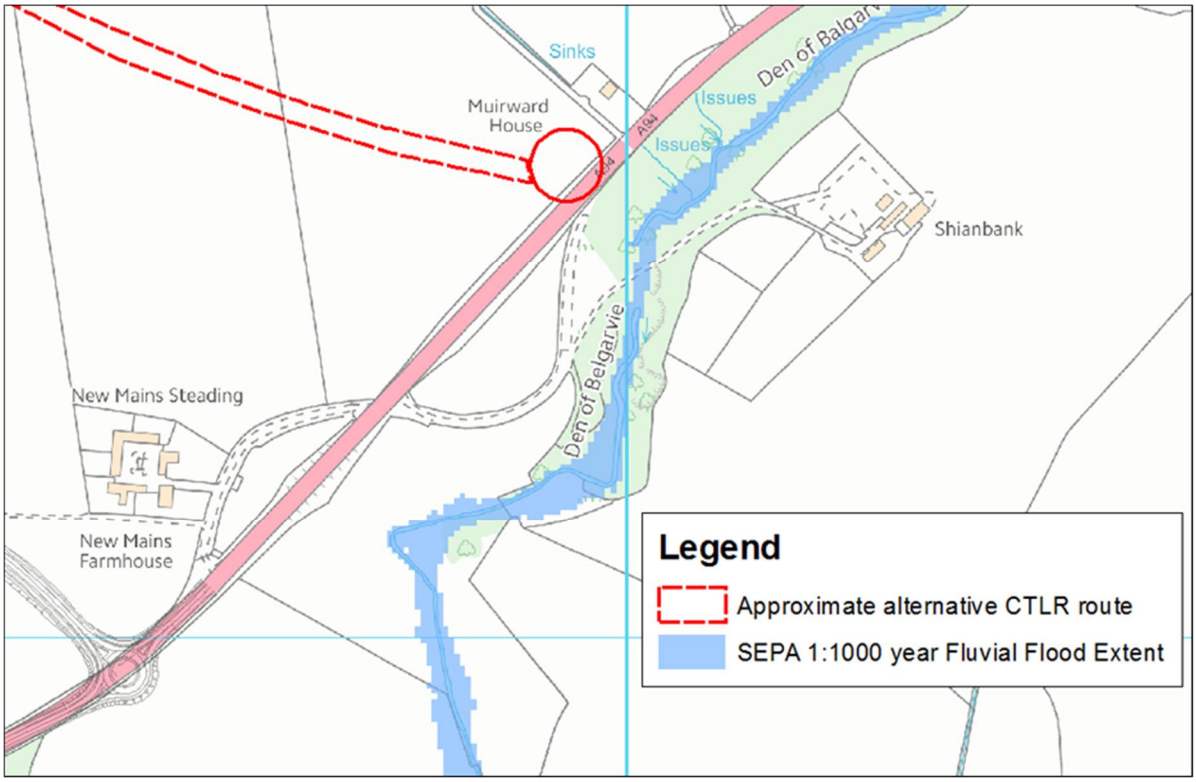


Figure 3.3.15: SEPA 1:1000-year flood extent in vicinity of the Alternative northern route connection to the A94

The current CTLR route and alternative northern routes are proposed to cross a number of drains in Highfield Woods. In the current CTLR route, several of these artificial drains, which currently drain into the Cramock Burn, are proposed to be intercepted by cut-off ditches during the construction phase. Hydrological connectivity will be maintained upstream and downstream of the carriageway where required with the provision of two pipe culverts. It is anticipated that if the alternative northern route was taken forward, the drainage arrangements during the construction and operational phases would maintain hydrological connectivity across the carriageway where required and deal with flowing water to prevent an increase in flood risk to the carriageway or elsewhere.

At this stage, the drainage design for the alternative northern route has not been developed. However, it has been assumed that if this proposal was to be progressed then road drainage from the new road carriageway would be drained to Sustainable Drainage Systems (SuDS) for treatment and attenuation. The CTLR carriageway is proposed to provide three levels of SuDS (including grass-top filter drains and a detention basin/treatment pond) prior to outfalling at the 0.5% AEP (1:2 year) Greenfield runoff rate to nearby watercourses. It is anticipated that if the alternative northern route was taken forward, the same standard of drainage arrangements would be provided, and in line with requirements of CIRIA's SUDS Manual (C753, 2015) and SEPA requirements.

The alternative northern route is in closer proximity to the Whiggle Burn than the current CTLR route, however modelling predicts there to be no increase in flood risk for the 0.5% AEP (1:200 year) flood event (including 20% climate change).

Potential effects on drains in Highfield Woods are predicted to similar for both routes and it is anticipated that the drainage design would maintain hydrological connectivity across the carriageway where required and deal with flowing water appropriately during construction and operation.

The operational drainage design for the alternative northern route has not been developed at this stage. It is anticipated that the same standard of drainage and SuDS would be provided to treat and attenuate carriageway runoff to acceptable levels before discharging to receiving watercourses.

3.3.11.3 Summary

Based on the assessment above, there are predicted to be minimal differences between both routes on surface water receptors and flood risk, and therefore there is considered to be **no preference** for the RDWE topic.

N

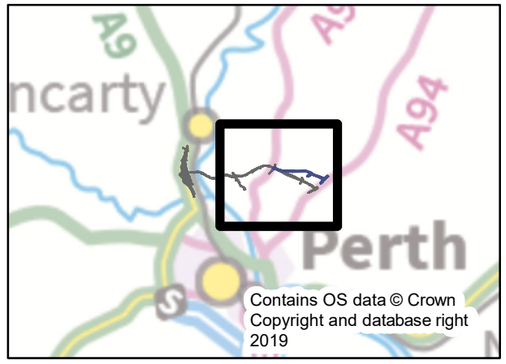
Legend

- Proposed Northern Alignment
- Proposed DMRB Stage 3 Alignment
- Watercourse

SEPA Indicative River Flood Extents - All Likelihoods

- High (1 in 10 years or greater return period)
- Medium (between 1 in 10 and 1 in 200 years return period)
- Low (between 1 in 200 and 1 in 1000 years return period)

0 0.5 1 Km



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Drawing Title: Figure 3.3.16 - Indicative Flood Extents

Scale @ A3	1:15,000	DO NOT SCALE	
Project No.	119046	Status	S2
BIM No.	119046-SWECO-EGN-000-DR-GS-20093		

3.3.12 Climate

3.3.12.1 Approach

European Union Directive 2014/52/EU, implemented in May 2017, through amended EIA Regulations in Scotland, requires that climate change is to be addressed within the EIA process. This involves minimising the potential effects of a development on the climate (i.e. Carbon Impact Assessment) as well as assessing the effects of projected climate change on identified receptors (i.e. Climate Change Resilience Assessment). In addition, the CTLR scheme is being designed in accordance with Publicly Available Standard (PAS) 2080:2016, the world's first specification for Carbon Management in Infrastructure which sets out a methodology for reducing whole life carbon emissions on projects. These requirements therefore form the basis for the consideration of carbon within this Comparative Assessment Report.

A Climate Change Resilience Assessment specific to the alternative northern route has not been undertaken in this instance. As the current CTLR route was deemed resilient to projected climate change within the EIA, and the alternative northern route is within 500m of the current CTLR route, it is not considered to vary materially when assessed against changes in future climate and weather extremes.

Consequently, this report features the results of a Carbon Impact Assessment only, which has considered the relative construction emissions of both proposed routes on the climate in terms of estimated greenhouse gas emissions (herein referred to as 'carbon emissions').

3.3.12.2 Assessment

Due to the differing stages of design development for each route (the current CTLR route is more detailed than the alternative northern route) this assessment has limited the quantification of carbon emissions to those associated with high-level estimates of material quantities, transport and construction plant (i.e. embodied carbon) only, for the relevant project sections, to ensure a proportionate comparison. Furthermore, it should be noted that the estimates of quantities developed for this assessment are subject to change and should be considered indicative only. This is particularly true in the case of the alternative northern route.

CTLR Project Design Series	Estimated Embodied Carbon (tCO2e)	
	Current CTLR route	Alternative northern route
Site Clearance	35	35
Fencing	24	24
Road Restraint Systems	5	5
Drainage	606	606
Earthworks	788	914
Pavement	1,773	2,159
Kerbs & Footways	513	461
Traffic Signs & Road Markings	14	14
Road Lighting & Electrical Work	103	103
Structures (Green Bridge at Highfield)	1,591	0
Accommodation	32	32
Total	**5,484**	**4,353**

Table 3.3.5: Estimated Embodied Carbon Comparison

Motorway Communications and Landscaping have been excluded from this assessment as their variability between routes is considered negligible.

The high-level estimates above indicate emissions associated with construction of the current CTLR route and alternative northern route (A93 to A94) to be 5,484 tCO2e and 4,353 tCO2e, respectively. This results in an additional 1,131 tCO2e (approximately 20%) associated with the current CTLR Route. This principally relates to the 'green' bridge construction at Highfield as there is no such structure proposed for the alternative northern route. This difference in embodied carbon emissions represents approximately 2% of the estimated total project carbon footprint (calculated from the specimen design for EIA purposes).

3.3.12.3 Summary

The assessment findings indicate that construction of the current CTLR route is estimated to generate an additional 1,131 tCO2e relative to the alternative northern route, a difference of 20%. When assessed against EIA significance criteria, the magnitude of this difference is such that these emissions are considered negligible and are not anticipated to materially influence the effect of the CTLR Project on the climate. However, when considering both routes in the context of PAS 2080 and whole life carbon minimisation, the **preference is towards the alternative northern route.**

3.3.13 **Land Take (3rd Party Land)**

A land referencing exercise has been undertaken to determine whether there would be any significant difference with regards to the amount of third-party land that would be required for each of the routes. This assessment concluded that there would be no significant difference in the extent of third-party land take that will be required to facilitate whichever approach is adopted and therefore there is **no preference** for either route on this basis. However, it is acknowledged that the current CTLR route falls within H29 thus cumulatively, the overall land take would increase if the alternative northern route was progressed.

3.3.14 Environmental Assessment Summary

Topic specific environmental assessments have been completed to predict the likely impacts associated with the Stage 3 DMRB Route and the alternative northern route and to determine if there is any clear preference.

A summary of the results is provided in **Table 3.3.6**. A shaded box identifies the preference for that particular topic. Where applicable, no clear preference has also been identified. The key reason for the preference is also stated.

Assessment Criteria	Current CTLR route	Alternative northern route	No Clear Preference	Reason for preference
Cultural Heritage				Additional setting impacts on the historic environment.
Landscape / LVIA				Slightly greater adverse landscape and visual effects and cumulative impacts.
Biodiversity				Greater loss of ancient woodland (additional 10,190m^2).
Geology, Soils, Contamination and Hydrogeology (GSCH)				No significant difference.
Materials				More materials associated with 'green' bridge in the current CTLR route.
Air Quality				Decrease in number of residential receptors within 200m of the road.
Noise and Vibration				Greater increase in cumulative road traffic noise levels by 2038
People and Communities				Less overall land lost for community use
Agriculture, Forestry and Sporting Interests				Affects fewer land owners, has less field severance and has a reduced size of mature forest crop lost.
Road Drainage and the Water Environment (RDWE)				No significant difference
Climate				Will generate an additional 459 tCO2e, an increase of 10%.
Land Take				No significant difference between routes, although current route sits within H29 so cumulatively there would be more land take if the northern route was progressed.

Table 3.3.6: Environmental Comparison Summary

The results show that there is a slight preference for the **current CTLR Route**, with GSCH, RDWE and Land Take indicating no clear preference from the assessments undertaken.

When summarised, the results of the assessment have not identified a clear preference with significant reasons for either of the proposed routes. It must also be considered however that in cumulative assessment terms **a preference would be identified for the current CTLR Route as this would be contained within the H29 development**, as opposed to the alternative northern route which would extend development further north. Overall the impacts would be greater as the developments would be separated.

3.4 Transport/Economic Assessment

3.4.1 Introduction

The purpose of this section of the report is to assess and compare the two differing routes of the CTLR. In particular, the routing and traffic conditions occurring in each route will be discussed and illustrated and the economic assessment results will be presented to show the performance and value for money for each route.

3.4.2 Transport Modelling

3.4.2.1 Approach

Figure 3.4.1 below shows the two route proposals for the CTLR as modelled within Paramics. The northern alternative is shown in red and the current CTLR route is shown in blue. The figure below shows that the alignment of the Eastern link of the CTLR will be moved north by approximately 500m between the A93 and A94. The proposed Highfield junction will be moved and access to and from the proposed Scone North development will take from a dedicated site access roundabout junction with the A94.

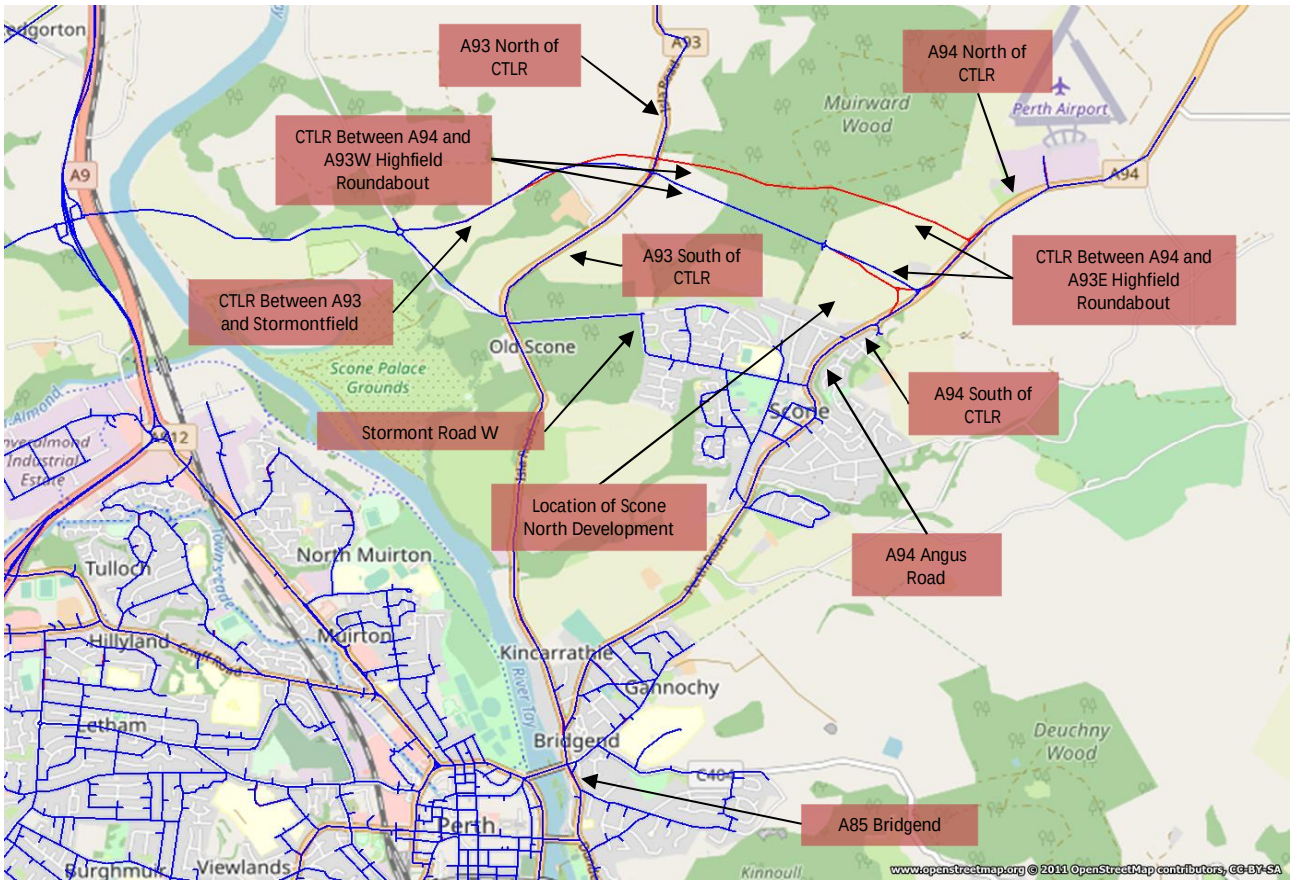


Figure 3.4.1: CTLR Route Options

The modelling of both routes has been undertaken within Paramics. For comparison purposes, the alternative route has been assessed in the 2038 forecast (design) year, consistent with the previous DMRB Stage 3 assessment. The traffic model road network was updated to reflect the proposed realignment, along with the changes relating to access and egress from the proposed Scone North development site.

It should be noted that the proposed realignment has not be remodelled in Transport Scotland's Transport Model for Scotland (TMfS). Since the distance between the two routes is only around 500m, it is anticipated

that the changes will have only a minor impact in terms of wider route assignment in the national strategic model.

In order to undertake a comparative assessment between the two routes, traffic flow in the peak hours and journey time comparisons on key routes have been presented to demonstrate the impact of each route.

3.4.2.2 Assessment

Table 3.4.1 compares and presents the two-way traffic flows at key locations in 2038 for the current CTLR route and the alternative northern route in the AM peak period. The results suggest that during the AM peak period, the realigned option is predicted to result in an increase of 9% in traffic using the A94 corridor that travels directly through Scone, along with a 19% reduction in traffic using the A93 corridor. This predicted difference is primarily due to the change in access arrangements serving the proposed Scone North development. This development traffic is predicted to use the A94 route into Perth via Bridgend. These changes in access arrangements for the H29 Development also lead to a predicted increase of 31% in traffic on the CTLR between the A93 and A94.

The results also suggest an increase of around 10% in traffic on Stormont Road West. Under the current CTLR route, traffic would have had direct access onto the A93 via the CTLR but this option will no longer be available with the alternative northern route. Traffic will instead have to use the local road network to reach the A93.

Comparisons of traffic flows on the CTLR between the A93 and Stormontfield Road Roundabout and to the north of the CTLR on the A93 and A94 corridors and on A85 Bridgend suggest little or no change between the scenarios indicating the effects of the realignment appear to be localised around the A93 / A94 / Scone locality.

2038 Design Flow Comparison AM	Current CTLR Route	Alternative Northern Route	Difference	% Difference
A94 North of CTLR	2652	2644	-8	0%
A94 South of CTLR	1480	1598	118	8%
A94 Angus Road	1622	1776	154	9%
A93 North of CTLR	2089	2077	-12	-1%
A93 South of CTLR	1213	980	-233	-19%
A85 Bridgend	3648	3602	-46	-1%
CTLR Between A94 and A93W Highfield Roundabout	2338	2111	-227	-10%
CTLR Between A94 and A93E Highfield Roundabout	1615	2111	496	31%
CTLR Between A93 and Stormontfield	3218	3236	18	1%
Stormont Road W	338	372	34	10%

Table 3.4.1: Flow Comparison for AM

Table 3.4.2 presents the same results as in the table above but for PM peak period. The results suggest a similar trend in the PM peak to the AM peak period. The alternative northern route is predicted to result in an increase of 14% in traffic using the A94 corridor that travels directly through Scone, along with a 19% reduction in traffic using the A93 corridor. This predicted difference is primarily due to the change in access arrangements serving the H29 development. Again, this development traffic is predicted to use the A94 route into Perth via Bridgend.

The results also suggest an increase of around 9% in traffic on Stormont Road West. Under the DMRB Stage 3 preferred route, traffic would have had direct access onto the A93 via the CTLR but will instead have to use the local road network to reach the A93.

Comparisons of traffic flows on the CTLR between the A93 and Stormontfield Road Roundabout and to the north of the CTLR on the A93 and A94 corridors and on A85 Bridgend suggest little or no change between the scenarios indicating the effects of the realignment appear to be localised around the A93 / A94 / Scone locality.

2038 Design Flow Comparison PM	Current CTLR Route	Alternative Northern Route	Difference	% Difference
A94 North of CTLR	3748	3765	17	0%
A94 South of CTLR	1834	2089	255	14%
A94 Angus Road	2144	2451	307	14%
A93 North of CTLR	2698	2705	7	0%
A93 South of CTLR	1535	1243	-292	-19%
A85 Bridgend	5330	5371	41	1%
CTLR Between A94 and A93W Highfield Roundabout	3592	3465	-127	-4%
CTLR Between A94 and A93E Highfield Roundabout	2791	3465	674	24%
CTLR Between A93 and Stormontfield	4601	4571	-30	-1%
Stormont Road W	430	469	39	9%

Table 3.4.2: Flow Comparison for PM

Figures 3.4.2, 3.4.3 and 3.4.4 provide more detail into the impact of the two routes on the traffic routing on the road network. **Figures 3.4.3 and 3.4.4** show the Annual Average Daily Traffic (AADT) flow difference between the do-something (with the CTLR scheme) and do-minimum (without the CTLR scheme) for the current and northern alternative routes respectively. The CTLR results in a significant reduction in traffic on the A93 and A94. The reduction of traffic on these two key strategic routes has a knock-on impact on the City Centre where key A-roads experience a reduction of traffic on them. The major difference in these figures is the flow changes that occur on the A85 Bridgend and the CTLR. In the current CTLR route there is a more significant reduction in traffic on this stretch of road than that occurring in the alternative northern route.

When referring to **Figure 3.4.2** this shows the AADT flow difference between the current CTLR route and the alternative northern route. As can be seen, the biggest impact occurs along the A93 and A94 corridors. The alternative northern route results in an increase in traffic on the A94 and a reduction in traffic on the A93. These trends are the same as explained in the tables above.

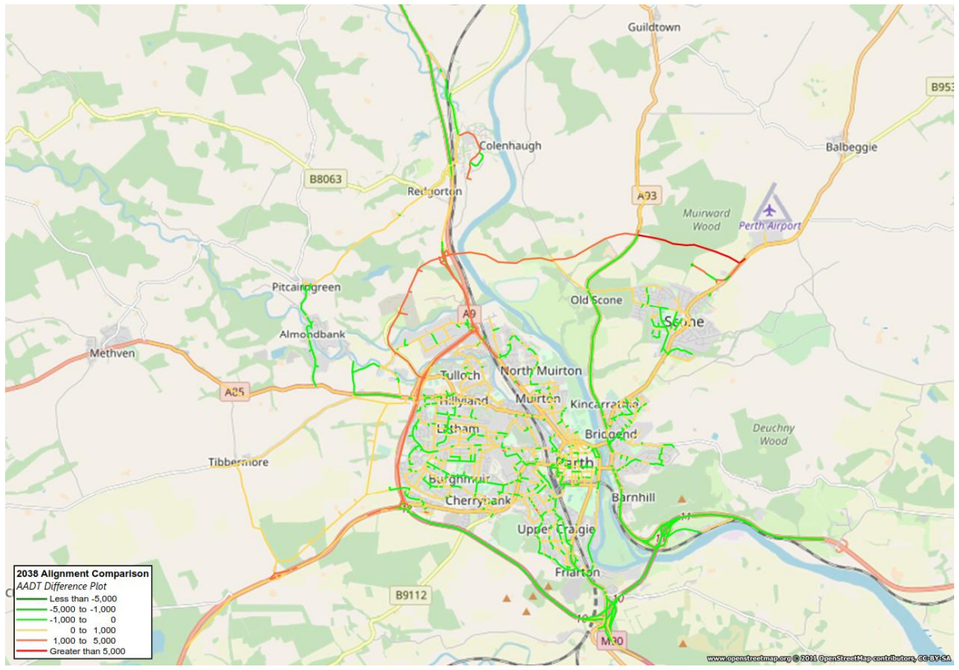


Figure 3.4.2: AADT ROUTE FLOW DIFFERENCE PLOT 2038 (Stage 3 vs Northern Alternative Route)

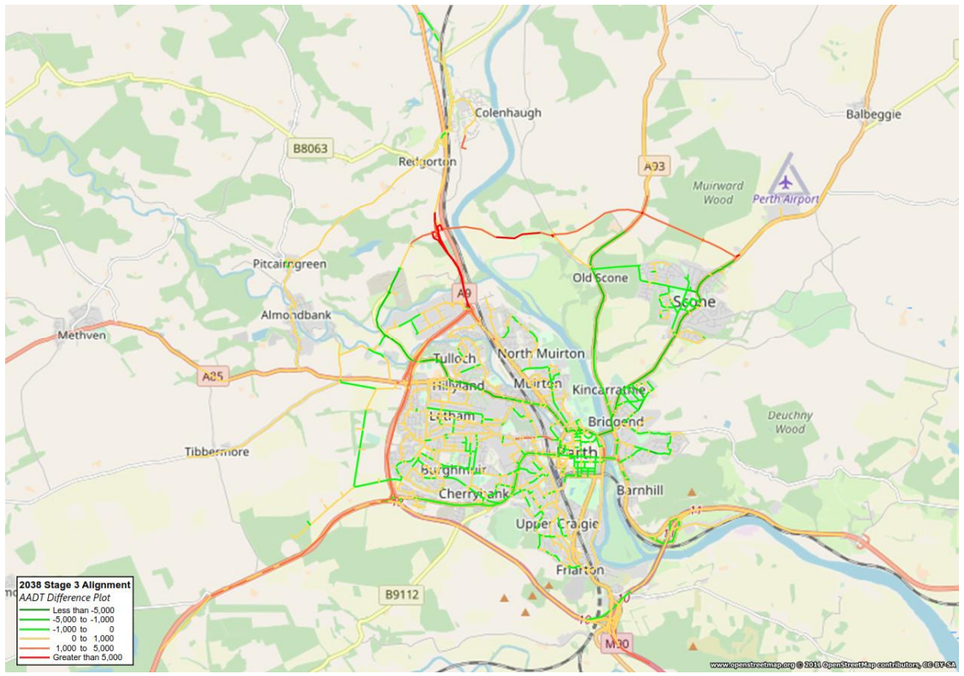


Figure 1.4.3: AADT CURRENT CTLR ROUTE FLOW DIFFERENCE PLOT 2038 DO-SOMETHING AGAINST DO-MINIMUM

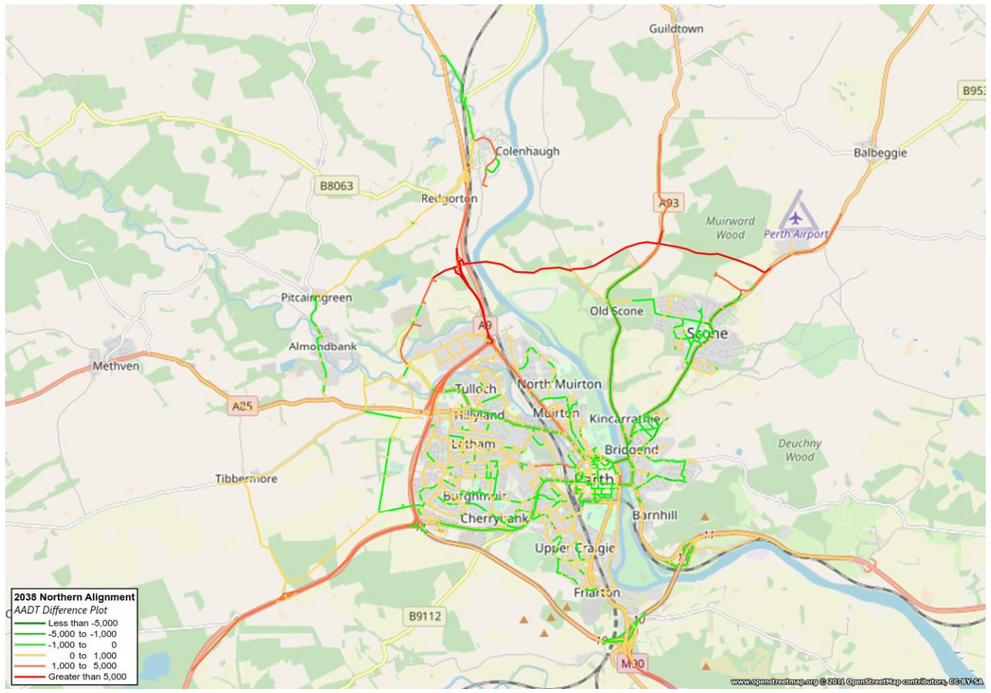
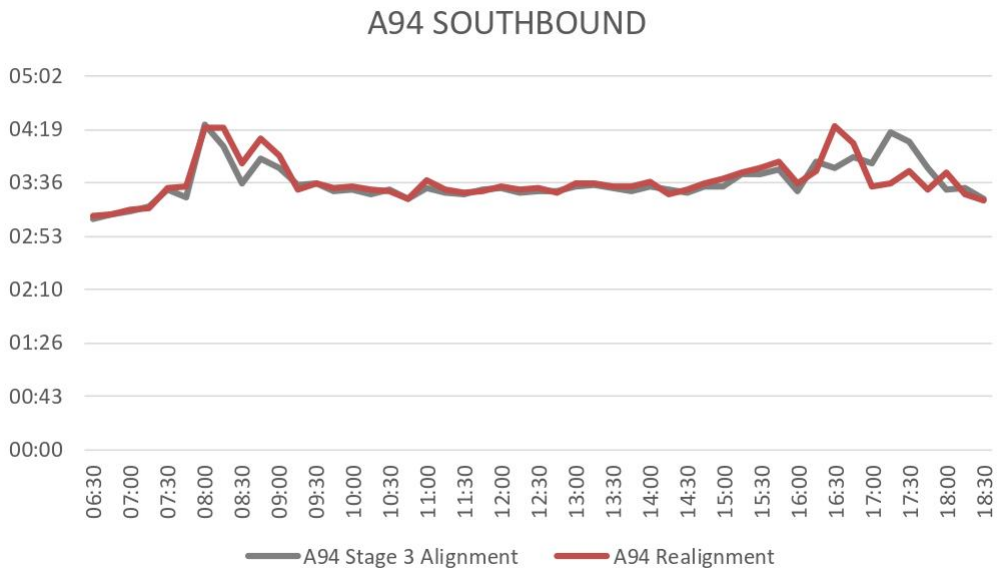


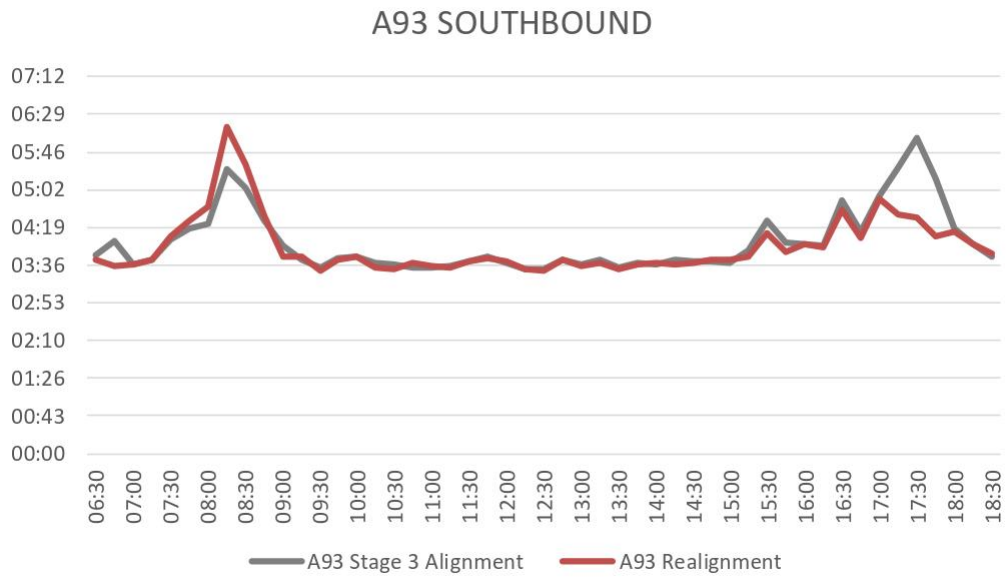
Figure 3.4.4: AADT ALTERNATIVE NORTHERN ROUTE FLOW DIFFERENCE PLOT 2038 DO-SOMETHING AGAINST DO-MINIMUM

When considering the impacts of the routes on journey times, it can be concluded that the different traffic reassignment occurring because of the reroutes does not create a significant difference (between 45-90 seconds) in terms of journey times on the A93 and A94. This is illustrated by **Figures 3.4.5 and 3.4.6**.



**Reference: GB01T17I46_10661414_002, CTLR Realignment Assessment, Systra*

Figure 3.4.5: 2038 Journey Time Comparison A94 Southbound



**Reference: GB01T17I46_10661414_002, CTLR Realignment Assessment, Systra*

Figure 3.4.6: 2038 Journey Time Comparison A94 Southbound

3.4.2.3 Summary

The assessment findings indicate that the major difference between the current CTLR route and northern alternative route is the change in traffic volumes along the A93 and A94 strategic routes. The alternative northern route is predicted to result in an increase of 9% in traffic using the A94 corridor, along with a 19% reduction in traffic using the A93 corridor in the AM Peak, and an increase of 14% in traffic using the A94 corridor, along with a 19% reduction in traffic using the A93 corridor in the PM Peak. The consequential increase in traffic using the A94 which travel directly through the centre of Scone is the biggest impact resulting from the alternative northern route. This increase in traffic through Scone would likely negatively impact local residents within Scone due to increased congestion making movements out of local roads onto the A94 more difficult and therefore impacting journey times for these trips. Therefore, when considering both routes in the context of the transport modelling undertaken, the **preference is towards the current CTLR route**.

3.4.3 Economic Assessment

3.4.3.1 Approach

The aim of this economic assessment is to assess and compare the performance of the two CTLR routes. The detailed economic assessment results will be presented first in order to explain the benefits that accrue as a result of the CTLR before a comparison is made to the alternative northern route.

An economic assessment has been undertaken over a 60-year period in accordance with the requirement of TAG Unit A1.1 – Cost-Benefit Analysis (Nov 2018). Economic assessment results have been presented in the form of Transport Economic Efficiency (TEE), Public Accounts (PA), and Analysis of Monetised Costs and Benefits (AMCB) tables.

The economic assessment has been based on a comparison in monetary terms of the total benefits generated by the current CTLR route and northern alternative route against the total associated costs of construction. This also includes an assessment of the disbenefits experienced by transport users during construction.

The assessment of the impacts of the CTLR scheme on users after opening has been based on a comparison of travel times and costs between the Do-Minimum and Do- Something scenarios in future years as modelled.

Scheme costs

Part of the economic analysis process is to derive the costs associated with the CTLR, predominantly construction, land, preparation and supervision costs. The preparation of preferred option costs for the CTLR has been carried out following the principles set out in TAG Unit A1.2 'Scheme Costs'. Where costs were provided in financial years, these are converted into calendar years for the purpose of the economic assessment.

Whilst preparing cost estimates, risk and uncertainty have been considered. For the assessment central forecasts have been used which utilises an average risk. The quantified risk assessment (QRA) of about 13% to roads and 9% to bridges and an optimism bias of 15% to roads and 17% to bridges have been considered for the assessment. These rates reflect the current stage of the project.

The expenditure profiles are based upon cost estimates in 2018 Q1 prices and then inflated to outturn costs using construction related inflation. These costs have then been rebased to 2010 calendar year profiles for economic calculations, using the GDP-deflator series as published in the latest TAG Data book (November 2018). All costs are in factor cost unit of account and exclude VAT, both recoverable and non-recoverable. All spend to date has been removed as these costs are considered as sunk costs and not included in the economic appraisal.

The following assumptions are used to calculate the costs of the alternative northern route:

- The Highfield Green Bridge has not been included;
- Land costs are the same as the current CTLR route;
- The road costs for the alternative northern route have been calculated at this stage as a rate per m length of CTLR carriageway based on the Stage 3 Cost Estimate of the existing route - £2,519/m;
- It is assumed that reverting the alternative northern route to DMRB Stage 2 and therefore recommencing DMRB Stage 3 for this section (i.e. between the A93 and A94) would result in a one-year programme delay with opening year of 2025. Further programme delay will obviously escalate costs further;
- Preparation costs have been calculated at 7.5% of construction and land costs in line with the NESA Manual recommendations for DMRB Stage 2;

- Inflation has been recalculated at 18.9% with base costs at Q1 2018 and an assumed construction start date of February 2023; and
- Optimism bias percentages have been recalculated at 16% for roads and 17% for bridges.

For both routes, operational and maintenance costs have not been included at this stage as they will be minor in comparison to the main CTLR implementation costs.

The impact of indirect taxation revenue is calculated within the Transport Users Benefit Appraisal (TUBA) program. As per recent guidance, indirect taxation revenue impacts were assessed as affecting the level of benefits rather than the level of costs. This means that in the Benefit Cost Ratio (BCR) calculation indirect taxation revenue was added to the benefits rather than subtracted from the scheme costs.

No grants or subsidies were included in the economic assessment of the routes.

Transport appraisal

The CTLR benefits are a combination of different elements which are dependent on network capacity, average speeds, numbers of trips, cost of travel, tax, etc. The total benefits, PVB (Present Value of Benefits), include the following items:

- Travel time - assessed within TUBA;
- Vehicle Operating Costs (VOC) - assessed within TUBA;
- Accident benefits - assessed within COBA-LT; and
- Indirect tax revenues - assessed within TUBA.

The total scheme costs, PVC, include the following items:

- Investment costs relating to the preparation and construction of the CTLR.

The detailed outputs from the economic assessments, in terms of TEE, PA and AMCB tables, for the Core Scenario are presented in **Appendix D**.

For the purpose of this comparative of assessment the benefits/disbenefits arising from construction and maintenance delays, environmental impacts, journey time reliability and wider economic impacts have not been assessed and included within this report.

TUBA provides a complete set of default economic parameters in its standard economics file, including values for variables such as values of time, vehicle operating cost data, tax rates and economic growth rates which have been used for this appraisal. The CTLR related assumptions and parameters defined in the TUBA file are presented below:

- Version 1.9.12 of TUBA has been used;
- Appraisal has been carried out using the distance band method within TUBA;
- First year – 2024 (opening year);
- Last year – 2083 (60 years from opening year);
- Modelled forecast years – 2023[2] and 2038;
- Current (appraisal) year – 2019;

[2] As per the TUBA guidance, if the scheme opening year is only 1 or 2 years after the first modelled forecast year then the modelled year data can be used to represent the scheme opening. This is the reason behind why the opening year is 2024 but the first modelled forecast year is 2023.

- No further change in traffic or benefits was assumed beyond the last forecast year of 2038, apart for an allowance for continued growth in the real value of time which is in line with TAG;
- The TUBA assessment has been based on the following time slices:
    - AM Weekday (07:00 - 10:00hrs)
    - PM Weekday (16:00 - 19:00hrs)
- Annualisation factors based on the assumption that there are 253 weekdays per year;
- Seven TUBA User Classes were specified as follows:
    - User Class 1: Car, all purposes, all person-types;
    - User Class 2: Light Goods Vehicles (LGV's) Personal, other purpose, all person-types;
    - User Class 3: LGV Freight, business purpose, all person-types;
    - User Class 4: Other Goods Vehicles 1 (OGV 1), business purpose, all person-types;
    - User Class 5: OGV2, business purpose, all person-types;
    - User Class 6: Coach / Bus, business purposes, driver person-type; and
    - User Class 7: Coach / Bus, all purposes, passenger person-type (12.2 passengers per coach / bus has been assumed).
- The transport model is based on a single User Class for cars and coach / bus passengers. The split of trips between purposes (business, commuting and other categories) has been based off the TUBA default values as per TAG Databook, A1.3.4. All other User Classes have been taken directly from the transport model.

3.4.3.2 Assessment

Scheme costs

The total scheme cost of the current CTLR route is approximately £117.7m (including inflation, QRA and optimism bias). **Table 3.4.3** summarises the value of the construction cost of the current CTLR route with expenditure profile and includes all spend on the DMRB Stage 3 assessment to date. It also shows total discounted costs in 2010 market price unit of account (Present Value of Costs, 2010 prices, discounted to 2010) for the preferred option.

	2019	2020	2021	2022	2023	2024	Total
Preparation	£1.53	£0.85	£0.71	£0.00	£0.00	£0.00	£3.1
Supervision	£0.00	£0.00	£0.25	£0.95	£0.92	£0.22	£2.3
Works	£0.00	£0.00	£7.68	£29.70	£28.69	£6.93	£73.0
Land	£0.00	£0.00	£1.69	£0.00	£0.00	£0.00	£1.7
Total, PVC	**£1.5**	**£0.8**	**£10.3**	**£30.6**	**£29.6**	**£7.2**	**£80.1**

Table 3.4.3: Summary of the discounted scheme costs – Investment, PV, £m, market price

The total scheme cost of the alternative northern route is approximately £125m (including inflation, QRA and optimism bias). **Table 3.4.4** summarises the value of the construction cost (discounted) with expenditure profile

for the alternative design option. It also shows total discounted costs in 2010 market price unit of account (Present Value of Costs, 2010 prices, discounted to 2010) for the alternative design option.

	2019	2020	2021	2022	2023	2024	2025	Total
Preparation	£1.83	£0.74	£0.71	£0.69	£0.00	£0.00	£0.00	£4.0
Supervision	£0.00	£0.00	£0.00	£0.00	£0.80	£0.93	£0.60	£2.3
Works	£0.00	£0.00	£0.00	£0.00	£25.18	£29.19	£18.80	£73.2
Land	£0.00	£0.00	£0.00	£1.72	£0.00	£0.00	£0.00	£1.7
Total, PVC	**£1.8**	**£0.7**	**£0.7**	**£2.4**	**£26.0**	**£30.1**	**£19.4**	**£81.2**

Table 3.4.4: Summary of the discounted alternative design scheme costs – Investment, PV, £m, market price

Travel Time Savings and Vehicle Operating Costs Results

When road vehicles are used they incur costs such as fuel, maintenance, and wear and tear. These costs are known as Vehicle Operating Costs (VOC). When the CTLR is implemented, a variety of changes in speed and distance could occur and there is a mixture of increases and decreases in VOC fuel and non-fuel elements. These occur due to the following reasons:

- Traffic that transfers onto the free-flow links will experience less delay and therefore have quicker journeys. However, some of that traffic travels a slightly longer distance. Such traffic therefore has a mixture of increases and decreases in VOC;
- Other traffic may reroute to take advantage of reduced travel times but this can result in longer distances being travelled (even if they are quicker). Such traffic therefore has a mixture of increases and decreases in VOC;
- Local traffic that would have to re-route away, resulting in longer distances being travelled. Such traffic is therefore likely to have an increase in VOC; and
- Other road users in the study area could experience increased journey times due to increases in traffic caused by variable demand. Such traffic could increase or decrease VOC depending upon the resultant speeds.

For the CTLR, the core TUBA scenario includes only the AM and PM peak periods and excludes the inter-peak (IP) period. With how the traffic model has been set up, congestion is noted to build throughout the day, ultimately having a significant impact on the user benefits generated through TUBA. By excluding the IP period, these overestimated benefits were restricted.

Table 3.4.5 shows the analysis of the benefits by trip purpose for the core scenario. The table indicates that 30% of trips are because of business trips, 38% because of commuting trips and 32% because of other trips. This is expected because the CTLR is likely to benefit commuters more as it connects the local town of Scone to the A912. Business trips will benefit through the reduced congestion in the city centre as they travel through Perth itself.

User Class	Scheme £m
Business	£128.8
% Business	30%
Commuting	£163.54
% Commuting	38%
Other	£136.52
% Other	32%
Total	**£428.85**

Table 3.4.5: TUBA benefits (time + VOC) by purpose – core scenario, £m

Analysis of benefits grouped by the size of time saving is shown in **Table** Error! Reference source not found.**3.4.6** by user class. The totals presented also follow the same trend as **Table 3.4.5**, with commuting trips having the largest time saving. The results show that most of the CTLR's benefits come from large journey time savings (> 5 min). The CTLR aims to reduce the inefficiently long-distance journeys in the area and so it is expected that the longer journey times are to benefit the most.

Trips that take less than 2 minutes experience slight increases in journey times. With the large increase in traffic growth, the city centre becomes congested in particular hotspots causing wide scale rerouting in order to avoid congestion and delays experienced.

User Class	< 2min	2 to 5 min	> 5 min	Total
Business	-£37.42	£10.36	£136.97	**£109.91**
Commute	-£15.89	£15.30	£160.19	**£159.60**
Other	-£14.67	£12.43	£134.34	**£132.09**

Table 3.4.6: TUBA benefits by time savings by purpose – core scenario, £m

Analysis of the benefits by time period, as shown in **Figure 3.4.7**, shows that the PM peak generates greater user time benefits than the AM peak, especially in 2038. In the do-minimum scenario, there is large amounts of congestion and grid lock that begin in the AM period which carries on over into the later time periods causing significant journey time implications. With the implementation of the CTLR and resultant congestion relief, the build-up in congestion is less significant and therefore this does not carry over into the PM period, hence illustrating the large-scale benefits that are generate in the PM.

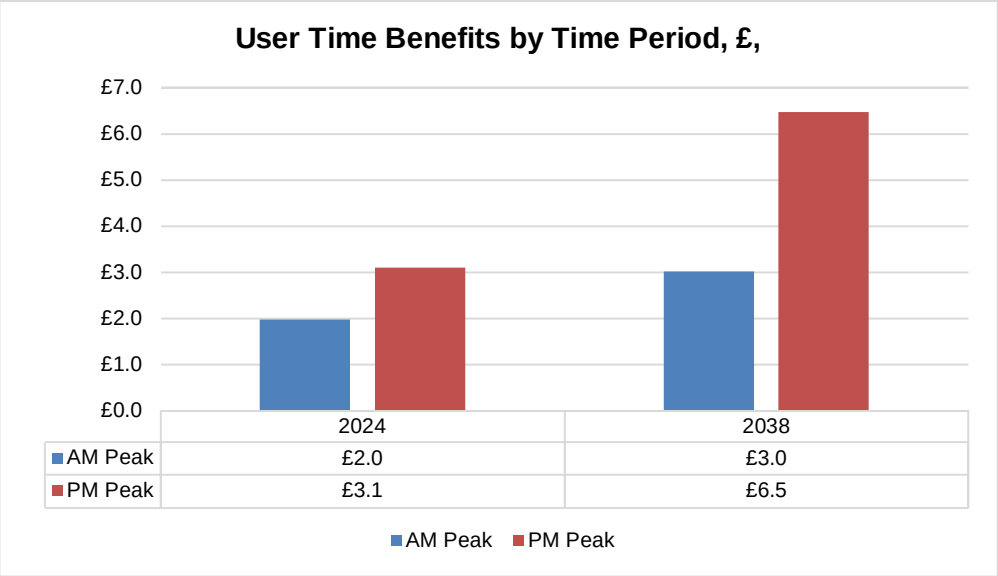


Figure 3.4.7: TUBA benefits by time savings by purpose – core scenario, £m

Analysis of the user benefits by vehicle class, journey purpose and time period is shown in **Table 3.4.7**. Over the 2 time periods, the main benefits accrue due to car – commuting (39%) and car – other (30%). Car – Business and LGV Freight both accrue 12% of the benefits, with slightly larger shares in the AM period compared with PM. All other user classes have a minute share of benefits across both time periods.

User Class	AM	PM	Total
Car - Business	£16.52	£28.12	**£44.64**
Car - Commuting	£45.79	£104.73	**£150.52**
Car - Other	£28.45	£86.28	**£114.73**
LGV Freight	£18.12	£26.19	**£44.31**
OGV1	£6.82	£6.53	**£13.35**
LGV Personal	£1.02	£1.50	**£2.53**
OGV2	£6.07	£8.28	**£14.35**
Bus – Business	£4.41	£7.73	**£12.14**
Bus – Commuting	£3.87	£9.14	**£13.01**
Bus – Other	£7.70	£11.57	**£19.27**
Total	**£122.79**	**£261.64**	**£384.43**

Table 3.4.7: TUBA benefits (time + VOC) by vehicle class/purpose – core scenario, £m

Figures 3.4.8, 3.4.9 and 3.4.10 show the 60-year benefit profile for road and buses. It includes time benefits, VOC fuel and non-fuel, indirect taxation and the overall total user benefits (time and VOC) profile. The benefit profile is required to determine whether the benefits of the CTLR occur towards the beginning of the CTLR opening or later. It indicates that for both road and bus modes, there will be a steep incline in benefits between the CTLR's opening year (2024) and its design year (2038). Benefits peak in 2038 and steadily decline thereafter due to the discounting effect within TUBA. Though the discounted benefits decline over the CTLR's life, this does not indicate that the actual undiscounted benefits would be declining over the CTLR's life.

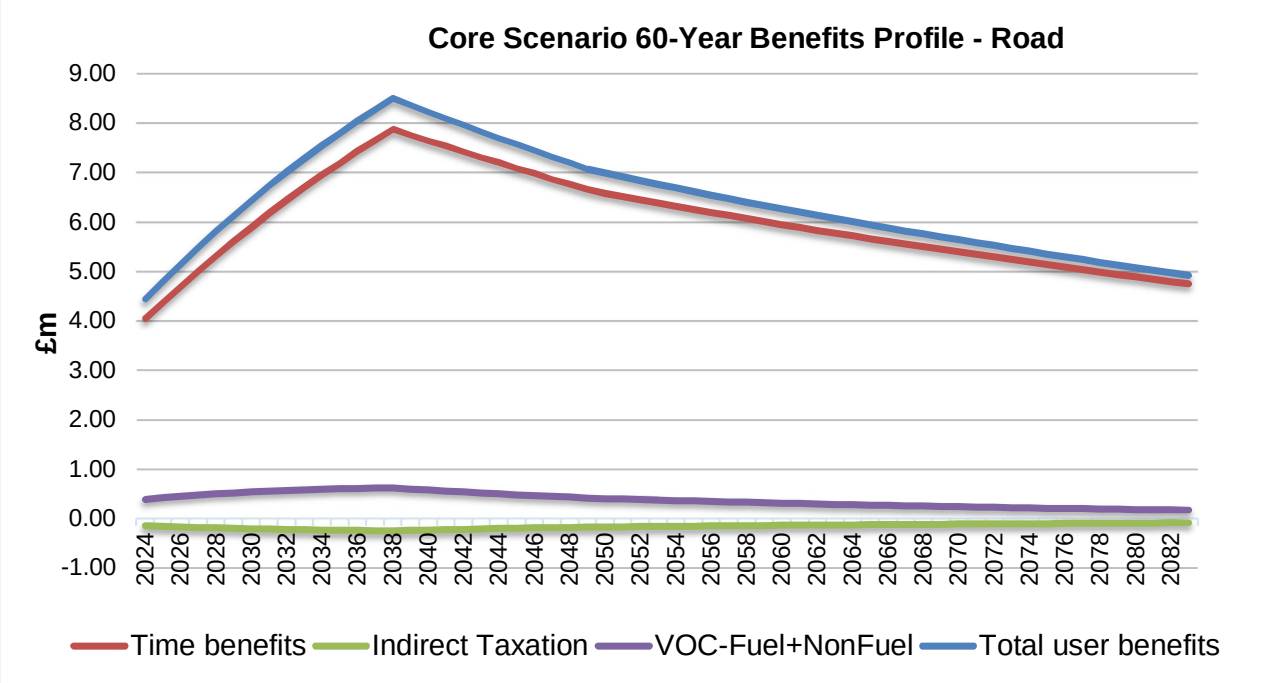


Figure 3.4.8: 60-year benefits profile for road modes, £m

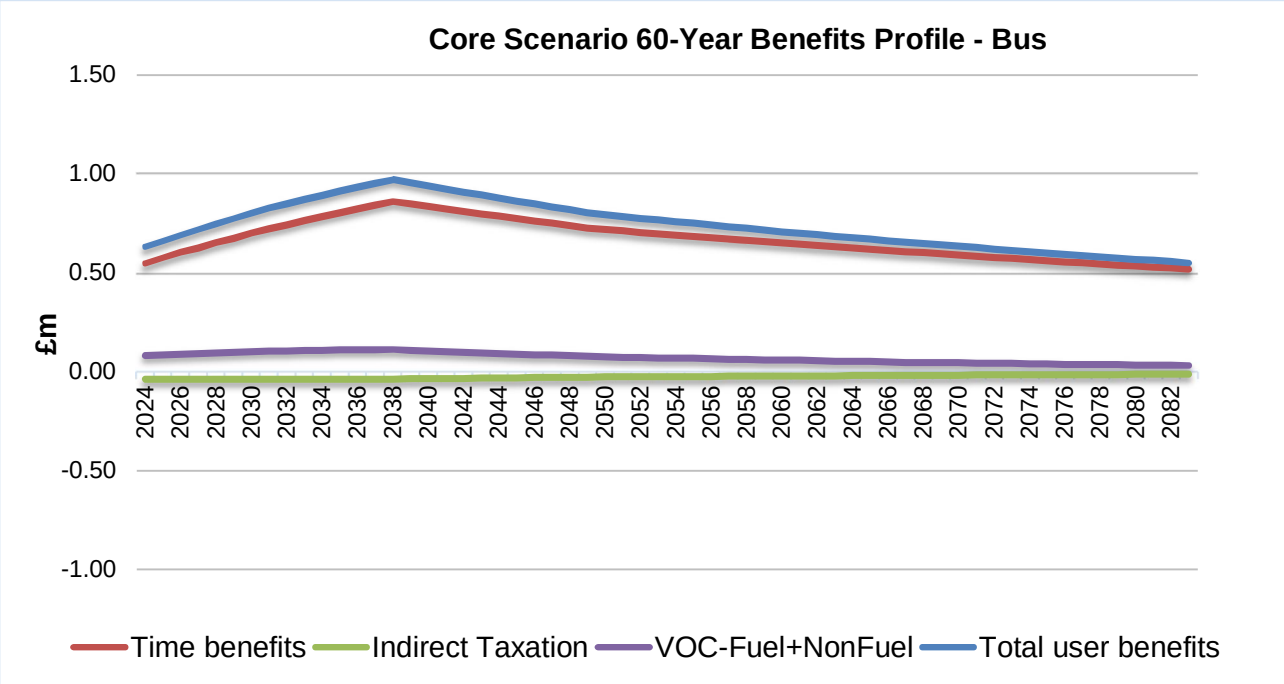


Figure 3.4.9: 60-year benefits profile for bus modes, £m

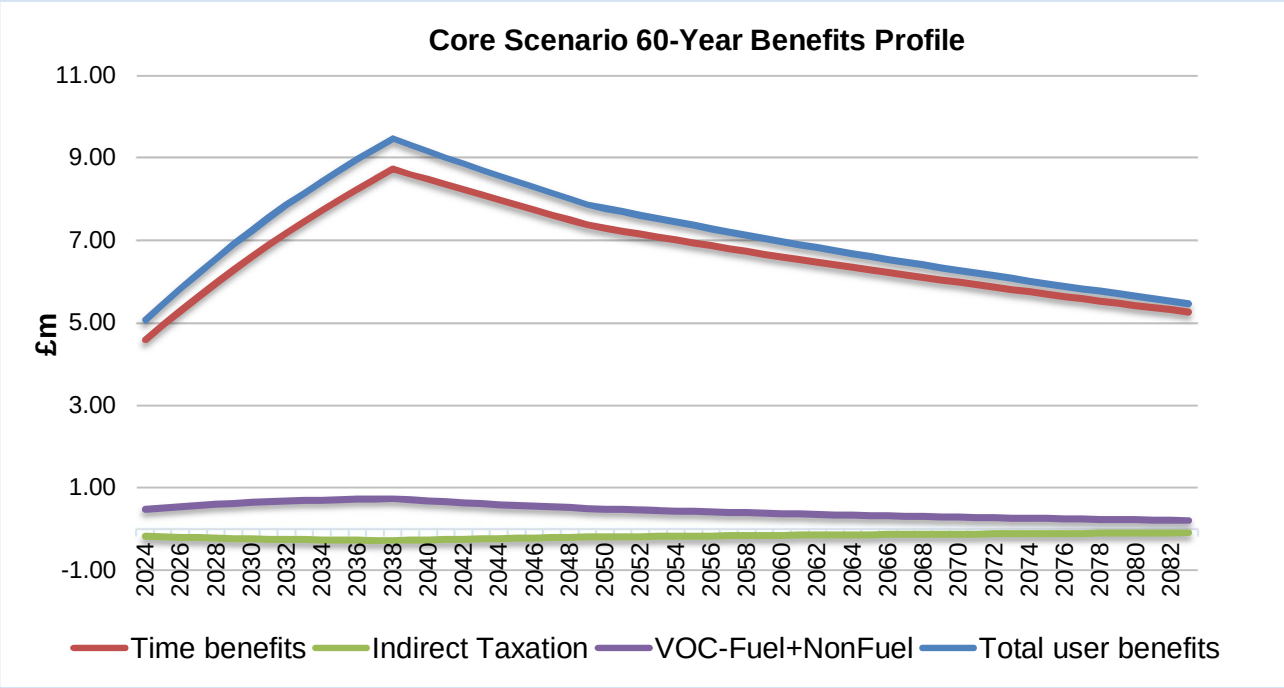


Figure 3.4.10: 60-YEAR BENEFITS PROFILE FOR ROAD AND BUS MODES, £M

The TUBA assessment and therefore the benefit outputs have been analysed at model sector level, which enables user benefits between model zone origin-destination pairs to be aggregated into larger, defined geographical areas. The relationship between model sectors and zones is defined in the TUBA sector file as well as the input file. For the CTLR there are 27 sectors which divided up the model. A 28th sector was used to categorise bus routes in the model. The model sectors are shown in **Figure 3.4.11**.

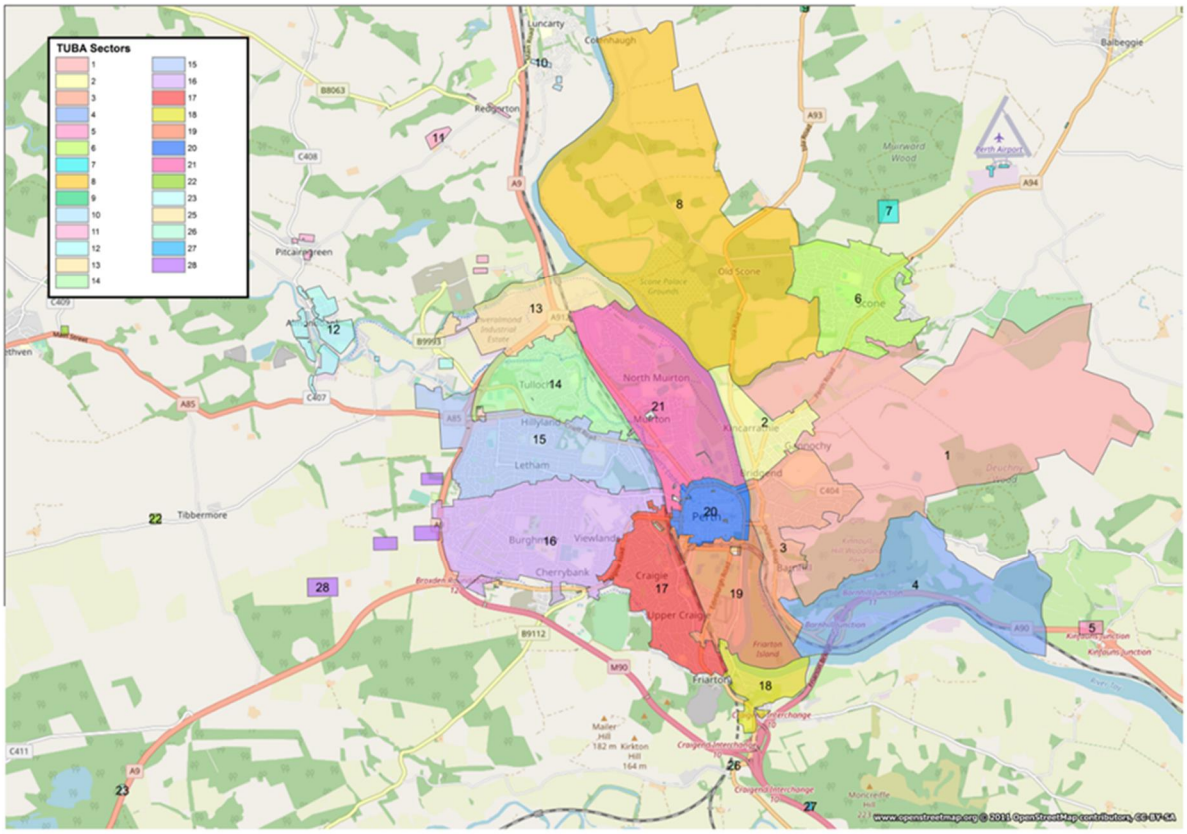


Figure 3.4.11: TUBA Sectors

The distribution of benefits resulting from the CTLR is presented on a sector to sector basis. **Table 3.4.8** shows the percentage split of benefits for all model sectors. The table shows that sector 7 accrues the largest percentage of the benefits as an origin and sector 6 the largest destination benefits, as a result of the CTLR. Sectors 6 and 7 are around Scone, which is expected to benefit the most from the new link road due to the rerouting of traffic from the A9 towards Scone.

The OD pair with the highest level of disbenefits is sector 23 to 9, this is likely due to the fact that these sectors have a considerable distance between them and sector 23 is the sector least likely to feel the impacts of the new link road. On the other hand, the benefits accrued between sectors 7 and 23 are the highest, possibly due to the CTLR reducing journey times from sector 7.

The origin-destination (OD) pair sectors 29 and 6 incorporate all the bus routes and so there is a skewed benefit reading in this particular OD.

Many trips have relatively negligible benefits, suggesting that the CTLR has limited to no influence on these sector to sector trips.

Table 3.4.8: Percentage sector to sector benefits from TUBA – core scenario

Total User Benefits		Destination																										Total
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	25	26	27	28	
Origin	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.3**
	2	0.0	0.0	0.1	0.0	0.1	0.1	0.0	0.0	0.0	0.1	0.1	0.0	0.1	0.2	0.1	0.3	0.1	0.1	0.1	0.1	0.3	0.0	0.1	0.0	0.0	0.3	0.1	**2.6**
	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.4	0.2	0.0	0.0	0.0	0.0	0.2	0.0	**1.6**
	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
	5	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	**0.3**
	6	0.0	0.4	0.1	0.0	0.9	0.1	0.0	0.0	0.1	0.2	0.3	0.1	0.7	0.8	0.2	1.1	0.2	0.3	0.4	0.6	1.2	0.0	0.5	0.2	0.2	1.3	0.1	**10.1**
	7	0.0	0.1	0.3	0.0	0.2	0.0	0.0	0.0	0.1	0.8	0.6	0.5	0.6	0.6	0.4	1.1	0.5	0.4	0.3	0.6	1.2	0.7	5.1	0.2	0.4	3.0	0.4	**18.3**
	8	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	**0.7**
	9	0.0	0.3	0.4	0.0	0.4	0.1	0.0	0.0	0.0	0.4	0.6	0.1	0.6	0.8	0.3	0.9	0.3	0.4	0.2	1.0	1.3	-0.3	2.8	0.0	0.1	2.4	0.3	**13.4**
	10	0.0	0.1	0.1	0.0	0.1	0.1	0.2	0.0	0.2	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	**1.3**
	11	0.0	0.1	0.1	0.0	0.0	0.1	0.3	0.0	0.2	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	**1.2**
	12	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.0	**0.9**
	13	0.0	0.1	0.1	0.0	0.0	0.2	0.2	0.0	0.3	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.2	0.0	0.1	0.3	0.2	0.0	0.0	0.0	0.1	0.1	0.0	**2.3**
	14	0.0	0.2	0.2	0.0	0.1	0.3	0.3	0.0	0.4	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.3	0.0	0.1	0.5	0.4	0.1	0.0	0.0	0.1	0.1	0.0	**3.4**
	15	0.0	0.1	0.1	0.0	0.1	0.1	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.1	0.3	0.6	0.0	0.0	0.0	0.1	0.1	0.0	**2.2**
	16	0.0	0.2	0.2	0.0	0.3	0.1	0.3	0.0	0.3	0.1	0.1	0.1	0.1	0.4	0.3	0.5	0.5	0.0	0.3	0.8	1.2	0.0	0.1	0.1	0.2	0.4	0.0	**6.8**
	17	0.0	0.1	0.0	0.0	0.1	0.0	0.1	0.0	0.1	0.1	0.2	0.0	0.2	0.3	0.1	0.2	0.1	0.0	0.1	0.2	0.4	0.0	0.1	0.0	0.0	0.1	0.1	**2.7**
	18	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.1	0.6	0.0	0.1	0.1	0.2	0.1	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.3	**2.2**
	19	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.1	0.2	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	**1.0**
	20	0.0	0.0	0.1	0.0	0.1	0.1	0.1	0.0	0.2	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.0	0.0	0.1	0.1	0.0	0.1	0.0	0.0	0.1	0.0	**1.3**
	21	0.0	0.4	0.4	0.0	0.6	0.3	0.5	0.0	0.5	0.2	0.2	0.2	0.1	0.4	0.9	0.6	0.7	0.1	0.2	1.0	2.1	0.1	0.1	0.0	0.2	0.5	0.1	**10.2**
	22	0.0	0.0	0.0	0.0	0.1	0.0	0.3	0.0	-0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	**0.4**
	23	0.0	0.1	0.1	0.0	0.5	0.1	1.4	0.0	-0.6	0.1	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.0	0.1	0.3	0.2	0.1	0.0	0.1	0.0	0.2	0.0	**3.3**
	25	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.0	-0.1	0.0	0.0	0.0	0.0	**0.5**
	26	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**1.0**
	27	0.0	0.1	0.1	0.0	0.0	0.3	0.1	0.0	0.2	0.0	0.1	0.1	0.0	0.1	0.2	0.2	0.3	0.0	0.0	0.1	0.2	0.1	0.0	-0.1	0.0	0.0	0.0	**2.3**
	28	0.0	0.1	0.0	0.0	0.0	0.0	0.3	0.0	0.1	0.1	0.2	0.0	0.1	0.0	0.0	0.1	0.0	0.1	0.0	0.1	0.3	0.0	0.0	0.0	0.0	0.1	0.0	**1.7**
	29	0.0	0.0	0.0	0.0	0.0	8.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**8.0**
Total		**0.1**	**2.6**	**2.4**	**0.1**	**3.7**	**10.5**	**4.9**	**0.1**	**2.1**	**2.4**	**2.8**	**2.1**	**2.8**	**4.6**	**3.4**	**6.6**	**4.4**	**1.6**	**2.2**	**7.3**	**10.5**	**1.0**	**8.9**	**0.6**	**1.6**	**9.0**	**1.6**	**100.0**

Accident Results

The DfT's COBA-LT spreadsheet model has been used to provide a simple assessment of the predicted impact of the CTLR on accidents. The basic principles of the analysis were as follows:

- The COBA-LT assessment covered the whole of the highway network;
- National default accident rates based on the 'Combined Link and Junction' methodology and 'Links and Junctions' were used. The severity of casualties was based on the default COBA-LT values for each link type;
- COBA-LT link types were allocated to all links within defined study area;
- The transport model was used to derive AADT flow data for the base year, Do-Minimum and Do-Something scenarios and for all of the forecast years. The transport model was also used to provide link lengths for all of the roads assessed; and
- To be consistent with the TUBA assessment, the COBA-LT assessment considered impacts over a 60-year appraisal period, assuming no further change in traffic or benefits beyond 2038 (apart from an allowance for continued growth in the real value of accidents which is in line with TAG).

Table 3.4.9 presents the predicted accident reductions and benefits that would occur due to the implementation of the CTLR Project. As the table shows, the CTLR should result in an increase in accidents experienced on the road network in and around Perth over the 60-year appraisal period.

Accident Results	Benefits
Reduction in number of accidents	-136.7
Reduction in casualties - fatal	-6.6
Reduction in casualties - serious	-33.2
Reduction in casualties - slight	-197.3
Total Accident Benefits (£m)	**-£8.7**

Table 3.4.9: Accident Reduction and Benefits - Core Scenario

The CTLR greatly improves connectivity between the main trunk roads (A9, A94 and A93) surrounding Perth as well as significant levels of new developments. The improved transport infrastructure means that vehicles not finishing their journey in Perth are able to bypass the City Centre by means of a faster moving, more resilient and greater capacity route.

The impact of this change in routing is a reduction of traffic within the City Centre of Perth, which is reflected by the subsequent reduction of accidents within Perth (as seen in **Figure 3.4.12**). However, with the significant increase in traffic growth because of the new developments, coupled with the large proportion of vehicles now using the A-Roads surrounding the City which travel at a faster speed, accidents occurring are only going to increase on these routes (as seen in **Figure 3.4.13**).

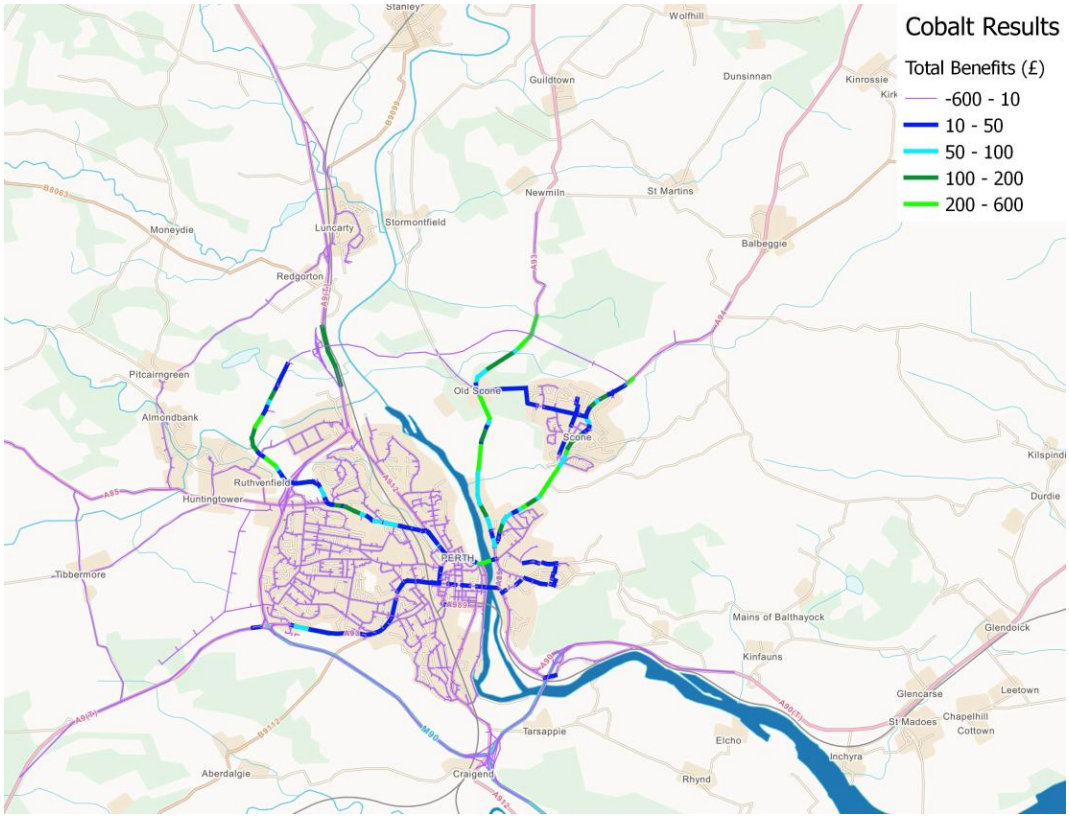


Figure 3.4.12: CTLR COBALT Assessment benefits plot

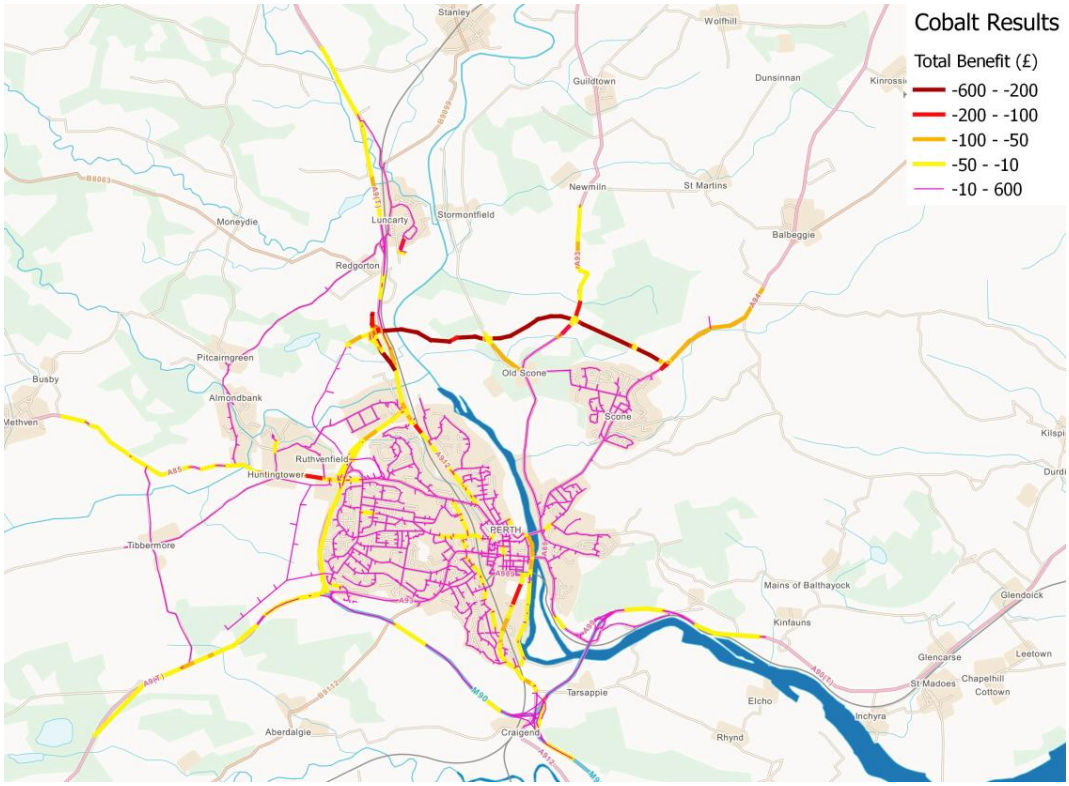


Figure 3.4.13: CTLR cobalt assessment disbenefit plot

The heavily congested, slow moving nature of the network pre-CTLR also reflects the results obtained, as accidents are less likely to occur when vehicles are standstill or slow moving. In comparison, the implementation of the CTLR releases congestion on the network, leading to freer moving traffic that is able to travel quicker, hence leading to the increased likelihood of accidents occurring.

Another reason for the results is due to a limitation with the COBA-LT software. As part of the CTLR, new links are added to the network, therefore these links only exist in the 'With-Scheme' scenario. Due to the relationship between the 'Without-Scheme' and the 'With-Scheme' scenarios used within the COBA-LT assessment, the impact on these new 'With-Scheme' links is significantly increased. The disbenefits that are generated on these links dominate the results as other links within the study area do not generate large enough benefits due to the significantly reduced flow.

Cost Benefit Analysis

The results of the TUBA assessment are summarised in **Table 3.4.10**. It includes:

- The core scenario which only includes the AM and PM peak periods (Inter-Peak has been excluded). This has been used as the core scenario because the traffic model is a 12-hour model, meaning that there is not a distinct break in time periods. Due to the heavily congested nature of the model in the do-minimum scenario in 2038, coupled with the nature of the model, congestion builds up throughout the day with no relief causing significant unrealistic results particularly in the Inter-Peak period. By excluding this period, these overestimated / improbable benefits accruing were restricted thus generating a more realistic BCR. It is important to note that the PVB and BCR presented for the core scenario are significantly lower than those of other sensitivity tests, but this is purely a result of excluding the large benefits arising in the IP;
- Sensitivity Test 1 - The full model, including all three (AM, Inter-Peak and PM) time periods. This scenario presents the economic results that would accrue if all three time periods were included as part of the TUBA assessment. With reference to the core scenario and the justification of excluding the Inter-Peak from the core assessment, the results presented for this scenario are very high and unrealistic due to grid-locked transport model in the do-minimum;
- Sensitivity Test 2 - No traffic growth scenario, including all three time periods. This scenario presents the economic results that would accrue if there was no traffic growth throughout the appraisal period. This was carried out by assuming the 2017 base demand for all forecast years. This was carried out in order to understand how the model would react to a significantly reduced level of traffic; and
- Alternative Northern Route - The proposed northern alternative route, including all three time periods. This scenario presents the economic results accruing due to the realignment of the CTLR to the north. For this scenario all time periods have been included within the assessment, therefore should be used as a direct comparison to Sensitivity Test 1. Again, it should be noted that the results presented for this scenario are very high and unrealistic due to the nature of the model as explained above.

The CTLR is estimated to generate a Present Value of Benefits (PVB) of £409m and a Benefit-Cost Ratio (BCR) of 5.1. The CTLR is expected to generate significant benefits following its implementation, with a very high BCR (5.1), as interpreted by the Department for Transport's (DfT) Value for Money Framework. When the IP period was included in the full model sensitivity test, the PVB generated is £704m resulting in a BCR of 8.8. Using the base demand scenario, total PVB is estimated at £47m and a BCR of 0.6.

As expected, including all three time periods (AM, IP and PM), a much higher PVB is generated. The build-up of congestion in the model throughout the day multiplies the benefits to an unjustifiable level, whereby it is highly unlikely that the CTLR alone will generate this level of benefit. It does however, highlight the intense level of congestion in and around Perth and the need for solutions like the CTLR.

In the base demand scenario that assumes no growth, PVB is considerably lower than the other two scenarios. This is as expected because the benefits that could arise due to the implementation of the scheme are not realised as there is not enough trips/congestion utilising/on the network.

In the core scenario, commuters benefit the most through travel time savings. However, in the full model sensitivity scenario, it is other users who benefit more than both commuters and business users. The fact that business users, in both scenarios, generate the least amount of benefits is understandable, as the CTLR is likely to only indirectly benefit business users through relieving some of the congestion off the main trunk roads that lead into and out of the city centre – where business users are most likely to be travelling to and from.

			Costs/Benefits (£m)			
			Core Scenario (AM/PM)	Sensitivity AM/IP/PM	Sensitivity Base Demands AM/IP/PM	Northern Alternative AM/IP/PM
Benefits	Consumer Commuting User Benefits	Travel Time	£159.60	£213.65	£16.24	£217.62
		VOC	£3.93	£6.29	£0.38	£5.21
		Construction Delays	£0.00	£0.00	£0.00	£0.00
		Net Consumer User Benefits	**£163.54**	**£219.93**	**£16.62**	**£222.83**
	Consumer Other User Benefits	Travel Time	£132.09	£260.46	£20.13	£264.27
		VOC	£4.43	£10.35	£0.39	£7.69
		Construction Delays	£0.00	£0.00	£0.00	£0.00
		Net Consumer User Benefits	**£136.52**	**£270.81**	**£20.52**	**£271.95**
	Consumer Business User Benefits	Travel Time	£109.91	£205.57	£17.28	£208.45
		VOC	£18.89	£37.70	£2.39	£36.23
		Construction Delays	£0.00	£0.00	£0.00	£0.00
		Net Business User Benefits	**£128.80**	**£243.27**	**£19.67**	**£244.68**
	Accidents Benefits		-£8.74	-£8.74	-£8.74	-£8.74
	Indirect Tax Revenues		-£10.85	-£21.57	-£1.21	-£19.24
	Total PVB (£m)		**£409.26**	**£703.70**	**£46.86**	**£711.48**
Costs	Operating and Maintenance Costs		£0.00	£0.00	£0.00	£0.00
	Investment Costs (including capital costs of Maintenance)		£80.10	£80.10	£80.10	£81.20
	Total PVC (£m)		**£80.10**	**£80.10**	**£80.10**	**£81.20**
Net Present Value (NPV)			**£329.16**	**£623.60**	**-£33.24**	**£630.28**
Benefits to Cost Ratio (BCR)			**5.1**	**8.8**	**0.6**	**8.8**

Table 3.4.10: Summary of TUBA results – core scenario and sensitivity tests, £m

In order to provide a detailed comparison between the current CTLR route and that of the alternative northern route, a TUBA assessment was conducted. It must be noted that the run undertaken includes the AM, Inter-Peak and PM periods and therefore provides a direct comparison to the AM, Inter-Peak and PM Full Model sensitivity test. A TUBA run only considering the AM and PM periods has not been undertaken due to the modelling limitations and skims provided from the modelling team in Systra, meaning a like for like comparison would be unable to be completed.

When comparing the results between the two routes it is clear to see that the results are very similar with negligible changes in benefits. The alternative northern route accrues slightly more travel time benefits, but users would likely experience slightly more disbenefits regarding vehicle operating costs. The increase in travel time benefits is most probably due to the reduction in traffic using the A93 and the reduction in VOC benefits is a result of the increase in journey distance due to the realignment of the scheme to the north. For this comparison, the COBALT results for the current CTLR route has been used for the alternative northern routes as it is expected that the realignment would not have a significant impact on accidents.

Therefore, the realignment of the CTLR to the north results in a negligible increase in benefits, however as mentioned previously this route incurs an increase in VOC and investment cost resulting in a BCR of 8.8. This BCR is identical to that for the current CTLR route therefore both providing very high value for money.

3.4.3.3 Summary

The assessment findings indicate that both routes consider generate similar benefits. The alternative northern route is expected to accrue slightly more journey time savings; however, the current CTLR route accrues more VOC benefits and has a significantly lower indirect tax disbenefit. Additionally, the cost of delivering the current CTLR route is slightly lower than that of the alternative northern route due to increased length of the CTLR when shifted north. However, when comparing the BCR's obtained for both routes, the results are identical, therefore when considering both routes in the context of the transport economics undertaken, there is **no preference towards either route**.

3.4.4 Transport/Economic Assessment Summary

Assessment Criteria	Current CTLR route	Alternative northern route	No Clear Preference	Reason for preference
Transport Modelling				Alternative northern route results in an increase in traffic along the A94 which travels directly through the Centre of Scone.
Transport Economics				No significant difference

Table 3.4.11: Transport Modelling and Appraisal Comparison Summary

When considering the transport modelling results, the main differences between the two routes occur along the A94 corridor (particularly trips travelling directly through Scone) and the A93 corridor. The alternative northern route is predicted to result in an increase of 9% in traffic using the A94, along with a 19% reduction in traffic using the A93 corridor in the AM peak, and an increase of 14% in traffic using the A94, along with a 19% reduction in traffic using the A93 corridor in the PM Peak. This predicted additional traffic travelling through the centre of Scone is likely to negatively impact the town due to the resultant increase in congestion. Therefore, it can be concluded that the **current CTLR route would be the preferred option from the transport modelling work undertaken**.

When considering the transport economics results, it is clear to see that the results are very similar with minor changes and differences in benefits. The alternative northern route accrues slightly more travel time benefits, but users would likely experience slightly more disbenefits regarding vehicle operating costs and the costs to deliver the alternative northern route is greater than that of the current CTLR route. Therefore, when considering the BCR's for both routes, the results obtained are identical (8.8) therefore both providing very high value for money and proving that there is **no preference between either route based on the economics work undertaken**.

Conclusions and Recommendations

The purpose of this report was to provide a comparison of the preferred CTLR route against a potential alternative northern route between the A93 and A94 junctions, thus determining if it is viable.

The comparative assessment of the routes has used the following assessment topics:

- Engineering;
- Environmental; and
- Transport and Economic.

The results of the assessment are summarised in the table below:

Topic	Current CTLR route	Alternative northern route	No clear preference
Engineering	3	1	3
Environment	5	4	3
Transport & Economic	1	0	1
Totals	9	5	7

Overall in engineering terms the proposed current CTLR route is slightly preferred over the alternative northern route as it is preferred for drainage, NMUs and constructability compared with utilities being the only criteria preferred for the alternative northern route. There is no clear preference in relation to design standards, geotechnical and future maintenance considerations.

The results of the environmental assessment show that there is a slight preference for the current CTLR route, with GSCH, RDWE and Land Take indicating no clear preference from the assessments undertaken.

The transport and economic assessment concludes that the main differences between the two designs occur along the A94 corridor (particularly trips travelling directly through Scone) and the A93 corridor. The alternative northern route is predicted to result in an increase in traffic of 9% in the AM peak and 14% in the PM peak using the A94, along with a 19% reduction in traffic using the A93 corridor. When considering the transport economics results, it is clear to see that the results are very similar with minor changes in benefits. The BCR's for both routes are identical (8.8) therefore both providing high value for money.

When summarised, the results of the comparative assessment have not identified a clear preference with significant reasons for either of the proposed routes. It must also be considered however that in cumulative environmental assessment terms a preference would be identified for the current CTLR Route as this would be contained within the Scone North development, as opposed to the alternative northern route which would extend development further north and require additional land take and greater access provision to the Scone North Development. Overall the impacts would be greater as the developments would be separated.

Therefore, there appears to be no obvious reason to take the alternative northern route forward for further assessment.

APPENDIX A | Consultation Q&A Document

July 2018

Perth Transport Futures Project, Phase 2

Cross Tay Link Road

Spring 2018 Public Consultation Sessions

QUESTIONS & ANSWERS

PERTH & KINROSS COUNCIL

TAYCITIES Smarter + Fairer

Invest in Perth Connect with business and life

SWECO

Perth Transport Futures Project, Phase 2 | Cross Tay Link Road

Spring 2018 Public Consultation Sessions – Questions & Answers

The Cross Tay Link Road (CTLR) is the second phase of Perth Transport Futures Project. Perth & Kinross Council appointed Sweco to design the CTLR in July 2017. The design is currently ongoing and more information on this scheme can be found on the project website:

www.perthtransportfutures.co.uk/cross-tay-link-road

The Council, along with representatives from Sweco, carried out public consultation sessions on the design of the Cross Tay Link Road in Spring 2018. These sessions were a chance for the public to view the current plans, ask any questions and give their views on the current design. The following sessions were held:

21 May 2018 14:00 to 18:00

Perth Concert Hall, Perth

23 May 2018 16:00 to 19:00

Luncarty Memorial Hall, Luncarty

28 May 2018 14:00 to 20:00

RDM Institute, Scone

18 June 2018 16:00 to 19:00

Coupar Angus Town Hall

The consultation sessions were a success with over 400 members of the public attending over the various events, demonstrating the importance of this project to the local area. Many questions were asked and answered on the day but questions were also sent to the Council after the events by email. Rather than reply to individual queries on a case by case basis, the questions have been collated and answers given in this 'questions and answers' document. This will ensure that everyone who sent in a query will see all questions that have been asked at the consultation sessions along with the answers given therefore ensuring that everyone who has taken part is as informed as possible about the scheme.

The following questions and concerns were raised by members of the public during the consultations. These are listed along with an answer to the question and, where applicable, the proposed actions associated with the issue.

Q1

Should the Cross Tay Link Road (CTLR) be a dual carriageway rather than a single carriageway?

There were significant concerns over future proofing the Cross Tay Link Road (CTLR) for increases in traffic volumes in the coming decades. Many consultees were of the opinion that it should be a dual carriageway.

ANSWER

There is no need for the CTLR to be dual carriageway based on the traffic modelling which includes all development in the current LDP and is projected up to 2038. Therefore the additional environmental impact, land take and cost associated with a dual carriageway cannot not be justified.

Q2

How will the CTLR affect pedestrian access in and around Highfield woods?

Concerns were raised over the CTLR severing the paths to and within the woods. Many consultees noted how well used these paths are and that they need to be retained wherever possible.

ANSWER

It is acknowledged that a section of the CTLR route severs this area of woodland and some of the paths within it. The project team are aware of the significance of this to the local community. Various options are being considered to mitigate this severance including pedestrian crossings, toucan crossings and provision of a pedestrian and wildlife bridge to retain the connection between the woodland on either side of the CTLR. The project team is working with various external user groups and access officers within the Council to establish the best solutions for this issue. Proposals will be presented to the public at the next round of consultations in early 2019.

Q3

What impact will the CTLR have on Highfield Woodland?

Concerns were raised about the environmental impact of the road in this area and specifically the loss of woodland which is an amenity to the local community and a habitat for local wildlife.

ANSWER

The CTLR cuts through Highfield woodland at a lower level than the existing woodland floor. This will result in a significant excavation through the woodland and the loss of an area of trees. Work is already underway to identify areas for tree planting to compensate for the loss of this woodland and habitat. This is being done in conjunction with the Forestry Commission, Historic Environment Scotland and the landowner. As stated above the project team are also working on solutions to ensure connectivity of the woodland for use by the local community and wildlife once the CTLR is in place.

Q4

What will be the speed limit on the CTLR?

Concerns were raised over the proposed 50mph speed limit through the section of the CTLR through the future H29 housing development at Scone North. Comments were received stating that they believed that this section should be a 30mph speed limit.

ANSWER

The speed limit will be 50mph on the mainline CTLR from its junction with the A94 to its junction with the A9. The project team are currently reviewing the proposed speed limit on the A94 for when the CTLR is in place and it is likely that there will be a reduced speed limit on the A94 which extends further north than it does at present. It should be noted that the section of the CTLR through the Scone North (H29) development will need to be reviewed and will likely be reduced to a 30mph once this phase of the development commences and is completed.

Q5

What will be done to mitigate the noise and air pollution caused by vehicles throughout CTLR route?

Concerns were raised over noise and air pollution due to the traffic being routed through this area. Specifically, mention was made of the caravan park at Scone Estates, Balboughty Farm cottages and the Scone North development (H29).

ANSWER

The noise and air quality impacts of the CTLR will be assessed as part of the EIA that will accompany the planning application for the scheme. Where required, mitigation will be proposed as part of the design. This will not be decided until next year when the latter stages of the EIA have been reached and the impacts can be properly determined. Examples of typical mitigation include noise barriers, landscaping and earth bunds. It is likely that these type of mitigation features will need to be included at sensitive areas along the CTLR route in the final design.

Q6

What impact will the CTLR have on local drainage systems and will it cause any flooding problems?

Queries were raised over the design of drainage systems for the CTLR and the flood assessments that will need to be carried out as part of the planning process.

ANSWER

The CTLR will be subject to a full flood risk assessment which will be submitted as part of the planning process. All drainage systems will have the required attenuation built in to the design as well as two levels of water treatment to ensure that the CTLR does not exacerbate flooding or pollution of local watercourses.

Q7

Is Stormontfield roundabout being adequately designed to cope with events at Scone Palace and the racecourse?

Concerns were raised over the design of this roundabout and whether it will be sufficient to allow for event traffic entering and exiting Scone Palace or the racecourse.

ANSWER

The CTLR and the widened Stormontfield Road are being designed to accommodate, where possible, for events at the race course and Scone Palace. Extra lanes will be provided on the roundabout exits (CTLR and Stormontfield Road south) to ensure that any impact on the CTLR is minimised.

Q8

What impact will the CTLR have on the landscape with regard to excavations?

Queries were raised with regard to the extent of the excavations required and the resultant effect on the landscape through the CTLR corridor.

ANSWER

There will be significant excavations required as part of the scheme. At present it is estimated that the CTLR east of the River Tay will require the excavation of approximately 150,000 cubic metres of material. This has been reduced from 330,000 cubic metres over the past year through design review and alterations as the project team seek to make the design as efficient and environmentally friendly as possible. The project team will continue to work to reduce this further if possible over the coming months, as they work positively with environmental bodies and landowners to make sure the final scheme design is as sympathetic to the surrounding landscape as possible.

Q9

What off-road cycle facilities are to be provided as part of the CTLR scheme?

There were concerns from families that the cyclist provision will be aimed at commuters and not leisure cyclists.

ANSWER

A 3m wide shared use cycle / footpath is to be provided as part of the CTLR. This will be on the south side of the CTLR with a separation strip currently proposed at 1.5 metres between the road and the path (plus a further 1 metre hardstrip beside the running surface of the road). This is under review following comments received from representatives of non-motorised users. It is also proposed to improve pedestrian and cycle links on the A93, the A94 and along the line of the existing A9 from the CTLR to Inveralmond Roundabout. The design of these facilities will be carried out in the coming year based on feedback from the public consultations and from user groups.

Q10

Can you confirm what tree planting is to be proposed to mitigate the visual effect of the CTLR on the landscape?

Some members of the public asked that adequate tree planting and landscaping is provided to minimise the visual impact of the road on the landscape.

ANSWER

The project team are keen that the visual impact of the road is mitigated as much as possible through good landscaping design. In some areas this will involve tree planting however in other areas, such as the designed landscape which surrounds Scone Palace, this would not be appropriate. These areas will need to be assessed on a case by case basis. The project team has already been liaising with Historic Environment Scotland, the Forestry Commission, Scottish Natural Heritage and the affected landowners in this regard. The proposed landscape design will be on show at the public consultations in early 2019.

Q11

Are traffic controlled pedestrian crossings to be provided along the CTLR to provide safe crossing points for children and people with mobility issues?

Concerns were raised that the CTLR will severe pedestrian routes and it was requested that provision for continued safe use of these routes is included in the design.

ANSWER

Traffic light controlled pedestrian crossings, are being considered for inclusion in the design where they are appropriate based on projected traffic flows and pedestrian movements. It is likely that crossing facilities will be provided near the A94 and Highfield Lane at the east end of the CTLR where pedestrian movements are higher. There may be scope for including them elsewhere on the route and this will be assessed as the design and planning application process moves forward.

Q12

How much land (arable and woodland) is affected by the CTLR scheme?

Concerns were raised about the amount of land being taken for the scheme and it was highlighted that this should be minimised.

ANSWER

The current areas of land required to accommodate the proposals are:

- Agricultural: 60.4 hectares (20.8 hectares temporary landtake for the purposes of construction)
- Woodland: 9.1 hectares (1.28 hectares temporary landtake for the purposes of construction)

Land will be required to accommodate sustainable drainage facilities such as ponds, and for environmental mitigation measures, such as noise bunds. However, it is emphasised that the design team will seek to minimise landtake in the developing design and the above areas are expected to reduce as the design progresses.

Any land acquired for the scheme but not required will be handed back to the landowner.

Q13

Can the scheme be delivered more quickly?

Many consultees felt that the road should be delivered more quickly than the programmed opening year of 2023.

ANSWER

The timescale for delivery of the Cross Tay Link road is dictated by the land purchase process, and funding. The Council is currently finalising the areas of land that will be required through a series of site investigations. Experience on previous similar schemes shows that it is likely to be early 2021 before the required land is acquired. If the land purchase process goes particularly well there may be scope to bring construction forward by six months or so.

(See Q.14 on funding.)

Q14

Is the scheme now certain to go ahead and is all funding in place?

Consultees asked if the scheme was now certain to proceed and if the Council had secured all of the money required.

ANSWER

The Council committed £78million of capital funding to this project in its capital budget in June 2016. The remaining £42million is being sought as part of the Tay Cities Deal. News of the success of the Tay Cities Deal is expected in Summer 2018. More information is available at https://www.taycities.co.uk/.

Q15

What impact will the CTLR have on existing traffic delays at Inveralmond Roundabout?

Significant concerns were raised over Inveralmond Roundabout and the possibility that the CTLR will result in increased traffic volumes and therefore increased delays at this existing junction.

ANSWER

The current traffic modelling shows that additional traffic will be diverted via Inveralmond Roundabout. The Council is working positively with Transport Scotland to encourage them to make relatively minor improvements to Inveralmond Roundabout that could mitigate the delays caused by this extra traffic. It is also highlighted that Phase 1 of Perth Transport Futures Project is due to be fully open by Spring 2019 and provides an alternative access into Inveralmond Industrial Estate thereby reducing traffic approaching Inveralmond Roundabout from the south. We acknowledge that members of the public also expressed concerns over the existing traffic delays at Inveralmond Roundabout, regardless of the CTLR, however the Council is not responsible for this junction and therefore concerns should be taken to Transport Scotland and/or BEAR Scotland. The project team has advised Transport Scotland and BEAR Scotland of these concerns.

Q16

Can the old A9 between Luncarty and Inveralmond roundabout be turned into a cycle / walkway?

Concern was raised that the redundant section of the A9 dual carriageway would be left as it is. Requests were made that this is enhanced with landscaping and used as a facility for walking and cycling.

ANSWER

Yes. It is currently envisaged that the final design will include an enhanced cycle and pedestrian facility in this location as well as a good quality landscaping scheme.

Q17

What impact will the CTLR have on traffic levels on the A94 north of Scone?

Consultees expressed concerns over the CTLR causing an increase in traffic on the A94 north of Scone, notably HGV traffic.

ANSWER

It is acknowledged that the CTLR has the potential to attract more traffic on to the A94 north of Scone, however it is currently envisaged that this will be negligible. The current traffic modelling shows a traffic increase of approximately 2-4% when the CTLR is complete. This modelling is yet to be finalised and final figures will be included in the Environmental Impact Assessment (EIA) which will accompany the planning application for the CTLR. The Council's Traffic & Network Team are currently working on a route safety strategy for the A94 and will also closely monitor the A94 upon completion of the CTLR.

Q18

Will the CTLR affect the number of vehicles speeding on the A94?

Consultees raised concerns over the possibility of the CTLR generating more through traffic which is more likely to speed, specifically in the vicinity of the A94 at Scone.

ANSWER

Although the CTLR is likely to cause a slight increase in traffic on the A94 north of Scone, there is no reason to believe that this will make any difference to vehicle speeds or driver behaviour. As stated the Council's Traffic & Network Team are currently working on a route safety strategy for the A94 and will also closely monitor the A94 upon completion of the CTLR.

Q19

What will be done to mitigate the effects of the CTLR on the nearby Newmains Steading?

Residents in Newmains Steading requested that the road be moved further away from their properties citing road safety, pedestrian safety, noise, air pollution and the closure of one of their accesses as the reasons for this.

ANSWER

The project team are working with the residents of Newmains Steading to try and alleviate concerns that they have with the existing design. Positive discussions are ongoing and solutions are being sought to address their main issues.

Q20

Why are the Council considering closure of a section of Stormontfield Road?

Concerns were raised by residents who use this route regularly over the potential stopping up of Stormontfield Road.

ANSWER

This is being considered as part of a strategy to ensure better access in this area, including to the racecourse and Scone Palace from the CTLR. The current proposal is to widen Stormontfield Road from the CTLR southwards to the access to Scone Palace. The remainder of Stormontfield Road (between the palace access and the A93) will then no longer be required as traffic can use the CTLR to get onto the A93. This will be a safer route with better capacity. The section of Stormontfield Road to be stopped up will be left available to non-motorised users and for use during events and emergencies. This proposal has not yet been finalised but it is currently intended to include this in the final design.

Q21

Can the Council provide traffic calming through Scone to help deter HGVs using this route after CTLR is open?

Concerns were raised about the number of HGVs using the main route through Scone and the safety and health implications associated with this for Scone residents.

ANSWER

It is not envisaged that this will be required due to the predicted reduction in HGVs using the A94 through Scone as a result of the CTLR opening. However, the Council's Traffic & Network Team will continue to monitor the safety of the A94 (including the section through Scone) after the CTLR has opened.

Q22

Will this road and subsequent development cause Perth and Scone to lose their character and become less attractive places?

Concerns were raised about the scale of the changes to the character of the city and villages in the Perth area caused by the development that is proposed in line with the Council's local development plan.

ANSWER

New development in Perth and its surrounding villages will inevitably change the visual landscape, but this does not necessarily make them less attractive. New development can often help to support the sustainability of town and village centres, allow for the provision of new or improved educational facilities and ensure the accessibility of key services. These qualities can make places more desirable to live in. All development was once new; character is created through time and people rather than strategy. It is of note that evidence suggests that villages which have seen little development over a sustained period often see a decline in their services. The Council is committed to good placemaking principles and has produced guidance to support the community, developers and planners through the process. This can be found here www.pkc.gov.uk/placemaking.

Q23

How will the Luncarty South development affect the CTLR?

Concerns were raised over the proposed development at Luncarty South and whether this will be accounted for in the design of the CTLR and specifically the new junction on the A9.

ANSWER

The Luncarty South development has been included in the traffic modelling which is used to inform the design of the CTLR.

Q24

Why has the current route through Scone North (H29) been selected?

Concerns were raised about the route through the proposed Scone North development given that there will be development on both sides of it. Requests were made for the CTLR to be moved further north, preferably to become the boundary of the proposed development.

ANSWER

The route of the CTLR is within a corridor that was included in the Local Development Plan (LDP) 2014. This corridor is also included in the current revision to the LDP. It has been the case since the Council adopted the LDP 2014 that Scone North (H29) extends beyond this corridor. The route of the CTLR within this corridor has been subject to various reports and options appraisals which are all available on the project website (https://www.perthtransportfutures.co.uk/cross-tay-linkroad/). When determining the route of a road many factors are considered, and include the environment, engineering, buildability and cost. In summary the route of the CTLR has been subject to a lengthy selection and appraisal process and it is not proposed to revisit this.

Q25

Why is Highfield roundabout shown on the plans when there is no development there when the road is to be opened?

Queries were raised over the need for this roundabout and why it is included in the scheme.

ANSWER

Highfield Roundabout is not required as part of the CTLR scheme but is a requirement of the developer as part of the Scone North (H29) development. It is currently proposed that the Council includes this roundabout in the scheme on the basis that the developer pays for the extra associated cost. This will minimise future delays and disruption as the roundabout will not need to be retrofitted at a later date. It also makes sense economically to build the roundabout at this time.

Q26

What will the CTLR do for Air quality in the Perth area?

Concerns were raised specifically with regard to Bridgend and Perth City Centre but also with regard to air quality along the proposed route of the CTLR.

ANSWER

Air quality is directly linked to the traffic levels on a route and the traffic modelling carried out to date shows that there will be a significant reduction in traffic in Bridgend and various streets within the City Centre once the CTLR is in place. For example the A94 south of the CTLR shows a reduction in traffic at morning peak times of 37-40% and Old Perth Bridge shows a reduction of 26-27% for the same period at the year of opening. This modelling is yet to be finalised and final figures and air quality assessments will be included in the Environmental Impact Assessment which will accompany the planning application for the CTLR.

Q27

What impact will the CTLR have on the number of HGVs using the road network in Perth City Centre?

Concerns were raised over the large volumes of HGV traffic using the roads in the city centre. Queries were raised with regard to the possibility of introducing restrictions to prevent this.

ANSWER

The current traffic modelling shows that there will be a reduction in traffic on many roads in Perth City Centre as a result of the CTLR. The following indicates the expected reductions in HGV traffic in Perth city centre with the CTLR in place:

- Queen's Bridge eastbound – 33%
- Queen's Bridge westbound – 36%
- South Street – 62%
- Canal Street – 44%
- Main St northbound (north of Perth Bridge) – 46%
- Main St southbound (north of Perth Bridge) – 47%

The traffic modelling is yet to be finalised and final figures may vary. These will be included in the Environmental Impact Assessment which will accompany the planning application for the CTLR.

Q28

What work has been carried out to establish the predicted reduction in traffic levels through Scone, Bridgend and Perth City Centre?

The logic that the provision of the CTLR will reduce traffic in these areas was questioned by some residents.

ANSWER

The Perth Wide Area S-Paramics Transport model managed on behalf of Perth and Kinross Council by consultants SYSTRA has been used as the basis for testing the changes in travel patterns, routing and demand across the modelled area as a result of the CTLR. The process undertaken to test the implications of road scheme follows international best practice and Scottish Government guidance and is described as follows.

The traffic model has been developed to replicate, in the first instance, the prevailing traffic patterns during the AM and PM peak periods for the year 2017. The model outputs are checked against observed traffic flows and journey times in a validation process which must meet certain Government defined criteria. These validated outputs establish the Base model which is then used in forecasting mode, whereby natural traffic growth and trips generated by new developments are overlaid to provide an estimated travel demand pattern for the year of opening of the CTLR (2023) and the design year (2038). Two scenarios are tested - with and without the CTLR.

The traffic model takes account of the generalised cost of journeys (time, distance, fuel etc.) for all journeys made during the periods tested, and re-routes traffic in a way that balances out flow, delay, speed and congestion across the network, taking account of savings in travel time and distance that could be possible as a result of the scheme. This is based on assumptions of route choices drivers will make. Certain trips will benefit from the scheme and others will not, depending on the origin and destination of each journey. The differences in traffic demand between the with and without CTLR scenarios, will highlight changes in traffic flow, delay (and hence congestion) across the full network as traffic is rearranged because of the scheme. This includes the areas identified in the query.

Q29

Can you please ensure that you involve local schools in the design of the CTLR through Highfield woodland?

It was highlighted that the route of the CTLR through the Highfield woodland will affect amenity well used by local children. It was suggested that the Council should engage with local children so that they can become involved in the development of the scheme.

ANSWER

Consideration will be given to the scope for benefits to the community through the CTLR project. This could include involvement of the community in suitable aspects of the project's development. For example, the school children could have an input to: naming the bridge at Highfield; or the design of appropriate landscape features such as waymarker signs in Highfield woods; or other landscape features. Sweco have been involved with similar successful exercises before and have found these to be particularly beneficial when the children are able to visit and view the outcome of their work.

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APPENDIX B | LVIA Assessment

Appendix B – Landscape and Visual approach, landscape baseline and summary of visual baseline

1.1 Landscape and Visual Approach

The key elements of the approach to the appraisal are summarised as follows:

- The appraisal has been informed by a combination of desk and site-based techniques. The alignment sites were visited on 11th April 2019.
- The study area for this appraisal comprises an area within a 1km buffer around each alignment.
- The identification of receptors is proportionate to that required for an options appraisal. The focus of the visual appraisal has been on the potential effects of the options on high sensitivity visual receptors such as people in residential properties or people using publicly accessible routes, e.g. core paths. In certain instances, visual receptors have been grouped together with receptors which are in close proximity and would likely experience similar visual effects. The focus of the landscape assessment is on the potential effects of the options on key landscape receptors, i.e. Local Landscape Character Areas (LLCAs) and designated landscapes, through which the option sites pass.
- The scope of this assessment includes the permanent visual effects of the alignments. Temporary landscape and visual effects during construction have been scoped out as effects during this phase are predicted to be similar for both options and would therefore not contribute to an assessment of clear differences between the options.
- As part of the broader LVIA process, potential landscape and visual mitigation measures have been considered. Primary mitigation measures have been incorporated as part of the design development of the options, such as alterations to the horizontal and vertical alignment to limit landscape and visual effects. In addition, secondary mitigation measures have been considered during the assessment process where these can be certain and may reduce landscape and visual effects which have been identified. The level of detail available in relation to this comparison of options means that secondary mitigation measures have been considered in general terms (as might be reasonably expected to be adopted as part of good practice). This also means that a precautionary approach has been taken during the LVIA regarding the ability of these measures to reduce adverse effects. Where, at this stage it has not been certain that effects could be mitigated, the residual level of effect is predicted to be the same as the pre-mitigation assessment. Further consideration will be given to the mitigation of potential effects at Stage 3 if relevant.
- Assessment of the potential difference in cumulative effects between the north and south options has been carried out in relation to the proposed Scone North residential development, which is within the study area and has planning permission in principle.

1.2 Landscape Baseline

Both alignments gradually increase in elevation from their western to eastern extents, however the proposed Northern Alignment is located on slightly higher ground than the proposed DMRB Stage 3 Alignment. At the western extents the alignments connect at an elevation of approximately 53m AOD, the lowest point of the alignments. At the eastern extents, close to the A94, the proposed DMRB Stage 3 Alignment reaches approximately 97m AOD and the proposed Northern Alignment 111m AOD.

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However, the highest point of each option is at its centre as the proposed Northern Alignment passes through woodland. The proposed Northern Alignment in particular is at approximately 115m AOD within the Highfield Plantation.

LLCA12 is located at the western extent which comprises medium to large scale agricultural fields and woodland upon a predominantly west-facing slope that falls from east to west. The landscape pattern of fields is highlighted by hedges and hedgerow trees as well as the edges of adjacent woodland. The variable extents of the fields in combination with the sloping landform create different degrees of spatial enclosure. This LLCA is also bisected by the A93 main road. The eastern part of this LLCA extends into Langedge Wood, Highfield Plantation and Muirward Wood, and these provide an elevated, wooded backdrop to the area. Clusters of houses and farm buildings create local foci in the landscape, connected by a network of roads, tracks and paths.

LLCA14 is located at the central extent which is covered predominantly in deciduous and coniferous woodland upon hill slopes. The screening effect of the trees results in an inward-looking area with strong characteristics of enclosure and shelter. Within the woodland, commercial forestry rotation has created a series of large-scale, clearings and corridors as well as parcels of woodland of different ages. This variation contributes to a dynamic experience whilst moving through the area, as there is alternating enclosure, light and vegetation. This LLCA is predominantly rural and quiet in character and the woodland interior seems secluded. It contains some forest access tracks as well as a network of informal paths for recreation. Due to shading, light is restricted within and adjacent to denser parts of the woodland, although clearings provide pockets of light in contrast to their surroundings.

LLCA15 is located at the eastern extent and has a rolling landform and is predominantly open, with just a few ribbons of riparian woodland. It has a distinct landscape pattern of medium and large-scale agricultural fields, divided by trees and/ or hedges. On higher slopes, this LLCA is simpler in pattern and more open, offering extensive views across the City of Perth and along the River Tay towards the Glen Almond Hills in the west. Farm steadings and houses are dispersed throughout the landscape, creating local foci. The prevailing character of this LLCA is rural but this is diminished at a local level by a network of minor roads and the A94 as well as Perth Airport. The eastern edges of Highfield Plantation and Muirward Wood define the western extents of this LLCA and form a prominent edge.

Considering value attributed to the landscape, and specifically landscape designations, both alignments are located within western extent of the Scone Palace GDL which extends from LLCA 12 into LLCA14.

1.3 Summary of Visual Baseline Receptors

Within the study area key visual receptors which have the potential to experience visual effects of the proposed alignments, and which are relevant to the comparison, have been identified in the following list (refer to **Figure B1** for their location):

TABLE B1: VISUAL RECEPTORS

No.	Receptor name	Receptor type	Location & elevation
1	Balboughty properties (group of receptors)	Residential	312655, 727600
2	Northern Scone (group of receptors)	Residential	313635, 726956
3	Highfield	Residential	314059, 727533
4	New Mains properties (group of receptors)	Residential	314576, 727150

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No.	Receptor name	Receptor type	Location & elevation
5	Muirward House	Residential	314983, 727487
6	Bonhard Park (group of receptors)	Residential	315440, 726578
7	Plantation routes - SCON/11/1, 11/2, 11/3 & 12/1(group of receptors)	Recreational routes	313822, 727600
8	Routes north of Scone – SCON/13/1, 124/1 & SCON/12/2 (group of receptors)	Recreational routes	313376, 727865
9	A93 at Balboughty	Vehicular travellers	312905, 727893
10	A94 at New Mains, including SCON/123/1	Vehicular travellers	314781, 727214

These receptors will form the basis of the appraisal of visual effects of the proposed alignments.

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APPENDIX C | Noise Comparative Assessment

Appendix C – Expanded Noise Comparative Assessment

1.1 Further Information on Findings

The SoundPLAN contours presented in **Figures 3.3.6, 3.3.7** and **3.3.8** show the absolute road traffic noise profiles for base and future assessment year, the proposed DMRB Stage 3 Alignment and proposed Alternative Alignment respectively. The colour in which each noise sensitive dwelling is presented in these plots is illustrative of the highest noise levels that are predicted to affect any façade of the specific property.

Figures 3.3.6, 3.3.7 and **3.3.8** illustrate the predicted change in road traffic noise levels between 2017 Do Minimum and 2038 Do-Something for the proposed DMRB Stage 3 Alignment and the proposed Alternative Alignment respectively. In these illustrations, the colour in which each noise sensitive dwelling is presented corresponds to the greatest change in noise levels that is predicted to occur at any façade of the property. For properties close to existing roads, the facades furthest from the road will experience less road traffic noise in the 2017 Do Minimum scenario than those facing the road. Where the CTLR route introduces road traffic noise to other facades of these properties, the greatest change in road traffic noise levels as a result of introducing the road may therefore be on these facades that are currently more protected, rather than those already facing a source of road traffic noise.

Table 3.3.6 presents the maximum change in road traffic noise levels that is predicted to occur at each dwelling, bearing in mind that the maximum change may not occur at the façade that will receive the highest levels of road traffic noise in the context of the scenario (i.e. including contributions from existing roads). In each case, ground and first floor receivers are presented separately to clarify any difference in effects.

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TABLE 4.3.6 – EXISTING RECEIVERS

Address	Map NSR reference	**Map**	Changes in noise level (dB(A))					
			All floors - most affected location		Ground floor		First floor	
			Increase - Sc 7 2038 Versus Base 2017 (no barrier)	**Increase - Sc 7 2038 Versus Base 2017 (no barrier) ALTERNATE**	**Increase - Sc 7 2038 Versus Base 2017 (no barrier)**	**Increase - Sc 7 2038 Versus Base 2017 (no barrier) ALTERNATE**	**Increase - Sc 7 2038 Versus Base 2017 (no barrier)**	**Increase - Sc 7 2038 Versus Base 2017 (no barrier) ALTERNATE**
HIGHFIELD COTTAGE, HIGHFIELD ROAD, SCONE, PERTH, PH2 6RN	179	F	13.1	15.1	13.1	15.1	11.2	14.2
2 NEWMAINS STEADINGS, SCONE, PERTH, PH2 6QF	212	G	9.9	9.5	9.9	9.5	9.1	8.5
3 NEWMAINS STEADINGS, SCONE, PERTH, PH2 6QF	213	G	7.9	8.0	7.6	8.0	7.9	7.8
1 NEWMAINS STEADINGS, SCONE, PERTH, PH2 6QF	214	G	7.8	9.8	7.8	9.8	6.9	8.4
4 NEWMAINS STEADINGS, SCONE, PERTH, PH2 6QF	215	G	6.0	8.4	6.0	8.4	5.6	10.5
5 NEWMAINS STEADINGS, SCONE, PERTH, PH2 6QF	216	G	3.7	5.6	3.7	5.6	3.6	5.2
NEW MAINS FARM, SCONE, PERTH, PH2 6NL	217	G	4.7	5.1	4.7	5.1	4.3	5.1
MUIRWARD HOUSE, SCONE, PERTH, PH2 6NL	218	G	4.4	7.5	2.3	4.7	4.4	7.5

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For the purposes of the EIA assessment, a change in road traffic noise levels of 3dB or more is considered significant; this corresponds with the advice in DMRB with reference to the long-term effects of a consented road scheme.

The results presented in Table 4.3.6 indicate that, on the basis of the 3D CTLR route designs included in the SoundPLAN model, the maximum change in road traffic noise levels elicited by either alignment will be significant at all properties identified, although the magnitude of the predicted maximum changes vary.

The predicted differences between the effects of the two alignments at the most impacted facades of 2 and 3 Newmains Steadings and at Newmains Farm are all less than 1dB.

Examination of the Do Something 2038 contour plots for the proposed DMRB Stage 3 Alignment and the proposed Alternative Alignment (**Figures 3.3.6, 3.3.7** and **3.3.8** respectively) indicates that the absolute levels along the A94 remain dominant regardless of the alignment selected; this is reflected in the results set out in Table 1 above. This effect is due to the logarithmic nature of decibel addition which means that around a 20% change in road traffic flows would be required to elicit a change of approximately 1dB in road traffic noise levels.

This is important because it emphasises the context of the CTLR at the eastern extent, where there is already a significant road traffic noise profile from the A94. The elements of existing dwellings potentially most affected are therefore those furthest from the existing source, as previously described.

Beyond the closest identified dwellings, the north boundary of Scone is the closest settlement with the potential for multiple existing properties to be adversely affected by the introduction of the CTLR. Beyond the existing northernmost properties, further residential development is consented (North Scone); while no detailed layout is currently available, the red line boundary of the consented Planning Permission in Principle is indicated in the **Figures 3.3.6, 3.3.7** and **3.3.8**.

While the proposed Alternative Alignment creates additional separation distance between the closest existing dwellings and the future road, the differential in traffic speed profile and the 3D positioning of the road in the existing topography suggests that both alignment options will result in significant changes in road traffic noise levels that are visualised in **Figures 3.3.6, 3.3.7** and **3.3.8**.

However, the absolute levels presented in **Figures 3.3.6, 3.3.7** and **3.3.8** indicate that all existing dwellings are predicted to receive levels of road traffic noise less than 56dB LA10,18h in 2038, except along the A94 where the existing road traffic noise profile dominates. Also, relevant, as previously described, is the prevailing baseline at locations further from existing sources of road traffic noise, which adds context to the assessment.

Baseline noise measurements undertaken at 36 Highfield Road (Location M) suggest that typical environmental noise levels are currently around 48-52dB LA10,18h (see previous discursive commentary). Predicted levels of road traffic noise at map reference location 139 (Location M) for 2038 (Scenario 7) are circa 47dB (the proposed DMRB Stage 3 Alignment) and 48dB (proposed Alternative Alignment). The comparison between prevailing baseline and future predicted road traffic noise profiles therefore suggests that, in this context, neither iteration of the CTLR alignment may result in a significant change in overall levels of environmental noise.

Where future development occurs within the boundary indicated, these future dwellings will act as a barrier to road traffic noise propagating from either route alignment to the closest existing dwellings on the northern boundary of Scone. As such, road traffic noise levels in situ will again be less than the modelling currently indicates.

The proposed alternative Alignment creates a larger continuous area of the North Scone future residential development site that is predicted to experience absolute levels of road traffic noise that are less than 56dB LA10,18h. Where mitigation is required closest to either alignment, future developers should include appropriate mitigation measures to ensure that good standards of indoor and outdoor residential amenity are attained; this may include orientation of principle gardens, local close-boarded fencing and appropriate selection of glazing and ventilation elements.

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APPENDIX D | Economic Assessment Outputs

Economic Efficiency of the Transport System (TEE)

Non-business: Commuting	**ALL MODES**		**ROAD**	**BUS and COACH**	**RAIL**	**OTHER**
User benefits	**TOTAL**		**Private Cars and LGVs**	**Passengers**	**Passengers**	
Travel time	£159,602.00		£146,589.00		£13,013.00	
Vehicle operating costs	£3,933.00		£3,933.00			
User charges						
During Construction & Maintenance						
NET NON-BUSINESS BENEFITS: COMMUTING	£163,535.00	*(1a)*	£150,522.00		£13,013.00	

Non-business: Other	**ALL MODES**		**ROAD**	**BUS and COACH**	**RAIL**	**OTHER**
User benefits	**TOTAL**		**Private Cars and LGVs**	**Passengers**	**Passengers**	
Travel time	£132,093.00		£112,825.00		£19,269.00	
Vehicle operating costs	£4,426.00		£4,426.00			
User charges						
During Construction & Maintenance						
NET NON-BUSINESS BENEFITS: OTHER	£136,519.00	*(1b)*	£117,251.00		£19,269.00	

Business								
User benefits			**Goods Vehicles**	**Business Cars & LGVs**	**Passengers**	**Freight**	**Passengers**	
Travel time	£109,911.00		£62,249.00	£39,746.00	£7,916.00			
Vehicle operating costs	£18,888.00		£9,762.00	£4,898.00				£4,227.00
User charges								
During Construction & Maintenance								
Subtotal	£128,799.00	*(2)*	£72,011.00	£44,644.00	£7,916.00			£4,227.00
Private sector provider impacts						**Freight**	**Passengers**	
Revenue								
Operating costs								
Investment costs								

Grant/subsidy						
Subtotal		*(3)*				
Other business impacts						
Developer contributions		*(4)*				
NET BUSINESS IMPACT	£128,799.00	*(5) = (2) + (3) + (4)*				
TOTAL						
Present Value of Transport Economic Efficiency Benefits (TEE)	£428,853.00	*(6) = (1a) + (1b) + (5)*				

Notes: Benefits appear as positive numbers, while costs appear as negative numbers.
All entries are discounted present values, in 2010 prices and values

Analysis of Monetised Costs and Benefits

Noise		*(12)*
Local Air Quality		*(13)*
Greenhouse Gases		*(14)*
Journey Quality		*(15)*
Physical Activity		*(16)*
Accidents	-£8,739.00	*(17)*
Economic Efficiency: Consumer Users (Commuting)	£163,535.00	*(1a)*
Economic Efficiency: Consumer Users (Other)	£136,519.00	*(1b)*
Economic Efficiency: Business Users and Providers	£128,799.00	*(5)*
Wider Public Finances (Indirect Taxation Revenues)	-£10,850.00	*- (11) - sign changed from PA table, as PA table represents costs, not benefits*
Present Value of Benefits (see notes) (PVB)	£409,264.00	*(PVB) = (12) + (13) + (14) + (15) + (16) + (17) + (1a) + (1b) + (5) - (11)*
Broad Transport Budget	£80,100.00	*(10)*
Present Value of Costs (see notes) (PVC)	£80,100.00	*(PVC) = (10)*
OVERALL IMPACTS		
Net Present Value (NPV)	£329,164.00	NPV=PVB-PVC
Benefit to Cost Ratio (BCR)	5.11	BCR=PVB/PVC

Note : This table includes costs and benefits which are regularly or occasionally presented in monetised form in transport appraisals, together with some where monetisation is in prospect. There may also be other significant costs and benefits, some of which cannot be presented in monetised form. Where this is the case, the analysis presented above does NOT provide a good measure of value for money and should not be used as the sole basis for decisions.

Public Accounts (PA) Table

	ALL MODES		ROAD	BUS and COACH	RAIL	OTHER
Local Government Funding	**TOTAL**		**INFRASTRUCTURE**			
Revenue						
Operating Costs						
Investment Costs						
Developer and Other Contributions						
Grant/Subsidy Payments						
NET IMPACT		*(7)*				
Central Government Funding: Transport						
Revenue						
Operating costs						
Investment Costs	£80,100.00		£80,100.00			
Developer and Other Contributions						
Grant/Subsidy Payments						
NET IMPACT	£80,100.00	*(8)*				
Central Government Funding: Non-Transport						
Indirect Tax Revenues	£10,850.00	*(9)*	£9,265.00		£1,585.00	
TOTALS						
Broad Transport Budget	£80,100.00	*(10) = (7) + (8)*				
Wider Public Finances	£10,850.00	*(11) = (9)*				

Notes: Costs appear as positive numbers, while revenues and 'Developer and Other Contributions' appear as negative numbers.

All entries are discounted present values in 2010 prices and values.