Transport Scotland

A9 NORTH KESSOCK TO TORE STUDY

STAG Appraisal: Case for Change Report

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EXECUTIVE SUMMARY

Transport Scotland appointed WSP as Engineering Consultants to assess and report on the safety and operation of the A9 between North Kessock and Tore.

This study sought to identify existing problems or opportunities for improvement. The study has considered the safety and operational aspects of the corridor and the junctions, looking into the impact of existing and proposed traffic growth in the wider area as well as considering the strategic role the A9 plays for connectivity to the north of Scotland.

The study has reviewed both current and future operations, taking account of potential and future developments within the surrounding area, and has been undertaken in line with Scottish Transport Appraisal Guidance (STAG). The study represents the Initial Appraisal (Case for Change) stage of the STAG process (formerly known as the Pre-Appraisal stage) and sets out whether there is a case for change.

SCOPE OF THE STUDY

The study area includes both carriageways of the A9 from North Kessock Junction to Tore Roundabout and all junctions in between.

The objectives of the study are to:

- Develop and evidence the problems, opportunities and transport planning objectives in the form of a STAG Initial Appraisal: Case for Change Report; and
- Undertake effective stakeholder engagement that enables appropriate local representation to inform the evidence base for the appraisal.

Following completion of this Initial Appraisal: Case for Change stage, if Transport Scotland considers that there is a case for change, and there is funding available to do so, the study will continue into the Preliminary Appraisal stage.

KEY FINDINGS FROM THE STUDY

Traffic and Road Safety Analysis

The analysis of the traffic and road safety evidence identified the following:

- Traffic levels during the study period September 2020 are within 10% of those observed in September 2019 (pre-COVID).
- The traffic growth projected for the A9 between 2020 and 2035 is 9.79% between North Kessock and Tore Roundabout based on modelling informed by the adopted Inner Moray Firth Local Development Plan (2015).
- The collisions statistics show that collisions are spread out over the extent of the study area and do not exhibit any common contributory factors.

- The conflict study at Munlochy Junction shows that some drivers from the B9161 merging with the A9 southbound are not giving way to vehicles on the southbound carriageway and expect them to change lanes or slow down. A large number of conflicts were observed for this movement.
- The right turn into the B9161 presented a low number of observed conflicts.
- At Tore Roundabout, all except one of the non-motorised user (NMU) conflicts occurred on the northbound exit to the A9 where NMUs had to walk siftly/run across the road due to the speed of the vehicles exiting the roundabout.

Stakeholder Engagement

Stakeholder engagement formed an important element of this study and has been undertaken to include views from stakeholders on the problems and opportunities in the study area. Given the COVID-19 restrictions, stakeholder engagement has been carried out mainly through online meetings and workshops that have been facilitated in smaller groups to allow opportunities for all stakeholders to express their views and concerns.

At the Case for Change stage, the process did not include a broader public consultation as the engagement sought to identify the problems and opportunities (as opposed to consultation on presented options). If the study progresses to further stages where options are developed and appraised, public consultation will be undertaken at that point to gather views on the options presented.

PROBLEMS AND OPPORTUNITIES IDENTIFIED

The following problems and opportunities were identified:

Problems:

- North Kessock to Tore
  - 1 - Perceived safety risks due to right turn movements from side roads across the A9
  - 2 - Perceived safety risks for general traffic and buses merging onto the A9 at intermediate junctions
- Munlochy Junction
  - 3 - Conflicts arising from vehicles merging from the B9161 onto the A9 southbound
  - 4 - Perceived safety risks for right turning movements from the A9 onto the B9161
  - 5 - Safety risks due to queues forming on northbound right turn lane and extending onto the main northbound carriageway
- Tore Roundabout
  - 6 - Perceived safety risks to pedestrians and cyclists at Tore Roundabout
  - 7 - Conflicts arising from vehicles movements at Tore Roundabout

Opportunities:

- 1 - Improve road safety and support the Scottish Road Safety Framework to 2030
- 2 - Encourage walking and cycling by local residents.

TRANSPORT PLANNING OBJECTIVES

From the analysis of the problems and opportunities identified through the consideration of analytical evidence and stakeholder inputs, the following Transport Planning Objectives (TPOs) were identified:

- **TPO 1**: A reduction in conflicts for active modes at the junctions along the A9 between North Kessock and Tore to encourage the use of active travel modes.
- **TPO 2:** To achieve an improvement in vehicular road safety and a reduction in conflicts at the Munlochy Junction (A9/B9161) in the short (3 years), medium (3-10 years) and longer term (beyond 10 years).
- **TPO 3:** To achieve an improvement in vehicular road safety and a reduction in conflicts at Tore Roundabout (A9/A832/A835) in the short (3 years), medium (3-10 years) and longer term (beyond 10 years).
- **TPO 4:** To achieve an improvement in vehicular road safety and a reduction in conflicts at intermediate junctions along the A9 from north of the North Kessock junction up to but not including the Tore Roundabout in the short (3 years), medium (3-10 years) and longer term (beyond 10 years).

CONCLUSIONS

This Initial Appraisal: Case for Change report has set out the context for the appraisal of the A9 section between North Kessock and Tore Roundabout and the intermediate junctions. Following STAG guidance, it has identified the transport problems as well as the opportunities alongside the issues and constraints of the study area. This analysis provided the basis for objective setting and the generation of a longlist of potential options to be further considered.

This report sets out that there are identified and evidenced problems at locations along the A9 between North Kessock and Tore, with most stakeholder views generally aligning with road safety analysis (supported by collision statistics and a conflicts study). A longlist of options which could potentially achieve the objectives and address the problems and opportunities has been identified.

1 INTRODUCTION

1.1 BRIEF INTRODUCTION

1.1.1. Transport Scotland appointed WSP as Engineering Consultants to assess and report on the safety and operation of the A9 between North Kessock and Tore. This study sought to identify existing problems or opportunities for improvement.

1.1.2. The study has considered the safety and operational aspects of the corridor and the junctions, looking into the impact of existing and proposed traffic growth in the wider area as well as considering the strategic role the A9 plays for connectivity to the north of Scotland.

1.1.3. The study has reviewed both current and future operations, taking account of potential and future developments within the surrounding area, and has been undertaken in line with Scottish Transport Appraisal Guidance (STAG). The study represents the Initial Appraisal stage of the STAG process (formerly known as the Pre-Appraisal stage) and sets out whether there is a case for change.

1.2 SCOPE OF THE STUDY

1.2.1. The study area includes both carriageways of the A9 from North Kessock Junction to Tore Roundabout and all junctions in between as shown in Figure 1-1.

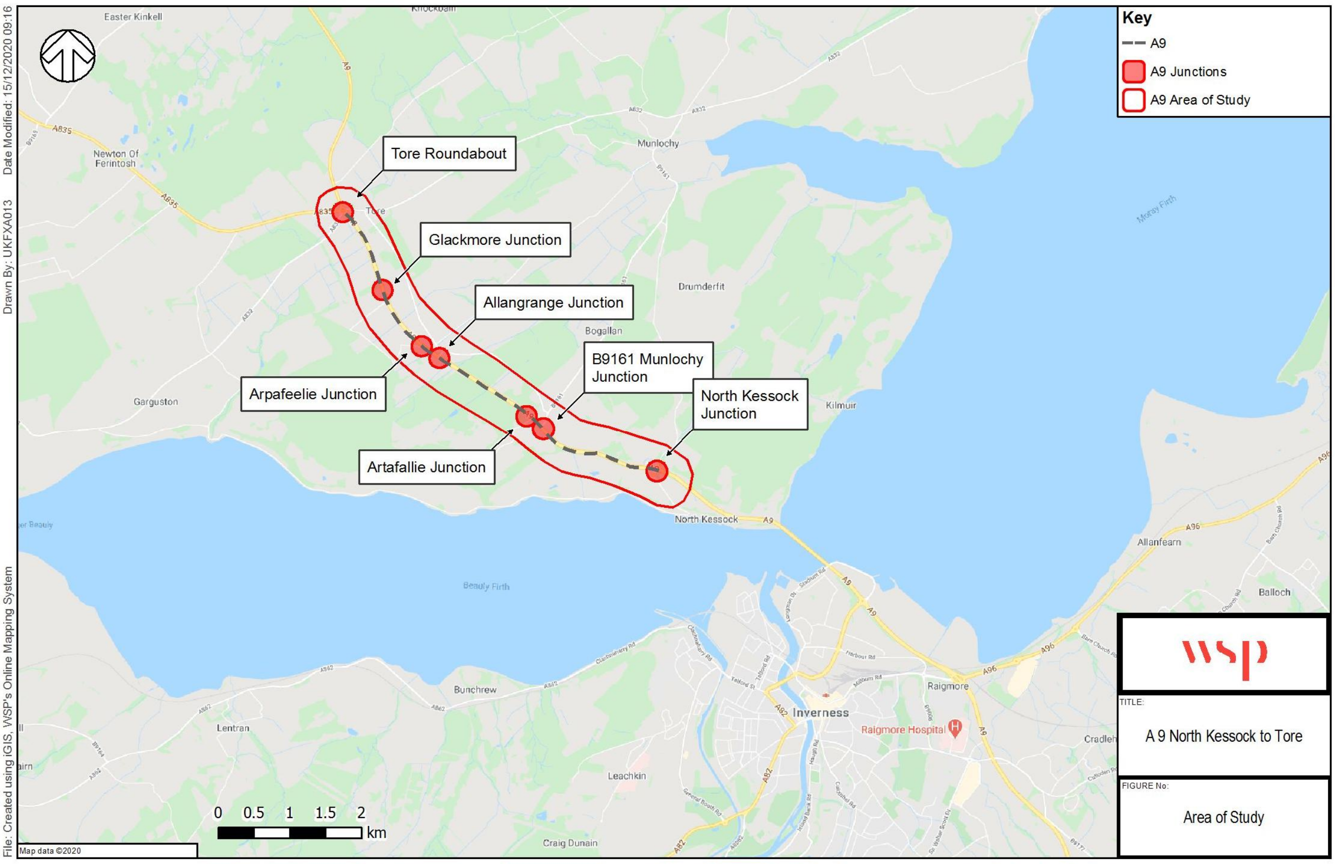


Figure 1-1: Study area

1.2.2. The North Kessock junction is grade-separated allowing all turning movements and Tore Roundabout is at-grade and connects the A9 with the A835 and the A832.

1.2.3. The five junctions between the North Kessock junction and Tore Roundabout are at-grade priority junctions sharing a similar layout, allowing movement in all directions and including right turns across the main carriageway. All the junctions have turning lanes in the central reservation to allow turning vehicles to slow down and wait before making the right turn across the opposing carriageway. In addition, some of the junctions have left turn slip lanes into and out of the side roads.

1.2.4. Of these, the B9161 junction, referred to as the Munlochy Junction in this report, has been highlighted by residents and elected representatives due to their road safety concerns. The stakeholder concerns about this junction have been reiterated through the study process during engagement with stakeholders.

1.2.5. The layout of the existing junctions in the study area are included under **Appendix A**.

1.2.6. The objectives of the study are to:

- Develop and evidence the problems, opportunities and transport planning objectives in the form of a STAG Initial Appraisal: Case for Change Report; and
- Undertake effective stakeholder engagement that enables appropriate local representation to inform the evidence base for the appraisal.

1.2.7. Following completion of this Initial Appraisal: Case for Change stage, if Transport Scotland considers that there is a case for change, and there is funding available to do so, the study will continue into the Preliminary Appraisal stage.

1.3 STRUCTURE OF REPORT

1.3.1. This report includes 12 chapters which describe the process that has been followed as part of the scope of the study. Below is an outline of the structure:

- Chapter 1: Introduction → Brief introduction and scope of study.
- Chapter 2: Methodology → Methodology followed during the study and the STAG process.
- Chapter 3: Study Context → Introduction to the main geographic and socio-economic characteristics of the area.
- Chapter 4: Policy Review → Understanding of National, Regional and Local Policy and the related objectives regarding road safety.
- Chapter 5: Current Transport Network → Description of the strategic transport network as well as local roads, public transport and active travel.
- Chapter 6: Transport Demands and Traffic Modelling → Analysis of current demand and travel patterns and consideration of future demand.
- Chapter 7: Road Safety Analysis → Analysis of road safety aspects including previous studies, collision data and conflicts.
- Chapter 8: Stakeholder Engagement → Description of the process followed during the stakeholder engagement and inputs from stakeholders.
- Chapter 9: Problems, Opportunities, Issues and Constraints → Identification of problems and opportunities from the transport and safety technical analysis and the stakeholder engagement.
- Chapter 10: Transport Planning Objectives (TPOs) → Description of TPOs identified.

- Chapter 11: Options Generation à Development of long list of options that could address the problems and opportunities and achieve the TPOs.
- Chapter 12: Next Steps à Conclusion of the Case for Change and recommendations for the further Appraisal Stages.

2 METHODOLOGY

2.1 INTRODUCTION

2.1.1. This chapter includes a description of the STAG process and the methodology that has been followed during the study which has informed this report.

2.2 STAG PROCESS SUMMARY

2.2.1. This study has been developed in accordance with STAG and this report presents the pre-appraisal stage (now called Case for Change). The Case for Change is the first stage of the STAG process, shown in Figure 2-1, and is designed to set out proportionate justification for taking the study forward to the subsequent STAG stages and includes consideration of the following aspects:

- The constraints which bind the study and issues which may affect the study area
- The problems and opportunities related to transport within the study area
- The Transport Planning Objectives (TPOs) which specify the aims of the study and will allow testing of options or intervention packages
- Development of the longlist of options which may address the identified problems and opportunities.

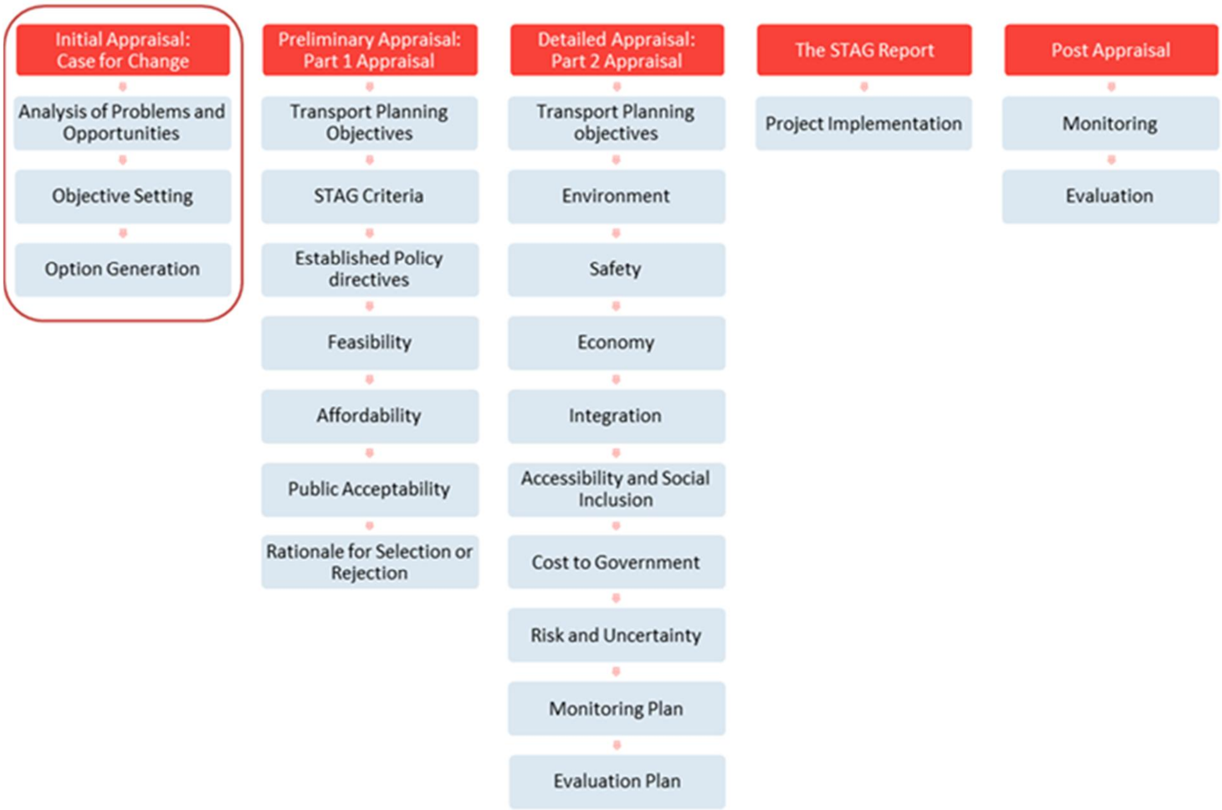


Figure 2-1: The STAG process

2.2.2. If the Case for Change is identified, and there is funding available to do so, the study would then proceed to the subsequent appraisal stages.

2.3 INITIAL APPRAISAL: CASE FOR CHANGE METHODOLOGY

2.3.1. The methodology for the study included the following activities:

- Policy and key document review
- Analysis of the current and future transport infrastructure and transport demand, including problems and issues
- Road safety analysis, including a conflicts analysis
- Stakeholder engagement
- The development and setting of Transport Planning Objectives
- The generation of an initial longlist of potential options.

POLICY AND DOCUMENT REVIEW

2.3.2. At the outset of the study a review was undertaken of all relevant local and regional policy documents, strategies, development plans and the findings from previous studies.

2.3.3. The review provided further context for the study and the Transport Planning Objectives were reviewed against this policy context to confirm their alignment with existing policy.

TECHNICAL ANALYSIS

2.3.4. The technical analysis, undertaken as part of the study, underpins the quantitative and qualitative evidence of the problems, opportunities, issues and constraints affecting the area.

2.3.5. The analysis considered the current situation as well as a "most likely" future scenario based upon the impacts of future infrastructure changes, planned development and traffic growth.

2.3.6. This report was supported by the technical inputs set out below.

- A collision analysis, which considered the period between January 2010 and September 2020 between North Kessock and Tore including the roundabout. The analysis considered the contributory factors and locations of the collisions.
- A conflict study at Munlochy Junction and at Tore Roundabout. The conflict study recorded the number of conflicts and a grading of these conflicts based on a scale of severity. The conflict study could further be used to support a monitoring and evaluation programme by providing data on conflicts before and after any interventions applied in future.
- Speed survey data collected in March 2020 to the north and south of Munlochy Junction.

2.3.7. A site visit took place on 19 and 20 August 2020 to the study area. The site visit considered existing crossing points, junction layouts, side roads and other features of the network. The study team met with Police Scotland at the Munlochy junction during the site visit on 20 August 2020.

DATA COLLECTION AND MODELLING UNDERTAKEN

2.3.8. The existing available data (as shared by the Client Team, or available from public records) was supplemented with data sourced from Transport Scotland's traffic count database, the Police, the Highland Council traffic safety team and BEAR Scotland (Transport Scotland's North-West Unit Operating Company).

2.3.9. Traffic surveys were undertaken in the period 10 to 12 September 2020. An overview of the locations surveyed is included in **Appendix C**, and the surveys included the following:

- Vehicle turning counts at each of the junctions in the study area
- Video footage at junctions to inform the road safety analysis
- Vehicle queue lengths
- Pedestrian and cycle counts at Tore Roundabout.

2.3.10. In order to support the technical analysis two traffic models have been developed.

- A spreadsheet model that captures the link flows and turning movements for the baseline (current) situation and the most likely future scenario. The assignment of origin-destination movements in the model (due to new developments, traffic growth and reassignment) was done using a high-level gravity-model approach. This spreadsheet model informed the analysis of the impacts of future traffic growth and/or reassignment.
- Stand-alone isolated junction models of Munlochy Junction and Tore Roundabout which were used to assess the operational performance of each junction approach in the baseline and most likely future scenario.

2.3.11. Further detail on the development of the traffic models is provided in Chapter 6.

IDENTIFICATION OF PROBLEMS AND OPPORTUNITIES

2.3.12. In line with STAG requirements the study team identified real and perceived potential problems, opportunities, issues and constraints associated with the study area.

2.3.13. The current and future problems (real and perceived) and opportunities were informed by the technical analysis and by stakeholder inputs, and consideration of the constraints and issues impacting upon the study area.

TRANSPORT PLANNING OBJECTIVES

2.3.14. Transport Planning Objectives (TPOs) have been developed in accordance with SMART principles (Specific, Measurable, Achievable, Relevant and Timed) and reflect the identified problems and opportunities and the stakeholder inputs.

OPTIONEERING AND INITIAL OPTIONEERING

2.3.15. Once the TPOs were finalised an initial optioneering exercise was undertaken to identify all potential intervention options to address the problems and opportunities identified (with a focus on road-based options).

2.3.16. The optioneering was unconstrained and all realistic options were considered, regardless of potential issues of costs, timescales, etc. The optioneering was informed by the WSP project team, the Client Team, options considered as part of previous studies (identified through the review of previous documents) and input provided by stakeholders.

2.3.17. Options have been categorised against short, medium and long-term timeframes.

STAKEHOLDER ENGAGEMENT

2.3.18. In order to draw in stakeholder input to the study during the development of the Case for Change report, the study team undertook an engagement process (in alignment with the requirements of STAG).

2.3.19. During the development of the Case for Change the approach included engagement with stakeholders (including organisations and elected members) identified in conjunction with the Highland Council and other stakeholders. At the Case for Change stage, the process did not include a broader public consultation as the engagement sought to identify the problems and opportunities (as opposed to consultation on presented options). If the study progresses to further stages where options are developed and appraised, public consultation will be undertaken at that point to gather views on the options presented.

2.3.20. The stakeholder engagement gathered technical data and views from stakeholders regarding perceived problems, opportunities, issues and constraints on the A9 (relevant to the study area) through the use of pre-engagement meetings, written submissions and stakeholder workshops. Through the careful recording of stakeholder inputs throughout the process, this report provides evidence of consensus and conflicting stakeholder views on the problems and opportunities in the study area.

2.3.21. The engagement was undertaken over three phases.

- Phase 1 - Pre-workshop engagement with stakeholders through telephone discussions and written submissions. This included gathering information/local knowledge and supporting technical data (where available)
- Phase 2 - Workshop 1 – gathered views on existing and future problems and opportunities, and inputs to the development of Transport Planning Objectives
- Phase 3 - Workshop 2 – gathered views on the proposed Transport Planning objectives and inputs to the potential options informing the longlist.

2.3.22. All stakeholder inputs are reflected in this report and the workshop reports included in **Appendix D**.

3 STUDY CONTEXT

3.1 OVERVIEW

3.1.1. This chapter provides a summary of the geographic and socio-economic context of the study area, including Inverness and the Inner Moray Firth. It considers topics for the study area such as demographics, areas of deprivation, economic activity, car ownership and commuting patterns. Information was obtained from secondary sources such as Scotland's Census and National Records of Scotland.

3.1.2. Data from the 2011 census has been referenced in this chapter. This represents the most reliable and the most recent source for broader socio-economic and travel pattern data. The next census is planned for 2022. Whilst the 2011 data is older than would ideally be used to inform a study, it would require a disproportionate effort to gather the same information for a specific study. Further, the purpose of the data is to describe the broad socio-economic patterns and these are unlikely to have changed (since 2011) to the extent that it would alter any conclusions drawn from this study.

3.1 GEOGRAPHICAL CONTEXT

3.1.1. The study area is located north of Inverness between the North Kessock junction and the Tore Roundabout. In this section, the A9 is a dual carriageway road which serves as the strategic road corridor linking the north of Scotland and the Isles through the A9 and A835 respectively, as well as connecting the local communities along the route through a number of local single carriageway roads that connect into the A9 (mostly through at-grade junctions).

3.1.2. The Inner Moray Firth area, as defined in the adopted Inner Moray Firth Local Development Plan (2015), is shown in Figure 3-1 and is the most densely populated area of the Highlands. It contains the Black Isle area, as well as Inverness, which are directly located in the catchment area served by the A9 corridor. Inverness is the largest city in the north of Scotland and serves as a main administrative, economic and financial centre for the wider area. Inverness also serves as the main transport hub, being served by main roads such as the A9, A82 and A96.

3.1.3. Other transport links include local roads, Inverness rail station and Inverness Airport which is located east of Inverness and which served just under one million passengers in 2019.

3.2 SOCIO-ECONOMIC CONTEXT

3.2.1. This section includes key demographic and economic indicators in the Inner Moray Firth, including population, economic activity, travel to work/school, car ownership and multiple deprivation. The understanding of the socio-economic context supports an understanding of the role that transport plays in the local and wider context, supporting residents, businesses and commuters.

POPULATION

3.2.2. According to mid-year estimates by the national Records of Scotland, the Highland Council area, which includes the Inner Moray Firth area, had a population of 235,830 of which roughly 38% live in Inverness and the Black Isle peninsula.

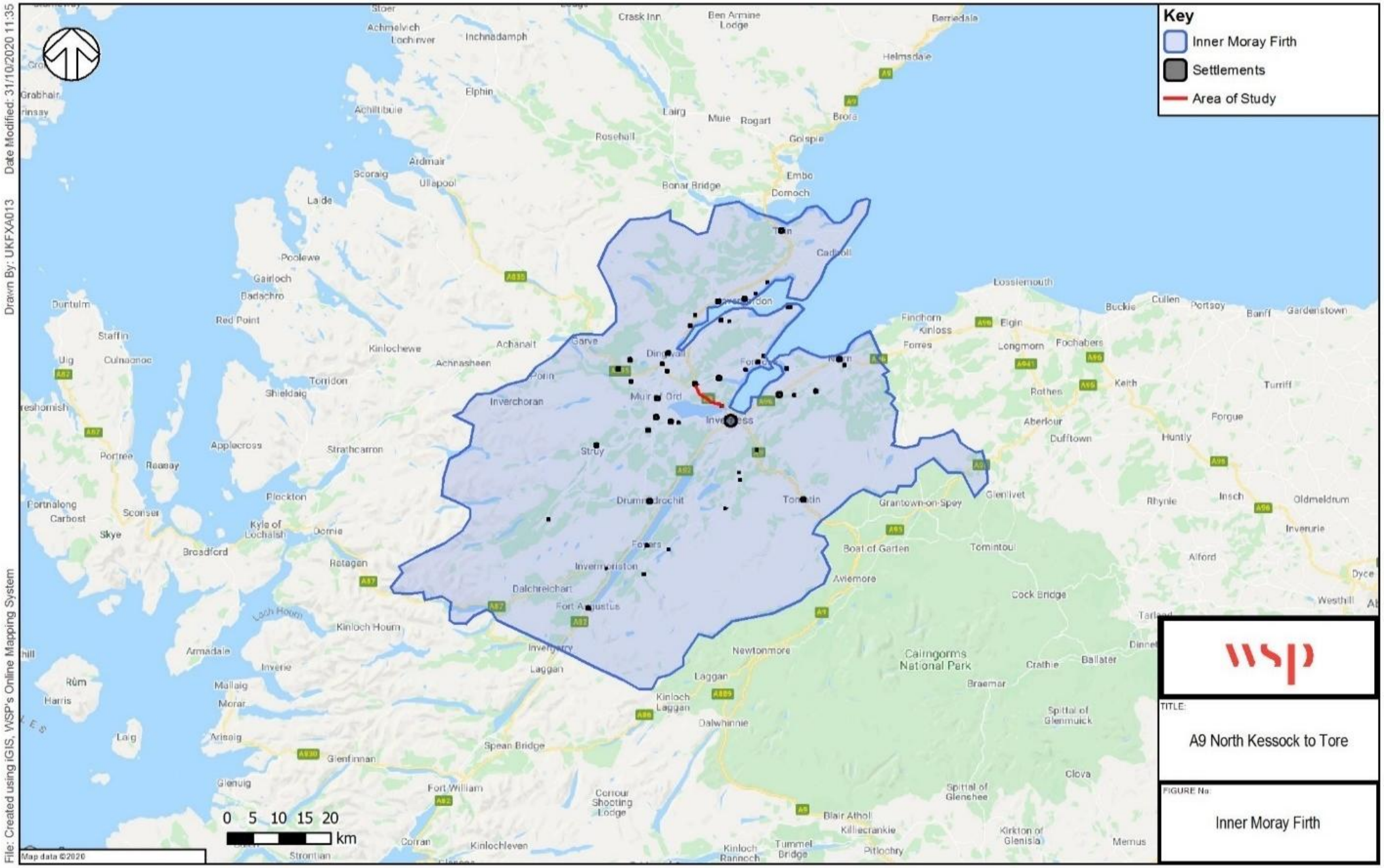


Figure 3-1: Inner Moray Firth geographical context

3.2.3. The population age distribution (Figure 3-2) shows that the percentage of population in working age has remained relatively constant in the Highland Council since 2001. However, the population in the area is ageing as there is now a higher percentage of people over 65. In comparison, Scotland has a slightly higher percentage of population in working age and a smaller percentage of people over 65.

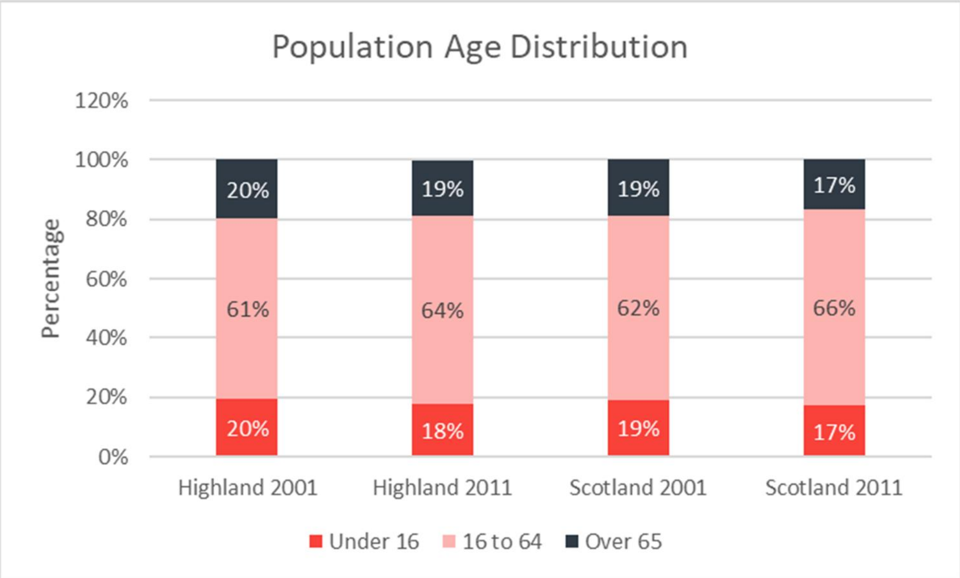


Figure 3-2: Age distribution in Scotland and Highland Council (Census 2001 and 2011)

EMPLOYMENT

3.2.4. Although the percentage of people in working age is lower in the Highland Council area than that of Scotland as a whole, Figure 3-3 shows that 72% of the population in the working age group is economically active, compared to the 69% in Scotland.

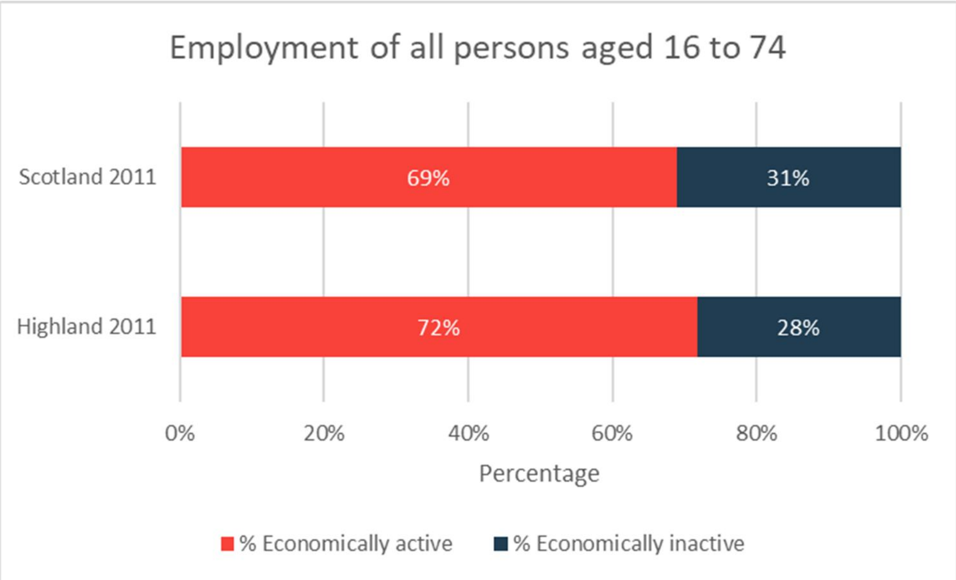


Figure 3-3: Percentage of population economically active and inactive (Census 2011)

3.2.5. Figure 3-4 shows the distribution of type of employment. There is a higher percentage of self-employed people as well as part-time employed when compared to the whole of Scotland. Unemployment is shown in Figure 3-5, indicating two different patterns: the younger population has lower levels of unemployment compared to the whole of Scotland although unemployment has increased since 2001. In the 50 to 74 age group the number of unemployed has reduced since 2001 but is still greater than in Scotland.

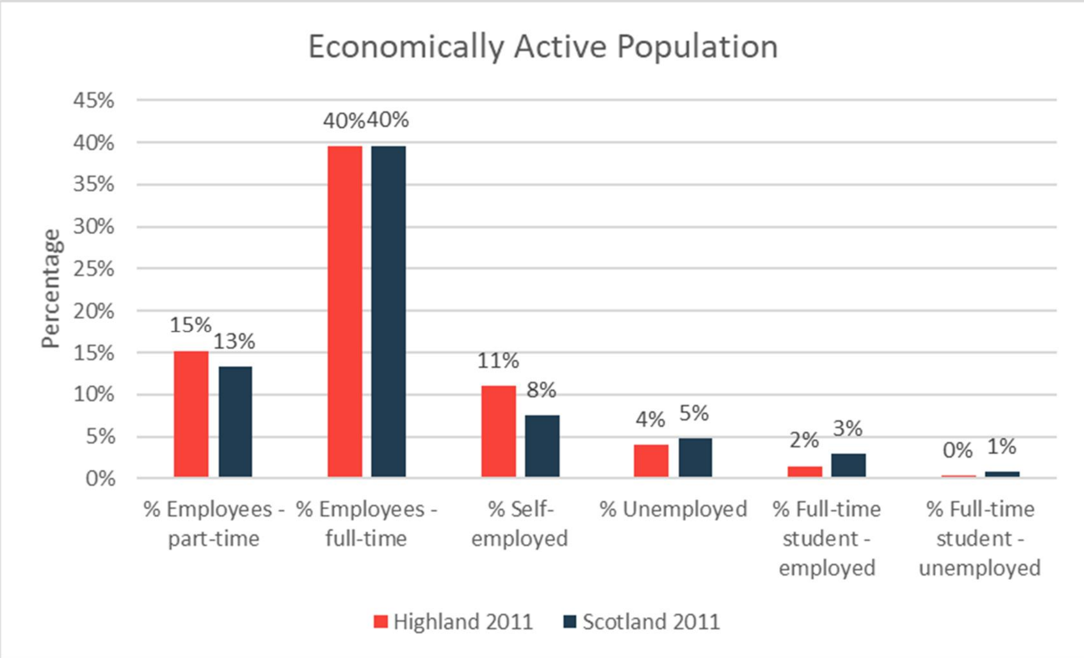


Figure 3-4: Economically active population in Scotland and Highland Council (Census 2011)

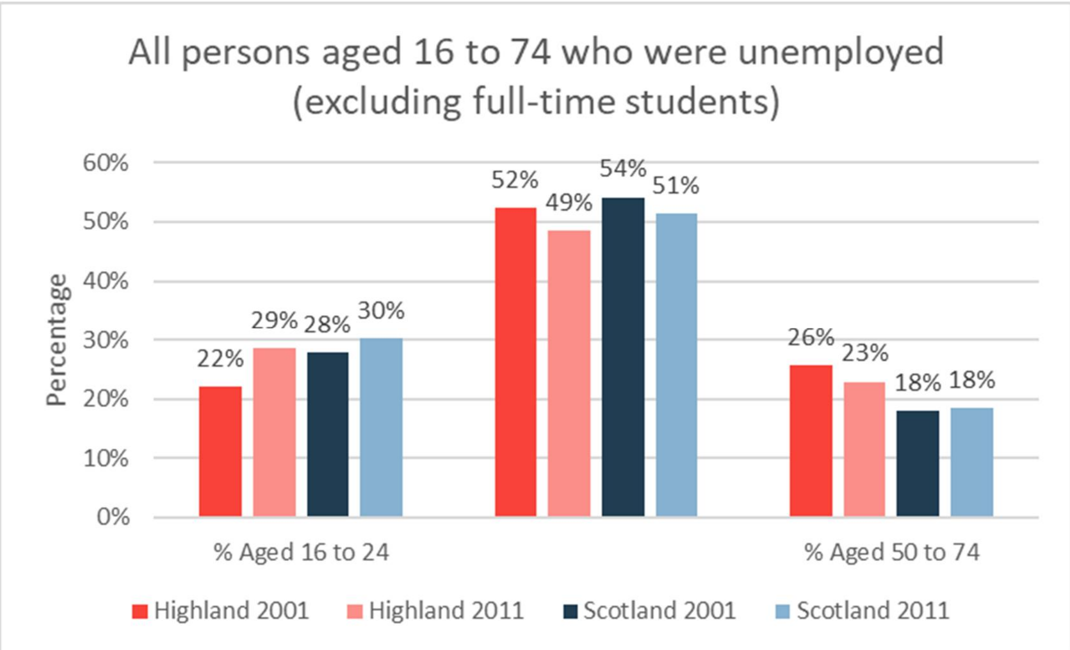


Figure 3-5: Percentage of unemployment in Scotland and Highland Council (Census 2001 and 2011)

EDUCATION

3.2.6. The level of education shown in Figure 3-6 reflects the increase in levels of education both in Scotland and the Highland Council area. Between 2001 and 2011 there was a significant decrease in the percentage of people with no qualifications as well as Level 1 and Level 2, whilst there has been an increase in the percentage of people that attain higher levels of qualification such as Level 3 and Level 4. Levels of qualification are as follows:

- Level 1: O Grade, Standard Grade or equivalent
- Level 2: SCE Higher Grade or equivalent
- Level 3: HNC, HND or equivalent
- Level 4: Degree or Postgraduate qualifications.

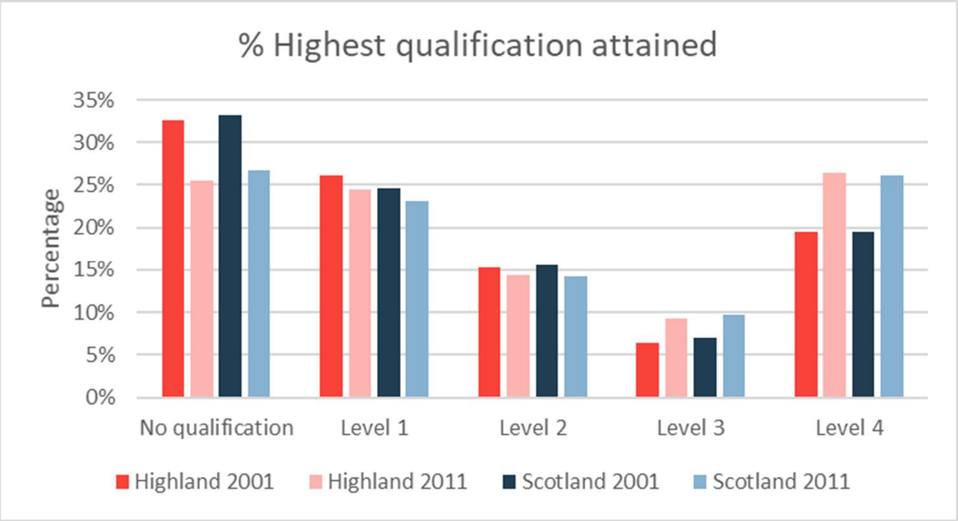


Figure 3-6: Highest qualification attained in Scotland and Highland Council (Census 2001 and 2011)

HEALTH

3.2.7. Figure 3-7 shows the classification of general health from the 2011 Census. The Highland area benefits from slightly higher levels of very good health and a lower percentage of bad health when compared to Scotland.

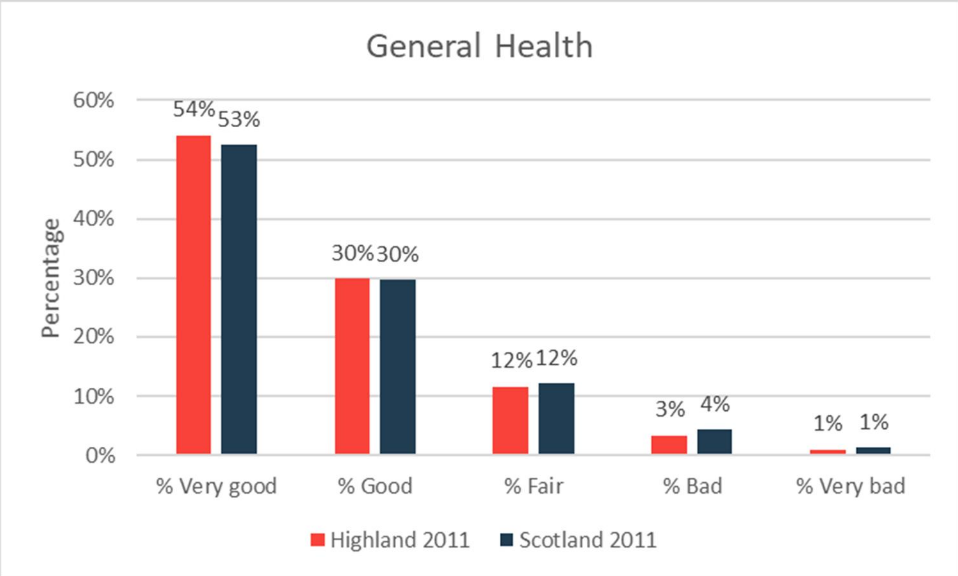


Figure 3-7: General health in Scotland and Highland Council (Census 2001)

LEVELS OF DEPRIVATION

3.2.8. The Scottish Index of Multiple Deprivation (SIMD) is the Scottish Government's official tool for identifying those places in Scotland suffering from deprivation. The SIMD incorporates several different aspects of deprivation such as employment, income, health, education, skills and training, geographic access, crime and housing and combines them into a single index. The 2016 Index provides a relative ranking for small areas in Scotland, from 1 (most deprived) to 6,976 (least deprived).

3.2.9. The figure presented in **Appendix E** shows the level of Deprivation around the study area. It reflects that the areas with the highest levels of deprivation areas lie within Inverness, particularly the rural areas of the city, as well as areas around Alness, Invergordon and Kildary. However, the rest of the towns and villages within the Inner Moray Firth are in the range of 25% to 100% percentiles of areas with the least deprivation in the SIMD.

TRANSPORTATION

3.2.10. Figure 3-8 and Figure 3-9 show the modal share of trips to work and study, respectively. Work related trips have a slightly higher car dependency than the rest of Scotland. There has been an increase in the share of trips made by public transport between 2001 and 2011.

3.2.11. Trips for the purpose of study have a higher mode share of public transport and active travel due to the proximity of schools from the origins.

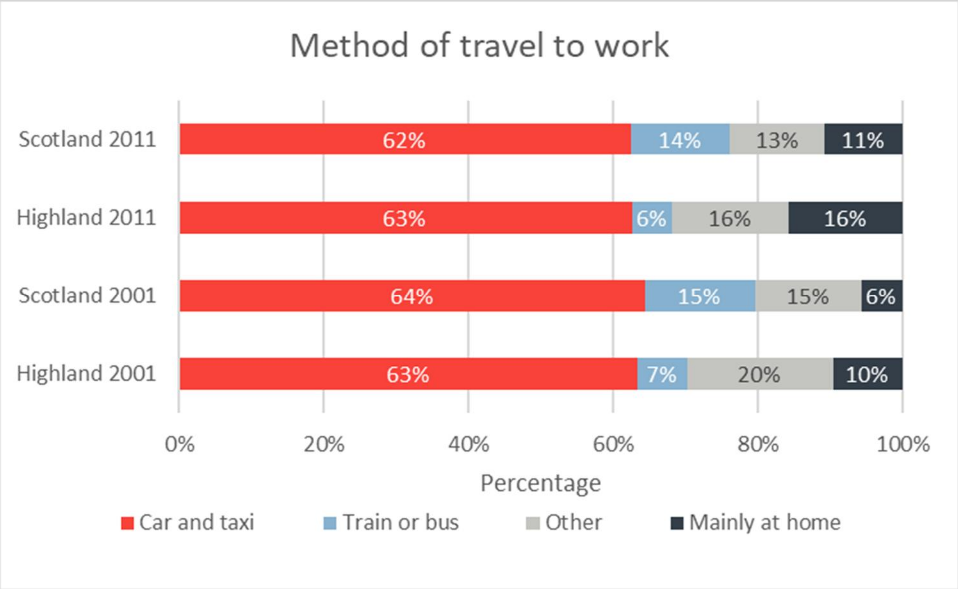


Figure 3-8: Method of travel to work Scotland and Highland Council (Census 2001 and 2011)

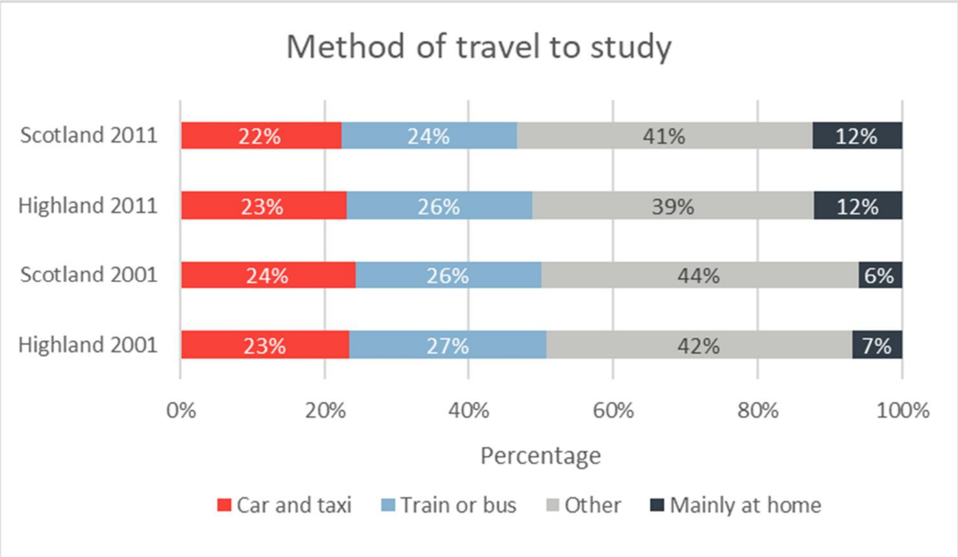


Figure 3-9: Method of travel to study Scotland and Highland Council (Census 2001 and 2011)

TRAVEL TO WORK PATTERNS

3.2.12. Figure 3-10 shows the trip distribution of journeys to work in Inverness, which is the main centre of economic, social and community activity in the north of Scotland. The figure highlights the broad geographic area from which commuters travel to Inverness and, in particular, the Black Isle, and the associated importance of the A9 and the Kessock Bridge over the Beauly Firth in connecting this region to Inverness.

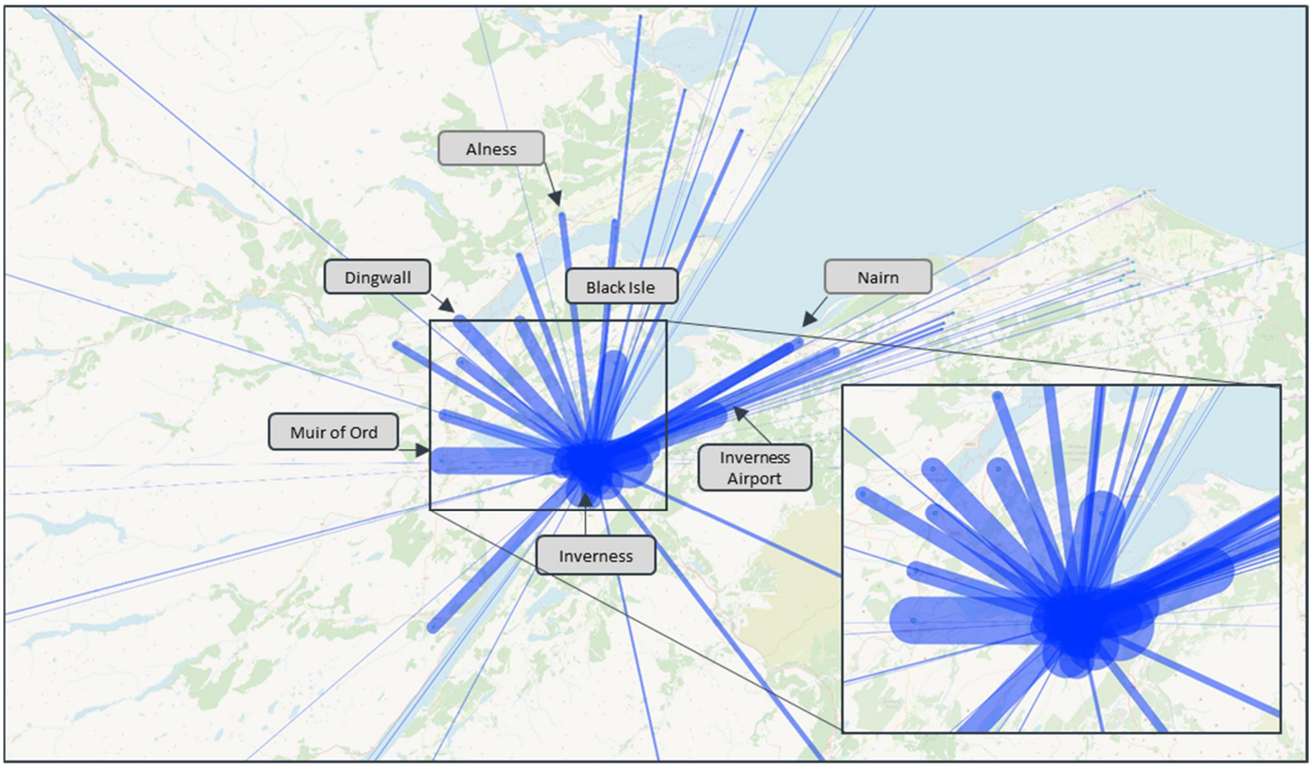


Figure 3-10: Patterns of travel to work to Inverness

3.2.13. Further detail of the road network and transport demand is presented in chapters 4.4.8 and 6.

3.3 ANALYSIS OF GEOGRAPHIC AND SOCIO-ECONOMIC CONTEXT

3.3.1. The geographic and socio-economic data indicates the following:

- The A9 in the study area serves a broad region, with pockets of population spread out over a large area, which would place a greater reliance on car as the mode of travel to work.
- The population is aging but levels of employment are slightly higher than in the rest of Scotland. The higher levels of employment suggest a greater requirement for transport connections to employment areas.
- The growing levels of educational attainment (between 2001 and 2011) may result in a greater desire to travel to urban centres, such as Inverness, for higher earning employment.
- Conversely the higher levels of working from home and part time working may reduce the need for travel during the peak commuting periods on weekdays.
- There is a strong “draw” to Inverness for commuters from the Black Isle based on the 2011 Census journey to work data, and the A9 in the study area serves these commuters.
- It is also important to note that the medium- and longer-term impacts of the COVID-19 pandemic, which will have an impact on the socio-economic profile of the area, are is still unfolding and which changes are transient or more permanent is yet to be understood.

4 POLICY REVIEW

4.1 INTRODUCTION

4.1.1. This chapter sets out the policy context which informs the study, including a summary of key policy documents from all levels of governance. Strategic transportation aims and objectives are set out at a national level and are subsequently transposed into regional transport strategies which then inform local transport strategies. The relevant policy documents are summarised below.

4.2 NATIONAL POLICY

NATIONAL TRANSPORT STRATEGY 2

4.2.1. Scotland's new National Transport Strategy (NTS2), published in February 2020, sets out the vision for Scotland's transport system:

> **"We will have a sustainable, inclusive, safe and accessible transport system, helping deliver a healthier, fairer and more prosperous Scotland for communities, business and visitors"**

4.2.2. This vision is underpinned by four pillars or priorities with three associated outcomes each, as shown in Figure 4-1.

Figure 4-1: National transport strategy 2 priorities.

4.2.3. The fourth pillar aims to create a transport system that is safe and secure as well as making communities that are great places to live and which enable people to make healthier travel choices. Having a transport system that is safe and secure focuses on the prevention and reduction of incidents on the transport system.

4.2.4. According to the “Reported Road Casualties Scotland 2019” (October 2020), there were 7,638 road accident casualties reported in Scotland in 2019, a 9% decrease compared to the previous year; however, there were 165 fatalities, an increase of 2%.

SCOTLAND’S ROAD SAFETY FRAMEWORK TO 2030

4.2.5. Scotland’s Road Safety Framework to 2030 was published in February 2021, setting out the national road safety strategy for Scotland. It builds upon the work achieved by the Framework to 2020 in reducing road casualties and confirms the Government’s commitment to achieving safer road travel in Scotland by having the best road safety performance in the world by 2030, and ambitious interim targets where the number of people being killed or seriously injured on our roads will be halved by 2030 (and a 60% reduction for children aged under 16).

4.2.6. The vision of the Road Safety Framework to 2030 is “For Scotland to have the best road safety performance in the world.”

4.2.7. The Framework recognises the impact of COVID-19 on transport and, together with the actions to target the climate emergency, foresees a change in patterns by 2032, shifting away from the dominance of private car use, particularly single occupancy, to a society which has embraced more walking, wheeling, cycling, public transport and shared transport options, particularly in urban settings.

4.2.8. It also embeds the vision of the NTS2 to have a transport system that will enhance opportunities and encourage long-term, sustainable development, calling for an inclusive, safe and accessible system to help deliver a healthier, fairer and more prosperous Scotland for its communities, businesses and visitors alike.

4.2.9. The intended outcomes of the Framework are shown in Figure 4-2, and align with the five pillars of the Safe System: Safe Road Use; Safe Vehicles; Safe Speeds; Safe Roads and Roadsides; and Post-crash Response.

4.2.10. The Framework sets the following interim targets to 2030:

- 50% reduction in people killed;
- 50% reduction in people seriously injured;
- 60% reduction in children (aged <16) killed; and
- 60% reduction in children (aged <16) seriously injured.

4.2.11. These targets are supported by seven intermediate outcome targets and three intermediate measures. The Key Performance Indicators are currently being developed and will be published in the first Road Safety Annual Delivery Plan.

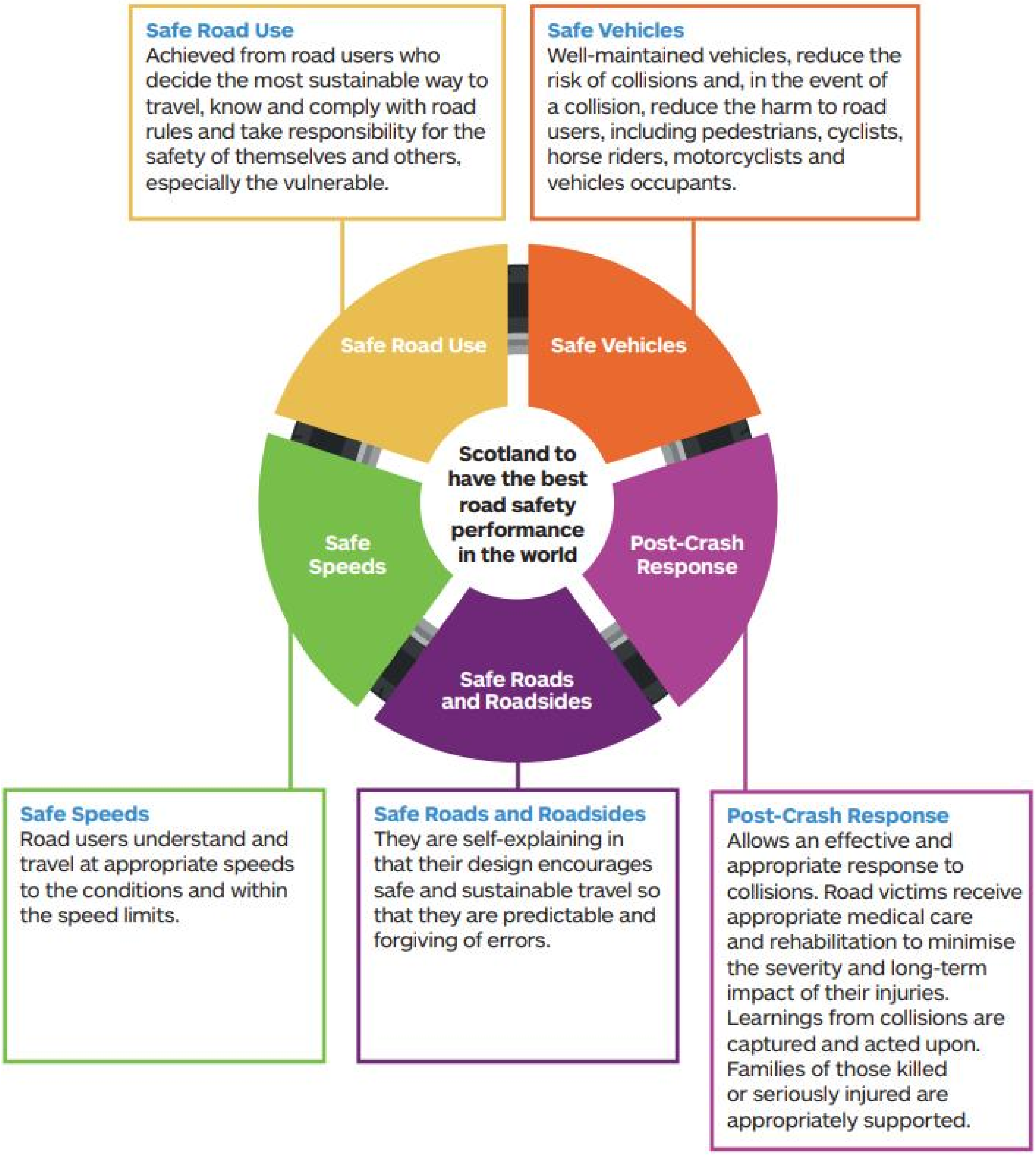


Figure 4-2 - Outcomes of the Road Safety Framework to 2030

4.2.12. The Framework identifies 12 current and emerging challenges that will make an impact on road safety. To address these challenges, the Framework proposes 12 Strategic Actions which are intended to be seen as the collective responsibility of all stakeholders and road safety partners. The delivery of these actions will be monitored and will be transferred and expanded upon in national and local delivery plans which sit outside the Framework. The 12 Strategic Actions as stated in the Framework are:

- Speed: will deliver a range of speed management initiatives to support the Safe System;

- Climate: will deliver road safety initiatives that positively impact the climate emergency and we will mitigate the negative impacts climate change may have on road safety;
- Funding & Resourcing: will improve funding streams for national and local road safety delivery;
- Change in Attitudes & Behaviour: will engage in partnership working to enable all road users to understand their road safety responsibilities, allowing them to improve their attitudes and behaviours for the safety of themselves and others;
- Technology: will research, implement and evaluate technologies for use within the Safe System and promote them as appropriate;
- Active & Sustainable Travel: will ensure road safety remains a key focus of active & sustainable travel in Scotland;
- Knowledge & Data Analysis: will ensure our actions are evidence-led to support the delivery of the Safe System;
- Enforcement: will optimise enforcement to encourage good road user behaviour to support the Safe System;
- Health: will strengthen the relationship between health and road safety, reduce the likelihood, number and severity of collisions and improve the post-crash response;
- Education: will provide opportunities for all road users to gain the knowledge, skills and experience required to become safe and responsible users;
- Engineering: will improve road infrastructure and maintenance; and
- Inequality: will reduce road safety inequality due to socio-economic disadvantage of people living in areas of deprivation.

STRATEGIC ROAD SAFETY PLAN 2016

4.2.13. The Strategic Road Safety Plan sets out how Transport Scotland delivers road safety on the trunk road network. It highlights the need to remove risk and prioritise initiatives aimed at preventing accidents and mitigating the effect when accidents occur.

4.2.14. The Road Safety Plan was published to support the outgoing Scotland Road Safety Framework to 2020 by reinforcing the use of a Safe System approach within the road transport system. This includes an Action Plan aligned with the five pillars which makes use of Transport Scotland's knowledge of the trunk road network and how to most effectively reduce casualties.

4.2.15. The Plan sets out 20 actions for the trunk road network, supporting wider engineering, education and enforcement programmes carried out by all agencies involved in road safety, which are in line with the actions set out by the Road Safety Framework to 2030.

4.3 REGIONAL POLICY

HIGHLAND-WIDE LOCAL DEVELOPMENT PLAN

4.3.1. The Highland-wide Local Development Plan (HwLDP) was adopted by the Highland Council in April 2012 setting out the overarching spatial planning policy for the whole of the Highland Council area, except the area covered by the Cairngorms National Park Local Plan. A review of the HwLDP was started in 2016 but was put on hold due to the publication of the Planning Bill published by the Scottish Government in December 2017.

4.3.2. The Plan sets out the vision and spatial strategy for the area to support the growth of all communities across the Highlands. The Plan is aligned with Scottish Government policy for sustainable development and sets out an increase in the number of houses to be built in order to meet the aspirations based on the Housing Need and Demand Assessment.

4.3.3. Further details on development and land use change is described in chapter 6.

4.3.4. The HwLDP addresses the need to work with Transport Scotland and other transport bodies to deliver transport infrastructure improvements across the area in line with Local Transport Strategies and the Scottish Government's Strategic Transport Projects Review. Although there are no specific objectives or actions related to road safety within the HwLDP, the Council recognises the importance of road safety in the Highland Local Transport Strategy.

4.3.5. The Highland Council Transport Strategy 2011 – 2014 highlights road safety as one of the 16 core policies. The objectives are closely aligned with the Road Safety Framework to 2030 and the Scottish Road Safety Targets.

4.4 LOCAL POLICY

INNER MORAY FIRTH LOCAL DEVELOPMENT PLAN

4.4.1. The Inner Moray Firth Local Development Plan (IMFLDP) was adopted in July 2015, setting out the guidance for future development alongside the Highland-wide LDP and Supplementary Guidance. It is the first of three new area local development plans used to determine planning applications in the Inner Moray Firth area. The adopted IMFLDP is currently under review.

4.4.2. The adopted IMFLDP sets out the land use strategy for delivering the vision of the plan to concentrate development in existing settlements, to create sustainable new communities and to provide the infrastructure and transport network required to support the communities whilst ensuring the protection of the area's natural and built environment.

4.4.3. The adopted IMFLDP is supported by a number of documents as follows.

- Strategic Environmental Assessment
- Habitats Regulations Appraisal
- Equalities Impact Assessment
- Transport Appraisal
- Action Programme
- Housing Land Requirement Background Paper
- Education Provision in the Inverness-Nairn Corridor.

4.4.4. In terms of transport, the adopted IMFLDP sees the potential for encouraging a shift to more sustainable forms of travel by taking advantage of the high population densities in the area, compared to the rest of the Highlands. In addition to new development being required to contribute towards local and strategic transport infrastructure requirements and contribute to the delivery of more sustainable forms of travel, the IMFLDP considered the following transport interventions:

- Encouraging more frequent and faster rail journeys
- A new rail station at Dalcross
- A park and ride in East Inverness
- Improving National Cycle Network 78
- An Inverness city centre to East Inverness walking/cycling route
- The West Link road scheme to relieve congestion in the city centre
- Delivery of priority actions detailed in Active Travel Masterplans.

Adopted Inner Moray Firth Local Development Plan – Transport Appraisal

4.4.5. The transport appraisal supports the IMFLDP by addressing the relationship between land use and transport planning. The appraisal assesses the implications of the IMFLDP vision and spatial strategy for the transport network, examines the capacity of the transport network to accommodate future development and outlines the transport interventions required to ensure that development is supported by a transport network that is fit for purpose.

Adopted Inner Moray Firth Local Development Plan – Planned Development

4.4.6. The data in **Appendix B** shows the quantum and location of development included in the IMFLDP. The sites included under **Appendix B** total more than 12,750 housing units to be delivered during the plan period up to 2035, with approximately half of these located in Inverness and Tornagrain.

4.4.7. The IMFLDP includes the Ross-shire growth area, which includes for growth in an arc from Muir of Ord through Alness, Invergordon and Tain. An extract from the IMFLDP showing the Ross-shire Growth Area is included in Figure 4-3 and shows the importance of the A9 link connecting this area to Inverness and the Inverness to Nairn Growth Area.

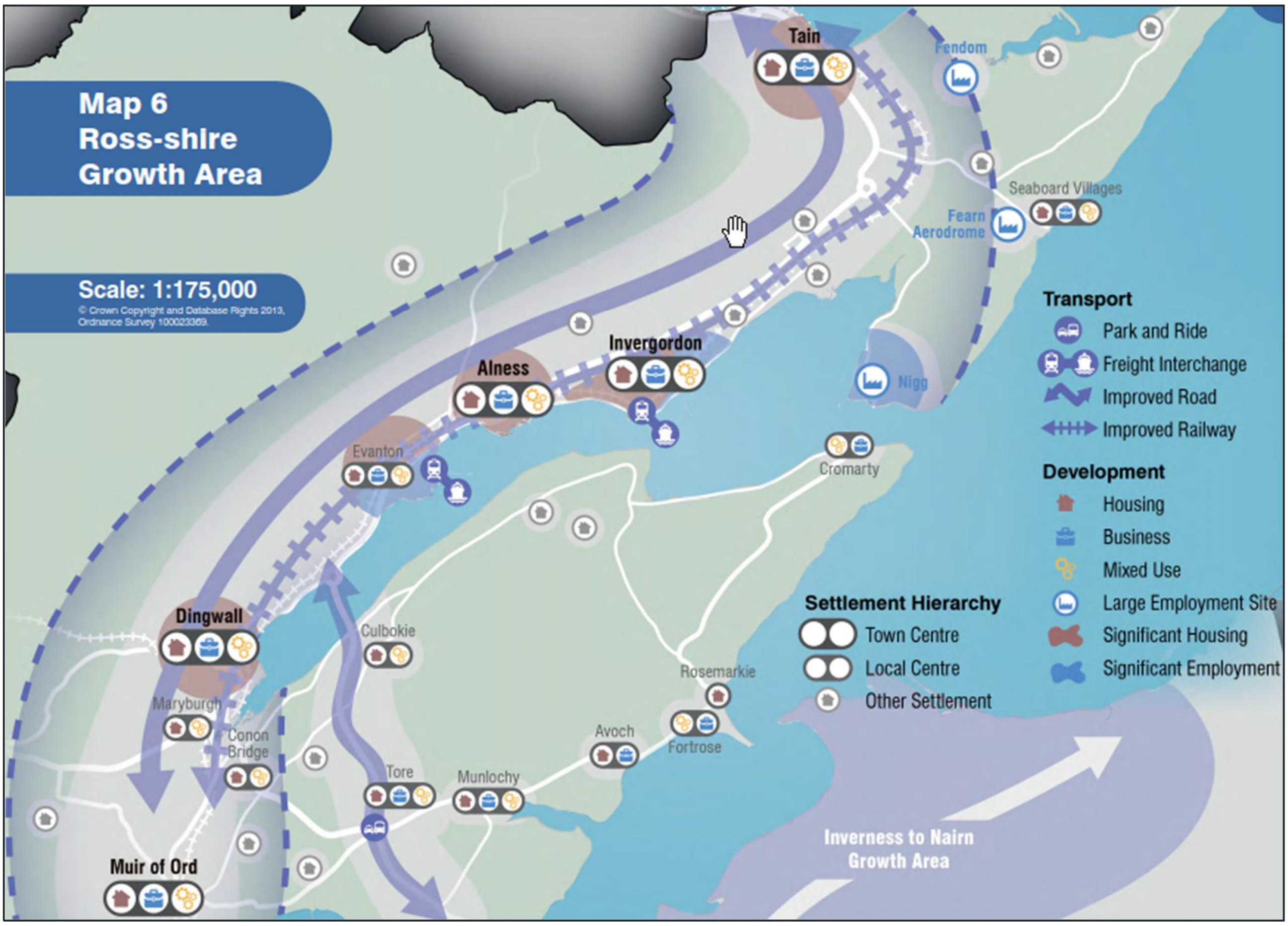


Figure 4-3: Extract from the Inner Moray Firth Local Development Plan (2015) – Map 6 showing the Ross-Shire Growth Area

4.4.8. The IMFLDP identified major infrastructure requirements for the Ross-shire Growth Area as follows:

- Improvements to important A9 junctions, in particular Munlochy (A9/B9161)

- Potential for other trunk road upgrades including overtaking lanes on the A9 and A835
- Potential for a park and ride at Tore
- Permanent bus priority measures on the Kessock Bridge.

4.4.9. The IMFLDP does not identify who is responsible for delivering the identified infrastructure.

Review of Inner Moray Firth Local Development Plan

4.4.10. At the time of drafting this report the Highland Council was undertaking a review of the IMFLDP. The Main Issues Report was published in January 2021 and is open for comments from the public until April 2021[1].

4.4.11. The main issues identified in the report published for consultation are:

- Addressing the Climate and Ecological Emergency
- Supporting a strong, diverse and sustainable economy
- Growing the most sustainable places
- Delivering affordable housing
- Matching development with infrastructure capacity
- Creating a more healthy, sustainable transport network
- Identifying and safeguarding valued, local green space
- Placemaking
- Meeting the needs of an ageing population.

4.4.12. A draft Transport Appraisal[2] has been undertaken to support the Main Issues Report. This document has not informed this Case for Change Report, as it is still in draft, but the Transport Appraisal will be considered in future appraisal stages.

[1] https://consult.highland.gov.uk/kse/event/35403
[2] https://highland.objective.co.uk/creation/download/5715972

5 CURRENT TRANSPORT NETWORK

5.1 OVERVIEW

5.1.1. This chapter provides details of the existing transport network, information of any planned improvements and identified current issues on the network.

5.2 STRATEGIC TRANSPORT NETWORK

5.2.1. The A9 corridor is the main strategic link connecting the north of Scotland. It is currently undergoing an ambitious dualling programme between Perth and Inverness, upgrading 80 miles of road from single to dual carriageway. According to Transport Scotland, £3 billion (2020) is being invested in the programme which is aimed at delivering economic growth through improved road safety and reduced travel times. The scheme also considers active travel and facilities for public transport.

5.2.2. North of Inverness, the Kessock Bridge carries the A9 across the Beauly Forth as dual carriageway road up to Tore Roundabout. From Tore Roundabout northwards the A9 is a single carriageway road. The A835 connects the A9 to the north of Scotland and serves as a strategic corridor to Ullapool and the connecting ferries to the Western Isles, as seen in Figure 5-1.

5.2.3. Other transport links include Inverness rail station and Inverness Airport which are the main hubs for rail and air travel in the north of Scotland. Inverness rail station is served by the Highland mainline from Perth to Inverness and the east line connecting with Aberdeen, Dundee and Edinburgh. From Inverness, there are connections to Wick and Thurso in the north and Kyle of Lochalsh in the northwest, with corresponding intermediate stations, providing alternative transport links to the A9 and A835 north of Inverness.

5.3 ROAD NETWORK

5.3.1. The strategic road network described in the previous section is supported by a number of local roads. Relevant to the study area are the B9161 connecting the A9 to the village of Munlochy, the A832 connecting Tore to Munlochy to the east and Muir of Ord to the west. Furthermore, a network of rural roads and paths serve the farms and industry in the region.

5.3.2. Of particular importance in this study is the B9161 Junction, which connects communities in the south of the Black Isle to the A9 via the B9161. The Black Isle lies within the Inverness travel to work area, as described in chapter 3, which (as shown in chapter 4) has seen considerable development growth in recent years and this has had an impact upon traffic volumes on the road network. A review of current demand and travel patterns, as well as future development and the impact on the network has been carried out and is presented in chapter 6.

5.3.3. Through ongoing monitoring of accident patterns across the trunk road network, an accident cluster (3 Personal Injury Accidents in 3 years) developed at the A9/B9161 junction. Transport Scotland's policy in this situation is to commission an accident investigation and prevention study provided there is the possibility of a common treatable cause of the accidents. In the case of the A9/B9161 junction, partly because of the concerns raised by stakeholders regarding safety and the impact of development on the Black Isle, and also because of the number of previous road safety improvements, Transport Scotland made the decision to undertake the Case for Change study (under STAG).

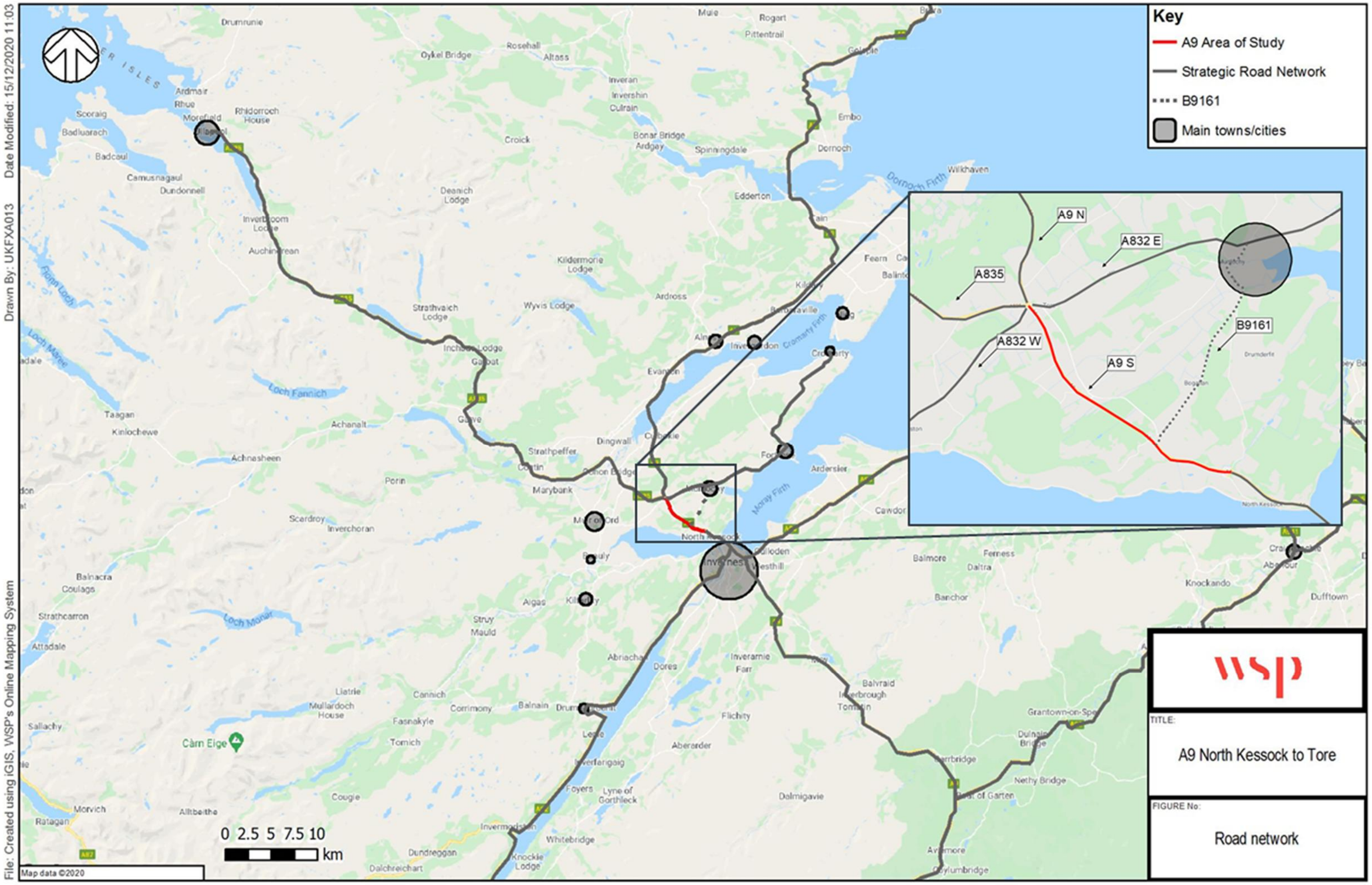


Figure 5-1: Strategic road network in the north of Scotland

5.3.4. A detailed Road Safety Analysis is presented in chapter 7 which reviews information from previous studies as well as the surveys commissioned for this study to assess the collision data, conflicts and safety issues.

5.4 BUS NETWORK AND ACTIVE TRAVEL

5.4.1. The study area is served by long and short distance bus services. Bus stops that serve residents are located in the settlements and local roads as well as along the A9 on both directions. The bus stops and services provided (as of September 2020) are shown in Figure 5-2.

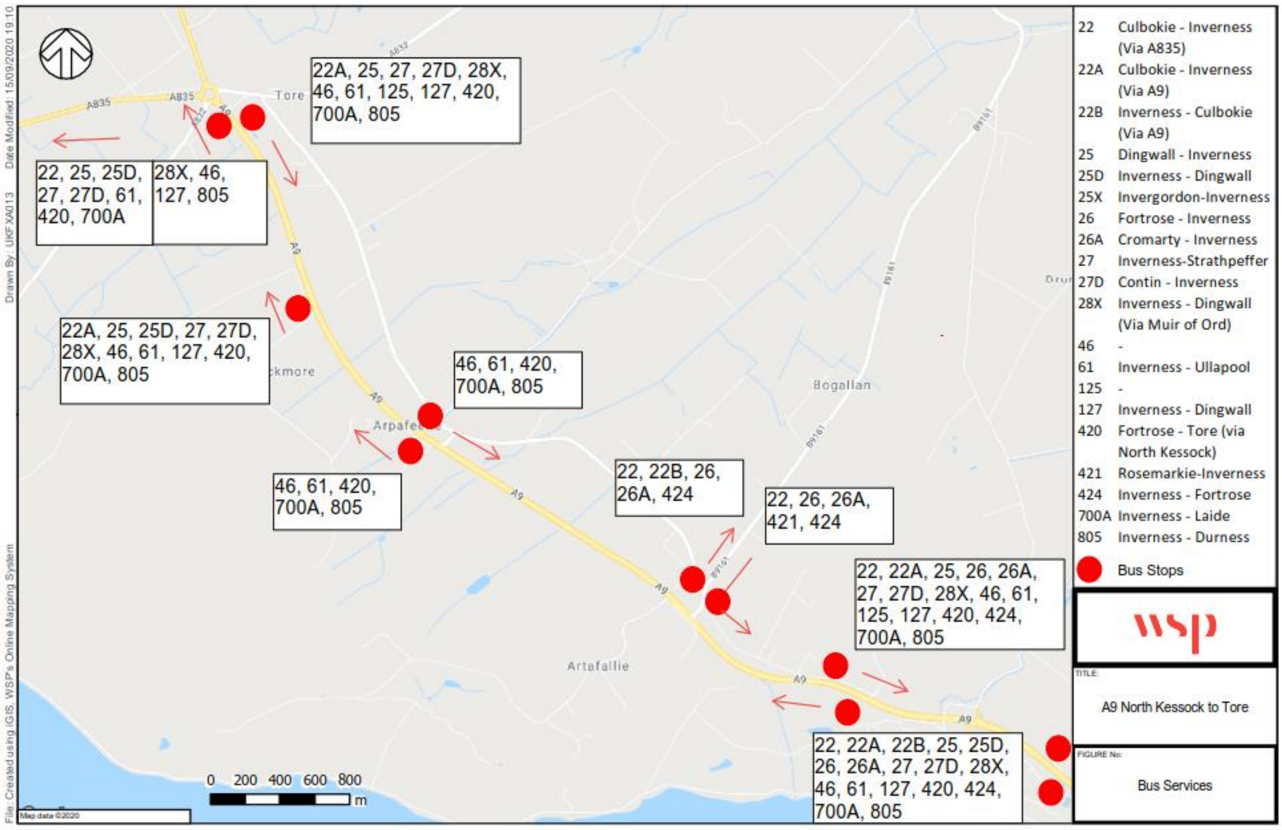


Figure 5-2: Bus stops and services

5.4.2. There are active travel provisions in the study area as shown in Figure 5-3. These include the National Cycle Network Route 1 connecting Inverness to Tain and Dingwall in the north. This section is composed of a mixture of on-road and traffic-free paths as well as pedestrian and cycling crossings.

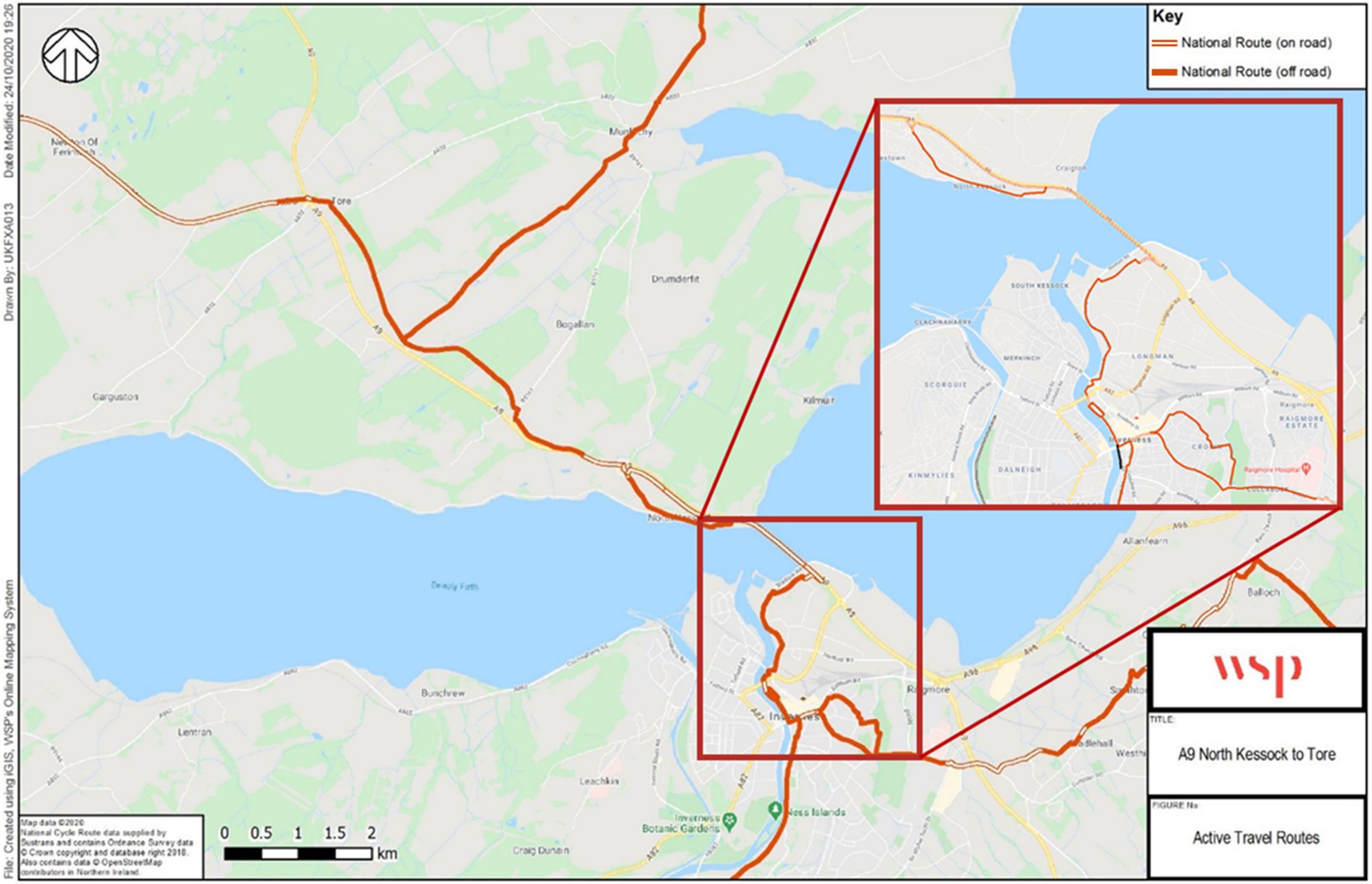


Figure 5-3: Active travel routes

6 TRANSPORT DEMAND AND TRAFFIC MODELLING

6.1 INTRODUCTION

6.1.1. This chapter sets out an analysis of the existing demand on the transport network described in the previous chapter, informed by the available data, new traffic surveys, and traffic modelling assessments which considered the current situation (2020) and the most likely future scenario (2035).

6.2 EXISTING TRANSPORT DEMAND

6.2.1. The existing transport demand was identified by analysing the following information:

- Department for Transport / Transport Scotland permanent traffic counters
- Speed surveys carried out in March 2020 by Transport Scotland
- Traffic counts carried out in September 2020.

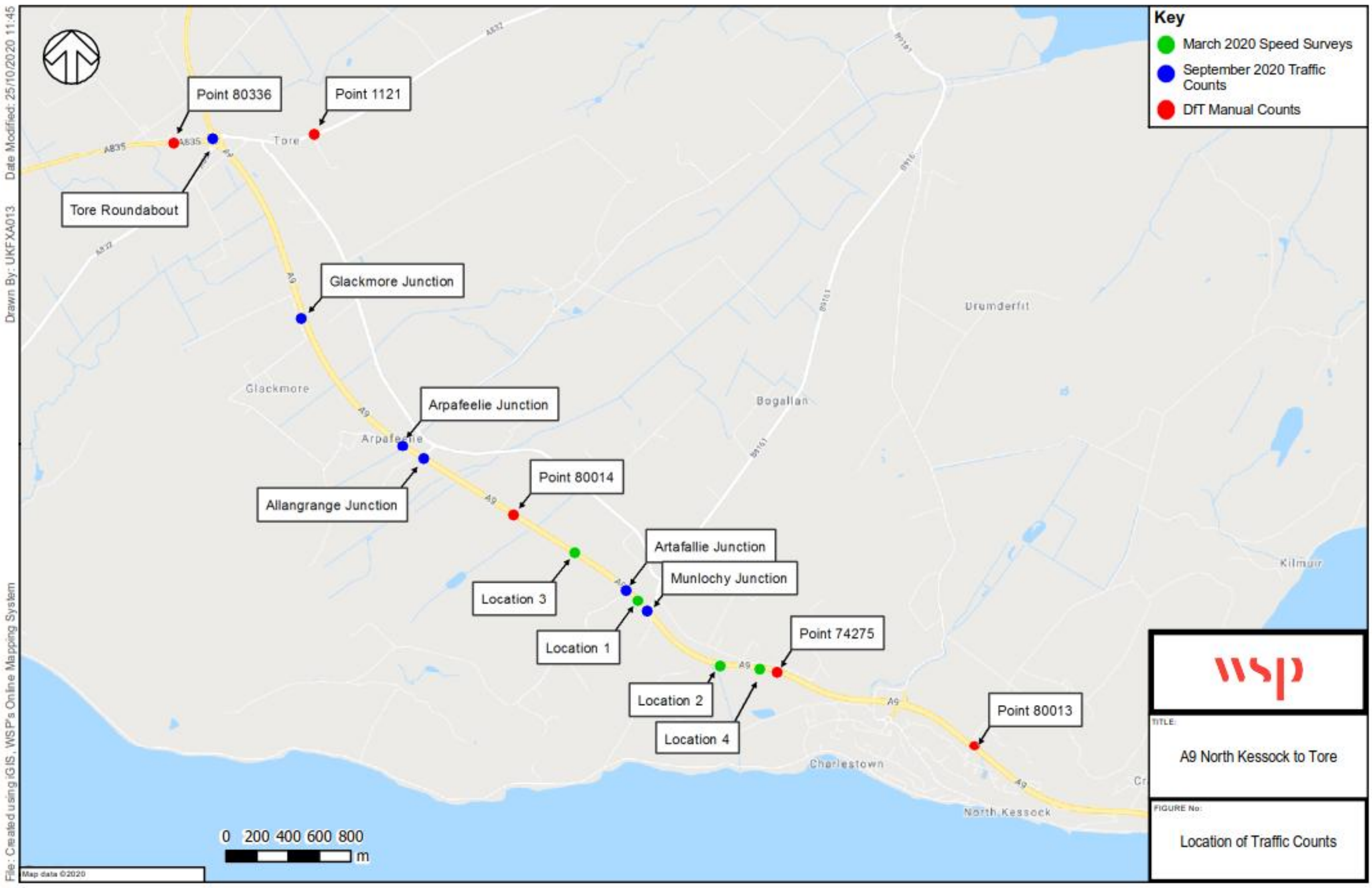


Figure 6-1: Location of traffic counts (September 2020) and speed surveys (March 2020)

6.2.2. Data from the permanent counters just west of the Kessock Bridge were used to identify the overall change in flows between September 2019 and September 2020 in order to ascertain whether traffic volumes had reduced due to the impacts of the COVID-19 pandemic.

6.2.3. Transport surveys were undertaken between 10 September 2020 (Thursday) and 12 September 2020 (Saturday), including turning counts, queue lengths as well as pedestrian counts at crossings on Tore Roundabout. Details of the locations surveyed are included in **Appendix C.**

6.2.4. Results from the surveys carried out during September, as well as information publicly available, were used to understand the travel patterns around the study area. This includes trips between major generation and attraction centres such as Inverness, the Black Isle area, Tore, and long-distance trips going to the north and north-west of Scotland.

Consideration of COVID-19 impacts on traffic survey data

6.2.5. The ongoing COVID-19 pandemic has had an impact on the traffic levels observed on the whole of Scotland's network. Government restrictions on travel has meant a reduced number of vehicles on the roads, including the A9. For this reason, traffic levels were compared between September 2019 and September 2020.

6.2.6. The comparison shows that although traffic demand has not fully returned to pre-pandemic levels, through traffic flows are within 10% of that observed in 2019 and hence the traffic data can be considered to be reasonably representative and suitable for the purposes of this study. This is shown in Figure 6-2 which compares information recorded by counter 104540, located just west Kessock Bridge, between September 2019 and September 2020.

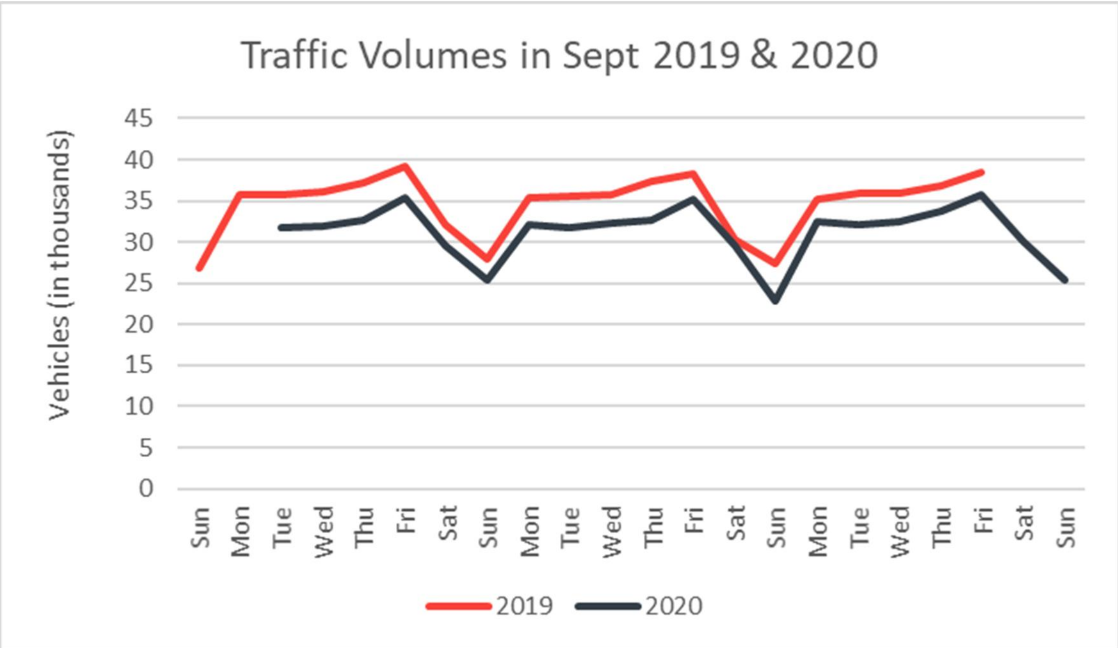


Figure 6-2: Traffic volumes comparison between 2019 and 2020 at counter 104540

Traffic Profiles

6.2.7. In this section, the A9 acts as a strategic corridor for long distance trips as well as a commuting route to/from the areas mentioned above. This is reflected by the variation in traffic volumes in different directions during peak hours. Figure 6-3 shows the hourly southbound profile on the A9 while Figure 6-4 shows the northbound profile.

6.2.8. The southbound hourly profile shows the morning peak for commuters going to Inverness, which is particularly noticeable at 7:00 am for Thursday and Friday. The Saturday peak appears later during the day, in line with similar weekend travel patterns observed in other routes, and is higher than the peaks observed for Thursday and Friday.

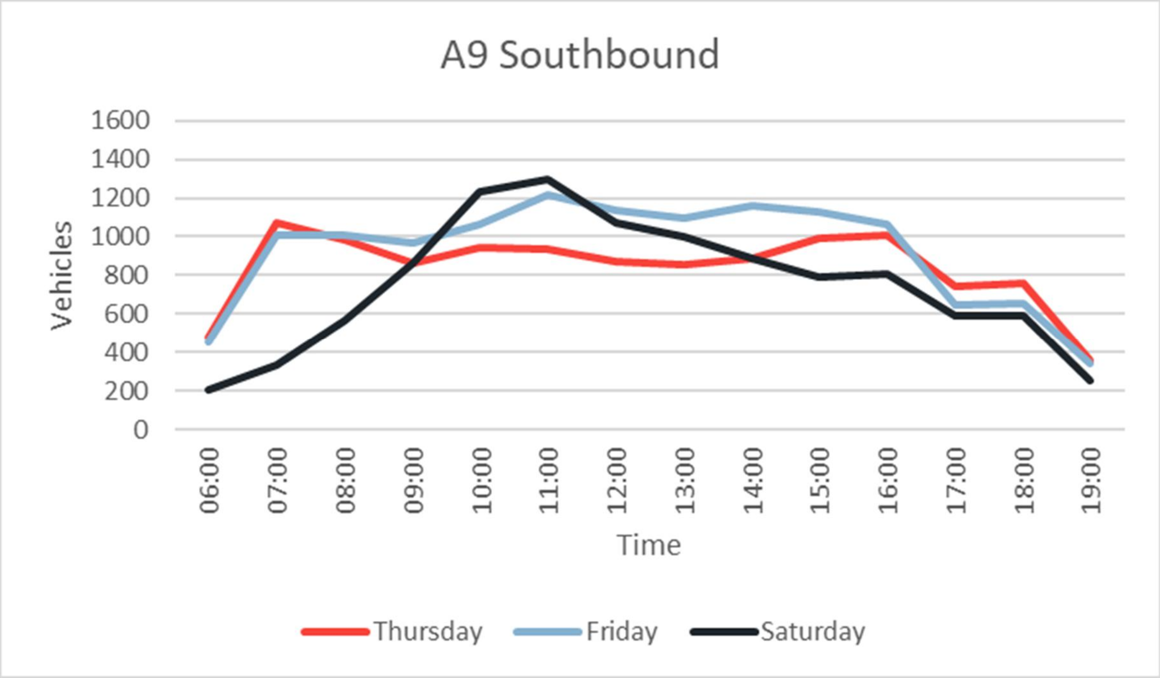


Figure 6-3: A9 Southbound hourly profile (September 2020)

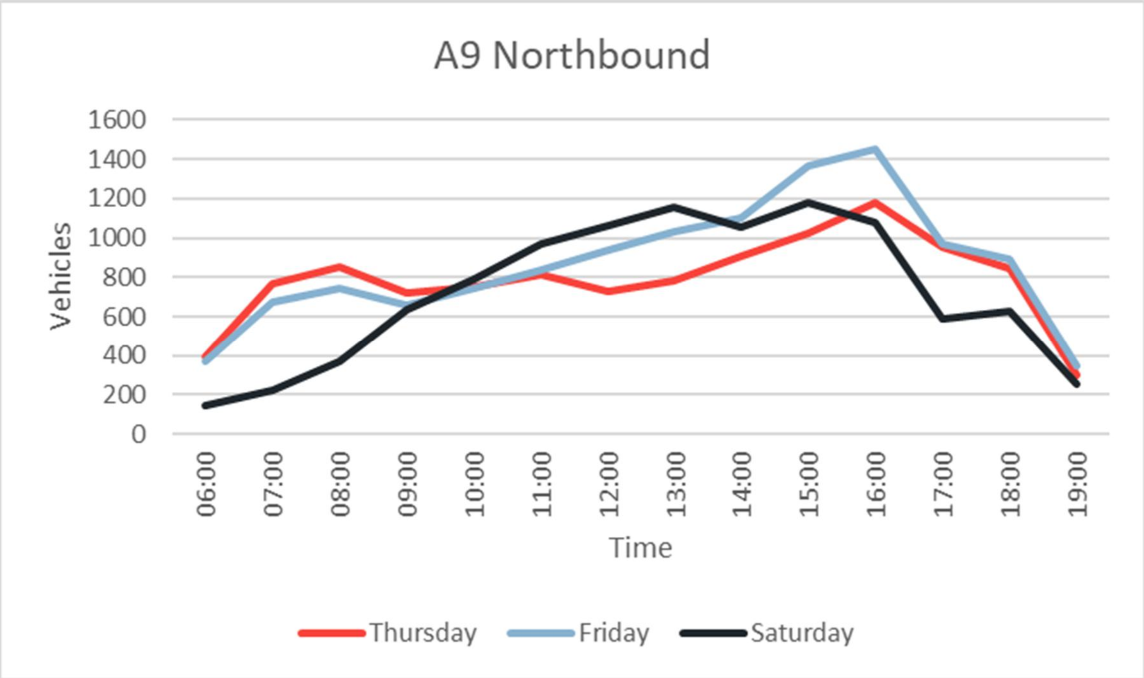


Figure 6-4: A9 Northbound hourly profile (September 2020)

6.2.9. In contrast, the northbound profile reflects the PM peak of commuters heading home from Inverness into different areas of the Black Isle and the wider Inner Moray Firth area. The Friday evening peak is the highest, which may be the result of evening commuters combined with leisure trips northbound for the weekend.

6.2.10. Of particular interest to the study are the travel patterns between Inverness and the north-eastern parts of the Black Isle. The two main routes to access the north-eastern parts of the Black Isle are the B9161 and the A832 (via Tore Roundabout), as described in previous chapters.

6.2.11. Although the A832 is a major road, there is a strong preference to use the B9161 as it provides a more direct route and is (based on stakeholder views) in a better condition than the A832 which is mainly used by HGVs and farming vehicles. However, using the B9161 means users must make a right turn off the A9 dual carriageway.

6.2.12. Table 6-1 shows the proportion of vehicles that use the B9161 and the A832 to go between the north-eastern parts of the Black Isle and Inverness. Information from the surveys carried out in September 2020 show that roughly between 70% and 80% of the trips are made through the B9161, with 20%-30% through the A832. In absolute values, these figures amount to a total of over 4,000 vehicles per day going from the A9 to the north-eastern part of the Black Isle using both junctions and, during the PM peak hour, this amounts to almost 300 vehicles turning right towards the northeast part of the Black Isle.

Table 6-1: Travel patterns between Inverness and the north-eastern parts of the Black Isle through the study area (September 2020)

	Peak AM hour		Peak PM hour		Saturday	
To Munlochy (northbound)	**Vehicles**	**Proportion**	**Vehicles**	**Proportion**	**Vehicles**	**Proportion**
Via B9161	115	76%	242	81%	207	79%
Via A832	36	24%	56	19%	54	21%
From Munlochy (southbound)						
Via B9161	288	88%	176	78%	208	79%
Via A832	40	12%	49	22%	54	21%

Vehicle Mix

6.2.13. Cars account for 79% of trips using the A9, while heavy goods vehicles make up 5%. For trips to and from the Black Isle area the mix on the B9161 is cars (82%) other vehicles (15.5%) and HGV's (2.5%). By contrast the A832 carries a higher percentage of HGVs (15%) to/from Munlochy and the wider Black isle area, with cars making up 68% of the total traffic volume and other traffic (17%).

6.3 QUEUE ANALYSIS

6.3.1. Queues were recorded in all junctions as part as the surveys carried out in September 2020. A detailed queue analysis was carried out for Munlochy Junction and Tore Roundabout as part of the analysis. The intermediate junctions (Glackmore, Arpafeelie, Allangrange and Artafallie) recorded maximum queue lengths of between one and two vehicles and, as a result, detailed analysis was not carried out in these junctions.

MUNLOCHY JUNCTION

6.3.2. At Munlochy Junction the survey data shows a maximum queue of 25 vehicles waiting to turn right into the B9161 from the A9. This queue was detected on 10 September 2020 (Thursday) during the PM peak. The queue did not extend to beyond the extent of the right turning lane but the queue reached to the maximum capacity of the turning lane.

6.3.3. The profile of queuing at this right turn movement is shown in the figure below, which shows that the maximum queue of 25 vehicles only occurred at a single five minute interval in the peak period.

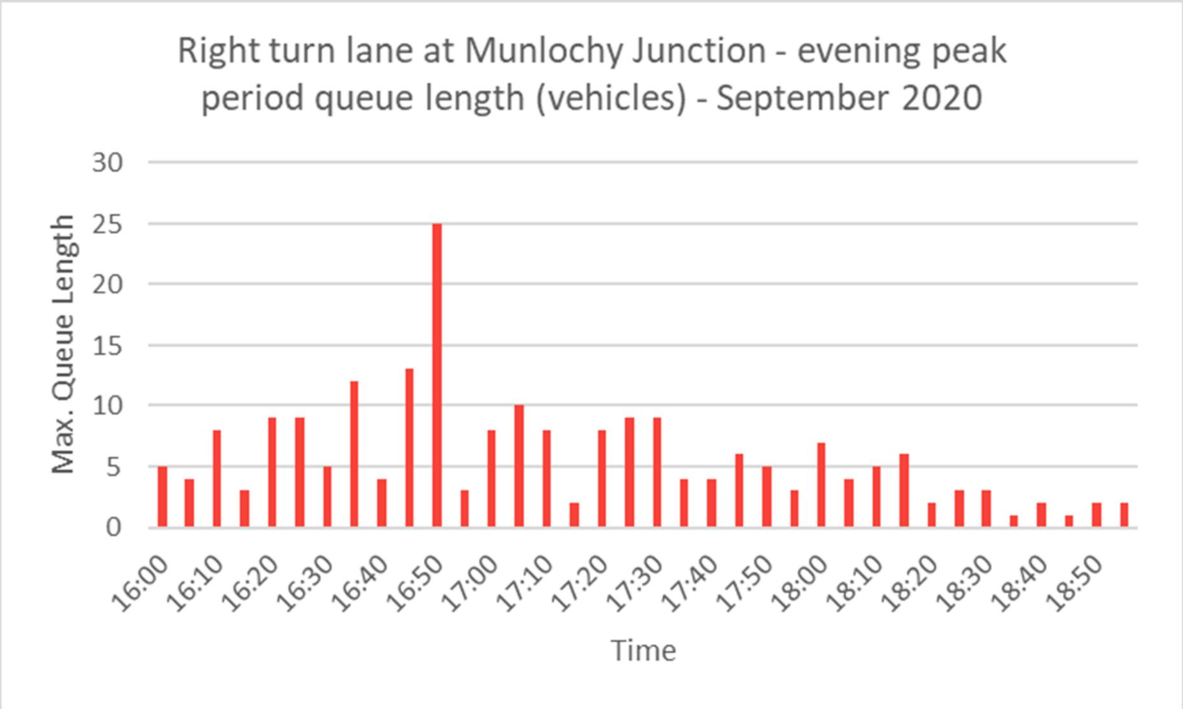


Figure 6-5: Five-minute interval queue profile (Thursday 10th September 2020) for A9 Northbound right turn from into B9161

6.3.4. During the build-up of the observed maximum queue length, one vehicle was recorded to be in the queue for around 2.5 minutes waiting to turn right.

6.3.5. It was noted that traffic appeared to arrive at the Munlochy Junction in platoons during the evening peak which could be attributed to the traffic signals at Longman Roundabout to the south of the Kessock Bridge.

TORE ROUNDABOUT

6.3.6. At Tore Roundabout, the maximum number of vehicles queueing on the A9 north approach (southbound) to the roundabout was 29 vehicles, which occurred at 16:55 on 10 September 2020 (Thursday). The maximum on the A832 west approach (eastbound) to the roundabout was 19 vehicles at 17:05 on the same day.

6.3.7. The maximum on the A9 south approach (northbound) to the roundabout was 11 vehicles at 17:20 on 10 September 2020 (Thursday) and repeated at 16:00 on 11 September 2020 (Friday).

6.3.8. The maximum queue length on the A832 east approach (westbound) to the roundabout was 20 vehicles at 07:15 on 10 September 2020 (Thursday) and on the A835 east approach (westbound) it was 39 vehicles at 16:10 on 11 September 2020 (Friday).

6.3.9. The maximum queue profiles are shown in Figure 6-6.

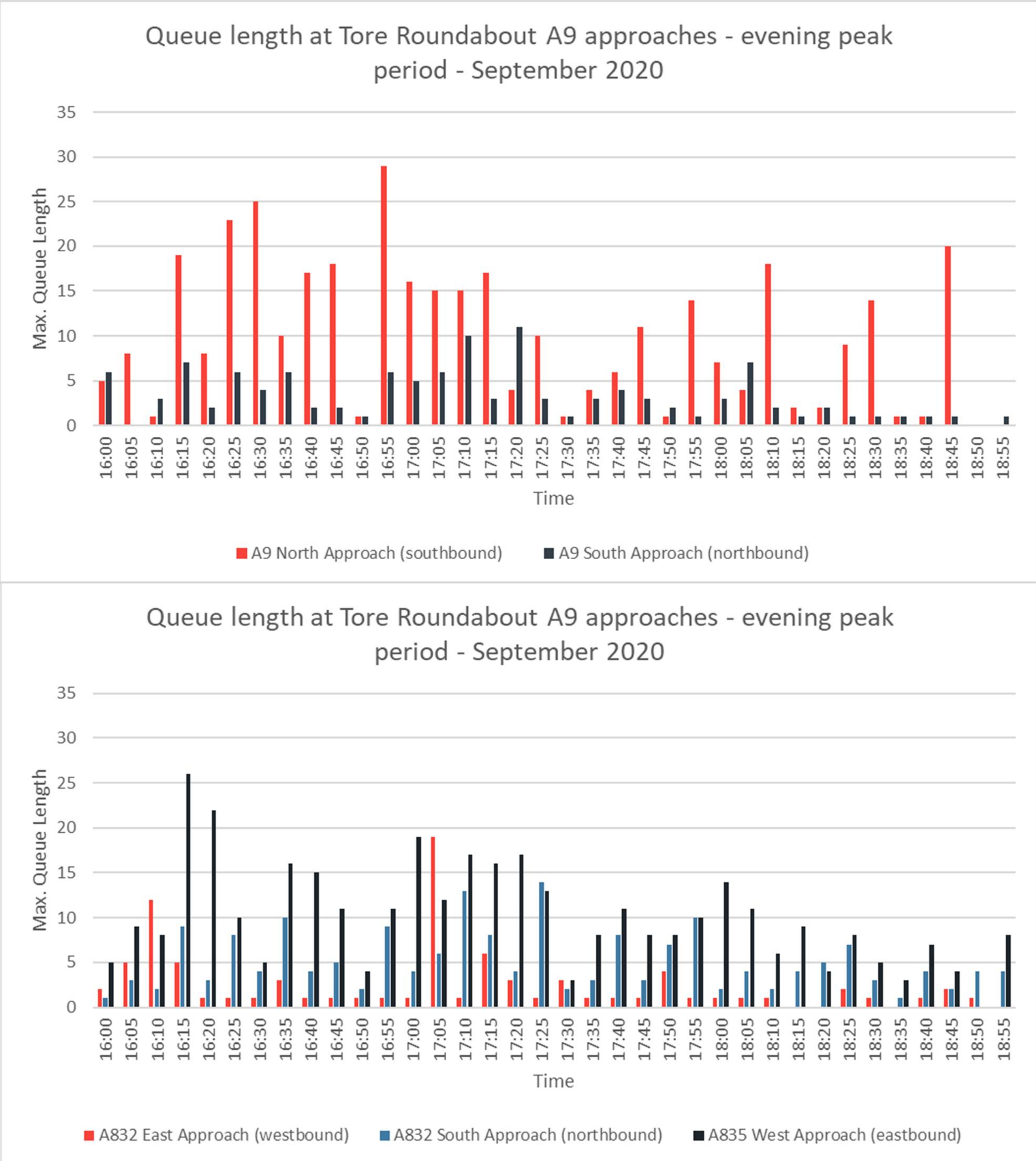


Figure 6-6 - Five-minute interval queue profile (Thursday 10 September 2020) - Tore roundabout approaches

6.4 TRAFFIC MODELLING OF EXISTING AND FUTURE DEMAND

6.4.1. The traffic counts informed the existing traffic volumes and movements at the junctions and provided the evidence for the road safety analysis. In addition to the transport surveys, information from the Inner Moray Firth Local Development Plan and the Highland-wide Local Development Plan provide information on the proposed future development in the area to 2035.

SPREADSHEET MODELLING OF THE STUDY AREA NETWORK

6.4.2. A spreadsheet traffic model is included in **Appendix F.** The model represents the current situation and the future situation with development growth included. The inputs used for the model, as described throughout this report, have included traffic counts and the forecast growth was based on information from Transport Scotland's Transport Model for Scotland (TMfS).

6.4.3. The objective of the traffic model was to reflect the current and forecast traffic demands as accurately as possible based on available data and assumptions. A number of assumptions were applied which included:

- No change in existing infrastructure
- No change in travel behaviours (i.e. no additional modal shift into sustainable modes of transport or changes due to COVID-19 pandemic)
- Growth in line with that used in the IMFLDP, which is what has informed the TMfS forecasts. This growth does not include development not considered in the IMFLDP.

6.4.4. Growth from TMfS (as applied in the model for this study) is 9.79% between 2020 and 2035. The model takes land use changes and transport supply impacts into consideration, i.e. the impact of congestion and potential mode shift.

6.4.5. Further consideration of forecast growth scenarios will be undertaken at future stages of the study (should it proceed) to inform the detailed appraisal of options.

LOCAL ISOLATED JUNCTION MODELLING – EXISTING SITUATION

6.4.6. The results from the spreadsheet model have been used to inform the Junctions 9 models for Munlochy junction and Tore Roundabout respectively. The main outputs from the Junctions 9 models are the current capacity and levels of service at which the junctions are operating. The levels of service assign a qualitative grade based on the performance including speed, congestion, delays and density. These levels of service range from A, indicating free flow with no congestion or delays, through to F, indicating an uneven or broken flow, heavily congested and with long delays. The full reports from Junctions 9 are included in **Appendix G.**

6.4.7. Descriptions of the Level of Service (LOS) categories reported in this section are provided below:

- LOS A: Free flow, traffic flows at speed limit or above with complete mobility between lanes, vehicle separation is around 27 car lengths.
- LOS B: Reasonably free flow, traffic flows at speed limit or above with manoeuvrability between lanes slightly restricted, vehicle separation is around 16 car lengths.
- LOS C: Stable flow, traffic flows at speed limit and mobility between lanes requires more awareness from drivers, vehicle separation is around 11 car lengths.
- LOS D: Approaching unstable flow, reduced speed and manoeuvrability, driving comfort decreases, vehicle separation is around 8 car lengths.

- LOS E: Unstable flow, speed varies rapidly, unable to reach speed limit, reduced gaps to manoeuvre, vehicle separation is around 6 car lengths.
- LOS F: Breakdown flow, every vehicle moves in lockstep with the vehicle in front, no space to manoeuvre, no separation between vehicles.

6.4.8. Table 6-2 shows the level of service for each of the movements at Munlochy junction, while Table 6-3 shows the delays in seconds experienced by users at each of the approaches. Overall, the junction is operating with levels of service in the range between A and C at peak times.

6.4.9. The results are consistent with the observed conditions on site, with more vehicles seeking to turn right from the A9 (northbound) onto the B9161 during the PM peak and the left turn from the B9161 to the A9 (southbound) during the AM peak, translating into greater delays and lower levels of service.

6.4.10. The results for Tore Roundabout are presented in Table 6-4 and Table 6-5, where the modelling output indicates that the junction is operating with good level of service (levels A to C), having delays of no more than 15 seconds per vehicle accessing the roundabout during the weekday peaks.

Table 6-2: 2020 Average Level of service at Munlochy Junction

Munlochy Junction			
Movement	**Weekday**		**Saturday Peak**
	AM Peak	**PM Peak**	
A9 (Southbound) - B9161	A	A	A
B9161 - A9 (Northbound)	B	B	B
B9161 - A9 (Southbound)	C	A	B
A9 (Northbound) - B9161	B	B	B

Table 6-3: 2020 Average Modelled Delays (in seconds) at Munlochy Junction

Munlochy Junction			
Movement	**Weekday**		**Saturday Peak**
	AM Peak	**PM Peak**	
A9 (Southbound) - B9161	0.00	0.02	0.03
B9161 - A9 (Northbound)	10.36	12.05	11.78
B9161 - A9 (Southbound)	20.36	9.99	13.68
A9 (Northbound) - B9161	10.02	14.08	13.91

Table 6-4: 2020 Average Level of service at Tore Roundabout

Tore Roundabout			
Approach	Weekday		Saturday Peak
	AM Peak	PM Peak	
A9N (Southbound)	B	A	B
A832 (E)	A	A	A
A9S (Northbound)	A	A	A
A832 (W)	A	A	A
A835	B	B	C

Table 6-5: 2020 Average Modelled Delays (in seconds) at Tore Roundabout

Tore Roundabout			
Approach	**Weekday**		**Saturday Peak**
	AM Peak	**PM Peak**	
A9N (Southbound)	10.22	9.58	13.76
A832 (E)	5.09	4.94	5.29
A9S (Northbound)	4.00	8.24	3.30
A832 (W)	4.47	5.03	3.91
A835	12.47	14.39	16.02

Modelled Queuing vs Observed Queuing

6.4.11. The observed queuing for the right turn movement from the A9 onto the B9161 at Munlochy Junction is higher than the modelled maximum queue lengths. Whilst a reasonable effort was made to calibrate the model to the observed conditions, the profile of observed queuing does suggest the queues are influenced by the arrivals of platoons of northbound traffic over the Kessock Bridge, which cannot be replicated in an isolated junction model.

6.4.12. There may be other localised elements that influence the calibration of the junction models such as the gap acceptance behaviour of local drivers. This calibration was beyond the proportional scope at the Case for Change stage but would be revisited at subsequent more detailed options appraisal stages.

6.4.13. Similarly, at Tore Roundabout the observed queuing is influenced by the presence of slow-moving vehicles (HGVs or agricultural vehicles) which cause delays and queuing when attempting to enter the roundabout. The isolated junction model is unable to replicate this impact and the modelled queue lengths (which are also averaged over both lanes) are shorter than the observed queues.

6.4.14. However, the models are considered to be suitably robust to support an assessment of the relative impact of traffic growth to be made (supporting the Case for Change report).

6.5 FORECAST CHANGES TO THE TRANSPORT SUPPLY AND DEMAND

6.5.1. There is projected traffic growth due to housing development and employment in the wider Inner Moray Firth Area. The following documents have been analysed for the planned land-use development:

- The Highland-wide Local Development Plan (HwLDP)
- Inner Moray Firth Local Development Plan (IMFLDP)
- Recent planning applications submitted.

HIGHLAND-WIDE LOCAL DEVELOPMENT PLAN

6.5.2. The Plan notes that the Inner Moray Firth, with Inverness at its centre, is the engine of the wider Highland economy and experiences pressures from development, as well as constraints from its infrastructure. The plan identifies that capacity in the existing transport network may be a constraint for future development.

6.5.3. The Spatial Strategy for the Inner Moray Forth identifies planned major housing expansion at Dingwall, near the A835 trunk road northwest of the study area, as well as new housing and employment at Evanton, Alness and Invergordon on the A9, north of the study area.

6.5.4. Within Inverness, strategic growth areas are concentrated in the south and east of the city, including at sites in proximity to the A9 including Milton of Leys, Inshes. Raigmore, the former Longman landfill site and at South Kessock.

6.5.5. The plan also identifies that the majority of growth around Inverness up to 2031 will be concentrated along the A96 corridor between Inverness and Nairn, which is dependent on infrastructure upgrades to facilitate increased transport demand.

INNER MORAY FIRTH LOCAL DEVELOPMENT PLAN

6.5.6. The areas identified in the adopted Inner Moray Firth Local Development Plan (2015) for future development are shown in **Appendix B** and Figure 6-7. The plan also identifies areas within the Inner Moray Firth considered as a Special Landscape Area or Rural Hinterland, which guides development in the countryside.

6.5.7. The Black Isle is identified in the Plan as predominantly Rural Hinterland, with growth areas focussed north and south of the Black Isle, along the A9 between Tain and Dingwall to the north of the study area, and along the A96 between Nairn and Inverness to the south of the study area. Growth is also identified in proximity to the A835 and the North Highland Line railway between Dingwall and Muir of Ord.

Rural Hinterland Land Use Policy

6.5.8. Policy 35 of the Highland-wide LDP (Housing in the Countryside) sets a presumption against approving housing development in the rural hinterland outside of existing settlements, with exceptions in limited circumstances such as redevelopment of disused buildings or development on brownfield sites which cannot be returned to a natural state. With this policy in place, development within the study area is constrained to existing settlements, with major new developments unlikely.

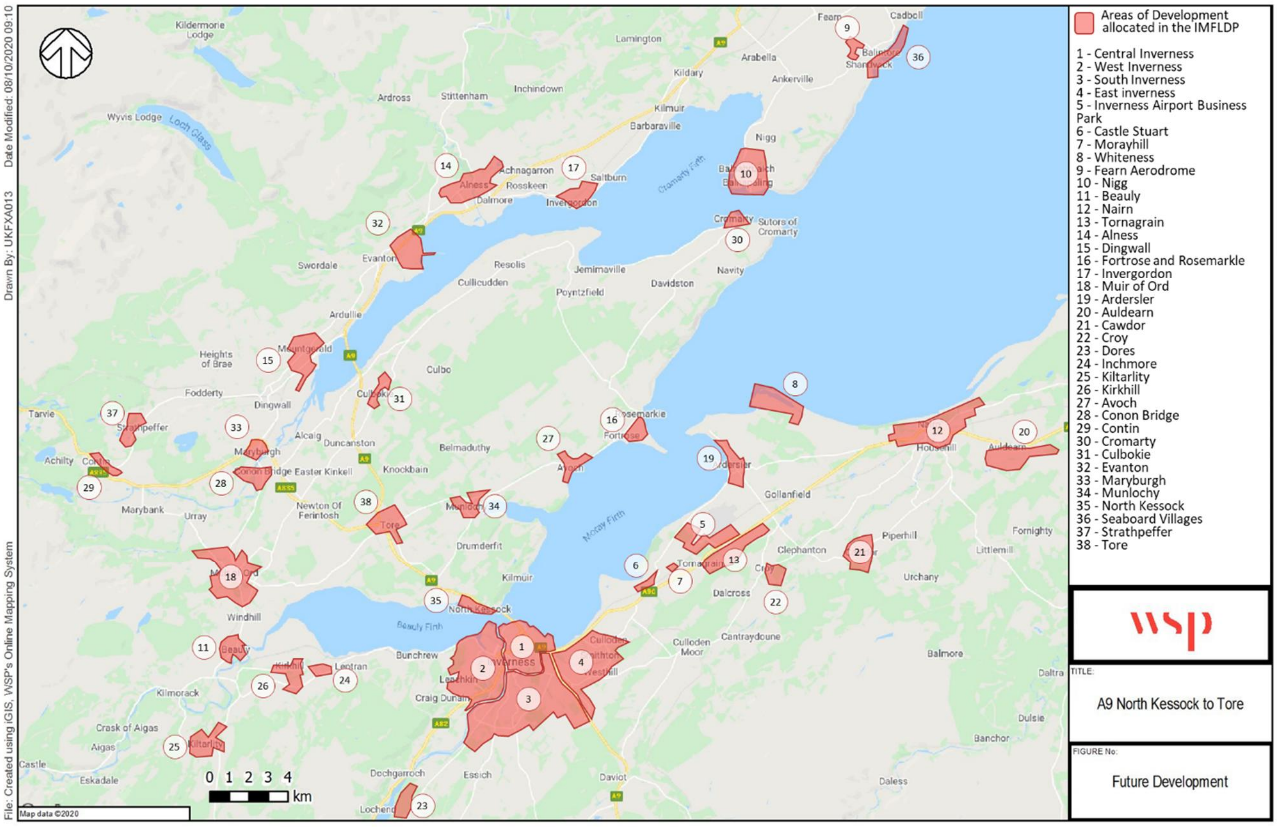


Figure 6-7: Planned development proposed in the adopted Inner Moray Firth Local Development Plan (2015)

Ross-shire Growth Area

6.5.9. As described in section 4.4, the IMFLDP has identified the Ross-shire Growth Area as a strategic location for housing and employment sites.

6.5.10. The IMFLDP identifies land for 5,750 new homes in the Ross-shire Growth Area between 2011 and 2031, with up to 1,404 houses in the Mid Ross area between 2021 and 2031 concentrated in the growth area focussed around Dingwall. Outside of the significant housing expansions identified along the A9 corridor between Tain and Dingwall, opportunities for more limited housing are identified in Mid Ross at Tore and Munlochy.

Inverness to Nairn Growth Area

6.5.11. The Inverness to Nairn Growth Area is expected to see up to 18,350 new homes built between 2011 and 2031, focussed on existing settlements along the A96. A new town at Tornagrain is identified, dependent on major infrastructure improvements requiring central government support. Infrastructure improvements to support the delivery of development in the Inverness to Nairn Growth Area includes proposals for an ‘East Link’ road, connecting the A9 with the A96, dualling of sections of the A96 trunk road, including a Nairn bypass, and upgrading of key junctions such as Inshes Roundabout.

6.5.12. The ongoing review of the IMFLDP (at the time of writing) includes an increased focus on a more sustainable transport network. However, as the review was still in an early review stage at the time of this study, it was agreed with the Highland Council that the growth assumptions for the Case for Change stage of the study be based on the adopted IMFLDP.

QUANTUM OF FUTURE GROWTH

6.5.13. The future growth considered for the traffic modelling has been obtained from the Transport Model for Scotland (TMfS). A selection of the A9 northbound and southbound links was made on the model to extract the flows, giving the results shown in Table 6-6.

Table 6-6: Modelled daily traffic flows on the A9 in the study area (from TMfS)

Direction	2017	2022	2027	2032	2037	2042
NB	13,419	14,200	14,841	15,077	15,452	15,712
SB	14,687	15,554	16,186	16,336	16,843	17,191

6.5.14. The modelled flows have been interpolated to obtain 2020 as base year and 2035 as future year, resulting in a growth factor of 9.79% as an average for both directions along the corridor. This growth has then been applied to the spreadsheet model to generate the flows for 2035.

6.5.15. The full output from the TMfS model is included under **Appendix H.**

LOCAL ISOLATED JUNCTION MODELLING – FORECAST SITUATION

6.5.16. The spreadsheet model for 2035 builds from the current situation and applies expected growth in the area to assess the impacts of increased demand and pressure on the transport network. Results of the junction modelling for Munlochy junction are included in Table 6-7 and Table 6-8.

Table 6-7: 2035 Average Level of service at Munlochy Junction

<table>
<tr><th colspan="7">Munlochy Junction</th></tr>
<tr><th rowspan="3">Movement</th><th colspan="3">Current LOS</th><th colspan="3">Forecast LOS</th></tr>
<tr><th colspan="2">Weekday</th><th rowspan="2">Saturday Peak</th><th colspan="2">Weekday</th><th rowspan="2">Saturday Peak</th></tr>
<tr><th>Peak AM</th><th>Peak PM</th><th>Peak AM</th><th>Peak PM</th></tr>
<tr><td>A9 (Southbound) - B9161</td><td>A</td><td>A</td><td>A</td><td>A</td><td>A</td><td>A</td></tr>
<tr><td>B9161 - A9 (Northbound)</td><td>B</td><td>B</td><td>B</td><td>B</td><td>B</td><td>B</td></tr>
<tr><td>B9161 - A9 (Southbound</td><td>C</td><td>A</td><td>B</td><td>D</td><td>B</td><td>C</td></tr>
<tr><td>A9 (Northbound) - B9161</td><td>B</td><td>B</td><td>B</td><td>B</td><td>C</td><td>C</td></tr>
</table>

Table 6-8: 2035 Modelled average delays (in seconds) at Munlochy Junction

Munlochy Junction						
Movement	**Current Delays**			**Forecast Delays**		
	Weekday		**Saturday Peak**	**Weekday**		**Saturday Peak**
	Peak AM	**Peak PM**		**Peak AM**	**Peak PM**	
A9 (Southbound) - B9161	0.00	0.02	0.03	0.00	0.02	0.04
B9161 - A9 (Northbound)	10.36	12.05	11.78	11.90	14.46	14.01
B9161 - A9 (Southbound	20.36	9.99	13.68	30.52	11.41	17.20
A9 (Northbound) - B9161	10.02	14.08	13.91	11.24	17.60	17.52

6.5.17. The levels of service and modelled delays at Tore Roundabout for 2035 are shown in Table 6-9 and Table 6-10.

Table 6-9: 2035 Average Level of service at Tore Roundabout

Tore Roundabout						
Approach	**Current LOS**			**Forecast LOS**		
	Weekday		**Saturday Peak**	**Weekday**		**Saturday Peak**
	Peak AM	**Peak PM**		**Peak AM**	**Peak PM**	
A9N (Southbound)	B	A	B	B	B	C
A832 (E)	A	A	A	A	A	A
A9S (Northbound)	A	A	A	A	B	A
A832 (W)	A	A	A	A	A	A
A835	B	B	B	C	C	D

Table 6-10: 2035 Modelled average delays (in seconds) at Tore Roundabout

Tore Roundabout						
Approach	**Current LOS**			**Forecast LOS**		
	Weekday		**Saturday Peak**	**Weekday**		**Saturday Peak**
	Peak AM	**Peak PM**		**Peak AM**	**Peak PM**	
A9N (Southbound)	10.22	9.58	13.76	14.63	13.25	23.29
A832 (E)	5.09	4.94	5.29	5.74	5.55	6.05
A9S (Northbound)	4.00	8.24	3.30	4.64	13.55	3.69
A832 (W)	4.47	5.03	3.91	5.06	5.91	4.25
A835	12.47	14.39	16.02	19.31	24.18	29.27

MODELLING QUEUE LENGTHS – COMPARISON OF 2020 AND 2035 CONDITIONS

Munlochy Junction – right turn movement from A9 to B9161

6.5.18. The modelled queue lengths for the 2020 and 2035 scenarios are lower than observed queue lengths (for the reasons described under paragraph 6.4.11), and don't reflect the maximum observed queue length at the right turn from the A9 northbound to the B9161 of 25 vehicles. As stated in the queue analysis, this is close to the capacity of the turning lane and any further vehicles would overspill onto the main carriageway.

6.5.19. The modelling does indicate that an increase in traffic flows would result in an increase in this queue length, as could be logically expected. Hence, although the maximum observed queue is not constant and occurs during vehicle platoons, the modelled growth would result in the maximum queue extending to beyond the capacity of the slip lane, and stationary traffic would be queuing on the northbound carriageway posing a significant risk to road safety.

Tore Roundabout – all approaches

6.5.20. The modelled queue lengths for the 2020 and 2035 scenarios are shown in the table below for all approaches at the Tore Roundabout.

Table 6-11: 2020 and 2035 Average Queue Lengths (in vehicles) – Tore Roundabout

Movement	Weekday		Saturday Peak	Weekday	Saturday	Saturday Peak
	AM Peak	PM Peak		AM Peak	PM Peak	
	2020			2035		
- A9(N)	1.8	1.7	1.8	2.8	2.6	2.8
- A832(E)	0.3	0.4	0.3	0.4	0.4	0.4
- A9(S)	1.3	3.7	1.3	1.6	6.5	1.6
- A832(S)	0.4	0.4	0.4	0.5	0.5	0.5
- A835(W)	2.0	2.1	2.0	3.4	3.9	3.4

6.5.21. Acknowledging that the modelled 2020 queue lengths are shorter than the observed 2020 queues (refer to section 6.4.11), the modelling indicates that average queue lengths will increase between 2020 and 2035.

6.6 OVERVIEW OF TRANSPORT SUPPLY AND DEMAND

6.6.1. As a result of the transport analysis including current and future demand it has been possible to identify key issues that should be taken into consideration as part of the overall review of the A9 between North Kessock and Tore. These key issues are summarised in the list below.

- The A9 is the main strategic corridor connecting Inverness with the north of Scotland
- There is a high number of commuter trips between Inverness and the Black Isle Area, using the A9 as the main route to/from Inverness
- The main route of travel to/from the Black Isle is the B9161 (via Munlochy Junction) with 20%-30% of drivers using the A832 (via Tore Roundabout) to access the area from the A9

- Traffic levels during the study period are within 10% of those observed in the same month in 2019
- Tore Roundabout and Munlochy Junction are currently operating with levels of service between A and C (based on isolated junction modelling) which indicates that they are operating within capacity
- The growth projected for the A9 between 2020 and 2035 is 9.79% between North Kessock and Tore Roundabout based on modelling informed by the adopted Inner Moray Firth Local Development Plan (2015)
- The queue length for the right turn at Munlochy Junction from the A9 onto the B9161 is projected to increase (due to traffic growth) beyond 25 vehicles between 2020 and 2035 (which is the capacity of the right turn slip lane). This would result in stationary traffic queuing on the northbound carriageway posing a significant risk to road safety.

7 ROAD SAFETY ANALYSIS

7.1 INTRODUCTION

7.1.1. This chapter describes the road safety analysis which was undertaken to support the study. This analysis included consideration of collision data, a conflict study and speed surveys, as well as an understanding of the concerns along the A9 between North Kessock and Tore Roundabout and the intermediate junctions raised by stakeholders.

7.1.2. To assist in the readers' understanding of comments made in this chapter, reference is made to the existing junction layouts included in **Appendix A** and to the more detailed layout of the A9/B9161 junction (Munlochy) in the figure below.

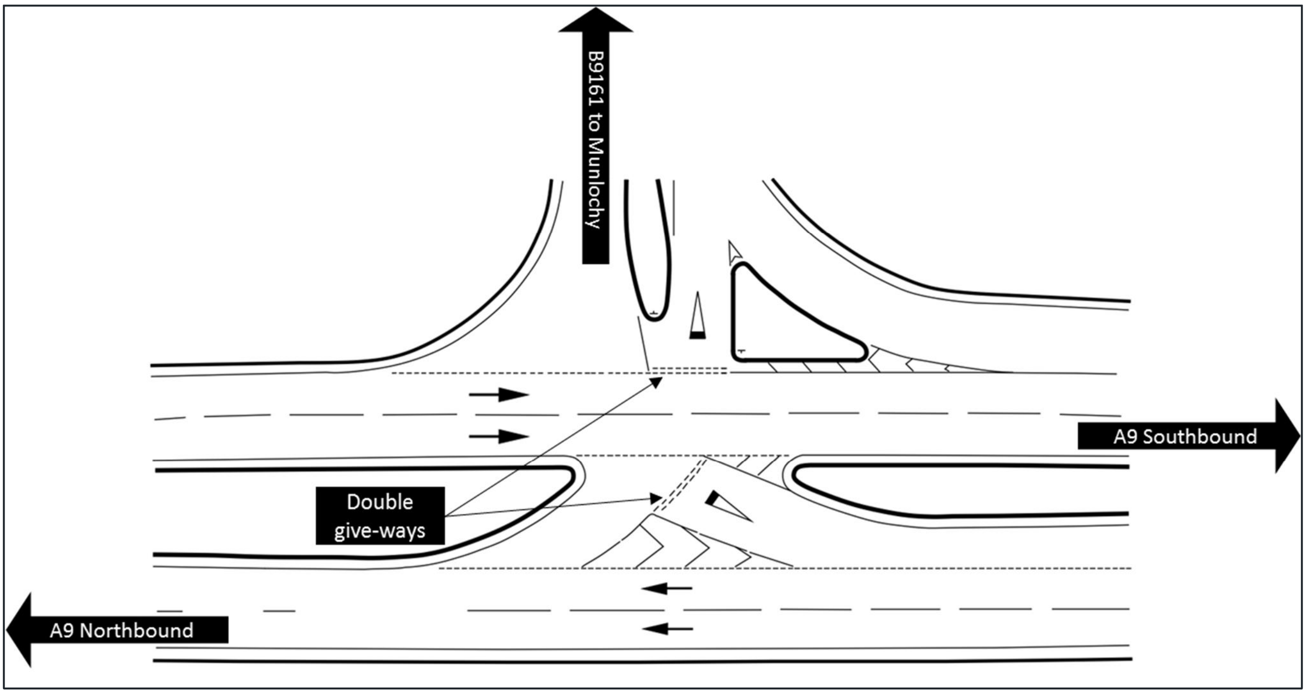


Figure 7-1: Existing layout of the A9/B9161 junction (Munlochy Junction)

7.2 PREVIOUS STUDIES

7.2.1. A number of previous studies have been undertaken regarding road safety at Munlochy Junction and Tore Roundabout.

- **A9 Tore Non-Motorised User Review – TMS Consultancy 2014**
  - The review considered walking and cycling movements at Tore Roundabout.
  - Following the study, improvements were completed to the A9 Non-Motorised User (NMU) crossing points. These crossing points were supplemented with the extension of lighting and the installation of pedestrian-activated electronic signs.

- **A835 Tore conflict study – BEAR 2014**
  - The purpose of the study was to investigate the level of traffic conflicts at the A835 junction at the access road to Tore Primary School and Village Hall, following concerns expressed by the community regarding road safety at Tore.
  - No problems within the injury accident data were identified and a conflict study was carried out to identify and quantify any operational issues which could present a safety problem.
  - The study concluded that the current road layout at this location is in line with the DMRB standards for traffic flows and further upgrades could not be justified in terms of accident savings or conflict severity.
- **B9161 Munlochy Junction Safety Review – BEAR 2015**
  - The scope of the report was to investigate the types and causations of injury accidents and to recommend measures to reduce injury accidents and casualty severity.
  - Following the review, BEAR Scotland installed improved signage, road markings and vehicle restraint systems as well as landscaping. The new road markings included the give way markings (shown in Figure 7-1).
- **A9 Munlochy Junction – Feasibility Assessment – JMP 2016**
  - This study looked at the feasibility of constructing a roundabout at Munlochy Junction as Transport Scotland had concerns regarding the future operational performance of this junction arising from increased usage, particularly from a road safety perspective.
  - The study's conclusions are that a roundabout might be a feasible solution, offering benefits in terms of capacity and road safety. However, layout and potential impacts on existing land required further consideration.
- **A9 Munlochy Queue Length Survey (BEAR Scotland) – September 2019**
  - The purpose of the survey (undertaken over four weekdays) was to measure queue lengths at Munlochy Junction and identify the number of times queues extended onto the main carriageway.
  - The survey did not identify any queuing that extended beyond the end of the right turn lane.

7.2.2. In 2017 the vehicle-activated signs for the right turn queuing were installed. These signals illuminate once queues exceed a specified threshold.

7.2.3. As part of Transport Scotland's annual review of the safety performance of the trunk road network, BEAR Scotland carried out a screening exercise to identify all locations where three or more personal injury accidents have occurred over a three-year period to prioritise interventions where considered necessary. Through this analysis, no locations in the study area were identified that meet the threshold for further investigation in the 2018 and 2019 annual reviews.

7.2.4. However, in 2020 this threshold was met in the study area leading to this study. As stated in paragraph 5.3.3 Transport Scotland made the decision to undertake the Case for Change study (under STAG).

7.3 COLLISION DATA

7.3.1. NOTE: the contributory factors referenced throughout this chapter are are based on data recorded on the day of the collision/incident and are not the factors identified from any follow up police investigations.

7.3.2. There have been 29 personal injury collisions from 1 January 2010 to 6 September 2020 between the North Kessock and Tore Roundabout. A summary of these collisions is shown in Table 7-1:

Table 7-1: Personal injury collisions from North Kessock up to and including Tore Roundabout

Year	Fatal	Serious	Very Serious[3]	Moderately Serious[1]	Less Serious[1]	Slight	Total
2010	0	0	-	-	-	2	**2**
2011	0	1	-	-	-	1	**2**
2012	0	1	-	-	-	2	**3**
2013	0	0	-	-	-	3	**3**
2014	0	0	-	-	-	5	**5**
2015	0	0	-	-	-	2	**2**
2016	0	0	-	-	-	6	**6**
2017	0	0	-	-	-	1	**1**
2018	0	0	-	-	-	1	**1**
2019	1	-	0	1	0	1	**3**
2020 (to 06/09/20)	0	-	0	0	0	1	**1**
TOTAL	**1**	**2**	**0**	**1**	**0**	**25**	**29**

[3] From summer 2019, Police Scotland introduced a new system for recording traffic collisions. Due to improved recording and categorisation processes, it is expected that there will be an increase in the number of casualties and accidents on Scottish roads that are classified as serious. The evidence from other police forces within the UK that introduced the same system is that this increase will be around 20%.

Serious Injuries were split into three levels as follows:

- Less Serious - Other Head Injury, Deep Cuts/Lacerations, Fractured Arm/Collar Bone/Hand, Fractured Lower Leg/Ankle/Foot
- Moderately Serious - Multiple Severe Injuries (conscious), Deep Penetrating Wound, Other Chest Injury that is not bruising, Fractured Pelvis or Upper Leg, Loss of Arm or Leg (or part)
- Very Serious - Multiple Severe Injuries (unconscious), Internal Injuries, Severe Chest Injury, any difficulty breathing, Severe Head Injury (unconscious) Broken Neck or Back.

7.3.3. The location of all the collisions are plotted in Figure 7-2.

Figure 7-2: Locations of collisions between 1st January 2010 and 6th September 2020

TORE ROUNDABOUT

7.3.4. At Tore Roundabout there have been seven injury collisions within the investigation period (1st Jan 2010 to 6th Sept 2020).

7.3.5. These can be broken down as follows:

- in the vicinity of the southbound exit to the A9 - four collisions occurred with contributory factors including poor lane discipline (e.g. changing lanes without indicating), travelling too close to the next vehicle and sun glare
- on the northbound approach – a car ran into the back of another car
- on the A835 exit - single car leaving the road in the rain
- on the A9 northwest corner of the roundabout - both cars were turning right with one car leaving the road and hitting a tree.

Summary

7.3.6. There have been four collisions attributed to poor lane discipline, one not having enough space with the vehicle in front, one due to loss of control on wet surface and one sun glare. The roundabout is lit with street lighting and only one collision occurred during the hours of darkness.

TORE ROUNDABOUT TO MUNLOCHY JUNCTION

7.3.7. Between Tore and the Munlochy Junction, in a section of approximately 4.2km, there have been 10 injury collisions within the investigation period. Collisions are spread out over the section and contributory factors included:

- Collision with another car which was changing lanes and overturned – northbound approach to Tore Roundabout
- Collisions with vehicles turning right onto A9 northbound
- Loss of control due to defective tyres, sun glare, snow and wet conditions.

Summary

7.3.8. Out of 10 injury collisions in this section, five collisions were weather-related (three attributed to sun glare, one to snow and another to wet conditions). Two collisions at the Allangrange junction involved right turn movements onto the northbound carriageway; one involved changing lanes, another crossing the central reserve and one involved defective tyres. Only one collision occurred during the hours of darkness at the Allangrange junction.

MUNLOCHY JUNCTION

7.3.9. At the Munlochy Junction there have been 9 injury collisions within the investigation period. Contributory factors included:

- Northbound vehicles turning right into B9161 and being hit by a southbound car
- Collision due to skidding in wet conditions
- Vehicle carrying out a U-turn and being struck by a southbound car
- Collisions while merging from the B9161 slip road with southbound vehicles
- Vehicles turning right from the B9161 colliding with northbound vehicles.

Summary

7.3.10. There have been four right turn collisions from the A9 to the B9161, two collisions of vehicles merging from the B9161 onto the A9 southbound, 2 turning right from the B9161 onto the A9 northbound and one loss of control in wet weather. Two collisions occurred during the hours of darkness at this junction.

MUNLOCHY JUNCTION TO KESSOCK JUNCTION

7.3.11. Between Munlochy Junction and North Kessock junction there have been three injury collisions within the investigation period, summarised as follows:

- Loss of control in fog
- Collision with farm vehicle after been dazzled by headlights
- Collision with southbound cars merging at North Kessock junction.

Summary

7.3.12. One collision was attributed to weather, one involved being dazzled by headlights and the other was merging traffic at the North Kessock Interchange. Two collisions occurred during the hours of darkness on this stretch of road.

CONCLUSIONS – COLLISION ANALYSIS

7.3.13. The collisions statistics indicate that collisions are spread out along the extent of the A9 in the study area and over the investigation period , with a drop in the rate of collisions over recent years (with the exception of 2019, and 2020 which is anomalous). There do not appear to be any common factors contributing to the collisions.

7.4 VIDEO SURVEYS

7.4.1. As part of the analysis Transport Scotland commissioned a video survey to cover three days from 10 to 12 September 2020. This survey included videos at all six junctions from North Kessock Junction to the Tore Roundabout. The video footage was recorded for 24 hours of each day, with the traffic counts processed for the period between 6am and 8pm.

7.4.2. The video surveys supported the counting of NMU's movements on all arms of the Tore Roundabout.

7.4.3. Maximum queue lengths on the approaches to Tore Roundabout and Munlochy Junction were recorded.

7.5 CONFLICT STUDY

7.5.1. A conflict study was carried out (using the video footage gathered during the September 2020 traffic surveys) in line with the best practice advice provided in the RoSPA (Road Safety Engineering Manual) Road Safety Engineering Manual. Table 7-2 shows the five grades of conflict. Unusual traffic manoeuvres were also recorded as part of this study.

Table 7-2: Gradings of conflicts

Conflict Severity
1. Precautionary conflict (i.e. Braking for vehicle waiting to emerge, precautionary lane change or anticipatory braking).
2. Controlled braking or lane change to avoid collision, but with ample time for manoeuvre.
3. Rapid deceleration, lane change or stopping to avoid collision, resulting in a near miss situation. No time for steady controlled manoeuvre.
4. Emergency braking or violent swerve to avoid collision resulting in near miss or occurrence of a minor collision.
5. Emergency action, followed by collision.

7.5.2. The conflict study was carried out to identify whether the concerns raised by stakeholders were reflected in evidence of conflicts and risk-taking behaviour. Stakeholders had intimated that there were concerns about turning manoeuvres at Munlochy Junction to and from the A9 Southbound from the B9161. There were also concerns with the roundabout at Tore A9 southbound (exit) and NMU movements crossing all arms.

7.5.3. To help readers understand the nature of some of the conflicts identified, key images were captured from the videos and are included in **Appendix I**.

MUNLOCHY JUNCTION

7.5.4. A conflict study was undertaken at Munlochy Junction using video survey footage from 10 and 11 September 2020 between 0700-0900 and 1600-1800 on each day (focussed on the peak traffic periods), recording any conflicts between vehicles that occurred during the right turn manoeuvre from the A9 northbound to the B9161 and the left turn (and merge) from the B9161 to the A9 southbound.

7.5.5. Table 7-3 and Table 7-4 show the number of conflicts for the two turning manoeuvres at Munlochy Junction.

Table 7-3: Munlochy Junction northbound right turn A9 to B9161

		Thu 10th Sept		Fri 11th Sept	
Diagram of Occurrence	**Conflict Severity**	**7:00 - 9:00**	**16:00 - 18:00**	**7:00 - 9:00**	**16:00 - 18:00**
Movement 1					
Northbound Right Turn from A9 to B9161	1. Precautionary conflict (i.e. Braking for vehicle waiting to emerge, precautionary lane change or anticipatory braking).	0	1	0	0
	2. Controlled braking or lane change to avoid collision, but with ample time for manoeuvre.	0	0	0	0
	3. Rapid deceleration, lane change or stopping to avoid collision, resulting in a near miss situation. No time for steady controlled manoeuvre.	0	0	0	1
	4. Emergency braking or violent swerve to avoid collision resulting in near miss or occurrence of a minor collision.	0	0	0	0
	5. Emergency action, followed by collision.	0	0	0	0

7.5.6. From the videos and the conflict assessment it was observed that drivers turning right into the B9161 were being cautious when making the right turn movement across the A9 southbound carriageway (i.e. vehicles were observed to not cross the carriageway when there was – in the opinion of the study team – sufficient gaps to cross safely).

7.5.7. Only two conflicts were recorded during the conflict study period. The first one involved a right turning car stopping beyond the give-way line (intruding onto the southbound carriageway) and southbound vehicles had to move towards the centreline to avoid any collision. The second involved two simultaneous right turners (one from the A9 and the other from the B9161) getting confused about which vehicle had right of way and nearly collided.

Table 7-4: Munlochy Junction southbound merge B9161 to the A9 southbound

		Thu 10th Sept		Fri 11th Sept	
Diagram of Occurrence	**Conflict Severity**	**7:00 - 9:00**	**16:00 - 18:00**	**7:00 - 9:00**	**16:00 - 18:00**
Movement 2					
Southbound Merge	1. Precautionary conflict (i.e. Braking for vehicle waiting to emerge, precautionary lane change[4] or anticipatory braking).	100	91	48	88
	2. Controlled braking or lane change to avoid collision, but with ample time for manoeuvre.	11	11	4	0
	3. Rapid deceleration, lane change or stopping to avoid collision, resulting in a near miss situation. No time for steady controlled manoeuvre.	0	0	0	1
	4. Emergency braking or violent swerve to avoid collision resulting in near miss or occurrence of a minor collision.	0	0	0	0
	5. Emergency action, followed by collision.	0	0	0	0

7.5.8. At the left turn merge (from B9161 to the A9) a large number of conflicts were recorded during each time period.

7.5.9. These conflicts can be put into two categories:

- 1 – merging vehicles do not give way to southbound vehicles and instead expect vehicles (already on the southbound carriageway) to move from the inside lane to the outside lane or (if they cannot change lanes) to brake suddenly to avoid a collision.

[4] The movement of vehicles to the outside lane was considered within the proximity of the junction and did include vehicles that were in the outside lane already. Included vehicles that - if they didn't change lane - would have collided with another vehicle.

- 2 – if the merging vehicles cannot join the southbound lane due to vehicles (already on the southbound carriageway) not moving into the outside lane, the merging vehicles have to brake on the merge lane and stop, then attempt to join the A9 from a standing start.

7.5.10. The number of conflicts recorded on the Friday morning of the survey (when conditions were wet) was approximately half of the Thursday morning (when conditions were dry). Traffic volumes did not differ significantly between the two survey days: the volume turning left on Thursday was 497 (in peak 2 hours) compared to 444 on the Friday, with the A9 mainline flows at 2,059 on the Thursday compared to 2,016 on the Friday.

7.5.11. Within the assessment periods studied, five vehicles were observed making a U-turn movement from the northbound carriageway to the southbound carriageway at Munlochy Junction.

7.5.12. Even though the National Cycle Network Route 1 is signposted on a parallel route to the A9, one cyclist was recorded cycling from the B9161 to the A9 southbound.

7.5.13. The recorded traffic figures at this junction were between 4,000 and 4,800 vehicles per day turning into and out of the B9161. The mainline flows along the A9 range between 23,000 and 30,000 vehicles per day.

ARTAFEELIE JUNCTION

7.5.14. A conflict study was not carried out at this junction due to the low traffic flows of around 200 vehicles per day turning into and out of this junction.

7.5.15. It was recorded that school minibuses use this junction to transport pupils to and from school.

7.5.16. The maximum number of vehicles queueing on the Artafallie approach was three with only one vehicle waiting to turn on the A9 SB.

ALLANGRANGE JUNCTION

7.5.17. A conflict study was not carried out at this junction due to the low flows of around 300 vehicles per day turning into and out of this junction. Observations included a cyclist crossing the A9 southbound carriageway and then cycling up along the central reservation.

7.5.18. Agricultural vehicles were observed turning right at this junction out of the side road and, due to the narrow width of the central reservation, larger agricultural vehicles had to stop in the main carriageway blocking the southbound lane before completing their turning manoeuvres.

7.5.19. The maximum number of vehicles queueing on the side road was two.

ARPAFEELIE JUNCTION

7.5.20. A conflict study was not carried out at this junction due to the low flows of around 50 vehicles per day turning into and out of this junction.

7.5.21. Agricultural vehicles were observed turning right at this junction out of the side road and these vehicles managed to wait in the central reservation before making the turn. However, they had to position themselves parallel with the flow of traffic (having to rely on their wing mirrors for visibility) in order to fit into the central reservation.

7.5.22. The maximum number of vehicles queueing on the side road was two.

GLACKMORE JUNCTION

7.5.23. A conflict study was not carried out at this junction due to the low flows of around 120 vehicles per day turning into and out of this junction.

7.5.24. Agricultural vehicles use this junction to join the A9 from the side road. School buses also use the diverge taper to stop and pick up school pupils.

7.5.25. The maximum number of vehicles queueing on the side road was three.

TORE ROUNDABOUT

7.5.26. A conflict study was carried out on Tore Roundabout - shown in Table 7-5. The study focussed on the southeast exit to the A9 southbound (as there was a collision cluster at this location) using data from 10 and 11 September 2020 between 0700-0900 and 1600-1800.

Table 7-5: Tore Roundabout southeast exit

		Thu 10th Sept		Fri 11th Sept	
Diagram of Occurrence	**Conflict Severity**	7:00 - 9:00	16:00 - 18:00	7:00 - 9:00	16:00 - 18:00
Movement 1					
South East Exit	1. Precautionary conflict (i.e. Braking for vehicle waiting to emerge, precautionary lane change or anticipatory braking).	2	5	4	3
	2. Controlled braking or lane change to avoid collision, but with ample time for manoeuvre.	0	0	0	0
	3. Rapid deceleration, lane change or stopping to avoid collision, resulting in a near miss situation. No time for steady controlled manoeuvre.	0	0	0	0
	4. Emergency braking or violent swerve to avoid collision resulting in near miss or occurrence of a minor collision.	0	0	0	0
	5. Emergency action, followed by collision.	0	0	0	0

7.5.27. The southbound exit to the A9 has a small number of conflicts recorded within the timescale. A number of these conflicts occurred when slow moving vehicles (HGV's and agricultural vehicles) pulled out from the A832 causing other vehicles on the roundabout to brake or change lane.

7.5.28. Further observations highlighted that there were some vehicles from the A835 that should exit the roundabout in lane 2 of the dual carriageway but were observed to cut across and exit in lane 1 of the dual carriageway, reflecting poor entry and lane discipline.

NMU MOVEMENTS AT TORE ROUNDABOUT

7.5.29. Over the three days there were 22 pedestrians and 129 cyclists recorded crossing any of the legs at Tore.

7.5.30. A conflict analysis was carried out on the observed NMU movements (shown in Table 7-6).

7.5.31. All except one of the conflicts occurred on the northbound exit to the A9 where NMUs had to walk swiftly/run across the road due to the speed of the vehicles exiting the roundabout.

7.5.32. The other conflict involved a cyclist running beside his bicycle across the A9 southbound lane at the pedestrian crossing point. A number of NMUs crossing the A9 southbound approach crossed through stationary traffic that was waiting to enter the roundabout. A small number of NMUs crossing the A9 north arm southbound lane were observed to not use the dropped crossing point and crossed to the north of the crossing point. This may be attributable to (what the study team believes to be) poor visibility resulting from gorse hedges obscuring the sight lines from the existing crossing point to the oncoming traffic.

Table 7-6: Tore Roundabout - NMU crossings

Diagram of Occurrence	Conflict Severity	Nr of Conflicts Observed
Movement 1		
NMU Crossing	1. Precautionary conflict (i.e. Braking for vehicle waiting to emerge, precautionary lane change or anticipatory braking). Pedestrians walking swiftly across the road.	4
	2. Controlled braking or lane change to avoid collision, but with ample time for manoeuvre. Pedestrians running across the road.	2
	3. Rapid deceleration, lane change or stopping to avoid collision, resulting in a near miss situation. No time for steady controlled manoeuvre.	0
	4. Emergency braking or violent swerve to avoid collision resulting in near miss or occurrence of a minor collision.	0
	5. Emergency action, followed by collision.	0

7.5.33. One pedestrian was observed walking down the southbound verge to the bus stop rather than using the crossing point across the dual carriageway.

CONFLICTS STUDY CONCLUSIONS

7.5.34. The conflict study indicates the following:

- A large number of conflicts on the left turn merge from the B9161 to the A9 southbound. 100 conflicts were identified during the two-hour morning peak period where vehicles had to take action to prevent a collision (based on the Thursday morning observations).
- A lower number of conflicts for this movement were observed on the Friday morning (of the survey period) when conditions were wet.
- Two conflicts were observed for the right turn from the A9 to the B9161. This is fewer than was observed for the left turn out of the B9161 to the A9 (despite the number of turning movements being similar).
- Most of the conflicts at the southeast corner of Tore involved slow moving HGVs or agricultural vehicles entering the roundabout from the A832(E) arm and causing vehicles already in the roundabout to brake or change lane.
- All except one of the conflicts observed involving NMU's were all at the A9 northbound exit arm of Tore Roundabout; the other was a cyclist running beside their bike south of the roundabout.

7.6 SPEED SURVEY

7.6.1. A speed survey was carried out on both A9 carriageways either side of the Munlochy Junction for one week from 6 March 2020.

7.6.2. The results are shown in Table 7-7 and shows that there are a high number of vehicles that are travelling past the Munlochy Junction at speeds in excess of the posted speed limit. Location of the survey sites is shown in Figure 6-1.

Table 7-7: Seven-day speed survey along A9 at Munlochy Junction (March 2020)

Site Location	7-Day Average Speed	7-Day Average 85th percentile Speed	% of vehicles travelling over 70mph	% of vehicles travelling 15mph over 70mph
Northbound Site 1	70.1 mph	78.9 mph	52.80%	3.70%
Northbound Site 2	69.0 mph	78.3 mph	47.70%	3.00%
Southbound Site 3	71.5 mph	80.2 mph	59.00%	5.60%
Southbound Site 4	70.2 mph	78.9 mph	51.90%	3.90%

7.7 SUMMARY

7.7.1. The collisions statistics show that collisions are spread out over the extent of the study area and from the information recorded in Stats 19, do not exhibit any common contributory factors (noting that these factors are not necessarily those reflected in the final police investigations).

7.7.2. The conflict study at Munlochy Junction shows that drivers from the B9161 merging with the A9 southbound are not giving way to vehicles on the southbound carriageway and expect them to change lanes or slow down. A large number of conflicts were observed for this movement, with approximately one conflict per minute during the morning peak period, which suggests – on the basis that a higher rate of conflicts represents a higher probability of collision occurrence – that road safety risks are present at this junction. There have been two collisions between January 2010 and September 2020 involving vehicles carrying out this merge manoeuvre. The right turn into the B9161 presented a low number of conflicts relative to the volume of turning vehicles and the number of conflicts resulting from other manoeuvres at the junction.

7.7.3. The conflicts at Tore appear to result primarily from slow moving vehicles entering the circulatory carriageway (and these larger vehicles also appear to cause longer queues on the approach arms).

7.7.4. All except one of the conflicts occurred on the northbound exit to the A9 where NMUs had to walk swiftly/run across the road due to the speed of the vehicles exiting the roundabout. Some pedestrians were observed avoiding the A9(N) east side crossing point which could be attributed to a lack of visibility, either due to the layout of the carriageway and crossing points or a lack of vegetation management.

7.7.5. Speed surveys recorded more than 50% of vehicles exceeding the speed limit of 70 mph (for general traffic) at three of the four sites on the A9 passing Munlochy Junction.

8 STAKEHOLDER ENGAGEMENT

8.1 INTRODUCTION

8.1.1. Stakeholder engagement formed an important element of this study and has been undertaken to include views from stakeholders on the problems and opportunities in the study area.

8.1.2. Given the current COVID-19 restrictions, stakeholder engagement has been carried out mainly through online meetings and workshops which have been facilitated in smaller groups to allow opportunities for all stakeholders to express views and concerns.

8.2 STAKEHOLDER ENGAGEMENT AND WORKSHOPS

8.2.1. In order to demonstrate active and collaborative engagement with stakeholders as evidence to the Case for Change report the STAG-aligned process outlined below was followed.

8.2.2. During the development of the Case for Change the approach included engagement with stakeholders (including organisations and elected members) identified in conjunction with the Highland Council and other stakeholders.

8.2.3. At the Case for Change stage, the process did not include a broader public consultation as the engagement sought to identify the problems and opportunities (as opposed to consultation on presented options). If the study progresses to further stages where options are developed and appraised, public consultation will be undertaken at that point to gather views on the options presented.

8.2.4. The stakeholder engagement aimed to gather technical data and inputs from stakeholders regarding perceived problems, opportunities, issues and constraints on the A9 (in the study area) through pre-engagement meetings and stakeholder workshops.

8.2.5. Engagement included the following stakeholders:

- Transport Scotland
- BEAR Scotland
- Police Scotland
- Scottish Ambulance Service
- Scottish Fire and Rescue Service
- NHS Highland
- Members of the Scottish Parliament and/or their staff
- Councillors (Highland Council)
- The Highland Council
- Community Councils
- HiTRANS.

8.2.6. A full list of Stakeholders that were engaged with is included in **Appendix J**.

8.2.7. The Engagement Plan consisted of three phases:

- Phase 1 - Pre-workshop engagement with stakeholders through telephone discussions and written submissions. This included gathering information/local intelligence and supporting technical data

- Phase 2 - Workshop 1 – seeking views on problems and opportunities, and the development of Transport Planning Objectives
- Phase 3 - Workshop 2 – seeking inputs to the finalisation of the Transport Planning Objectives, and seeking potential options that could address the problems, unlock the opportunities and achieve the objectives.

PROCESS LETTER

8.2.8. The first step which was undertaken was the drafting and distribution of a "Process Letter" which was sent on 3 September 2020. This document provides an overview of the study, a description of the process, and the intended outcome (i.e. making the evidenced case for change).

PHASE 1 - PRE-WORKSHOP ENGAGEMENT WITH STAKEHOLDERS

8.2.9. Prior to the first stakeholder workshop, a series of pre-engagement calls with stakeholders took place in order to achieve the following:

- An understanding of the previously identified issues and concerns from the perspective of officers, users and members
- Input as to the stakeholders that should be considered for the first and second workshops, and the opportunity to focus the number of stakeholders at the workshops to a manageable number
- Technical data inputs to support the analysis
- Demonstrating and evidencing a robust engagement approach to the stakeholders and responding to the high level of interest in the study.

8.2.10. The pre-engagement calls with stakeholders took place ahead of the workshops in order to overcome the practical constraints caused by the COVID-19 pandemic and to gather as much information before the workshops to make these more practically manageable.

8.2.11. The information gathered from the pre-workshop engagement informed the preparation for the first workshop.

8.2.12. The pre-workshop engagement included stakeholders from the following groups:

- Local authority officers, including officers from the Highland Council road safety team
- Community Council members
- Road user representatives, including bus operators and active travel user groups
- Local members, including MSPs.

PHASE 2 - WORKSHOP 1 (PROBLEMS/OPPORTUNITIES/TPOS)

8.2.13. The first workshop drew in the views of stakeholders about the actual and perceived problems and opportunities relating to this stretch of road, both currently and in the future.

8.2.14. The workshop further gathered views from the stakeholders on the development of potential Transport Planning Objectives (TPOs).

8.2.15. The actual and perceived problems and opportunities identified from the workshop are included under **Appendix D**.

PHASE 3 – WORKSHOP 2 (FINALISING OBJECTIVES/INITIAL OPTIONEERING)

8.2.16. The second workshop followed on from the collation of the problems and opportunities and focussed on agreeing the final TPOs with the stakeholders and taking comments on these.

8.2.17. The workshop invited stakeholders to contribute ideas for interventions that would address the problems and opportunities and achieve the objectives.

8.2.18. The comments on the draft TPOs and the suggested options from the workshop are included under **Appendix D**.

8.3 PROBLEMS AND OPPORTUNITIES IDENTIFIED BY STAKEHOLDERS

8.3.1. The key problems and opportunities identified by stakeholders are set out below and represent the stakeholders' views which may nor may not be supported by evidence.

WHOLE STUDY AREA

- High traffic speeds, especially approaching Munlochy junction and Tore Roundabout
- Growth in traffic will increase safety problems at Tore Roundabout and Munlochy junction
- Concerns that any interventions in one location may shift problem to another
- Mix of traffic on the network, with commuters, heavy goods and agricultural vehicles interacting
- Safety risks at intermediate junctions due to large agricultural vehicles turning across the high-speed carriageway

MUNLOCHY JUNCTION

- Layout of Munlochy junction – requiring at-grade crossing of a high-speed dual carriageway
- High traffic volumes (in particular during the PM peak) putting pressure on right-turners from A9 at the junction, and reducing the available gaps
- Long queue for right turn movement on northbound approach
- Short length of slip lane from B9161 to merge onto A9 southbound
- Lack of visibility at junction/sun glare

TORE ROUNDABOUT

- Pedestrian and cyclist safety concerns at Tore Roundabout – crossing the dual carriageway at-grade
- High speed on approaches/sudden braking at approaches to Tore Roundabout
- Lack of adequate lighting and markings on junctions and the pedestrian crossing points.

8.3.2. The list above is not comprehensive and full details of the stakeholder comments are included in **Appendix D**.

9 PROBLEMS, OPPORTUNITIES, ISSUES AND CONSTRAINTS

9.1 INTRODUCTION

9.1.1. This section identifies and provides evidence of the actual and perceived problems and opportunities related to the study area. The analysis and identification of problems and opportunities sets the basis for the development of Transport Planning Objectives and the option generation.

9.1.2. Issues and constraints are considered in parallel to the problems and opportunities. According to STAG, issues described are uncertainties that the study is not in a position to resolve and constraints may represent the bounds which limit the scope of the study as well as specific limitations to certain options.

9.1.3. The evidence underpinning the identification of existing and future year problems and opportunities along the A9 between the North Kessock junction and Tore Roundabout has been described throughout this report and includes:

- Review of previous studies
- Stakeholder inputs
- Travel demand and traffic modelling
- Road safety analysis.

9.1.4. In addition to identifying and understanding existing problems and opportunities, it is important to consider changes that may impact the future scenarios. The identification of future problems has focussed on assessing the current situation and understanding the impact on future growth and development in the area as well as any changes in travel patterns.

9.2 PROBLEMS

9.2.1. The study area is the section of the A9 between the North Kessock junction and Tore Roundabout and it includes all intermediate junctions. The analysis of problems has been split into the following three main sections:

- A9 North Kessock to Tore (mainline and intermediate junctions)
- Munlochy Junction
- Tore Roundabout.

A9 NORTH KESSOCK TO TORE (MAINLINE AND INTERMEDIATE JUNCTIONS)

9.2.2. The current and future problems identified in this section can be further divided into the following:

Problem 1 – Perceived safety risks due to right turn movements from side roads across the A9

9.2.3. During the stakeholder engagement, it was highlighted that the nature of the A9 in the section between North Kessock and Tore Roundabout means that it serves as a strategic corridor for long distance trips as well as local communities, industries and farms. There are slow moving vehicles such as trucks, farm vehicles and heavy goods vehicles as well as the caravans of holidaymakers using this section of the A9.

9.2.4. Stakeholders highlighted the perceived safety risks resulting from large agricultural vehicles attempting to turn right across the high-speed carriageway.

9.2.5. Risks arise from vehicles standing in the narrow central reserve (and extending out into the carriageway) whilst awaiting the opportunity to complete the turning movement.

9.2.6. This perceived risk is highest during peak periods when the traffic demand on the A9 is highest.

9.2.7. The risk is potentially increased during the summer/holiday periods when a larger number of users that are unfamiliar with the area and the layout of the A9 junctions in this section may not be as aware of the potential hazards at the junctions. There are also peaks in the movements of slow-moving agricultural vehicles at certain times of the year.

9.2.8. This perceived risk would increase in the future if traffic demand on the A9 were to grow as vehicles would have fewer gaps in which to make the turning movements, resulting in vehicles spending more time waiting on side roads and/or in the central reserve to complete the movements.

Evidence: this problem is highlighted through stakeholder views and is supported by observations from the conflict study (albeit the vehicles were observed to complete the turning movements safely) and collision data (two collisions at Allangrange involved agricultural vehicles).

Problem 2 – Perceived safety risks for general traffic and buses merging onto the A9 at intermediate junctions (Glackmore, Arpafeelie, Allangrange and Artafallie)

9.2.9. Stakeholders raised concerns that the left turn slips at the intermediate junctions which should facilitate traffic from the side roads merging with the A9 are not long enough length to allow vehicles to speed up sufficiently in order to join the A9 in a safe manner.

9.2.10. At present there are no merge tapers at any of the intermediate junctions as the design standards (CD123) require there to be more than 450 vehicles/day turning left before a merge taper is considered. The highest recorded number of vehicles turning left at any of the four junctions was at the Allangrange junction, with 133 daily vehicles observed on Thursday 11th September 2020.

9.2.11. Bus operators have noted that certain services are unable to use bus stops along the A9 as buses are unable to stop and then merge back into traffic in a safe manner. This limits the bus services that can be provided to the existing bus stops on the A9 in the study area.

Evidence: this problem is highlighted through stakeholder views.

MUNLOCHY JUNCTION

9.2.12. The current and future problems identified in this section can be further divided into the following:

Problem 3 – Conflicts arising from vehicles merging from the B9161 onto the A9 southbound

9.2.13. There are observed conflicts that arise from left turn and merging movements from the B9161 onto the A9. Drivers turning left were observed to not slow down/give way to the A9 mainline vehicles, resulting in a large number of conflicts as vehicles on the A9 southbound changed lanes or slowed down to avoid collisions.

9.2.14. Stakeholders raised concerns about risks resulting from all movements at the at-grade Munlochy Junction, with mention made of the potential impact of drivers unfamiliar with the area and of the impact of solar glare.

9.2.15. This section of the A9 does not have street lighting (excluding Tore Roundabout). There is a perceived risk by some stakeholders that poor visibility at Munlochy Junction (as a result of a lack of lighting) increases the likelihood of near misses and/or collisions. These concerns regarding visibility increase during the winter months when there is less natural light and poorer weather conditions, with driving conditions made more challenging by road surface water, snow and ice.

9.2.16. Stakeholders commented that driver frustration during peak morning and evening peak periods may contribute to this problem.

9.2.17. This problem would increase in the future if traffic demand on the A9 and side roads were to grow as vehicles would have fewer gaps (to allow merging movements), potentially leading to driver frustration and risk-taking behaviours.

Evidence: this problem is highlighted through extensive stakeholder views and is supported by collision data (two collisions). Data from the conflict study at this location indicated that this movement results in up to 100 conflicts during the two-hour morning peak period at Munlochy Junction.

Problem 4 – Perceived safety risks for right turning movements from the A9 onto the B9161

9.2.18. Stakeholders raised concerns about risks resulting from all movements at the at-grade Munlochy Junction, with particular mention made of the right turn movement from the A9 northbound onto the B9161 across the high-speed southbound carriageway of the A9.

9.2.19. Stakeholders commented that driver frustration during peak morning and evening peak periods may contribute to this risk. Due to higher volumes of traffic on the A9 southbound carriageway during these periods, there are reduced gaps for completing the right turn across the carriageway which results longer waiting times (with 2.5 minutes waiting time observed for one vehicle during the study surveys) and the build-up of queues. Drivers that have been waiting for a longer time may get frustrated and pressure builds up to complete the right turn, resulting in drivers perhaps taking greater risks whilst trying to cross the southbound carriageway.

9.2.20. This perceived risk would increase in the future if traffic demand on the A9 were to grow as vehicles would have fewer gaps in which to make the turning movements which may result in risk-taking.

9.2.21. The conflict study observed instances of driver confusion over the give-way in the central reserve between movements from the A9 into B9161 and movements from the B9161 to the A9 northbound.

Evidence: this problem is highlighted through extensive stakeholder views and is supported by collision data (four collisions involving vehicles making this turning movement). Data from the conflicts study, however, indicated few conflicts for this movement.

Problem 5 – Safety risks due to queues forming on northbound right turn lane and extending onto the main northbound carriageway

9.2.22. Stakeholders raised concerns about the queue for the right turn movement from the A9 northbound onto the A9 extending beyond the length of the right turn slip lane during the evening peak period. Queuing appears to be impacted by platoons of northbound vehicles arriving over the Kessock Bridge.

9.2.23. BEAR Scotland installed a warning system, including an electronic vehicle active sign (VAS), to inform drivers of possible queue formation extending onto the northbound carriageway.

9.2.24. Survey data during the study (and the most recent BEAR Scotland study) did not show queuing extending beyond the end of the slip lane, but it did extend to the limit of the lane. There is anecdotal evidence from stakeholders that the queue extends beyond the limit of the lane.

9.2.25. Traffic modelling (which assumes that routing remains unchanged and that the platooning caused by the Longman Roundabout signals continues) projects that the queue length for the right turn movement would increase (due to traffic growth) from the maximum 25 observed in 2020, extending beyond the extent of the right turn slip lane. This would result in stationary traffic queuing on the northbound carriageway posing a significant risk to road safety.

Evidence: this problem is highlighted through stakeholder views, is supported by survey data of current maximum queue lengths and traffic modelling.

TORE ROUNDABOUT

9.2.26. The current and future problems identified in this section can be further divided into the following categories:

Problem 6 – Perceived safety risks to pedestrians and cyclists at Tore Roundabout

9.2.27. As Tore Roundabout (and associated approaches) divides the village of Tore, there is a requirement for residents (including school pupils) to cross the carriageway on a regular basis in order to access the village's facilities.

9.2.28. Stakeholders raised concerns about the risks to the safety of pedestrians and cyclists crossing the A9 approaches to Tore Roundabout at grade. There were concerns raised that drivers are not fully aware of the crossing points.

9.2.29. The conflict study identified pedestrians running across the carriageway (suggesting risk-taking behaviour) and using alternative crossing locations with better visibility (due to vegetation growth).

9.2.30. The previous study "A9 Tore Non-Motorised User Review" carried out in 2014 identified areas of improvement at the crossing points which have been delivered.

Evidence: this problem is highlighted through stakeholder views and is supported by observations from the conflict study.

Problem 7 – Conflicts arising from vehicle movements at Tore Roundabout

9.2.31. Stakeholders raised concerns about conflicts between vehicles entering and travelling through Tore Roundabout, in particular on the southeast quadrant (exit onto the A9 southbound).

9.2.32. The collision analysis and conflict study identified that there are instances of poor lane behaviour by vehicles in the roundabout. Stakeholders commented that there had been instances where vehicles left the carriageway whilst making manoeuvres to avoid other vehicles already in the roundabout.

9.2.33. Stakeholders noted that queues form on the approaches to Tore Roundabout, affecting the A835 and A832. Video observations suggest that these could be the result of slow-moving vehicles finding it challenging to enter the roundabout. There is a risk that this queuing may increase driver frustration and may result in risk-taking behaviour which may contribute to conflicts.

9.2.34. Conflicts observed at the southeast corner of Tore Roundabout involved slow moving HGVs or agricultural vehicles entering the roundabout from the A832(E) arm and causing vehicles already in the roundabout to brake or change lane.

9.2.35. Evidence from the queue analysis shows that the maximum queue on the A835 approach was 39 vehicles, 29 vehicles on the A9 southbound approach, 20 vehicles on the A832(W) approach, 19 vehicles on the A832(E) approach and 11 vehicles on the A9 northbound approach.

9.2.36. The isolated traffic model for the junction projects an increase in queues from 2020 to 2035, which may lead to greater driver frustration and potential risk-taking behaviours.

9.2.37. Comments made during the stakeholder engagement highlighted that the position of signs on the approaches to the roundabout could be improved. Signs on the A9 northbound approach are at a greater distance from the roundabout resulting in driver confusion as to where the roundabout is located, leading to drivers slowing down (expecting to enter into the roundabout) and then speeding up again when the roundabout does not appear, leading to higher speeds on the approach to the roundabout.

9.2.38. The A9 northbound, south of Tore Roundabout, is a dual carriageway that allows overtaking and observations support that drivers take this as a “last opportunity to overtake” before entering the single carriageway section north of Tore Roundabout. This results in increased speeds on the approach to the roundabout and overtaking manoeuvres on the roundabout. This is exacerbated by vehicles arriving in platoons from across Kessock Bridge.

Evidence: this problem is highlighted through extensive stakeholder views and is supported by collision data (four collisions). Observations and data from the conflict study supports that there is poor lane behaviour by vehicles within the roundabout and conflicts with slow-moving vehicles in the roundabout.

9.3 COMMENTARY ON STAKEHOLDER INPUTS

9.3.1. It should be noted that two elements of stakeholder input regarding problems have been addressed in this report, but are not included in the list above:

- Concerns that any interventions in one location may shift the problem to other locations:
  - This will be addressed as part of the appraisal of any options, as the Transport Planning Objectives (included in section 10) include separate objectives related to Munlochy Junction and Tore Roundabout. Hence, if there is a transferred impact from one location to another, this will be reflected in the appraisal against all the Transport Planning Objectives.
- Concerns that growth in traffic will increase safety problems at Tore Roundabout and Munlochy junction:
  - This will be considered as part of the appraisal of any options in subsequent stages – each option will be considered against existing and future traffic conditions.

9.4 OPPORTUNITIES

9.4.1. The problems identified in the previous section can be grouped into categories where opportunities have been identified as described below:

Opportunity 1: Improve road safety and support the Scottish Road Safety Framework

9.4.2. The National Transport Strategy 2, together with the Scottish Road Safety Framework to 2030, the Strategic Road Safety Plan 2016 and Local Policy, have a vision to reduce the number of accidents and fatalities on Scottish roads. It is the objective of Scottish Government and Transport Scotland to improve road safety and this can be achieved by addressing the problems identified above in a short, medium and long term.

Opportunity 2: Encourage walking and cycling by local residents

9.4.3. There is the opportunity to not only address the identified problems for pedestrians and cyclists at Tore Roundabout (improving the safety of their journeys) but also to facilitate and encourage a higher number of local journeys using active travel modes.

9.4.4. This would support the priorities of the National Transport Strategy (NTS2) by promoting greener, cleaner and healthier travel choices, reducing emissions and helping to make the transport network safer for all to use.

9.5 ISSUES

9.5.1. The Inner Moray Firth Local Development Plan (adopted in 2015) sets out the planned development across the Inner Moray Firth area. The adopted plan is currently under review and the new plan had not been published at the time of drafting this report.

9.5.2. The COVID-19 pandemic will impact on travel behaviours and the future demand for travel represents an area of uncertainty. If the study progresses into the next stage the appraisal will include consideration of this uncertainty in the future year scenarios analysed.

9.6 CONSTRAINTS

9.6.1. Other than the constraints of land ownership outside of the A9 extents, no specific constraints were identified during the study.

9.6.2. Further constraints will be considered as part of further appraisal stages.

10 TRANSPORT PLANNING OBJECTIVES

10.1 INTRODUCTION

10.1.1. This chapter describes the development of the Transport Planning Objectives (TPOs).

10.2 TRANSPORT PLANNING OBJECTIVES

10.2.1. The evidence gathered during the technical analysis, including current transport infrastructure and future demand and the road safety analysis, as well as the inputs provided by the stakeholders during the engagement process, informed the analysis of problems, opportunities, issues and constraints.

10.2.2. In response to these transport problems, opportunities, issues and constraints, the following TPOs were developed. It should be noted that no weighting is applied to any of the objectives and the numbering system is for presentation purposes only.

TPO 1: A reduction in conflicts for active modes at the junctions along the A9 between North Kessock and Tore to encourage the use of active travel modes.

Proposed indicator:

- Primary: reduction in number/scale of severity of conflicts
- Secondary: increase in the number of trips made by active modes on the network within the study area.

Supports National Objective:

- A reliable and resilient strategic transport system that is safe and secure for users
- A cohesive strategic transport system that enhances communities as places, supporting health and wellbeing.

Supports Regional Objective:

- Reduce transport-related casualties in line with reduction targets
- Increase the share of active travel for shorter, everyday journeys.

TPO 2: To achieve an improvement in vehicular road safety and a reduction in conflicts at the Munlochy Junction (A9/B9161) in the short (3 years), medium (3-10 years) and longer term (beyond 10 years).

Proposed indicator:

- Reduction in Collision Numbers/Severity (STATS 19)/Collision description
- Reduction in number/scale of severity of conflicts resulting from driver behaviour
- Reduction in the number of unusual manoeuvres at the junction.

Supports National Objective:

- A reliable and resilient strategic transport system that is safe and secure for users.

Supports Regional Objective:

- Reduce transport-related casualties in line with reduction targets.

TPO 3: To achieve an improvement in vehicular road safety and a reduction in conflicts at Tore Roundabout (A9/A832/A835) in the short (3 years), medium (3-10 years) and longer term (beyond 10 years).

Proposed indicator:

- Reduction in Collision Numbers/Severity (STATS 19)/Collision description
- Reduction in number/scale of severity of conflicts resulting from driver behaviour
- Reduction in the number of unusual manoeuvres at the junctions (e.g. passing within the roundabout).

Supports National Objective:

- A reliable and resilient strategic transport system that is safe and secure for users.

Supports Regional Objective:

- Reduce transport-related casualties in line with reduction targets.

TPO 4: To achieve an improvement in vehicular road safety and a reduction in conflicts at intermediate junctions along the A9 from north of the North Kessock junction up to but not including the Tore Roundabout in the short (3 years), medium (3-10 years) and longer term (beyond 10 years).

Proposed indicator:

- Reduction in Collision Numbers/Severity (STATS 19)/Collision description
- Reduction in number/scale of severity of conflicts resulting from driver behaviour
- Reduction in the number of unusual manoeuvres at the junctions.

Supports National Objective:

- A reliable and resilient strategic transport system that is safe and secure for users.

Supports Regional Objective:

- Reduce transport-related casualties in line with reduction targets.

10.3 CONSISTENCY WITH PROBLEMS, ISSUES, CONSTRAINTS AND OPPORTUNITIES

10.3.1. Table 10-1 shows the alignment between the identified problems and opportunities with the TPOs.

Table 10-1: Relationship between TPOs and identified Problems and Opportunities

Problem	TPO 1	TPO 2	TPO 3	TPO 4
North Kessock to Tore				
1 - Perceived safety risks due to right turn movements from side roads across the A9	O	O	O	P
2 - Perceived safety risks for general traffic and buses merging onto the A9 at intermediate junctions	O	O	O	P
Munlochy Junction				
3 - Conflicts arising from vehicles merging from the B9161 onto the A9 southbound	O	P	O	O
4 - Perceived safety risks for right turning movements from the A9 onto the B9161	O	P	O	O
5 – Safety risks due to queues forming on northbound right turn lane and extending onto the main northbound carriageway	O	P	O	O
Tore Roundabout				
6 – Perceived safety risks to pedestrians and cyclists at Tore Roundabout	P	O	O	O
7 - Conflicts arising from vehicles movements at Tore Roundabout	P	O	P	O
Opportunity	TPO 1	TPO 2	TPO 3	TPO 4
General				
1 – Improve road safety and support the Scottish Road Safety Framework	P	P	P	P
2 – Encourage walking and cycling by local residents	P	O	O	O

11 OPTION GENERATION

11.1 INTRODUCTION

11.1.1. Following the development of the TPOs a longlist of potential options that could address the problems and achieve the TPOs was identified.

11.1.2. At the Case for Change stage the focus is on identifying a long list of options that could potentially provide solutions that would meet the Transport Planning Objectives and alleviate the problems or address the opportunities identified. This is to provide confidence that – should the study proceed to the next stage of appraisal – that there are potential options that could be further considered.

11.2 OPTION GENERATION

11.2.1. In line with STAG guidance, a do-minimum scenario needs to be considered as part of the initial appraisal. The do-minimum scenario considered at this stage does not include changes to the existing network and assumes a growth in line with the existing LDP.

11.2.2. The list of options generated are shown in **Appendix K**. Options are divided into short, medium and long-term interventions and were initially appraised against the performance against the Transport Planning Objectives.

12 CONCLUSIONS AND NEXT STEPS

12.1 THE CASE FOR CHANGE

12.1.1. This Initial Appraisal: Case for Change report has set out the context for the appraisal of the A9 section between the North Kessock junction and the Tore Roundabout and the intermediate junctions. Following STAG guidance, it has identified the transport problems as well as the opportunities alongside the issues and constraints of the study area. This analysis provided the basis for objective setting and the generation of a longlist of potential options.

12.1.2. This report sets out that there are identified and evidenced problems at locations along the A9 between North Kessock and Tore, with most stakeholder views generally aligning with road safety analysis (supported by collision statistics and a conflicts study).

12.1.3. A longlist of options which could potentially achieve the objectives and address the problems and opportunities has been identified.

12.2 PRELIMINARY APPRAISAL

12.2.1. If the study proceeds beyond the Case for Change, the next stage would be the preliminary appraisal. The purpose of the Preliminary Options Appraisal, as established in the Brief and in line with the STAG process, will examine the options generated in this report against a number of criteria that includes:

- Scheme objectives (in more detail)
- Policy alignment review
- STAG criteria (environment, safety, economy, integration, and accessibility and social inclusion)
- Affordability
- Feasibility
- Acceptability.

12.2.2. This criterion provides a framework to ensure all impacts are considered within the national, regional and local objectives. Following the Preliminary Appraisal, if funding is available, a more detailed appraisal may be carried out for the options that perform well against the TPOs and STAG criteria.

Appendix A

EXISTING JUNCTION LAYOUTS

wsp

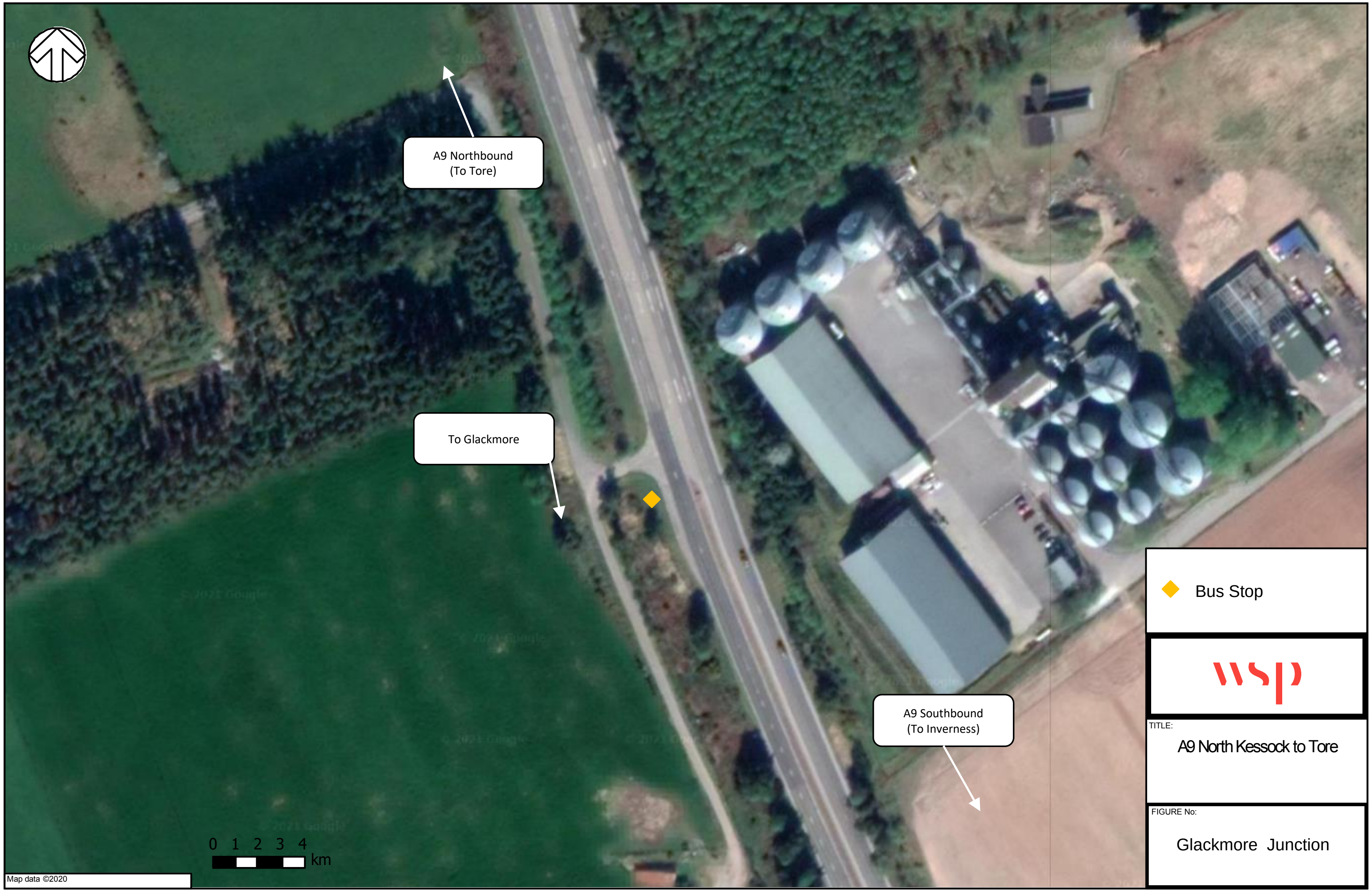
TITLE:

A9 North Kessock to Tore

FIGURE No:

Tore Roundabout

Date Modified: 18/09/2020 10:03
Drawn By: UKFXA013
File: Created using iGIS, WSP's Online Mapping System



File: Created using iGIS, WSP's Online Mapping System Drawn By: UKFXA013 Date Modified: 09/09/2020 12:29

Bus Stop

TITLE:

A9 North Kessock to Tore

FIGURE No:

Arpafeelie Junction & Allangrange Junction

File: Created using iGIS, WSP's Online Mapping System

Drawn By: UKFXA013

Date Modified: 09/09/2020 12:29

Date Modified: 09/09/2020 12:29
Drawn By: UKFXA013
File: Created using iGIS, WSP's Online Mapping System

Bus Stop

wsp

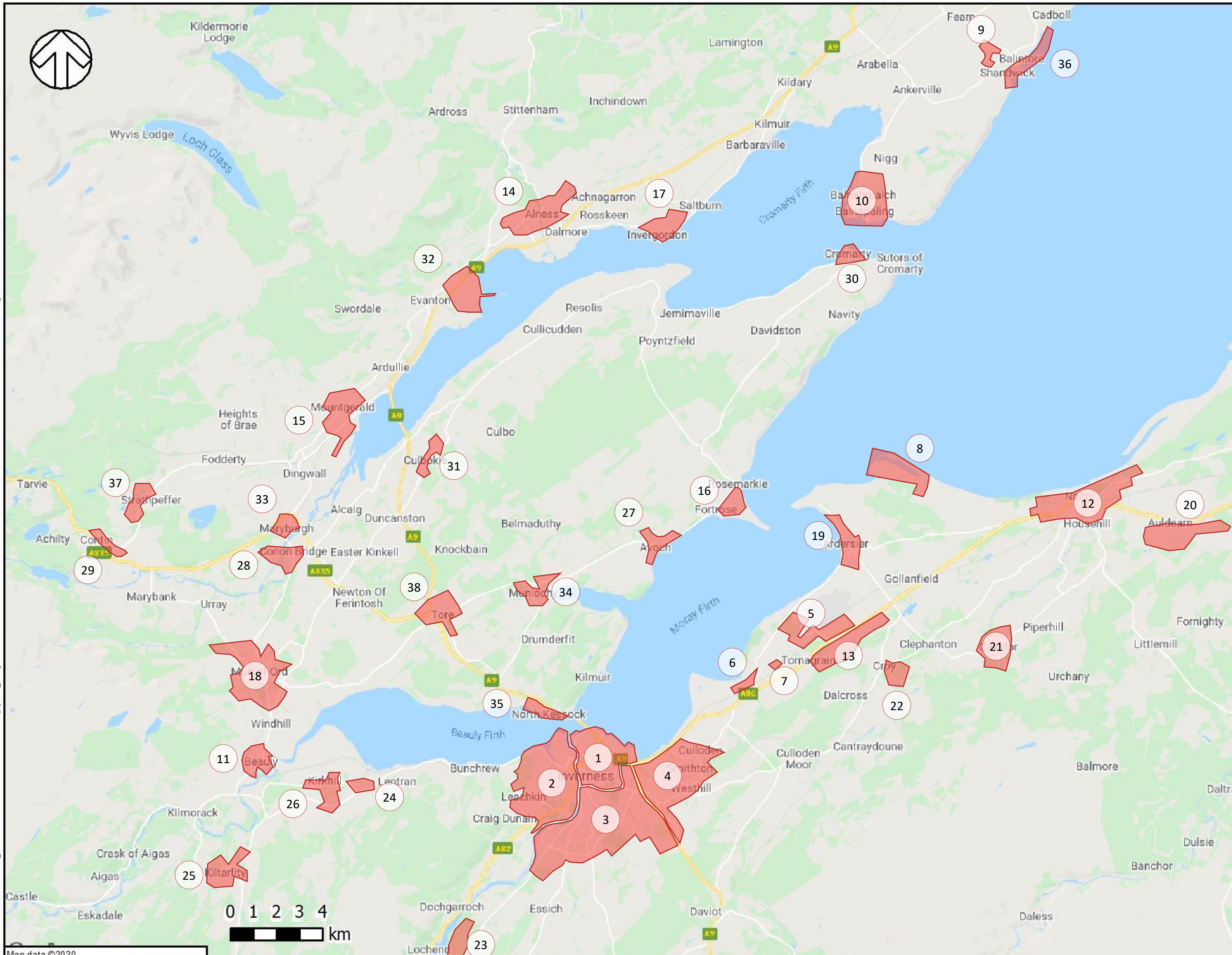
TITLE:
A9 North Kessock to Tore

FIGURE No:
Artafallie Junction

File: Created using QGIS, WSP's Online Mapping System
Drawn By: UKFXA013 Date Modified: 18/09/2020 10:04

Appendix B

INNER MORAY FIRTH LOCAL DEVELOPMENT PLAN DATA



Areas of Development allocated in the 2015 IMFLDP

1 - Central Inverness
2 - West Inverness
3 - South Inverness
4 - East inverness
5 - Inverness Airport Business Park
6 - Castle Stuart
7 - Morayhill
8 - Whiteness
9 - Fearn Aerodrome
10 - Nigg
11 - Beauly
12 - Nairn
13 - Tornagrain
14 - Alness
15 - Dingwall
16 - Fortrose and Rosemarkle
17 - Invergordon
18 - Muir of Ord
19 - Ardersler
20 - Auldearn
21 - Cawdor
22 - Croy
23 - Dores
24 - Inchmore
25 - Kiltarlity
26 - Kirkhill
27 - Avoch
28 - Conon Bridge
29 - Contin
30 - Cromarty
31 - Culbokie
32 - Evanton
33 - Maryburgh
34 - Munlochy
35 - North Kessock
36 - Seaboard Villages
37 - Strathpeffer
38 - Tore

wsp

TITLE:

A9 North Kessock to Tore

FIGURE No:

Future Development

No	Area	Type of Development	Area (Ha)	Housing Capacity (Dwellings)	Timeframe
1	Central Inverness	Housing	4.7	7	Undefined
		Mixed Use	45.1	35	Undefined
		Community	0.2		Undefined
		Industry	21.1		Undefined
		Retail	0.6		Undefined
2	West Inverness	Housing	6	163	Undefined
		Mixed Use	212.4	994	Undefined
		Community	147.9		Undefined
		Industry	3.2		Undefined
3	South Inverness	Housing	162.2	243	Undefined
		Mixed Use	19.3	95	Undefined
		Community	47.3		Undefined
		Retail	4.7		Undefined
		Business	62.2		Undefined
4	East Inverness	Housing	8.3	164	Undefined
		Mixed Use	269.5	4,167	Undefined
		Community	14.4		Undefined
		Retail	7.2		Undefined
		Business	6.3		Undefined
5	Inverness Airport Business Park	Business	2		Phase 1 complete - 14.5ha of services land available. Co-op's new 12,000sqft distribution centre at IABP opened in Sept 2018. 130-bed hotel expected to open in Dec 2019. Ark Estates delivering new 10,000sqft distribution & training centre for Enercon Services UK and a 5,000sqft speculative industrial unit with both projects due to complete in Q1 2020.
6	Castle Stuart	Business	36.5		Ongoing
7	Morayhill	Industry	1.6		Major expansion completed in April 2018
8	Whiteness	Industry	37		Ongoing
9	Fearn Aerodrome	Industry	4.47		Ongoing
N/A	Fendom	Industry	194.5		Ongoing
10	Nigg	Industry	21.9		Planning applications submitted in 2017 for extension to existing buildings.
11	Beauly	Housing	13.4	238	Undefined
		Mixed Use	21.1	185	Undefined
		Community	5.4		Undefined
12	Nairn	Housing	26	126	Undefined
		Mixed Use	113.43	137	Undefined
		Community	3.1		Undefined
		Industry	5.1		Undefined
		Retail	4.4		Undefined
		Business	3.2	3	Undefined
13	Tornagrain	Mixed Use	226	1,602	2018 - 2022 = 432 homes 2023 - 2027 = 540 homes 2028 - 2032 = 630 homes
14	Alness	Housing	63.2	114	Undefined
		Mixed Use	22.5	67	Undefined
		Community	3.8		Undefined
		Industry	17.9		Undefined
		Retail	4.4		Undefined
		Business	41.5		Undefined
15	Dingwall	Housing	59.6	515	Undefined
		Mixed Use	13.21	1	Undefined
		Business	1.76		Undefined
16	Fortrose and Rosemarkle	Housing	1.9	5	Undefined
		Mixed Use	7.5	8	Undefined
		Community	1.3		Undefined
17	Invergordon	Housing	3.66	241	Undefined
		Mixed Use	6.7	674	Undefined
		Industry	223		Undefined
18	Muir of Ord	Housing	22.6	282	Undefined
		Mixed Use	9.82	6	Undefined
		Industry	44.25		Undefined
N/A	Tain	Housing	24.5	32	Undefined
		Mixed Use	24.9	25	Undefined
		Community	2.1		Undefined
		Industry	18.2		Undefined
		Business	1.3		Undefined
19	Ardersier	Housing	7.4	86	Undefined
		Mixed Use	6.62	28	Undefined
		Community	0.1		Undefined
		Industry	2.7		Undefined
20	Auldearn	Housing	7.17	61	Undefined
21	Cawdor	Housing	0.88	2	Undefined
		Mixed Use	29.2	230	Development of the site should be phased over the period 2011 to 2031 with development progressing at a prescribed rate of no more than 85 homes delivered in the period 2011-16; 70 homes in 2016-21; 65 homes delivered in each 5 year period 2021-26 and 2026-31.
22	Croy	Housing	2.5	35	Undefined
		Mixed Use	15	150	Development of the site should be phased over the period 2011 to 2031 with development progressing at a prescribed rate of no more than 50 homes delivered in each 5 year period from 2011 to 2021, and 25 homes delivered in each 5 year period from 2021 to 2031.
23	Dores	Housing	4.5	34	Undefined
		Mixed Use	3.1	16	Undefined
		Community	1.5		Undefined
N/A	Drumnadrochit	Housing	2.8	11	Undefined
		Mixed Use	11.8	13	Undefined
		Community	1		Undefined
N/A	Fort Augustus	Housing	9.5	76	Undefined
		Mixed Use	8.9	8	Undefined
		Community	13.2		Undefined
		Business	0.2		Undefined
24	Inchmore	Housing	1	8	Undefined
		Mixed Use	3.2	16	Undefined
		Business	0.1		Undefined
25	Kiltarlity	Housing	5.6	99	Undefined
		Mixed Use	1.9	14	Undefined
		Business	0.5		Undefined
26	Kirkhill	Housing	9.4	9	Undefined
		Mixed Use	6.4	11	Undefined
N/A	Tomatin	Housing	21	188	Undefined
		Mixed Use	1.1	15	Undefined
		Community	3.8		Undefined
		Industry	22.8		Undefined
		Business	3.4		Undefined
27	Avoch	Housing	9	123	Undefined
		Community	2.8		Undefined
		Business	4.5		Undefined
		Housing	12.8	143	Undefined

28	Conon Bridge	Mixed Use	24.2	294	Undefined
		Retail	0.2		Undefined
29	Contin	Housing	2.7	18	Undefined
		Mixed Use	5.6	65	Undefined
30	Cromarty	Mixed Use	1.3	33	Undefined
		Community	0.3		Undefined
31	Culbokie	Housing	8	88	Undefined
		Mixed Use	4.6	43	Undefined
32	Evanton	Housing	15.1	155	Undefined
		Mixed Use	17.7	175	Undefined
		Industry	154		Undefined
		Business	2.1		Undefined
33	Maryburgh	Housing	25.21	2	Undefined
		Mixed Use	2.2	1	Undefined
34	Munlochy	Housing	4	77	Undefined
		Mixed Use	1.5	16	Undefined
		Community	0.7		Undefined
		Business	3.2		Undefined
35	North Kessock	Mixed Use	11.3	9	Undefined
		Business	7.7		Undefined
36	Seaboard Villages	Housing	11.99	152	Undefined
		Mixed Use	1.91	23	Undefined
		Business	4.22		Undefined
37	Strathpeffer	Housing	4.4	67	Undefined
38	Tore	Housing	3.4	14	Undefined
		Mixed Use	43	46	Undefined
		Community	0.6		Undefined
		Industry	11.4		Undefined

Appendix C

2020 TRAFFIC SURVEY LOCATIONS

The traffic surveys undertaken as part of the study were undertaken at the locations shown in Figure 1. The location of pedestrian crossing counts undertaken at Tore Roundabout is illustrated in Figure 2. The survey extents include the following junctions:

Figure 3: A9 North Kessock to Tore Roundabout Study Area.

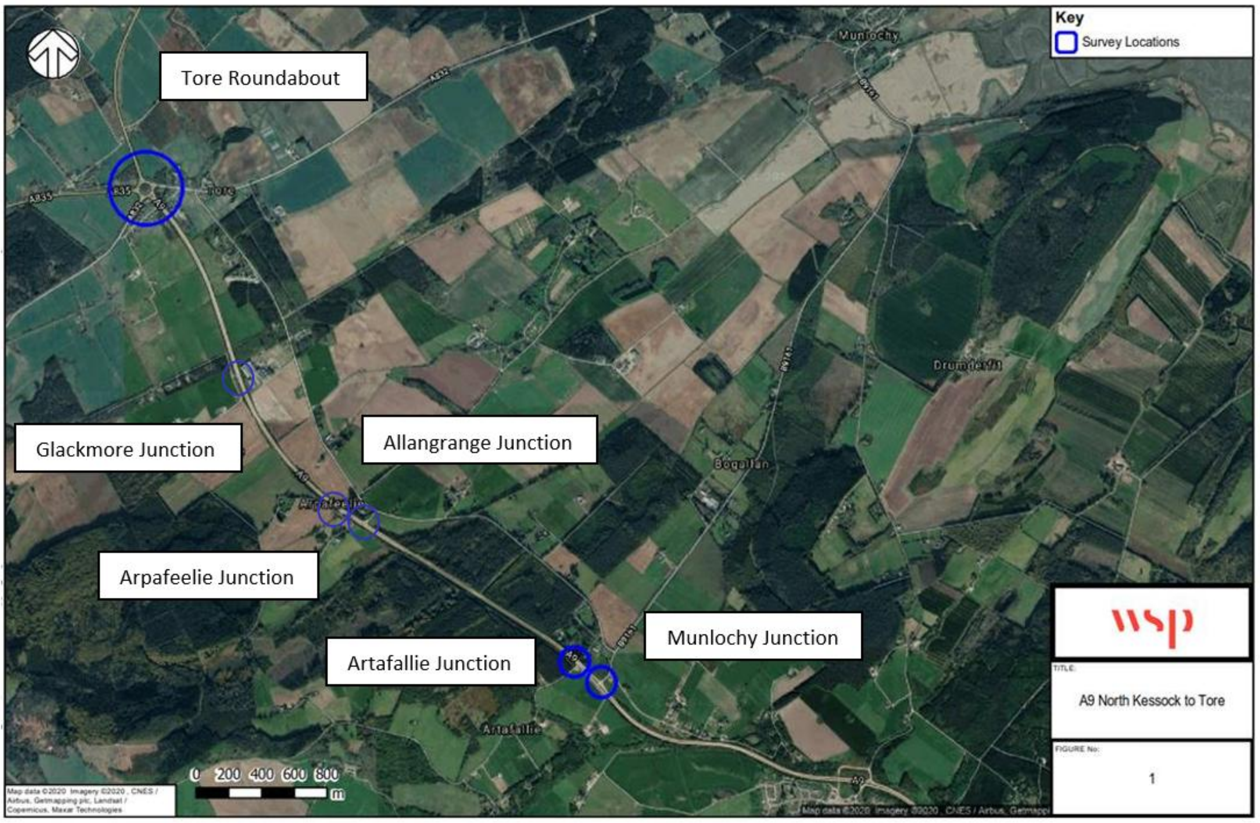
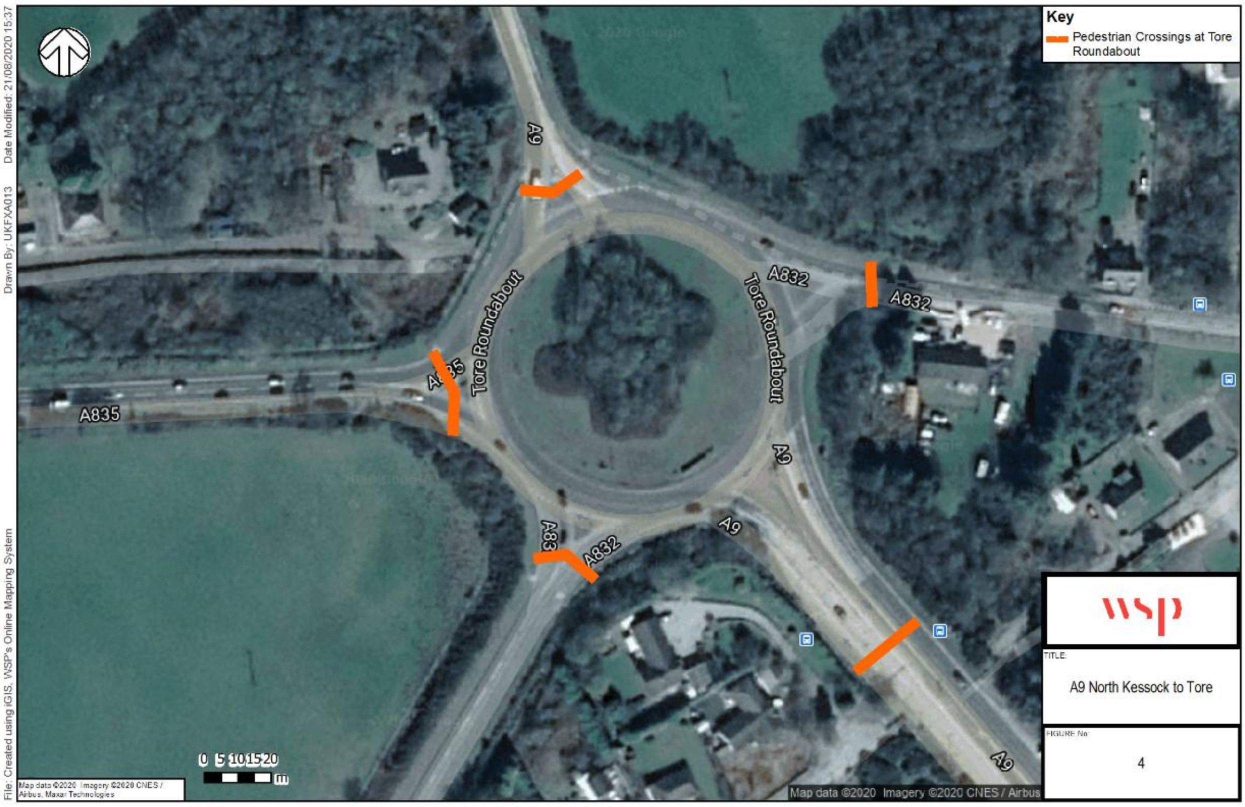


Figure 2: Tore Roundabout Pedestrian Crossings



Appendix D

STAKEHOLDER WORKSHOP REPORTS

WSP UK
110 Queen Street
Glasgow
G1 3BX

03 September 2020

Dear Sir/Madam,

A9 North Kessock to Tore Study

Transport Scotland has appointed WSP as Engineering Consultants to assess and report on the safety and operation of the A9 between North Kessock and Tore.

This study is seeking to identify existing issues or opportunities for improvement. It will review both current and future operations, taking account of potential and future developments within the surrounding area.

Whilst we are unable to predict the outcomes of the study, Transport Scotland has requested that WSP follow the principles of Scottish Transport Appraisal Guidance (STAG). The benefit of this approach ensures that a robust, evidence-led and transparent decision is reached. Statutory public consultation, which can attract unforeseen objections, is a key element of many infrastructure projects and the use of STAG demonstrates that where a specific outcome is recommended this can be founded on clear evidence and is robust to scrutiny.

If this process demonstrates an intervention is required on the trunk road network, before any significant alterations can be made to the road itself, a case must be presented for the justification for the investment of public funds in transport infrastructure. The process for this is guided by STAG and has 4 stages:

- Pre-Appraisal (the Case for Change)
- Part 1 Appraisal (Preliminary Appraisal)
- Part 2 Appraisal (Detailed Appraisal)
- Post Appraisal

This part of the study represents the Pre-Appraisal stage, where WSP is gathering evidence regarding actual and perceived issues and potential opportunities. This will confirm whether a Case for Change can be identified and evidenced for this section of the A9 between North Kessock and Tore.

As part of this study WSP will engage with local stakeholders and will review and analyse all the data relating to the safety, operation and suitability of this stretch of road to meet current and future demands.

Making the Case for Change

It is important to recognise that this first stage of the process is focussed on establishing whether there is a Case for Change and if so, the study will then progress to consider what potential engineering interventions could be further investigated to address any issues identified.

Request for Stakeholder Input

Throughout this study WSP and Transport Scotland will be engaging with local stakeholders, including community councils and elected members, to gather, listen to and understand collective views about the A9 and the junctions between North Kessock and Tore. This engagement will be initially through discussion with yourself and other stakeholders representing organisations or members.

This engagement could be by digital meetings or phone conversations, as appropriate, followed by two structured workshops. Unfortunately, our ability to meet face–to-face is restricted by Covid-19 protocols and we are not currently able to hold these meetings and workshops with you in person as we would have wished. We feel it is more important to make progress now, however, than await a point in the future at which face–to-face meetings would be permitted.

Through discussions with elected members and officials, we are aware of previous surveys and correspondence concerning parts of this section of the A9. We will use as much of this as possible, and our aim is to build upon this so as to further understand if there is a case for change.

WSP's brief is to take a holistic view of the A9 from the North Kessock junction to the Tore Roundabout and all junctions between those locations. We are now keen to hear from our stakeholders first-hand and to have early discussions to understand each of your perspectives, feeding into a working process of identifying the key issues in the study area. Once the key issues are understood, we can establish if there are interventions that would be meaningful and improve the current and future functionality of this stretch of the A9.

Timeframes for Stakeholder Input

We are hoping to begin these discussions from week commencing 31st August 2020 and aim to do so at a time that suits you. If you could email us at A9-North-Kessock-to-Tore-Study@WSP.com to confirm your availability and arrange a time for us to contact you.

To ensure both you and WSP can gain as much as possible from discussions, we would like your views on the following operational and safety aspects of the entire A9 between North Kessock junction and Tore Roundabout, however, the undernoted list is for guidance only and is not exhaustive in detail:

- Any anxiety or concerns for safety when driving, walking, wheeling or cycling along or across the A9, or when using any of the junctions
- The volume of traffic using the A9 and the junctions
- The speed of traffic on the A9 and surrounding roads
- Delays, congestion and queuing on the A9 and surrounding roads
- Any difficulties with visibility when using the A9 and the junctions
- The impacts of further housing development (e.g. north of Inverness) on this part of the A9
- Do you take alternative routes to avoid any part of the A9 or a particular junction?
- If you have concerns, how do you think Transport Scotland should address these?

An outline of the stretches and junctions of the A9 under review is attached in **Annex A**.

Whilst we would like to discuss these with you directly, we understand this may not suit everyone and if you would prefer to submit your views in writing, please feel free to email us at A9-North-Kessock-to-Tore-Study@WSP.com.

Once we have established the core issues, we will then circulate that as the basis for the first of our planned online workshops.

Next Steps

Following our initial discussions, the first of our two workshops will be an opportunity to further explore any issues we have identified to take forward into our next step, which is to establish the objectives and outcomes of our initial study.

As an 'online' forum will be required due to Covid-19 protocols, space will be limited in these workshops and we are therefore confirming with each stakeholder if they are keen to attend and also, where stakeholders are part of an organisation or group, that one appointee is identified and able to represent each at this event. The proposed workshops are an opportunity for us to engage in more detail with multiple stakeholders directly. Indicative dates and a proposed outline of these workshops are likely to be the following:

Workshop 1: 23 September 2020

- To further explore, understand and confirm the issues and opportunities along this stretch of the A9
- To consider and collectively agree objectives for the study, based on the identified issues and opportunities

Workshop 2: 8 October 2020

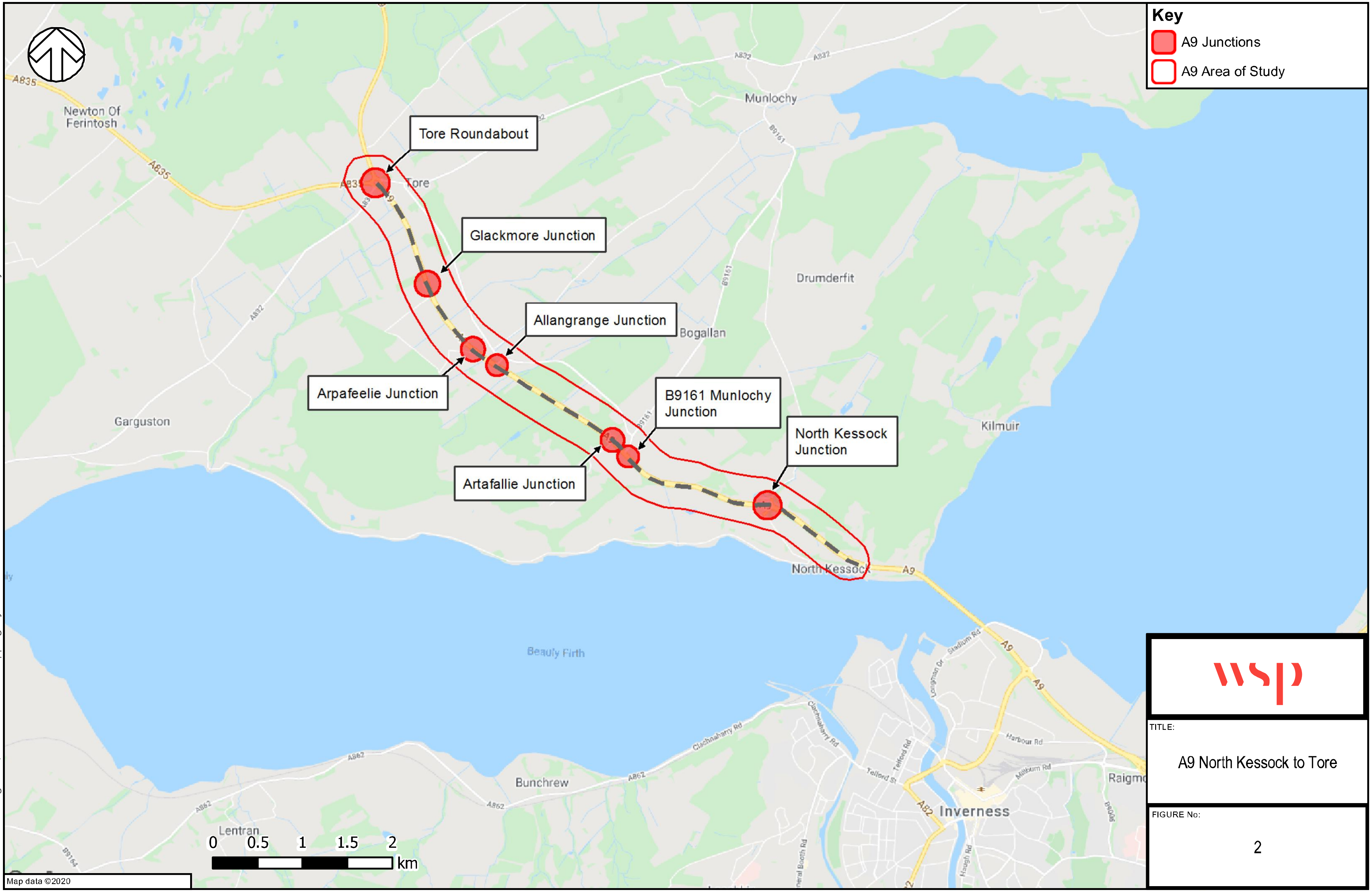
- To identify potential engineering options that could achieve the identified objectives

We greatly appreciate your engagement with this process and any feedback you can assist us with. We thank you in advance for your participation and look forward to discussing this study with you directly, where possible, in the near future.

Yours Faithfully,

[redacted]

Annex A - Map of Study Area



File: Created using iGIS, WSP's Online Mapping System

Drawn By: UKFXA013

Date Modified: 01/09/2020 16:19

Annex B – Stakeholder List

Stakeholder	Name
Transport Scotland	[redacted]
- Network	
- Development	
- Development	
- Transport Planning	
- Transport Planning	
BEAR Scotland	
Police Scotland	
- H&I Roads Policing	
- North Safety Camera Unit	
- Trunk Roads Policing	
MSPs	
Councillor (Highland Council)	
The Highland Council	
- Road Safety	
- Roads and Transport	

- Head of Service, Trapnsport Planning and Local Plans	[redacted]	
- Local Development Plan		
- Planning Applications		
- Passenger and School Transport		
- Area Roads Team		
- Policy and Programmes Manager Road and Transport		
HiTRANS		
- Partnership Manager		
NHS Highland		
Scottish Ambulance Service		
Scottish Fire and Rescue Service		
Stagecoach		
Community Council		
- Avoch and killen		
- Cromarty		
- Ferintosh		
- Fortrose		
- Killearnan		
- Knockbain		
- Resolis		
Local business groups / chambers of commerce		
- Inverness Chamber of Commerce		
- Federation of Small Businesses		
- Scottish Council for Development and Industry		
- Confederation of Passenger Transport		
- Logistics UK (formerly Freight Transport Association (FTA))		
- IAM Road Smart		

Workshop Feedback

PROJECT NUMBER	70075948	**MEETING DATE**	23 September 2020
PROJECT NAME	A9 North Kessock to Tore Study	**VENUE**	Microsoft Teams
CLIENT	Transport Scotland	**RECORDED BY**	[redacted]
MEETING SUBJECT	Key notes from 1st stakeholder workshop held on 23 September 2020		

ABBREVIATIONS	
PT	Public transport
SB	South bound
NB	North bound
NMU	Non-motorised users

Session 1 – Identifying Problems and Opportunities

Tore Roundabout

- Crossing here is a high-risk movement, as it is the only way for local residents and school children to access public transport. Parents are often concerned about their children crossing here to catch the school bus.
- The risk to pedestrian safety is intensified during school terms.
- Pedestrians must often navigate two cars entering the carriageway from the roundabout. This is risky and it is sometimes difficult to see if there is just one car or two.
- Narrowness of the A832 leads to conflicts with south-bound movements from the A9.
- Drivers do not use Tore roundabout to go to Munlochy due to delays on the roundabout and narrow road (A832).
- Queues formed in rush hour (AM and PM) trying to access Tore roundabout and this has an effect on the A835 and A832.
- There is potential for future development to the east and a new park and ride that will use this route – both will add more pressure on the roundabout.
- The sign for Tore roundabout (on the A9 NB) is positioned too early; people slow down but then accelerate when they don't see the roundabout immediately. There is a similar situation on the exit of the A9 north bound and A835 where drivers cannot see oncoming traffic with right of way on the roundabout. This results in vehicles ending up in the ditch due to conflict with the vehicle already on the roundabout.

- The A9 north of Tore roundabout is a single carriageway with very limited overtaking opportunities. This results in a surge of traffic at the roundabout.

- Workshop participant has witnessed a few cars going straight over the roundabout when they haven't slowed down in time.

- Cars accelerate immediately after leaving the roundabout which means they are approaching the pedestrian crossing at speed.

- Safety is an all year-round concern for pedestrians and bus users having to cross the carriageway. For cyclists it is more of a seasonal concern. Cyclists must take risks navigating the roundabout.

- Workshop participant has often witnesses last-minute over-taking on the approach to the roundabout travelling north in order to stop being stuck behind slow moving vehicles on the single carriage way stretch beyond Tore Roundabout.

A9 North Kessock to Tore Route

- Queued traffic on the side roads leads to risk taking behaviour to enter/cross the A9.

- Visibility issues caused by low sun or solar glare make it hard to see the curbs on certain sections resulting in cars clipping them.

- Near misses are being observed but are not being reported.

- A number of junctions have narrow central reserves which offer little protection for crossing pedestrians. Larger vehicles that need to pull out will often sit at an angle, very close to or on the central reserve, to make the manoeuvre easier for them.

- Side roads are narrow and old with poor maintenance which increases safety risks.

- People will often take chances and cut in front of SB traffic. Right turns onto NB lanes are also a risk.

- This section experiences risks due to both speed and volume of traffic (there is not enough space for traffic to merge).

- Some bus services cannot use the northbound bus stops (on A9 approaching Tore) as it's too difficult for the drivers to pull out safely and cross both lanes to get into the inside lane for onward routing.

- Non-local drivers (e.g. tourists) are unfamiliar with the roads and don't know the signage.

- Tourist traffic is increasing, and tourist seasons are getting longer which means there will be an increase in the dangerous driving behaviour resulting from their unfamiliarity with the roads.

- The Harry Gow café and layby is used as a meet-up point for motorhome drivers, they will then continue along the A9 together resulting in a fleet of slow-moving vehicles.

- The southbound carriageway is safer than the northbound – there is a frequent occurrence of southbound drivers moving into the inside lane (out of courtesy) to all traffic from the B9161 to join the A9, especially in the AM peak with people heading to Inverness.

- The acceleration lane for joining vehicles (SB from B9161 to A9) should be longer

- It is common behaviour for southbound vehicles to change lane to allow merging traffic (from the B9161) without fully checking it is clear to do so.
- Any future development needs to consider the impact on surrounding roads and ensure they are fit for purpose.
- Right-turn movements on a section of network at the national speed limit are dangerous.
- Workshop participant often witnesses undertaking due to frustration with slow moving vehicles preparing to turn right onto the B9161.
- There is public concern with slow traffic coming onto the A9 from the car park at North Kessock.
- The A9 was not designed to accommodate traffic from all the development that has happened, and any future development must take this into consideration.
- There are near misses regularly observed but very rarely recorded. There should be a way of recording this.
- The road was built in 1982 when the bridge was built – there is very little illumination and safety measures in place that other sections of the A9 have, such as flashing signs to warn of side road movements.
- The walking and cycling routes coming from Inverness are regularly used so any changes must not impact the safety of these.
- There is an aspiration to have more people commuting into Inverness from the Black Isle so this route is key to that and must take this additional traffic into consideration.

Munlochy Junction

- Near misses occur at the junction due to poor lighting and visibility.
- Turning right into Munlochy is a high-risk manoeuvre.
- Munlochy junction particularly dangerous at night with high traffic flows and low visibility.
- It is a two-step junction for those coming out of Munlochy heading north.
- There are no adequate alternative routes – it would mean going to Tore roundabout and using a narrow road (A832) that is often used by HGVs travelling to the refuelling station, resulting in an increased danger to cyclists and pedestrians.
- People are required to take more risks here due to the junction layout and there are issues with the queuing signage.
- The current signage encourages drivers to use the junction to turn right into Munlochy.
- Workshop participants reported witnessing long queues going beyond the end of the right turn lane (NB along A9 to the B9161 junction).
- Navigating the junction is more dangerous in poor weather and dark conditions due to inadequate lighting.
- Drivers' frustration with the junction and not being able to turn leads to risk taking behaviour.

- Comments have been made about the turning lane being full and the fast lane having to slow down/stop due to heavy traffic daily during the PM peak, particularly on Fridays.

- Before Covid-19, it was notable that you would have to wait at the junction for quite some time before being able to make the right turn.

- The junction creates a conflict of movements which is dangerous, particularly when vehicles are turning right out of the B9161 heading towards Tore and vehicles are waiting to turn right from the A9 onto the B9161.

- Accidents occur when someone is waiting to turn right, and they are shunted by cars coming up behind at speed – the reason these are more fatal is because the wheels are positioned towards the right in preparation for the turn, so they are shunted onto the south bound carriage way into oncoming traffic. If they have their wheels positioned forward whilst waiting, they would only be shunted up the carriageway their own side meaning the accident wouldn't be as severe.

Session 2 – Draft Transport Planning Objectives

Draft Transport Planning Objective 1

Objective:

To achieve a reduction in accidents, and/or potential conflicts at the junctions along the A9 between North Kessock and Tore.

Comments:

- Look to reduce the number of potential conflicts at the junction – be mindful of time of year when surveys are done, e.g. an appropriate time do conduct them would be the tourist season.

- Park and ride could reduce the number of cars accessing the city centre.

- Possible implementation of a roundabout at Munlochy or a segregated junction.

- If the Munlochy junction is not fixed then there will be more traffic avoiding the junction and coming to Tore - so they are very much linked, and both need improving at the same time.

Draft Transport Planning Objective #2

Objective:

To improve **–** *make positive statement - To achieve a reduction in risks to safe use of network for active modes (walking and cycling) at the junctions along the A9 between North Kessock and Tore.*

Comments:

- An indicator for this would be a reduction of conflict.

- Tore roundabout has a problem with pedestrian AND road safety.

- TPO is very aligned with the environment agenda and in line with the climate emergency. Can't have PT at Tore unless it's safe for pedestrians to access.

- Is welcomed for NMUs.

- Have conversations with developers re park and ride, active travel and public transport alternatives.

- There should be more cycling infrastructure.

- Encourage active travel/modal shift away from cars - especially with development growth. This needs to be away from the road for safety.

- Bus service to serve Munlochy village.

- Access to public transport /provision of public transport or both.

Suggested additional Transport Planning Objective #3

Objective:

Timescale of deliverability

Comments:

- All in agreement that they would like to see short term solutions that can be put in place immediately, as well as medium and longer-term solutions that will take longer to put into place.

- Agreement that there should be short, medium and long-term solutions.

- That which can be delivered quickly (vs long-term) should be identified.

Suggested additional Transport Planning Objective #4

Objective:

Improve driver behaviour

Comments:

- Issues related to poor decisions, driver error, high speed limit and own responsibility identified. Speed compliance has also been identified as being poor for both lanes.

- Driver frustration associated with lack of overtaking north and west of Tore.

- Improve driver behaviour by reducing risk e.g. short term a reduction in speed limit over both areas which will reduce risk and improve driver behaviour.

- Driving errors, poor decisions and speed compliance all identified causes of collisions.

- Make speeds / energy lower at roundabout.

- Provide driver education.

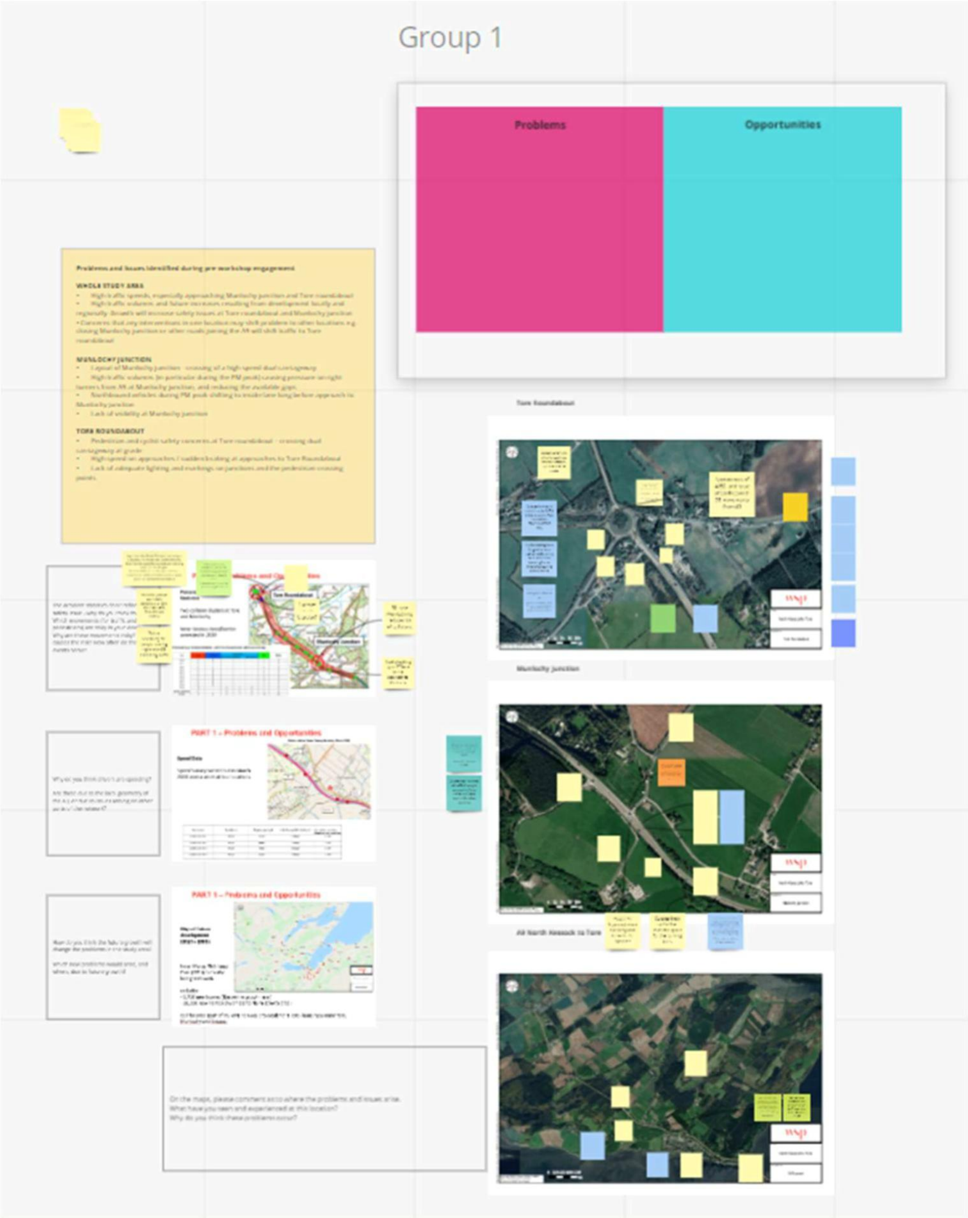
General TPO Comments

- The difficulty of having an overarching TPO is you will have a high level and crude sifting process, so I would like to suggest a note of caution of having a blanket TPO across all intervention as there will be a difference in scale and geography of areas.

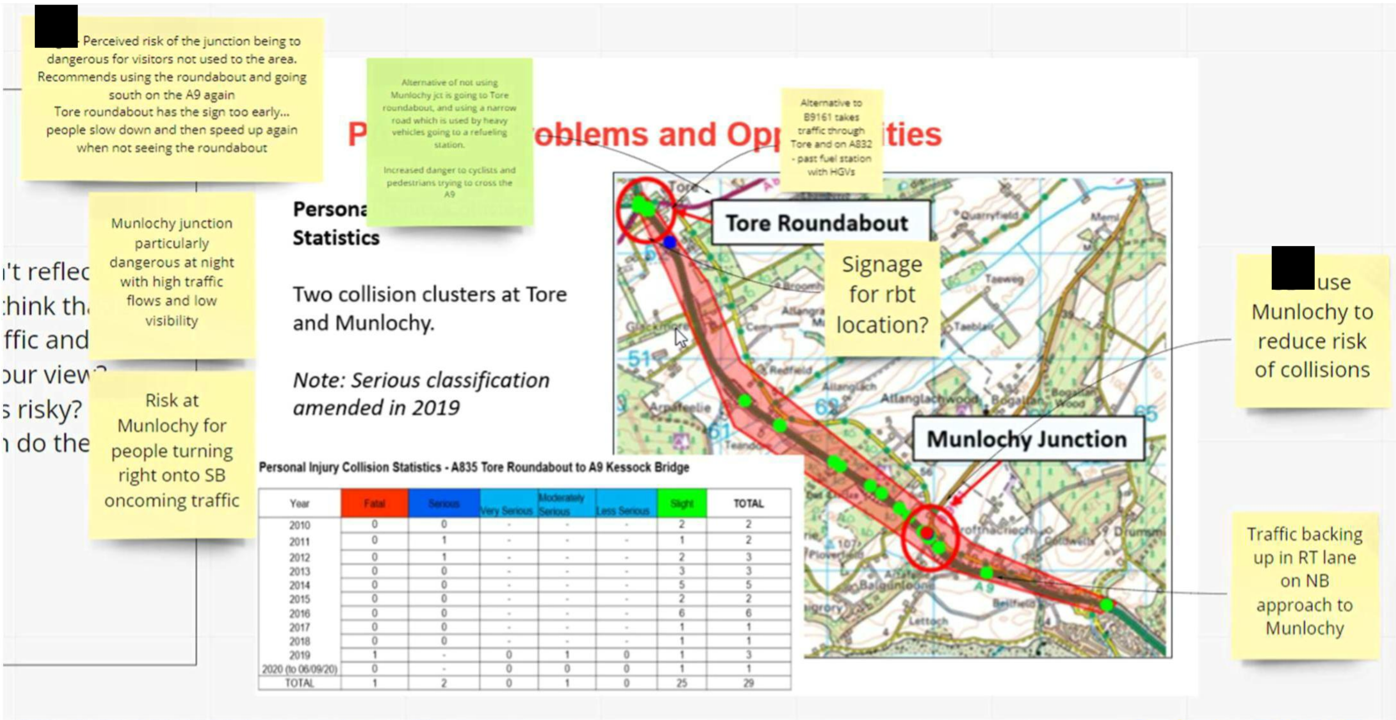
- Some concern that overarching won't capture nuances between Tore, Munlochy and other junctions.

- Consider reduction of conflict risk.

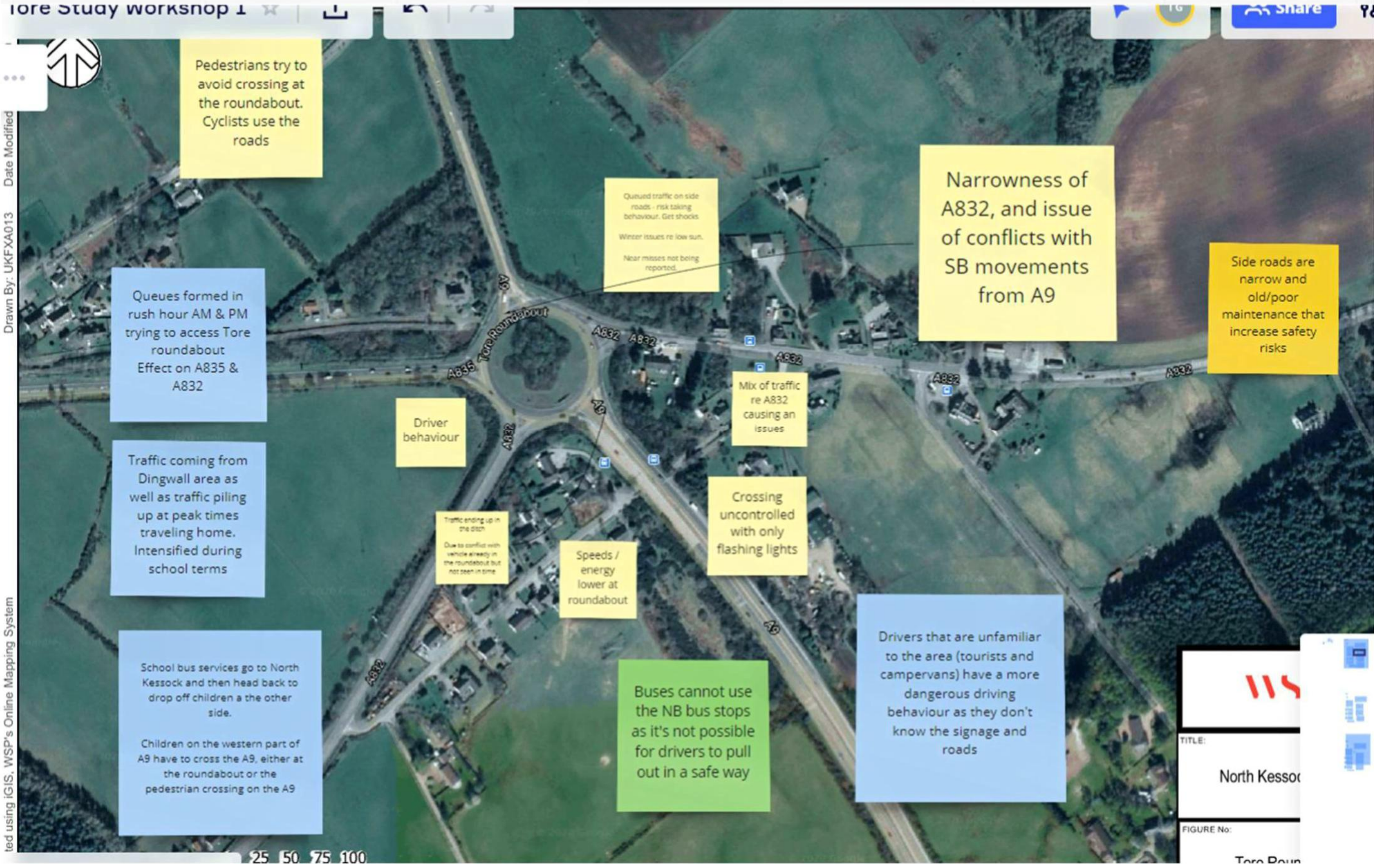
APPENDIX A – SESSION 1 / GROUP 1 MIRO NOTES



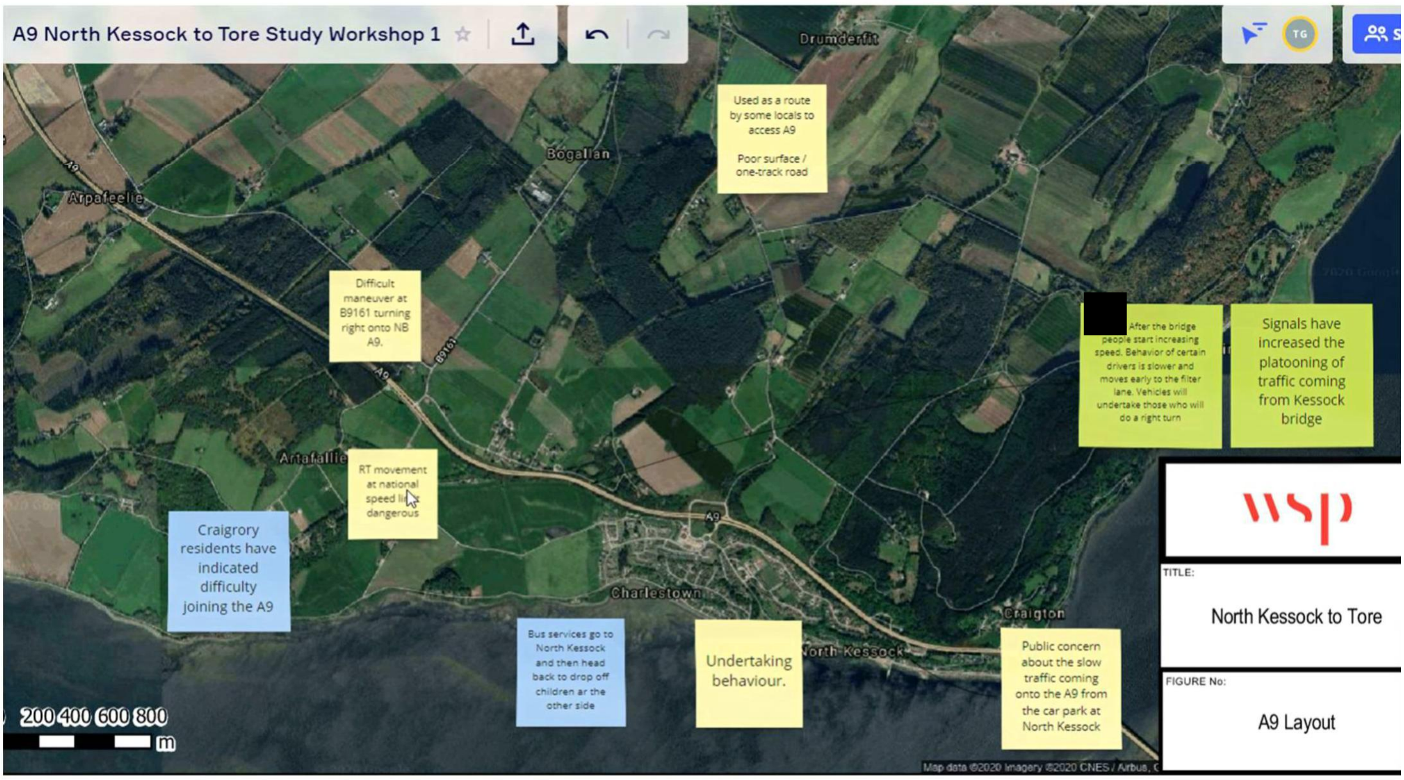
MEETING NOTES



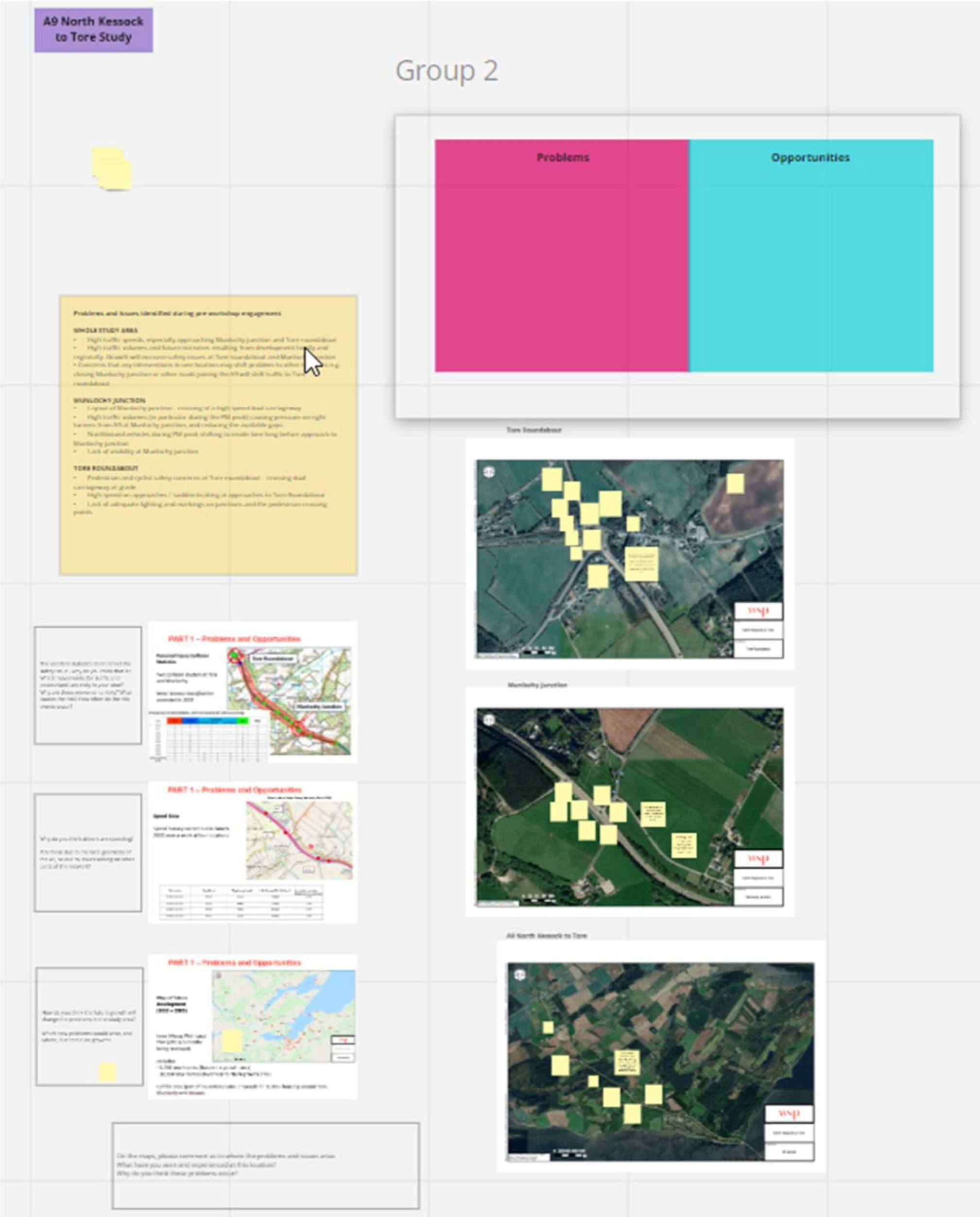
Year	Fatal	Serious	Very Serious	Moderately Serious	Less Serious	Slight	TOTAL
2010	0	0	-	-	-	2	2
2011	0	1	-	-	-	1	2
2012	0	1	-	-	-	2	3
2013	0	0	-	-	-	3	3
2014	0	0	-	-	-	5	5
2015	0	0	-	-	-	2	2
2016	0	0	-	-	-	6	6
2017	0	0	-	-	-	1	1
2018	0	0	-	-	-	1	1
2019	1	-	0	1	0	1	3
2020 (to 06/09/20)	0	-	0	0	0	1	1
TOTAL	1	2	0	1	0	25	29




to Tore Study Workshop 1
Share
[redacted] Local comments are different to what accident data shows - People take more risks due to jct layout.
Issue with queueing signage
Due to high volumes of traffic if people are waiting for a while they take more risks when crossing
Signage encourages drivers to turn righ at Munlochy jct
Bus service to serve Munlochy village
Near misses are not reported but often happen. Near misses due to the junction and poor lighting and visibility. People will often take chances and cut in front of SB traffic. Right turns on to NB lanes are also a risk
[redacted] safer than NB. Frequent occurrence of drivers from B9161 merging the A9. Specially in AM peak with people heading to Inverness
Challenges with both speed and volume of traffic (not enough space to merge).
Common behaviour when SB drivers change lanes to give way for merging vehicles.
The acceleration lane should be longer
People fill frustrated when not being able to make the right turn
Risk taking behaviour
Issues with queueing signing
Signage tells traffic to use B9161 to access Munlochy
Queue back beyond end of RT lane
Worse in rainy / dark conditions
Frustration driving risk taking behaviour
Queues back up further than the space for the turning lane.
Comments have been made about the turning lane being full and the fast lane having to slow down/stop due to traffic Daily between 4:30 and 6:00 pm. Particularly on Fridays evenings
Kessock to Tore
B9161
A9
0 25 50 75 100 m
Map data ©2020 Imagery ©2020 CNES / Airbus, Getmapping plc, Maxar Technologies
File: Created using iGIS, WSP's Online Mapping System
Drawn By: UKFXA013
Date Mo


A9 North Kessock to Tore Study Workshop 1
Drumderfit
Bogallan
Arpafeelie
Artafallie
Charlestown
Craigton
North Kessock
Used as a route by some locals to access A9
Poor surface / one-track road
Difficult maneuver at B9161 turning right onto NB A9.
RT movement at national speed li[...] dangerous
Craigrory residents have indicated difficulty joining the A9
Bus services go to North Kessock and then head back to drop off children ar the other side
Undertaking behaviour.
Public concern about the slow traffic coming onto the A9 from the car park at North Kessock
[redacted] After the bridge people start increasing speed. Behavior of certain drivers is slower and moves early to the filter lane. Vehicles will undertake those who will do a right turn
Signals have increased the platooning of traffic coming from Kessock bridge
TITLE:
North Kessock to Tore
FIGURE No:
A9 Layout
200 400 600 800 m
Map data ©2020 Imagery ©2020 CNES / Airbus

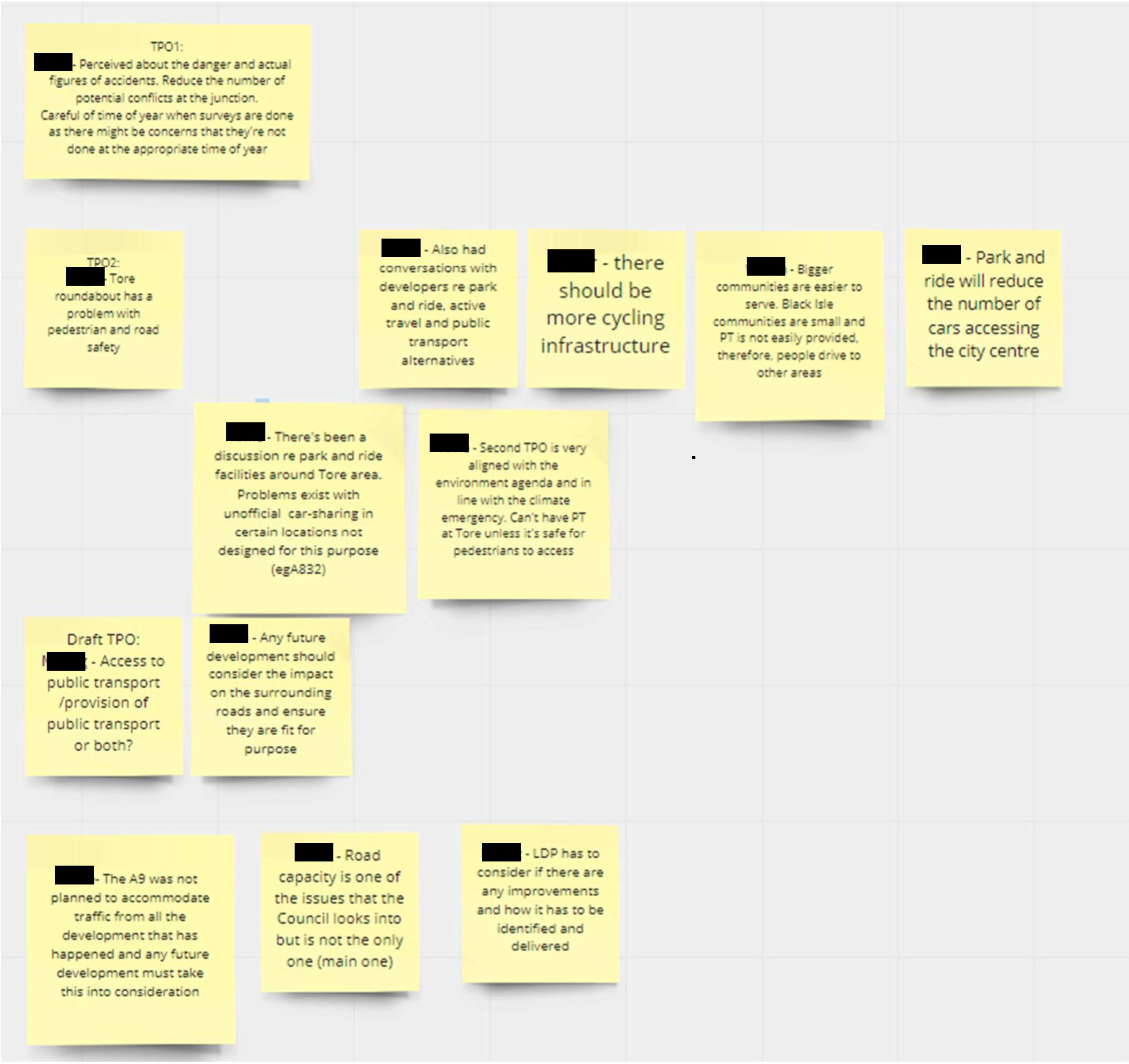
APPENDIX B – SESSION 1 / GROUP 2 MIRO NOTES



MEETING NOTES


A9 - satellite view.pdf
aspiration to have more people commuting into Inverness from Black Isle, so this route will be a key part of that
Harry Gow - cafe/layby where motorhomes group and then move off tcogether
long distance strategic traffic going far north as well as visitor traffic adding to the road and using it for different reasons
Drivers are opting to use alternative routes
Munlochy is a two step turn as you have the large central area to wait
Tourist traffic is increasing and tourist seasons are getting longer
Narrow central reserve - not a lot of protection when you are trying to cross larger vehicles will stop at an angle
A9
A9
B9161
Bogallan

APPENDIX C – SESSION 2 / GROUP 1 MIRO NOTES



APPENDIX D – SESSION 2 / GROUP 2 MIRO NOTES

APPENDIX E – Slide deck from the workshop on 23 September 2020

Wednesday 23 September 2020

A9 North Kessock to Tore Study

Stakeholder Workshop No. 1

Workshop Agenda & Timings

TOPIC	DETAILS	TIMING (FINISH)
SETUP & INTRODUCTION		09:00
· Join and Log in	ALL ATTENDEES	09:05
· Introduction	ALL ATTENDEES	09:20
· Overview of process	ALL ATTENDEES	09:25
BREAK	10 mins	09:35
SESSION 1 – PROBLEMS AND ISSUES		
· Identified problems and opportunities	ALL ATTENDEES	09:45
· Breakout session & voting	BREAKOUT GROUPS	10:30
· Breakout summary (from each group)	ALL ATTENDEES	11:00
· Summary from Chair	ALL ATTENDEES	11:05
BREAK	30 mins	11:35
SESSION 2 – TRANSPORT PLANNING OBJECTIVES		
· Overview of process and TPOs	ALL ATTENDEES	11:45
· Intro to draft TPOs	ALL ATTENDEES	12:00
· Breakout session	BREAKOUT GROUPS	12:30
BREAK	10mins	12:40
· Breakout summary (from each group)	ALL ATTENDEES	13:00
· Summary from Chair, Next Steps, Questions	ALL ATTENDEES	13:15
FINISH AND CLOSE AT 13:30		13:30

Introduction

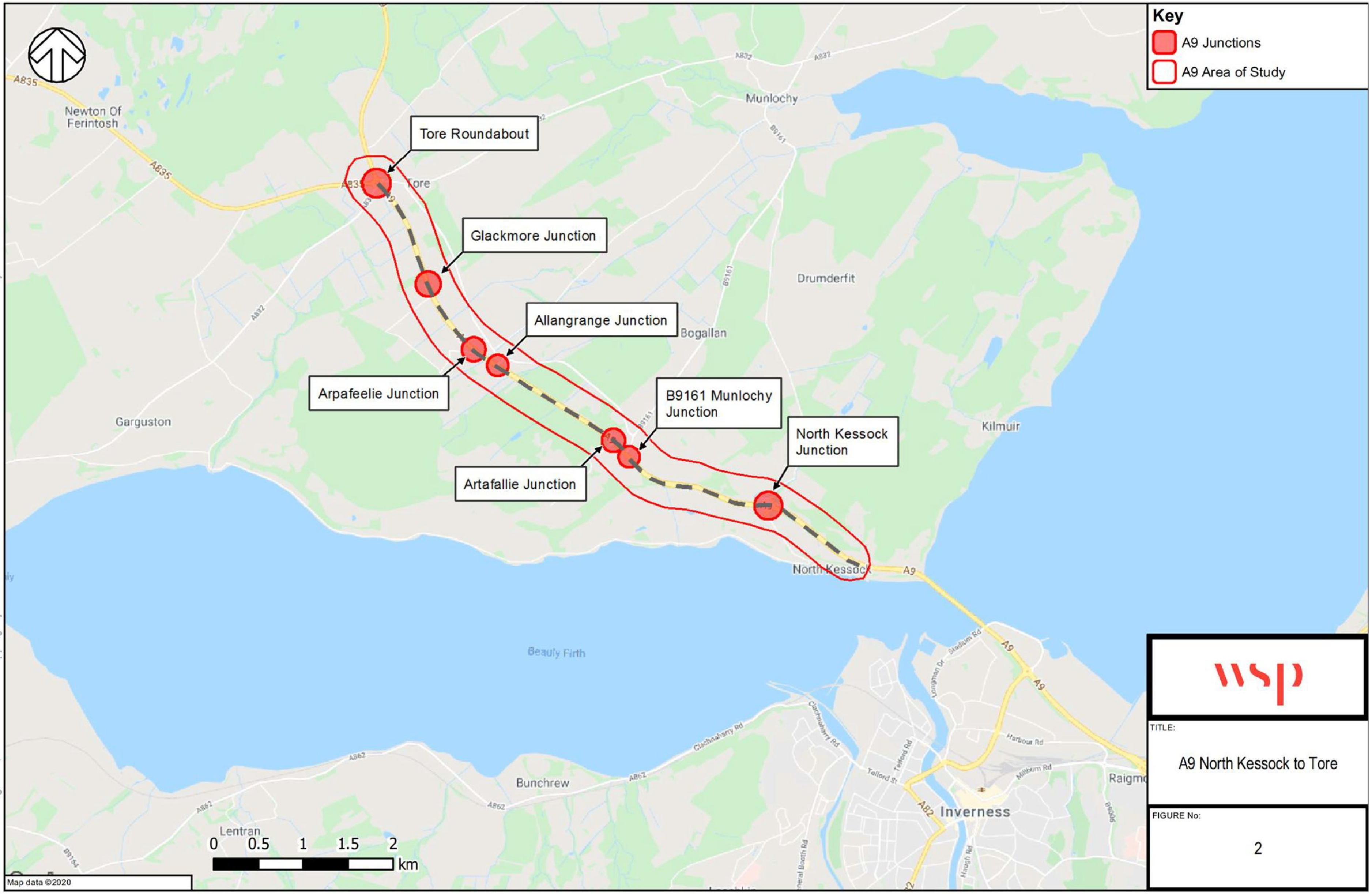
INTRODUCTION TO PROJECT TEAM

- Transport Scotland
- WSP

STUDY BACKGROUND & PROCESS

- Assess and report on the safety and operation of the A9 between North Kessock and Tore.
- Identify issues or opportunities for improvement, whilst reviewing both current and future considerations.
- Pre-Appraisal stage = Case for Change, focussed on gathering evidence regarding actual and perceived issues and potential opportunities.

Study Area


Key
A9 Junctions
A9 Area of Study
Tore Roundabout
Glackmore Junction
Allangrange Junction
Arpafeelie Junction
B9161 Munlochy Junction
Artafallie Junction
North Kessock Junction
Newton Of Ferintosh
Tore
Munlochy
Drumderfit
Bogallan
Kilmuir
Garguston
North Kessock
Beauly Firth
Bunchrew
Lentran
Inverness
Raigmo
A835
A832
B9161
A9
A862
A82
0 0.5 1 1.5 2 km
Map data ©2020
TITLE:
A9 North Kessock to Tore
FIGURE No:
2

Purpose of the Workshop

FOCUS ON PROBLEMS AND OPPORTUNITIES

- Please add to, and add detail to, the problems and opportunities identified to date
- Annotate the maps and whiteboard in Miro to share your comments
- Tell us
  - WHAT you have seen?
  - WHERE have you seen it?
  - HOW OFTEN you have seen it?
  - WHY you think these problems are occurring?
  - WHAT impact does this have on road users?

- Don't focus on solutions – this will form part of the next phase of the study

FURTHER OPPORTUNITIES FOR INPUT

- This is NOT the last opportunity to input to the study
- Stakeholders can provide written input, and further engagement to occur during this study and at future stages

BREAK

10mins

PART 1 – Problems and Opportunities

Identified to date from stakeholder input:

WHOLE STUDY AREA

- High traffic speeds, especially approaching Munlochy junction and Tore roundabout
- High traffic volumes and future increases resulting from development locally and regionally. Growth will increase safety issues at Tore roundabout and Munlochy junction
- Concerns that any interventions in one location may shift problem to other locations

MUNLOCHY JUNCTION

- Layout of Munlochy junction - crossing of a high speed dual carriageway
- High traffic volumes (in particular during the PM peak) causing pressure on right-turners from A9 at Munlochy junction, and reducing the available gaps
- Northbound vehicles during PM peak shifting to inside lane long before approach to Munlochy junction
- Lack of visibility at Munlochy junction / solar glare

TORE ROUNDABOUT

- Pedestrian and cyclist safety concerns at Tore roundabout – crossing dual carriageway at-grade
- High speed on approaches / sudden braking at approaches to Tore Roundabout
- Lack of adequate lighting and markings on junctions and the pedestrian crossing points

BREAKOUT SESSION #1

Problems and Opportunities

BREAKOUT SESSION 1 - OBJECTIVES

To help us add to our knowledge through your understanding of :

- Anecdotal and perceived problems/issues
- Evidence/data that your organisation may hold
- What you consider to be the key transport problems

Format of session:

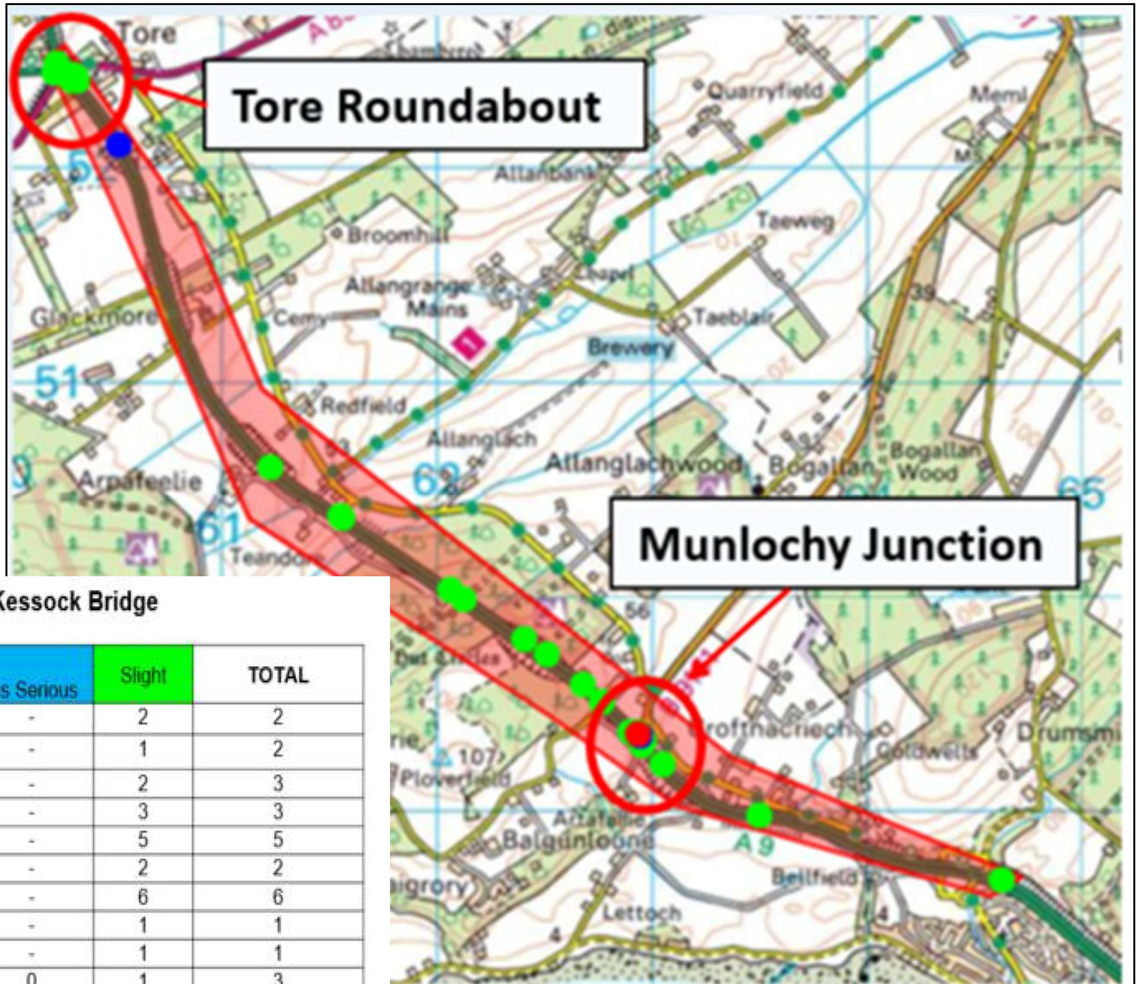
- Your facilitator will guide discussions through all aspects of the study area
- We to seek confirmation of what we know but more importantly understanding of what we don’t!
- Your facilitator will then ask you to vote for your Top5 issues to identify the level of agreement amongst stakeholders

PART 1 – Problems and Opportunities

Personal Injury Collision Statistics

Two collision clusters at Tore and Munlochy.

Note: Serious classification amended in 2019



Personal Injury Collision Statistics - A835 Tore Roundabout to A9 Kessock Bridge

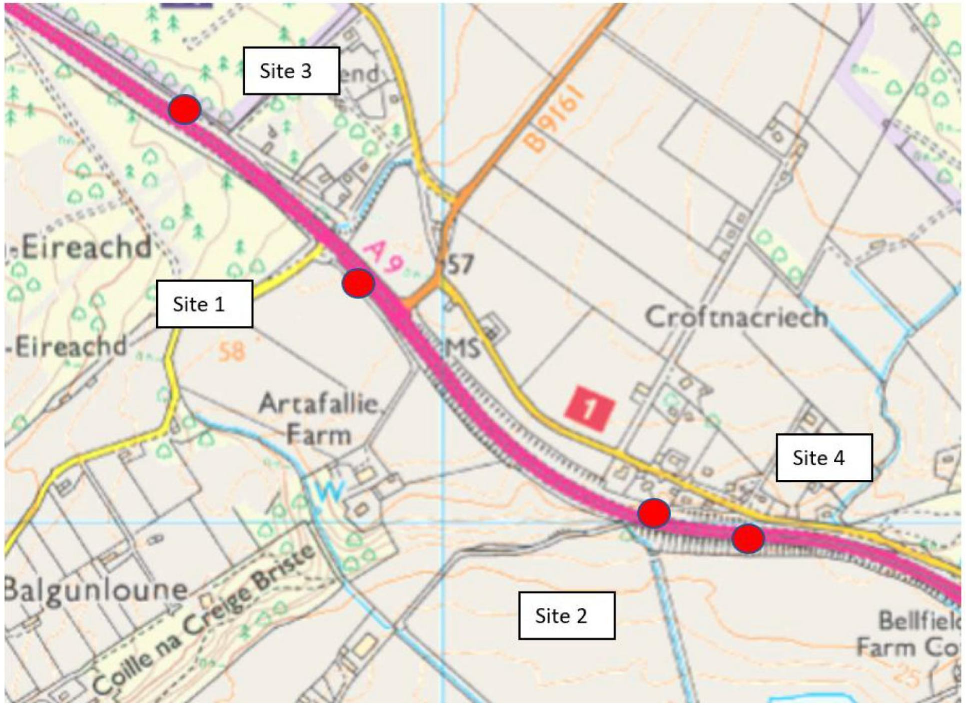
Year	Fatal	Serious	Very Serious	Moderately Serious	Less Serious	Slight	TOTAL
2010	0	0	-	-	-	2	2
2011	0	1	-	-	-	1	2
2012	0	1	-	-	-	2	3
2013	0	0	-	-	-	3	3
2014	0	0	-	-	-	5	5
2015	0	0	-	-	-	2	2
2016	0	0	-	-	-	6	6
2017	0	0	-	-	-	1	1
2018	0	0	-	-	-	1	1
2019	1	-	0	1	0	1	3
2020 (to 06/09/20)	0	-	0	0	0	1	1
TOTAL	1	2	0	1	0	25	29

PART 1 – Problems and Opportunities

Speed Data

Speed Survey carried out in March 2020 over a week at four locations

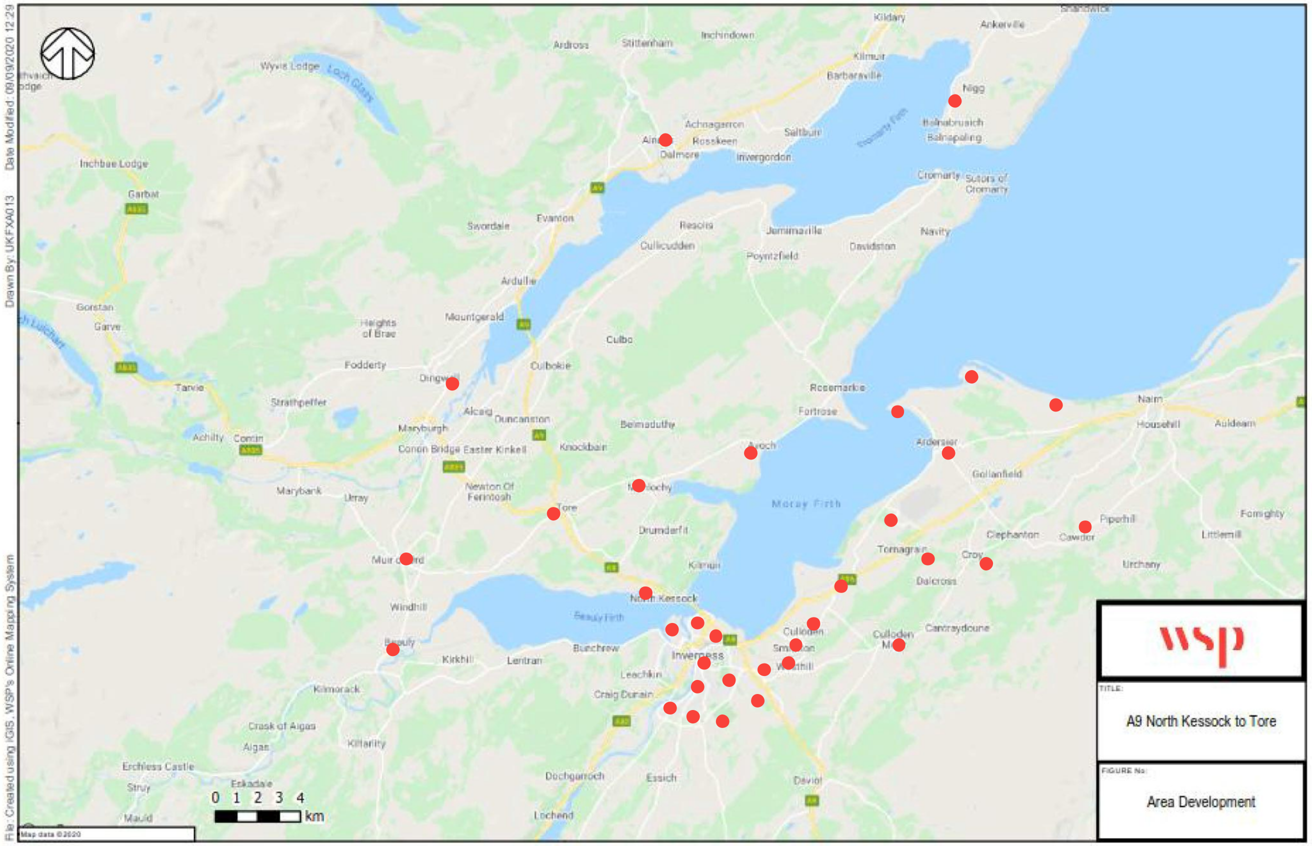
Site Locations Speed Survey Munlochy March 2020



Site Location	Speed Limit	7-Day Average Speed	7-Day Average 85th %ile Speed*	% of vehicles travelling 15mph over the speed limit
Northbound Site 1	70mph	70.1mph	78.9mph	3.70%
Northbound Site 2	70mph	69.0mph	78.3mph	3.00%
Southbound Site 3	70mph	71.5mph	80.2mph	5.60%
Southbound Site 4	70mph	70.2mph	78.9mph	3.90%

PART 1 – Problems and Opportunities

Map of future development (2015 – 2035)



Inner Moray Firth Local Plan (2015) currently being reviewed.

Includes:

- 5,750 new homes (Ross-shire growth area)
- 18,350 new homes (Inverness to Nairn growth area)

Call for sites (part of review) includes proposals for 1,000+ housing around Tore, Munlochy and Kessock

PART 1 – Problems and Opportunities

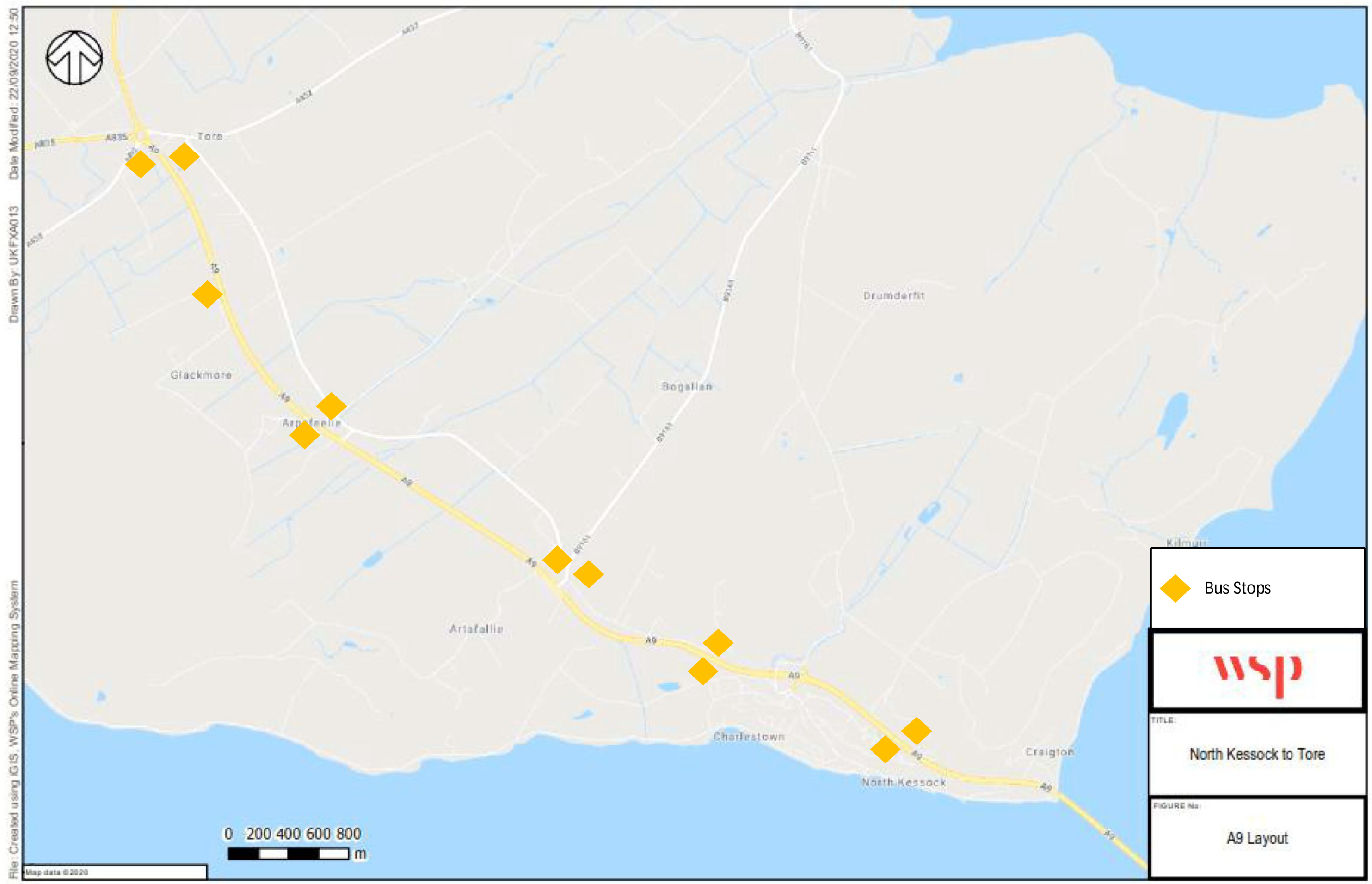
Existing layouts at Tore Roundabout

PART 1 – Problems and Opportunities

Existing layouts at Munlochy junction

PART 1 – Problems and Opportunities

A9 North Kessock – Tore layout



PART 1 – Problems and Opportunities

- Feedback from Breakout Groups

- Summary from Chair

BREAK

30mins

Group 1 Feedback

- Ped/Cycling Safety Issues @ Tore
  - Pedestrians risks, including for children
- Roads Safety @ Tore
  - Pressure related to lack of gaps for side roads
  - Location of signage for roundabout
- Road Safety @ Munlcohy
  - Turning movement across carriageway
  - Vehicles moving lanes
  - Driver frustration
  - Some detour via Tore rather than use of junction
- Mix of vehicles and users on the network
  - Tourists / agricultural / commuters / school
- Driver behaviour

Group 2 Feedback

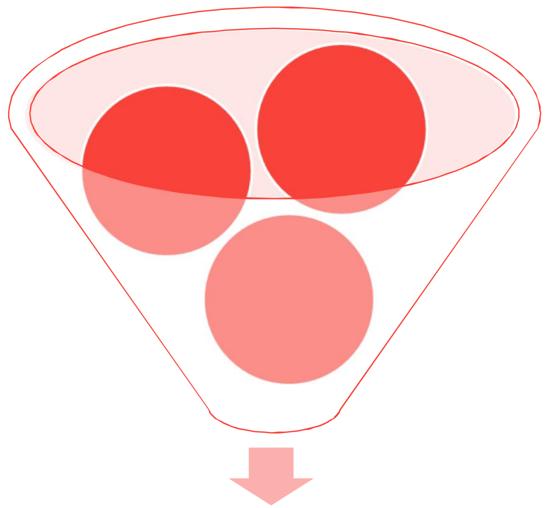
- Ped/Cycling Safety Issues @ Tore
  - Crossing of high-speed A9 at Bus Stops
  - Drivers are accelerating to overtake “last chance saloon”
- Roads Safety @ Tore
  - Poor lane discipline/overtaking on roundabout
  - Vehicles in centre of roundabout (speed)
- Road Safety @ Munlcohy
  - Conflict of vehicles and vehicles moving lanes
  - Lack of lighting
  - Evidence of detour via Tore rather than use of junction
- Accident Risk @ Other Junctions
  - Low use but narrow central reserve &large agricultural
- Traffic Growth
  - Reducing “gaps” and increasing accident risk
- Enhance opportunities for Modal Shift
  - Desire to encourage greater modal shift – increased bus patronage – Munclochy Junction will

PRIORITIES?

1. Ped/Cycling Safety Issues @ Tore = 8 votes
2. Roads Safety @ Tore = 13 votes
3. Road Safety @ Munlochy = 15 votes
4. Mix of vehicles and users on the network = 1 vote
5. Driver behaviour = 3 votes
6. Traffic Growth = 4 votes
7. Enhance opportunities for Modal Shift = 1 vote

Introduction to Transport Planning Objectives

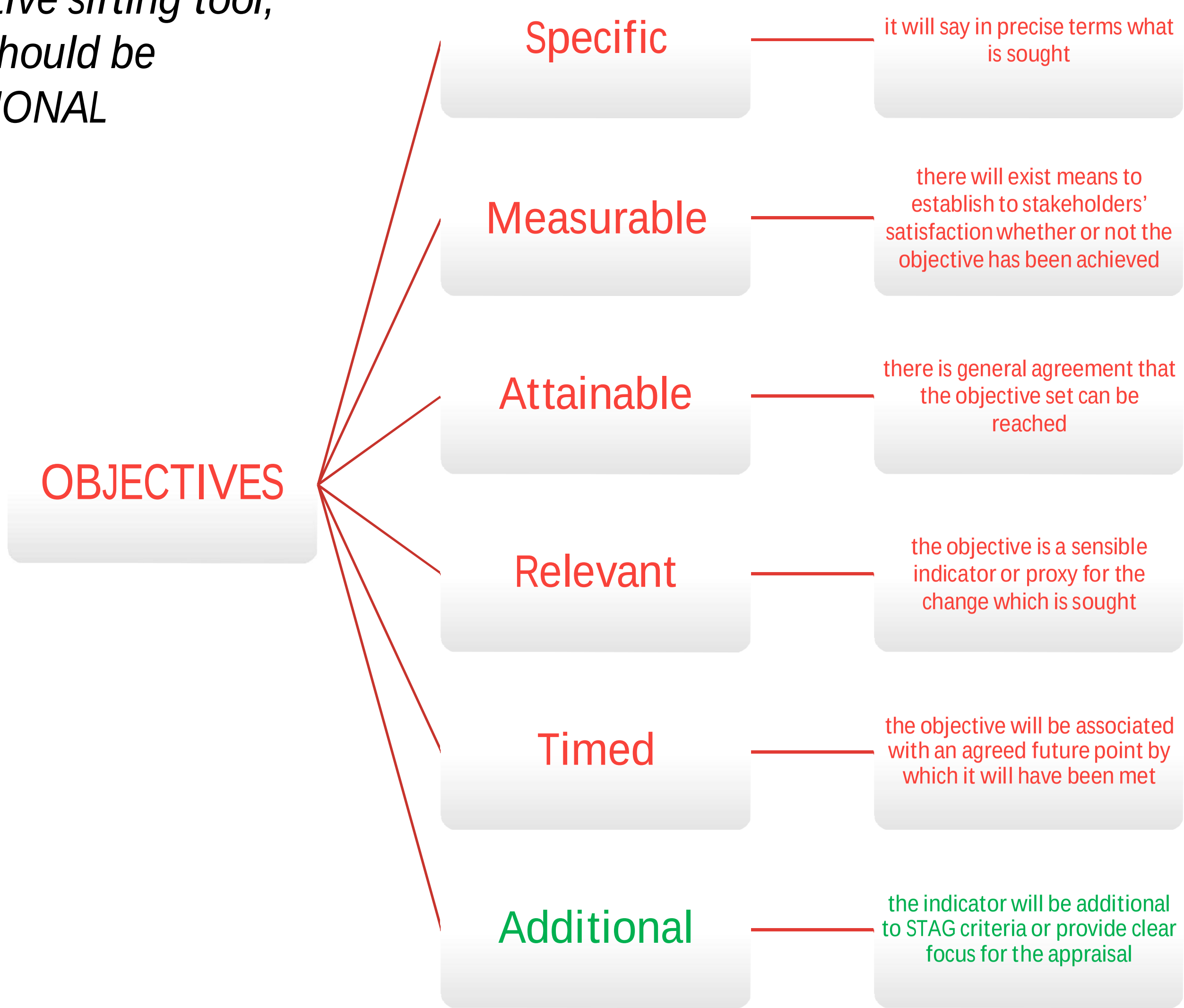
- Transport Planning Objectives enable study-specific objectives to be set that help define successful outcomes
- Collectively appraisal is against *both* the transport planning objectives and STAG criteria:
  - Safety
  - Economy
  - Environment
  - Integration
  - Accessibility and Social Inclusion



"Good" objectives provide a mechanism for sifting and support proportionate appraisal

Introduction to Transport Planning Objectives

To provide an effective sifting tool, "good" objectives should be SMART and ADDITIONAL



Emerging Key Themes

KEY THEMES – FROM PROBLEMS AND OPPORTUNITIES

- Road Safety at Munlochy Junction
- Pedestrian/cyclist safety at Tore Roundabout
- Current and future traffic volumes

CONSIDERATION OF NATIONAL AND REGIONAL OBJECTIVES

- National Transport Strategy
- Strategic Transport Projects Review 2 (STPR2)
- Road Safety Framework

PRIORITIES?

1. Ped/Cycling Safety Issues @ Tore = 8 votes
2. Roads Safety @ Tore = 13 votes
3. Road Safety @ Munlochy = 15 votes
4. Mix of vehicles and users on the network = 1 vote
5. Driver behaviour = 3 votes
6. Traffic Growth = 4 votes
7. Enhance opportunities for Modal Shift = 1 vote

Draft TPO #1

Draft TPO #1	Proposed Indicator	Associated problem or opportunity
To achieve a reduction in accidents, and potential conflicts at the junctions along the A9 between North Kessock and Tore	Change in Accident Numbers/Severity (STATS 19)/ Accident description Reduction in recorded damage to crown property Reduction in number/scale of severity of conflicts	Problem – road safety risk at Munlochy junction Problem – road safety risk at Tore Roundabout

Supports National Objective:

- A reliable and resilient strategic transport system that is safe and secure for users.

Supports Regional Objective:

- Reduce transport-related casualties in line with reduction targets

Draft TPO #2

Draft TPO #2	Proposed Indicator	Associated problem or opportunity
To achieve a reduction in risks to safe use of network for active modes (walking and cycling) at the junctions along the A9 between North Kessock and Tore	Change in the risk of potential conflicts	Problem – pedestrian/cyclist safety at Tore Roundabout

Supports National Objective:

- A reliable and resilient strategic transport system that is safe and secure for users.
- A cohesive strategic transport system that enhances communities as places, supporting health and wellbeing

Supports Regional Objective:

- Reduce transport-related casualties in line with reduction targets
- Increase the share of active travel for shorter, everyday journeys.

Draft TPO’s

1) To achieve an improvement in the provision of access to public transport, services / provision of public transport services?

BREAKOUT SESSION #2

Transport Planning Objectives

BREAKOUT SESSION 2 - OBJECTIVES

To help us:

- Understand if we have the transport objectives for the study right.
- Understand whether the objectives cover the most important transport issues to be addressed by the study
- Develop any additional objectives.

Format of session:

- You will be asked to review the objectives and record your own thoughts
- Your facilitator will then “tally” up and focus discussions on where there are differences in views and where additional objective have been suggested
- Following discussion, you will be given the opportunity to “update” your thoughts if you want

BREAK

10mins

PART 2 – Draft Transport Planning Objectives

- Feedback from Breakout Groups

- Summary from Chair

Next Steps

Stakeholder Engagement

- All inputs from workshop collated
- Report issued to all invitees summarising the inputs
- Opportunity for further written input
- Further stakeholder engagement

Optioneering

- 2nd Stakeholder Workshop - 8th October 2020

Reporting

- Development of the Case for Change Report - Oct 2020
- Transport Scotland decision on next steps - Winter 2020

QUESTIONS?

THANK YOU
&
CLOSE

WORKSHOP NOTES

PROJECT NUMBER	70075948	MEETING DATE	08 October 2020
PROJECT NAME	A9 North Kessock to Tore Study	VENUE	Microsoft Teams
CLIENT	Transport Scotland	RECORDED BY	[redacted]
MEETING SUBJECT	Key notes from 2nd stakeholder workshop held on 8 October 2020		

Session 1 - Draft Transport Planning Objectives (TPOs)

The first session built upon inputs from the stakeholder workshop held on 23 September and sought comments from the stakeholder attendees on the three proposed TPOs shown below.

1. To achieve an improvement in road safety and a reduction in conflicts at the Munlochy junction (A9 / B9161)
2. To achieve an improvement in road safety and a reduction in conflicts at Tore roundabout (A9 / A832 / A835)
3. Through a reduction in conflicts for active modes at the junctions along the A9 between North Kessock and Tore, encourage the use of active travel modes.

Breakout Session One – Transport Planning Objectives (workshop attendee comments)

Discussion theme: TPO #1

- Add in reference to the short, medium and long term in the TPO description
- Add in an indicator for "reduction in unusual manoeuvres"
- Add in an indicator for "driver behaviour/speeds"
- Speed compliance, lane discipline and near misses should be recorded
- The cost to society for fatal accidents and near misses should be considered
- There should be indicators that are a way of observing and monitoring the road network
- Add in an opportunity to support the Road Safety Framework

Discussion theme: TPO #2

- Add in reference to "vehicular" road safety to the TPO description
- Add in an indicator for "reduction in unusual manoeuvres"
- Add in an indicator for "driver behaviour/speeds"
- Add in an opportunity to support the NTS2 Travel Hierarchy

Discussion theme: TPO #3

- Reorder the TPOs to reflect the NTS2 travel hierarchy – so move this to TPO #1

(Project team comment - there is no prioritisation of objectives - they are equally important)

Discussion theme: potential additional TPO to reflect A9 intermediate junctions

- Road safety along the A9 intermediate junctions should be considered.
- Problem = mix of vehicles (including agricultural vehicles, commuters and 4x4s) seeking to access the A9 vs narrow central reserve. Problems with large agricultural vehicles and narrow central reserves - they encroach on fast lane when trying to pull out.
- Local farmers have mentioned that it's more and more difficult to use the junctions and the section of the A9 because they slow down traffic and also it's difficult to merge onto the A9.
- Indicator = conflicts / accidents

Discussion theme: potential additional TPO re future growth

- The route serves the whole of North of Scotland and the Isles and this strategic part of the corridor between Kessock and Tore should be considered
- Bear in mind that any short/mid/long term solutions can have impacts in the wider corridor and these need to be sustainable
- LDP is currently under review... there is a strong desire to engage with all stakeholders, approached by the Council as planning authority. The study team should have direct engagement with the Council's development planning team.
- A9 is main route north to and from Inverness – The Black Isle is one of the fastest growing areas for development. Really important for commuters. Stage now to upgrade junctions as the existing are not fit for purpose and requires major restructuring
- We have to align the national and regional priorities. We have to address how to build houses if the A9 has no capacity. Some of the issues come from being single lane from the west (A835) and North (A9)
- Safety is not reflected since the capacity does not reflect the future growth
- The A9 is the main link north of Inverness. Development is welcome but it has to be a holistic approach including future planning and the strategic characteristic of the A9
- Growth is one of the key elements that needs to be considered in the area
- Near misses are not usually recorded and are as important in the analysis.
- A9 is a trunk road and everything from the North comes through Tore and the roundabout. Big part of the highlands and essential for Scottish Govt and Transport Scotland. A9 should reflect its strategic vision
- Infrastructure around Tore is inadequate for future development of the Ports in the northern region. Traffic coming south can be of very high volume. Sightline from the A9 around the A832 to Cromarty has to be reviewed because it can be very dangerous
- Tore roundabout needs a serious amount of thought given that Tore was planned to be the biggest area north of Inverness

- There is a need for an objective around future growth, considering the the Highland-wide Local Development Plan (HWLDP) and the Inner Moray Firth Local Development Plan (IMFLDP) to identify future impacts on local roads associated with development.
- There is a need to take a strategic view of the area and to consider the strategic importance of the A9, and to develop an objective related to future travel demands and readiness for these future requirements.

Discussion theme: potential additional TPO re sustainability

- It's important to think in terms of Sustainability. The Highland Council is increasing its focus on sustainable modes of transport in the LDP revision. Good opportunity to include this as an objective
- Local unclassified road used from Tore to Munlochy (cyclist). If you want people to change mode of transport there needs to be safe and efficient route (Parallel to A9), and other options to the car. Note the population is getting older and they need safer options
- We need to encourage behavioural change. Allow people to engage with the change.

Breakout Session Two – Initial Optioneering

The second breakout session considered potential options to achieve the objectives and address the problems and opportunities identified. The session was facilitated using the MIRO online whiteboard tool (with screenshots from the sessions included under Annex B) and the table below summarises the options proposed by the workshop attendees.

Option Nr	Option Type	Name	Description
S1	Short	Vehicle Separation	Add gap markings (chevrons) to allow cars to leave enough space
S2	Short	Speed limit reduction	Reduce the speed limit to 50 mph and extend from North Kessock to North of Munlochy Reduce speed limit at approach to Tore to support pedestrian movements Reduce the speed limit within a one-mile radius of Tore roundabout
S3	Short	Warning signs for queueing traffic	Add warning signs at Munlochy to warn northbound vehicles of queueing traffic waiting to turn right onto the B9161
S4	Short	Educate road users	Conduct road user education regarding ‘give way’ markings. The current one can cause uncertainty around who has right of way
S5	Short	Amend road signage	Change signs to instruct drivers travelling to Cromarty to go via Tore roundabout instead of going through Munlochy

			Make signage clearer for visitors and those unfamiliar with the area, e.g. no awareness of uncontrolled pedestrian crossing
S5	Short	Install lights	Add lighting or solar studs to Munlochy junction Also increase the lighting from the bridge to Munlochy junction
S6	Short	Activated warning signs	Install warning signs that activate when there is traffic ahead or vehicles crossing carriageway, especially buses
S7	Short	Enhanced road markings	Improve lane discipline at Tore roundabout by adding enhanced markings or studs
S8	Short	Relocate roundabout warning signage	Current signage is too far away from the roundabout and should be moved closer
S9	Short	Prohibit right turns	Stop right turn movements coming from side roads onto the A9 Stop right turn into Munlochy
S10	Short	Relocate bus stops	Consider revising the location of current bus stops, particularly at intermediate junctions to promote modal shift
S11	Short	Improve pedestrian routes	Integrate pedestrian routes with bus stops, especially at Tore for residential properties Improve footpaths at Tore roundabout Install a controlled crossing on the A9 south of Tore roundabout
S12	Short	Enhanced signage for cyclists	Enhance the signage for the cycling route – add one on the southbound carriage way at Tore
S13	Short	Widen central reservations	All junctions need wider central reservations as the current ones are too narrow for larger vehicles
S14	Short	Paint the kerbs	Use fluorescent paint to improve the visibility of kerbs, especially at Munlochy junction
S15	Short	Install speed cameras	Install a speed camera on the A9 southbound carriageway just before Munlochy junction Continue the average speed cameras up to Tore area to change driver behaviour
M1	Medium	Improve slip lane	The slip lane from Munlochy onto the A9 should be improved to allow better merging of traffic
M2	Medium	Create public transport hub	Having a public transport hub would encourage the reduction of private car usage
M3	Medium	Add laybys	Add a layby for cars to stop and allow public transport to stop – previous suggestions also looked at bus lanes

M4	Medium	Side road flashing system	Install a flashing system for cars joining the A9 from side roads
M5	Medium	Park and ride	There is potential for a park and ride to support modal shift
M6	Medium	Install traffic lights	Install traffic lights at Tore roundabout which includes a controlled pedestrian crossing
M7	Medium	ITS Gantry System	Install an ITS Gantry System with signage
M8	Medium	Improvements to existing geometry	Improvements include extending the left turn merging lane and adding sight lines
L1	Long	Build an overpass	Close the intermediate junctions and build an overpass for slow moving vehicles
L2	Long	Build pedestrian bridge or underpass	On the northern section of Tore roundabout, build a pedestrian bridge or add underpass for better connectivity to the school Add an underpass at Munlochy junction similar to the one at North Kessock
L3	Long	Grade separation for Munlochy	Reroute access to Munlochy using grade separation where cars needing to turn right can come off at access Munlochy via a bridge
L4	Long	Promote modal shift	Promote travelling by public transport
L5	Long	Create single improved junction	A new single junction for local connector roads to feed into
L6	Long	New road connection	Add a new road connection into North Kessock junction from Munlochy road (restricted at Munlochy)

ANNEX A – Slides from Workshop on 8th October

Thursday 08 October 2020

A9 North Kessock to Tore Study

Stakeholder Workshop No. 2

Workshop Agenda & Timings

TOPIC	DETAILS	TIMING (FINISH)
SETUP & INTRODUCTION		09:00
· Join and Log in	ALL ATTENDEES	09:10
· Introduction	ALL ATTENDEES	09:20
· Overview of process	ALL ATTENDEES	09:30
SESSION 1 – TRANSPORT PLANNING OBJECTIVES	10 mins	09:40
· Overview of process and Objective development		
BREAK	10 mins	09:55
· Breakout session	BREAKOUT GROUPS	10:35
· Breakout summary (from each group)	ALL ATTENDEES	10:50
BREAK FOR 30 MINS		
SESSION 2 – INITIAL OPTIONEERING		
· Overview of process and approach	ALL ATTENDEES	11:30
· Review of problems identified and Objectives	ALL ATTENDEES	11:40
· Breakout session	BREAKOUT GROUPS	12:35
BREAK	10mins	12:45
· Breakout summary (from each group)	ALL ATTENDEES	13:00
· Summary from Chair, Next Steps, Questions	ALL ATTENDEES	13:15
FINISH AND CLOSE AT 13:30		13:30

Introduction

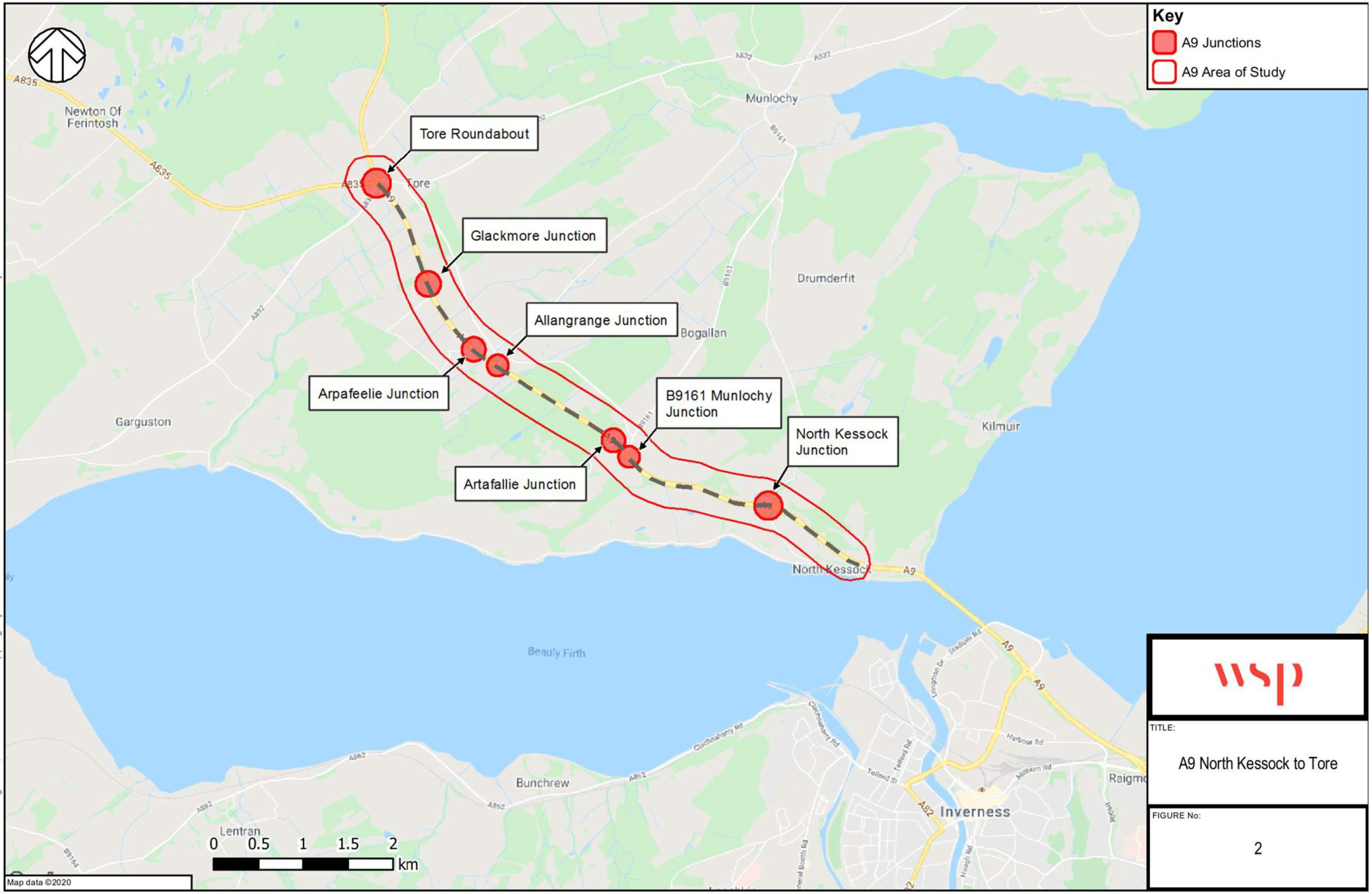
INTRODUCTION TO PROJECT TEAM

- Transport Scotland
- WSP

STUDY BACKGROUND & PROCESS

- Assess and report on the safety and operation of the A9 between North Kessock and Tore.
- Identify issues or opportunities for improvement, whilst reviewing both current and future considerations.
- Pre-Appraisal stage = Case for Change, focussed on gathering evidence regarding actual and perceived issues and potential opportunities.

Study Area


Key
A9 Junctions
A9 Area of Study
Tore Roundabout
Glackmore Junction
Allangrange Junction
Arpafeelie Junction
B9161 Munlochy Junction
Artafallie Junction
North Kessock Junction
Newton Of Ferintosh
Tore
Munlochy
Drumderfit
Bogallan
Garguston
Kilmuir
North Kessock
Beauly Firth
Bunchrew
Lentran
Inverness
A835
A832
B9161
A9
A862
A82
0 0.5 1 1.5 2 km
Map data ©2020
TITLE:
A9 North Kessock to Tore
FIGURE No:
2

Purpose of the Workshop

FINALISATION OF THE TRANSPORT PLANNING OBJECTIVES FOR THE STUDY

- *To help us*
  - Understand if we have the transport objectives for the study right.
  - Understand whether the objectives cover the most important transport issues to be addressed by the study
  - Develop any additional objectives

- *Format of session*
  - You will be asked to review the objectives and record your own thoughts
  - Your facilitator will then “tally” up and focus discussions on where there are differences in views and where additional objective have been suggested

INITIAL OPTIONEERING – a long list of potential options

FURTHER OPPORTUNITIES FOR INPUT

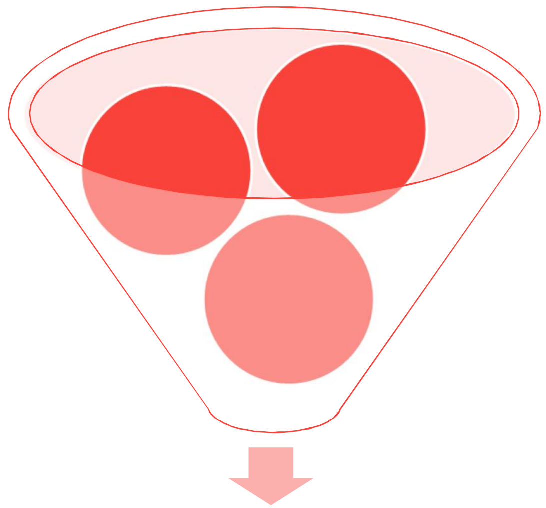
- Stakeholders can provide written input up to mid October 2020

BREAK

10mins

Introduction to Transport Planning Objectives

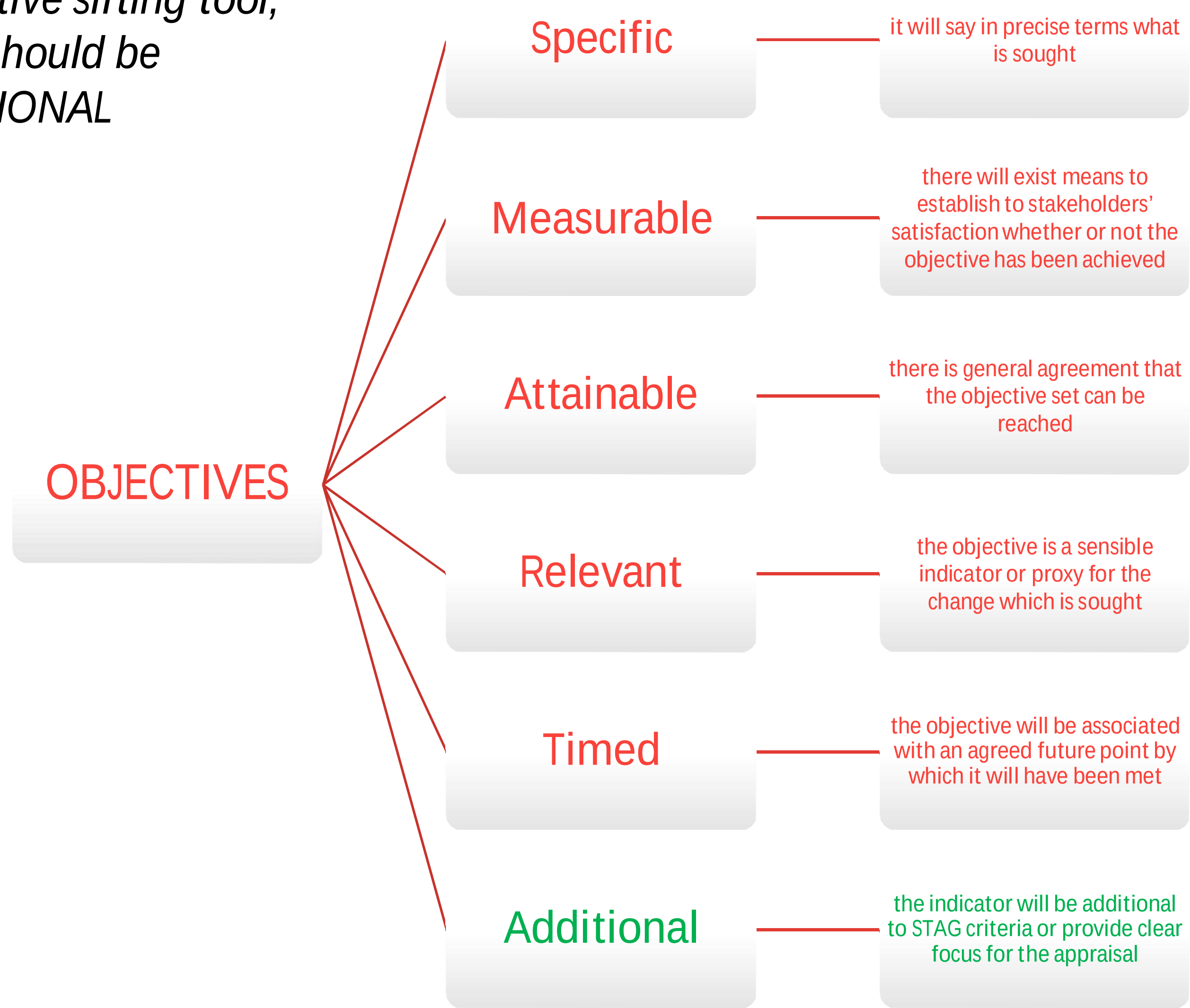
- Transport Planning Objectives enable study-specific objectives to be set that help define successful outcomes
- Collectively appraisal is against *both* the transport planning objectives and STAG criteria:
  - Safety
  - Economy
  - Environment
  - Integration
  - Accessibility and Social Inclusion



“Good” objectives provide a mechanism for sifting and support proportionate appraisal

Introduction to Transport Planning Objectives

To provide an effective sifting tool, "good" objectives should be SMART and ADDITIONAL



Emerging Key Themes

KEY THEMES – FROM PROBLEMS AND OPPORTUNITIES

- Road safety at Munlochy Junction
- Road safety at Tore Roundabout
- Pedestrian/cyclist safety at Tore Roundabout

CONSIDERATION OF NATIONAL AND REGIONAL OBJECTIVES

- National Transport Strategy
- Strategic Transport Projects Review 2 (STPR2)
- Road Safety Framework

PRIORITIES AS PREVIOUSLY IDENTIFIED AT 1ST WORKSHOP

1. Ped/Cycling Safety Issues @ Tore = 8 votes
2. Roads Safety @ Tore = 13 votes
3. Road Safety @ Munlochy = 15 votes
4. Mix of vehicles and users on the network = 1 vote
5. Driver behaviour = 3 votes
6. Traffic Growth = 4 votes
7. Enhance opportunities for Modal Shift = 1 vote

Draft Transport Planning Objective #1

Objective #1	Proposed Indicator	Associated problem or opportunity
To achieve an improvement in road safety and a reduction in conflicts at the Munlochy junction (A9 / B9161)	Change in Accident Numbers/Severity (STATS 19)/ Accident description Reduction in recorded damage to crown property Reduction in number/scale of severity of conflicts	Problem – road safety risk at Munlochy junction

Supports National Objective:

- A reliable and resilient strategic transport system that is safe and secure for users.

Supports Regional Objective:

- Reduce transport-related casualties in line with reduction targets

Draft Transport Planning Objective #2

Objective #2	Proposed Indicator	Associated problem or opportunity
To achieve an improvement in road safety and a reduction in conflicts at Tore Roundabout (A9 / A832 / A835)	Change in Accident Numbers/Severity (STATS 19)/ Accident description Reduction in recorded damage to crown property Reduction in number/scale of severity of conflicts	Problem – road safety risk at Tore Roundabout

Supports National Objective:
- A reliable and resilient strategic transport system that is safe and secure for users.

Supports Regional Objective:
- Reduce transport-related casualties in line with reduction targets

Draft Transport Planning Objective #3

Objective #3	Proposed Indicator	Associated problem or opportunity
Through a reduction in conflicts for active modes at the junctions along the A9 between North Kessock and Tore encourage the use of active travel modes.	Primary: reduction in number/scale of severity of conflicts Secondary: number of trips made by active modes on the network within the study area	Problem – pedestrian/cyclist safety at Tore Roundabout

Supports National Objective:

- A reliable and resilient strategic transport system that is safe and secure for users.
- A cohesive strategic transport system that enhances communities as places, supporting health and wellbeing

Supports Regional Objective:

- Reduce transport-related casualties in line with reduction targets
- Increase the share of active travel for shorter, everyday journeys.

BREAKOUT SESSION #1

Transport Planning Objectives

BREAKOUT SESSION 1 - OBJECTIVES

Help us

- Understand if we have the transport objectives for the study right
- Understand whether the objectives cover the most important transport issues to be addressed by the study
- Develop any additional objectives

Format of session

- You will be asked to review the objectives and record your own thoughts
- Your facilitator will then sum up the discussions and seek agreement on what will be shared back to the main workshop session

BREAK

10mins

Return to Breakout sessions at 10.00

wsp

SESSION 1 – Transport Planning Objectives

- Feedback from Breakout Groups

- Summary from Chair

BREAK

30mins

Returning at 11:30

Session 2 – Option Generation

Today:

- "Optioneering" – ideas on what options will meet our objectives (and therefore aligned to problems, issue or opportunities)
- Anything goes on the list at this stage

After today:

- This stage =
  - <u>Initial sifting</u> – sift out early 'no goers' e.g. options outside the remit of the study; deliverability issues (technical, financial etc).
- Future stages (if Case for Change is identified) =
  - <u>Initial Appraisal</u> – performance of options against transport planning objectives and STAG criteria assessed.
  - <u>Detailed Appraisal</u> of options retained after Initial Appraisal
  - <u>Further engagement</u> and workshops

BREAKOUT SESSION #2

Option Generation

BREAKOUT SESSION 2 – OPTION GENERATION

To help us:

- Develop a list of options that should be considered within the study.

Format

- You will be asked to input into options already identified and to add your own ideas for additional ones. Please try to keep in format of:
  - Option Name
  - Description
  - Key reason (problem/issue/opportunity it addresses)

Reminder

- Purpose is to generate options (aligned to objectives/problems/issues and opportunities) not to judge them – that is what the “appraisal” will do
- Think small “quick wins” as well as medium and longer term options

BREAKOUT SESSION 2 – OPTION GENERATION

BREAK

10mins

BREAKOUT SESSION 2 - OPTIONEERING

Summary from breakout groups

Next Steps

Stakeholder Engagement

- All inputs from workshops collated
- Further report issued to all invitees summarising the inputs

- Further written inputs until 16th October 2020

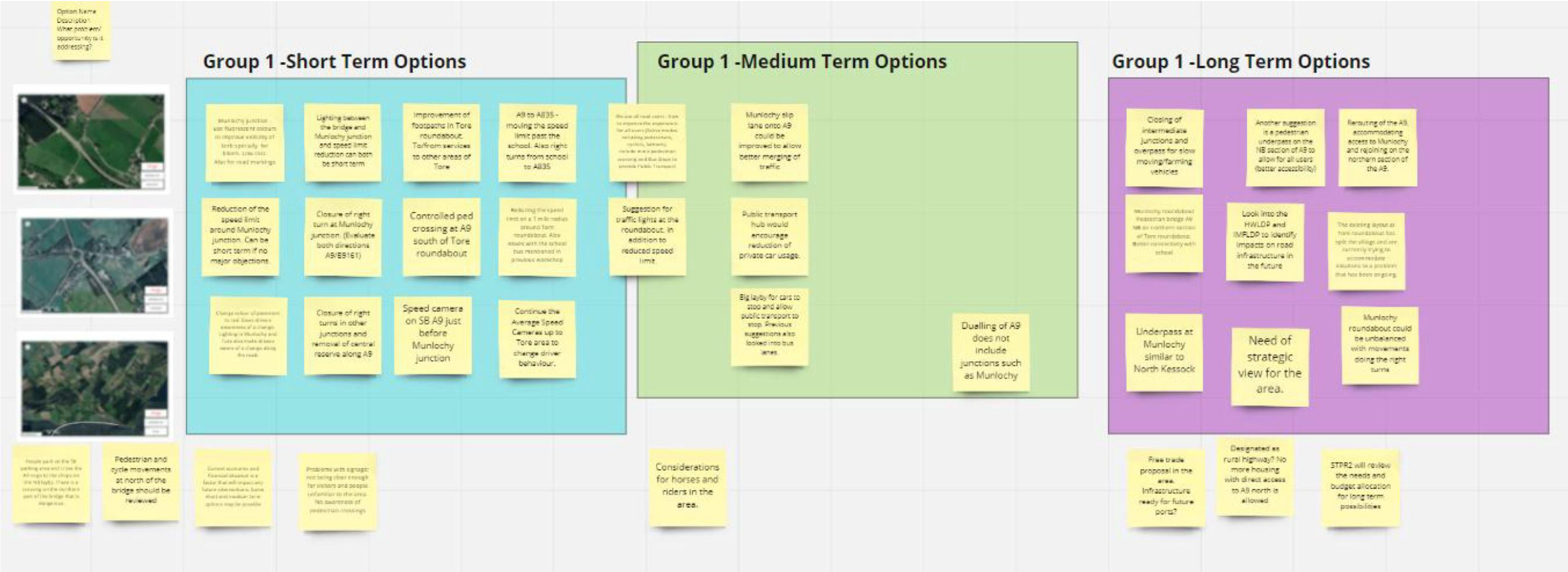
Reporting

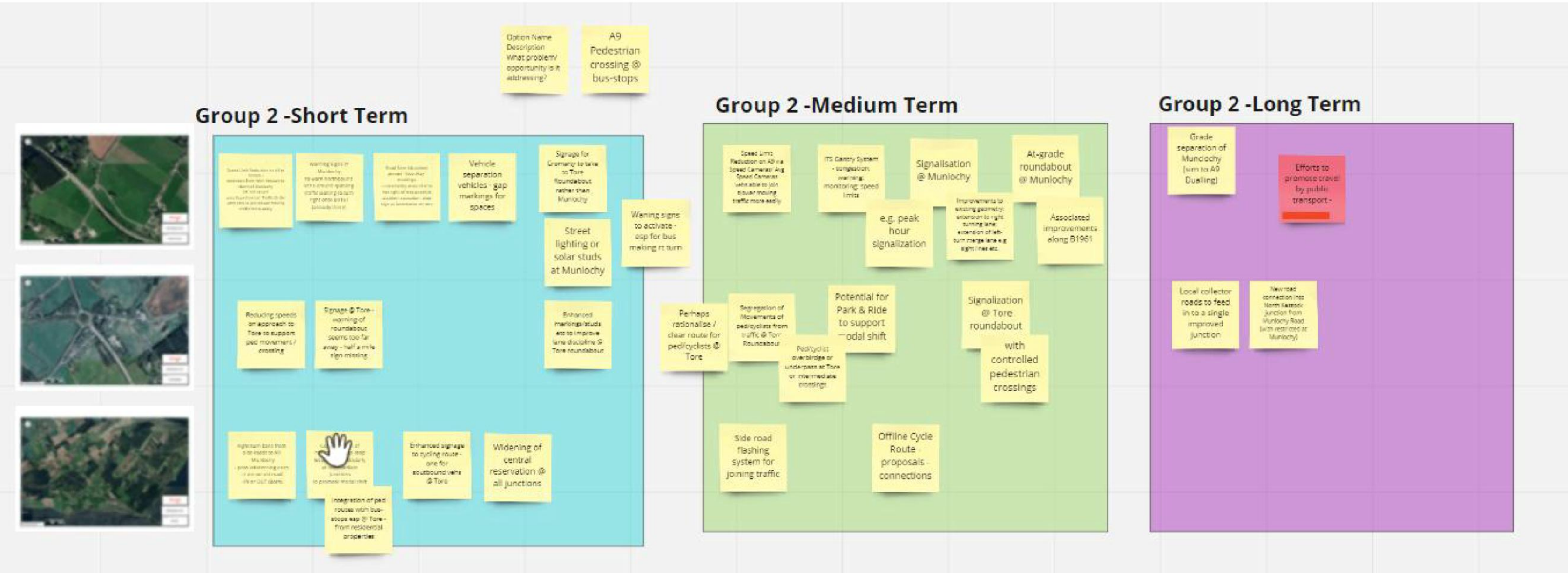
- Case for Change Report – Q1 2021

QUESTIONS?

THANK YOU
&
CLOSE

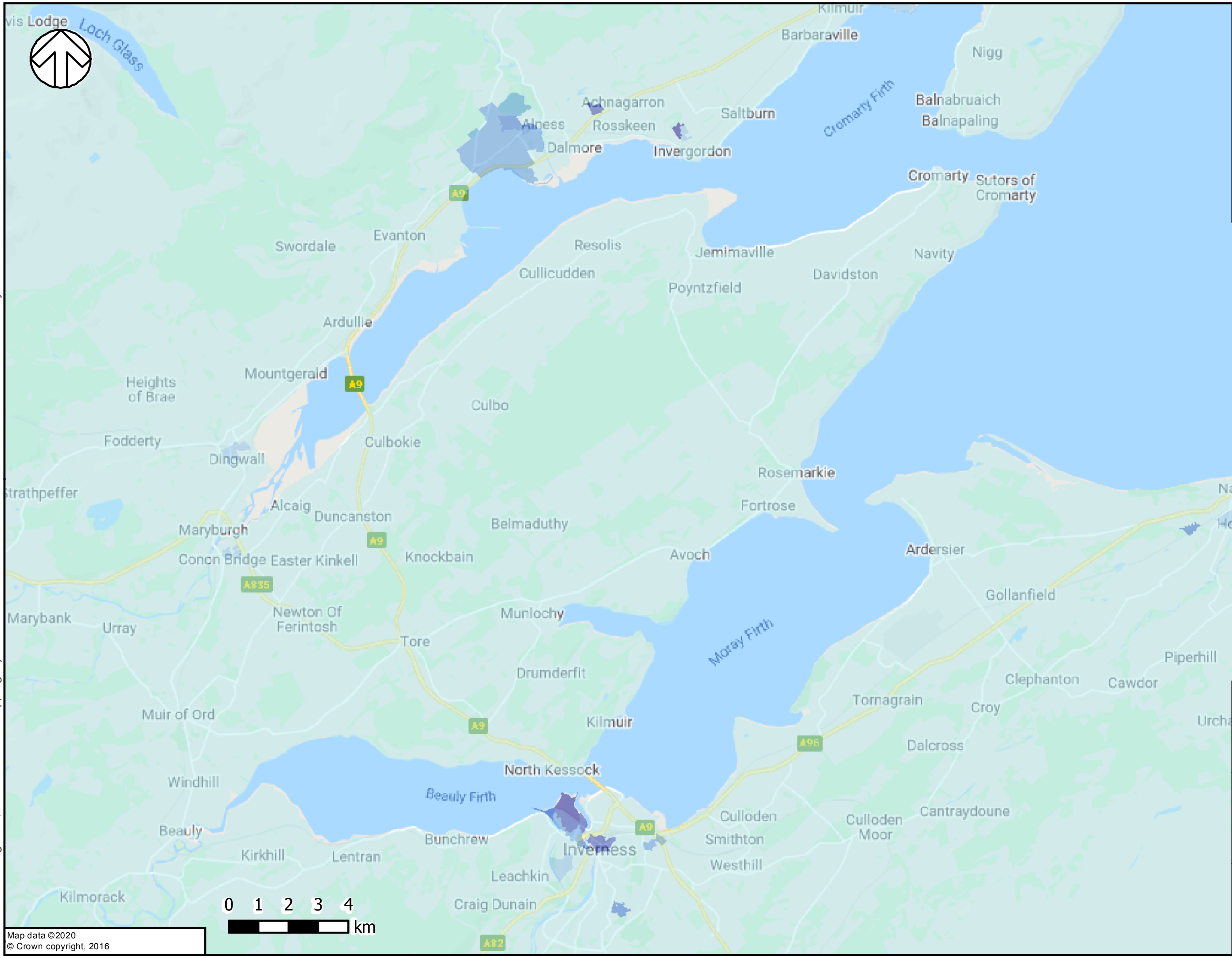
ANNEX B – Screenshots from MIRO Tool





Appendix E

SCOTTISH INDEX OF MULTIPLE DEPRIVATION



Key

- Top 5% most deprived
- 5 to 10%
- 10 to 15%
- 15 to 20%
- 20 to 25%
- 25 to 100%

wsp

TITLE:

A9 North Kessock to Tore

FIGURE No:

SIMD

File: Created using iGIS, WSP's Online Mapping System Drawn By: UKFXA013 Date Modified: 18/11/2020 21:31

Appendix F

SPREADSHEET TRAFFIC MODEL

Appendix G

JUNCTIONS 9 REPORTS

Junctions 9

PICADY 9 - Priority Intersection Module

Version: 9.5.0.6896

For sales and distribution information, program advice and maintenance, contact TRL:
+44 (0)1344 379777 software@trl.co.uk www.trlsoftware.co.uk

The users of this computer program for the solution of an engineering problem are in no way relieved of their responsibility for the correctness of the solution

Filename: Munlochy Junction.j9
Path: O:\50610325 - Chancery Lane Projects\Development Planning Projects\00000-A9 Junction Modelling\03 WIP\Transport Planning\02 CAD-BIM Models\20201119
Report generation date: 11/23/2020 5:12:30 PM

Summary of junction performance

	AM				Sat				PM			
	Queue (Veh)	Delay (s)	RFC	LOS	Queue (Veh)	Delay (s)	RFC	LOS	Queue (Veh)	Delay (s)	RFC	LOS
	2020											
Stream B-C	2.0	20.36	0.67	C	0.9	13.68	0.48	B	0.6	9.99	0.38	A
Stream B-A	0.0	10.36	0.01	B	0.0	11.78	0.01	B	0.0	12.05	0.00	B
Stream C-AB	0.4	10.02	0.28	B	0.9	13.91	0.48	B	1.2	14.08	0.54	B
	2035+Dev											
Stream B-C	3.2	30.52	0.77	D	1.2	17.20	0.56	C	0.7	11.41	0.43	B
Stream B-A	0.0	11.90	0.01	B	0.0	14.01	0.01	B	0.0	14.46	0.00	B
Stream C-AB	0.5	11.24	0.33	B	1.3	17.52	0.56	C	1.6	17.60	0.62	C

Values shown are the highest values encountered over all time segments. Delay is the maximum value of average delay per arriving vehicle.

File summary

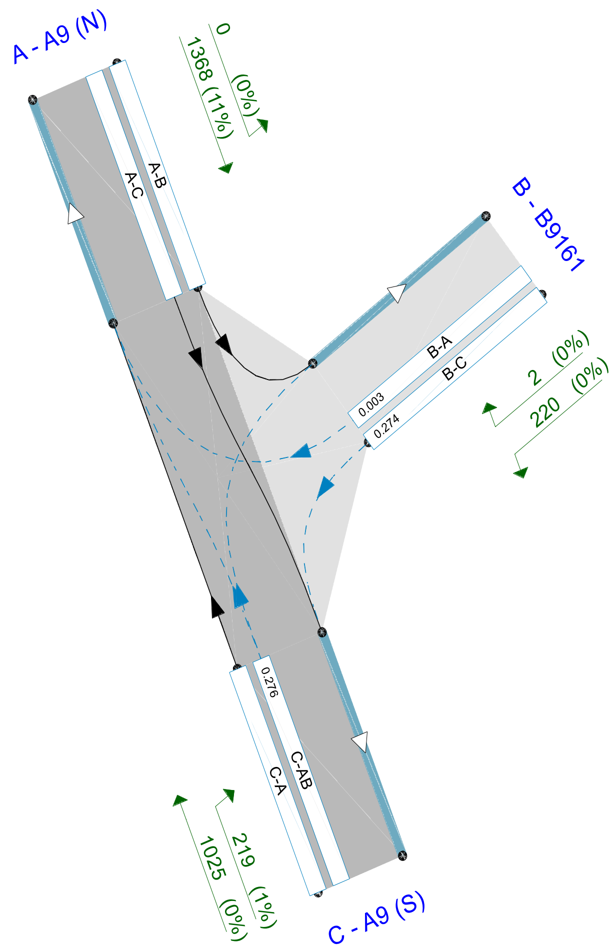
File Description

Title	
Location	
Site number	
Date	10/14/2020
Version	

Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	CORP\INVN01911
Description	

Units

Distance units	Speed units	Traffic units input	Traffic units results	Flow units	Average delay units	Total delay units	Rate of delay units
m	kph	Veh	Veh	perHour	s	-Min	perMin



The junction diagram reflects the last run of Junctions.

Analysis Options

Calculate Queue Percentiles	Calculate residual capacity	RFC Threshold	Average Delay threshold (s)	Queue threshold (PCU)
		0.85	36.00	20.00

Demand Set Summary

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D1	2020	AM	ONE HOUR	07:15	08:45	15
D2	2020	Sat	ONE HOUR	10:45	12:15	15
D3	2020	PM	ONE HOUR	16:15	17:45	15
D4	2035+Dev	AM	ONE HOUR	07:15	08:45	15
D5	2035+Dev	Sat	ONE HOUR	10:45	12:15	15
D6	2035+Dev	PM	ONE HOUR	16:15	17:45	15

Analysis Set Details

ID	Network flow scaling factor (%)
A1	100.000

2020, AM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	Munlochy Junction	T-Junction	Two-way		2.74	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description	Arm type
A	A9 (N)		Major
B	B9161		Minor
C	A9 (S)		Major

Major Arm Geometry

Arm	Width of carriageway (m)	Has kerbed central reserve	Width of kerbed central reserve (m)	Has right turn bay	Width for right turn (m)	Visibility for right turn (m)	Blocks?	Blocking queue (PCU)
C - A9 (S)	15.40	✓	9.20	✓	4.16	172.4	✓	33.30

Geometries for Arm C are measured opposite Arm B. Geometries for Arm A (if relevant) are measured opposite Arm D.

Minor Arm Geometry

Arm	Minor arm type	Lane Width (Left) (m)	Lane Width (Right) (m)	Visibility to left (m)	Visibility to right (m)
B - B9161	Two lanes	4.10	3.54	181	182

Slope / Intercept / Capacity

Priority Intersection Slopes and Intercepts

Junction	Stream	Intercept (Veh/hr)	Slope for A-B	Slope for A-C	Slope for C-A	Slope for C-B
1	B-A	804	0.072	0.182	0.114	0.259
1	B-C	820	0.074	0.188	-	-
1	C-B	818	0.187	0.187	-	-

The slopes and intercepts shown above do NOT include any corrections or adjustments.
Streams may be combined, in which case capacity will be adjusted.
Values are shown for the first time segment only; they may differ for subsequent time segments.

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D1	2020	AM	ONE HOUR	07:15	08:45	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
A - A9 (N)		✓	1323	100.000
B - B9161		✓	326	100.000
C - A9 (S)		✓	1176	100.000

Origin-Destination Data

Demand (Veh/hr)

		To		
		A - A9 (N)	**B - B9161**	**C - A9 (S)**
From	**A - A9 (N)**	0	0	1323
	B - B9161	2	0	324
	C - A9 (S)	1047	129	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		A - A9 (N)	**B - B9161**	**C - A9 (S)**
From	**A - A9 (N)**	0	0	0
	B - B9161	0	0	2
	C - A9 (S)	14	9	0

Detailed Demand Data

Demand for each time segment

Arm	Time Segment	Demand (Veh/hr)	Demand in PCU (PCU/hr)
A - A9 (N)	07:15-07:30	996	996
	07:30-07:45	1189	1189
	07:45-08:00	1457	1457
	08:00-08:15	1457	1457
	08:15-08:30	1189	1189
	08:30-08:45	996	996
B - B9161	07:15-07:30	245	251
	07:30-07:45	293	300
	07:45-08:00	359	368
	08:00-08:15	359	368
	08:15-08:30	293	300
	08:30-08:45	245	251
C - A9 (S)	07:15-07:30	885	1002
	07:30-07:45	1057	1197
	07:45-08:00	1295	1465
	08:00-08:15	1295	1465
	08:15-08:30	1057	1197
	08:30-08:45	885	1002

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS
B-C	0.67	20.36	2.0	C
B-A	0.01	10.36	0.0	B
C-AB	0.28	10.02	0.4	B
C-A				
A-B				
A-C				

Main Results for each time segment

07:15 - 07:30

Stream	Total Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	244	618	0.395	241	0.6	9.507	A
B-A	2	494	0.003	1	0.0	7.311	A
C-AB	97	581	0.167	96	0.2	7.422	A
C-A	788			788			
A-B	0			0			
A-C	996			996			

07:30 - 07:45

Stream	Total Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	291	582	0.501	290	1.0	12.270	B
B-A	2	433	0.004	2	0.0	8.343	A
C-AB	116	547	0.212	116	0.3	8.337	A
C-A	941			941			
A-B	0			0			
A-C	1189			1189			

07:45 - 08:00

Stream	Total Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	357	533	0.670	353	1.9	19.631	C
B-A	2	350	0.006	2	0.0	10.355	B
C-AB	142	501	0.283	142	0.4	9.994	A
C-A	1153			1153			
A-B	0			0			
A-C	1457			1457			

08:00 - 08:15

Stream	Total Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	357	533	0.670	357	2.0	20.361	C
B-A	2	350	0.006	2	0.0	10.359	B
C-AB	142	501	0.283	142	0.4	10.022	B
C-A	1153			1153			
A-B	0			0			
A-C	1457			1457			

08:15 - 08:30

Stream	Total Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	291	582	0.501	295	1.0	12.705	B
B-A	2	433	0.004	2	0.0	8.347	A
C-AB	116	547	0.212	116	0.3	8.367	A
C-A	941			941			
A-B	0			0			
A-C	1189			1189			

08:30 - 08:45

Stream	Total Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	244	618	0.395	245	0.7	9.713	A
B-A	2	493	0.003	2	0.0	7.316	A
C-AB	97	581	0.167	97	0.2	7.457	A
C-A	788			788			
A-B	0			0			
A-C	996			996			

2020, Sat

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	Munlochy Junction	T-Junction	Two-way		2.05	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D2	2020	Sat	ONE HOUR	10:45	12:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
A - A9 (N)		✓	1368	100.000
B - B9161		✓	222	100.000
C - A9 (S)		✓	1244	100.000

Origin-Destination Data

Demand (Veh/hr)

		To		
		A - A9 (N)	**B - B9161**	**C - A9 (S)**
From	**A - A9 (N)**	0	0	1368
	B - B9161	2	0	220
	C - A9 (S)	1025	219	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		A - A9 (N)	B - B9161	C - A9 (S)
From	A - A9 (N)	0	0	11
	B - B9161	0	0	0
	C - A9 (S)	0	1	0

Detailed Demand Data

Demand for each time segment

Arm	Time Segment	Demand (Veh/hr)	Demand in PCU (PCU/hr)
A - A9 (N)	10:45-11:00	1030	1143
	11:00-11:15	1230	1365
	11:15-11:30	1506	1672
	11:30-11:45	1506	1672
	11:45-12:00	1230	1365
	12:00-12:15	1030	1143
B - B9161	10:45-11:00	167	167
	11:00-11:15	200	200
	11:15-11:30	244	244
	11:30-11:45	244	244
	11:45-12:00	200	200
	12:00-12:15	167	167
C - A9 (S)	10:45-11:00	937	938
	11:00-11:15	1118	1120
	11:15-11:30	1370	1372
	11:30-11:45	1370	1372
	11:45-12:00	1118	1120
	12:00-12:15	937	938

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS
B-C	0.48	13.68	0.9	B
B-A	0.01	11.78	0.0	B
C-AB	0.48	13.91	0.9	B
C-A				
A-B				
A-C				

Main Results for each time segment

10:45 - 11:00

Stream	Total Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	166	605	0.274	164	0.4	8.140	A
B-A	2	466	0.003	1	0.0	7.757	A
C-AB	165	598	0.276	163	0.4	8.260	A
C-A	772			772			
A-B	0			0			
A-C	1030			1030			

11:00 - 11:15

Stream	Total Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	198	563	0.351	197	0.5	9.820	A
B-A	2	399	0.005	2	0.0	9.054	A
C-AB	197	557	0.354	196	0.5	9.971	A
C-A	921			921			
A-B	0			0			
A-C	1230			1230			

11:15 - 11:30

Stream	Total Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	242	505	0.479	241	0.9	13.540	B
B-A	2	308	0.007	2	0.0	11.763	B
C-AB	241	500	0.483	240	0.9	13.762	B
C-A	1129			1129			
A-B	0			0			
A-C	1506			1506			

11:30 - 11:45

Stream	Total Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	242	505	0.479	242	0.9	13.682	B
B-A	2	308	0.007	2	0.0	11.778	B
C-AB	241	500	0.483	241	0.9	13.911	B
C-A	1129			1129			
A-B	0			0			
A-C	1506			1506			

11:45 - 12:00

Stream	Total Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	198	563	0.351	199	0.6	9.934	A
B-A	2	399	0.005	2	0.0	9.070	A
C-AB	197	557	0.354	198	0.6	10.089	B
C-A	921			921			
A-B	0			0			
A-C	1230			1230			

12:00 - 12:15

Stream	Total Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	166	605	0.274	166	0.4	8.222	A

B-A	2	465	0.003	2	0.0	7.767	A
C-AB	165	598	0.276	166	0.4	8.342	A
C-A	772			772			
A-B	0			0			
A-C	1030			1030			

2020, PM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	Munlochy Junction	T-Junction	Two-way		1.89	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D3	2020	PM	ONE HOUR	16:15	17:45	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
A - A9 (N)		✓	1167	100.000
B - B9161		✓	199	100.000
C - A9 (S)		✓	1777	100.000

Origin-Destination Data

Demand (Veh/hr)

		To		
		A - A9 (N)	**B - B9161**	**C - A9 (S)**
From	**A - A9 (N)**	0	0	1167
	B - B9161	1	0	198
	C - A9 (S)	1505	272	0

Vehicle Mix

Heavy Vehicle Percentages

	To			
		A - A9 (N)	B - B9161	C - A9 (S)
From	A - A9 (N)	0	0	0
	B - B9161	0	0	0
	C - A9 (S)	0	4	0

Detailed Demand Data

Demand for each time segment

Arm	Time Segment	Demand (Veh/hr)	Demand in PCU (PCU/hr)
A - A9 (N)	16:15-16:30	879	879
	16:30-16:45	1049	1049
	16:45-17:00	1285	1285
	17:00-17:15	1285	1285
	17:15-17:30	1049	1049
	17:30-17:45	879	879
B - B9161	16:15-16:30	150	150
	16:30-16:45	179	179
	16:45-17:00	219	219
	17:00-17:15	219	219
	17:15-17:30	179	179
	17:30-17:45	150	150
C - A9 (S)	16:15-16:30	1338	1346
	16:30-16:45	1597	1607
	16:45-17:00	1957	1968
	17:00-17:15	1957	1968
	17:15-17:30	1597	1607
	17:30-17:45	1338	1346

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS
B-C	0.38	9.99	0.6	A
B-A	0.00	12.05	0.0	B
C-AB	0.54	14.08	1.2	B
C-A				
A-B				
A-C				

Main Results for each time segment

16:15 - 16:30

Stream	Total Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	149	655	0.228	148	0.3	7.086	A
B-A	0.75	460	0.002	0.75	0.0	7.834	A
C-AB	205	628	0.326	203	0.5	8.430	A
C-A	1133			1133			
A-B	0			0			
A-C	879			879			

16:30 - 16:45

Stream	Total Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	178	623	0.286	178	0.4	8.081	A
B-A	0.90	393	0.002	0.90	0.0	9.182	A
C-AB	245	597	0.409	244	0.7	10.148	B
C-A	1353			1353			
A-B	0			0			
A-C	1049			1049			

16:45 - 17:00

Stream	Total Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	218	578	0.377	217	0.6	9.950	A
B-A	1	300	0.004	1	0.0	12.030	B
C-AB	299	555	0.540	298	1.1	13.895	B
C-A	1657			1657			
A-B	0			0			
A-C	1285			1285			

17:00 - 17:15

Stream	Total Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	218	578	0.377	218	0.6	9.991	A
B-A	1	300	0.004	1	0.0	12.050	B
C-AB	299	555	0.540	299	1.2	14.079	B
C-A	1657			1657			
A-B	0			0			
A-C	1285			1285			

17:15 - 17:30

Stream	Total Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	178	623	0.286	179	0.4	8.125	A
B-A	0.90	392	0.002	0.90	0.0	9.201	A
C-AB	245	597	0.409	246	0.7	10.308	B
C-A	1353			1353			
A-B	0			0			
A-C	1049			1049			

17:30 - 17:45

Stream	Total Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	149	655	0.228	149	0.3	7.132	A
B-A	0.75	459	0.002	0.76	0.0	7.847	A
C-AB	205	628	0.326	206	0.5	8.541	A
C-A	1133			1133			
A-B	0			0			
A-C	879			879			

2035+Dev, AM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	Munlochy Junction	T-Junction	Two-way		3.92	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D4	2035+Dev	AM	ONE HOUR	07:15	08:45	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
A - A9 (N)		✓	1453	100.000
B - B9161		✓	357	100.000
C - A9 (S)		✓	1292	100.000

Origin-Destination Data

Demand (Veh/hr)

	To			
		A - A9 (N)	B - B9161	C - A9 (S)
From	A - A9 (N)	0	0	1453
	B - B9161	2	0	355
	C - A9 (S)	1150	142	0

Vehicle Mix

Heavy Vehicle Percentages

	To			
		A - A9 (N)	B - B9161	C - A9 (S)
From	A - A9 (N)	0	0	0
	B - B9161	0	0	2
	C - A9 (S)	14	9	0

Detailed Demand Data

Demand for each time segment

Arm	Time Segment	Demand (Veh/hr)	Demand in PCU (PCU/hr)
A - A9 (N)	07:15-07:30	1094	1094
	07:30-07:45	1306	1306
	07:45-08:00	1600	1600
	08:00-08:15	1600	1600
	08:15-08:30	1306	1306
	08:30-08:45	1094	1094
B - B9161	07:15-07:30	269	275
	07:30-07:45	321	329
	07:45-08:00	393	403
	08:00-08:15	393	403
	08:15-08:30	321	329
	08:30-08:45	269	275
C - A9 (S)	07:15-07:30	973	1101
	07:30-07:45	1161	1315
	07:45-08:00	1423	1610
	08:00-08:15	1423	1610
	08:15-08:30	1161	1315
	08:30-08:45	973	1101

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS
B-C	0.77	30.52	3.2	D

B-A	0.01	11.90	0.0	B
C-AB	0.33	11.24	0.5	B
C-A				
A-B				
A-C				

Main Results for each time segment

07:15 - 07:30

Stream	Total Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	267	600	0.446	264	0.8	10.636	B
B-A	2	463	0.003	1	0.0	7.797	A
C-AB	107	564	0.190	106	0.2	7.850	A
C-A	866			866			
A-B	0			0			
A-C	1094			1094			

07:30 - 07:45

Stream	Total Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	319	560	0.569	317	1.3	14.673	B
B-A	2	397	0.005	2	0.0	9.116	A
C-AB	128	527	0.242	127	0.3	8.997	A
C-A	1034			1034			
A-B	0			0			
A-C	1306			1306			

07:45 - 08:00

Stream	Total Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	391	506	0.772	384	3.0	27.959	D
B-A	2	305	0.007	2	0.0	11.888	B
C-AB	156	477	0.328	156	0.5	11.195	B
C-A	1266			1266			
A-B	0			0			
A-C	1600			1600			

08:00 - 08:15

Stream	Total Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	391	506	0.772	390	3.2	30.524	D
B-A	2	305	0.007	2	0.0	11.895	B
C-AB	156	477	0.328	156	0.5	11.239	B
C-A	1266			1266			
A-B	0			0			
A-C	1600			1600			

08:15 - 08:30

Stream	Total Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	319	560	0.569	326	1.4	15.807	C
B-A	2	396	0.005	2	0.0	9.123	A
C-AB	128	527	0.242	128	0.3	9.040	A
C-A	1034			1034			
A-B	0			0			
A-C	1306			1306			

08:30 - 08:45

Stream	Total Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	267	600	0.446	269	0.8	10.979	B
B-A	2	463	0.003	2	0.0	7.803	A
C-AB	107	564	0.190	107	0.2	7.894	A
C-A	866			866			
A-B	0			0			
A-C	1094			1094			

2035+Dev, Sat

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	Munlochy Junction	T-Junction	Two-way		2.57	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D5	2035+Dev	Sat	ONE HOUR	10:45	12:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
A - A9 (N)		✓	1502	100.000
B - B9161		✓	243	100.000

C - A9 (S)		✓	1365	100.000

Origin-Destination Data

Demand (Veh/hr)

		To		
		A - A9 (N)	**B - B9161**	**C - A9 (S)**
From	**A - A9 (N)**	0	0	1502
	B - B9161	2	0	241
	C - A9 (S)	1125	240	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		A - A9 (N)	**B - B9161**	**C - A9 (S)**
From	**A - A9 (N)**	0	0	11
	B - B9161	0	0	0
	C - A9 (S)	0	1	0

Detailed Demand Data

Demand for each time segment

Arm	Time Segment	Demand (Veh/hr)	Demand in PCU (PCU/hr)
A - A9 (N)	**10:45-11:00**	1131	1255
	11:00-11:15	1350	1499
	11:15-11:30	1654	1836
	11:30-11:45	1654	1836
	11:45-12:00	1350	1499
	12:00-12:15	1131	1255
B - B9161	**10:45-11:00**	183	183
	11:00-11:15	218	218
	11:15-11:30	268	268
	11:30-11:45	268	268
	11:45-12:00	218	218
	12:00-12:15	183	183
C - A9 (S)	**10:45-11:00**	1028	1029
	11:00-11:15	1227	1229
	11:15-11:30	1503	1505
	11:30-11:45	1503	1505
	11:45-12:00	1227	1229
	12:00-12:15	1028	1029

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS
B-C	0.56	17.20	1.2	C
B-A	0.01	14.01	0.0	B
C-AB	0.56	17.52	1.3	C
C-A				
A-B				
A-C				

Main Results for each time segment

10:45 - 11:00

Stream	Total Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	181	584	0.311	180	0.4	8.869	A
B-A	2	432	0.003	1	0.0	8.353	A
C-AB	181	577	0.313	179	0.4	9.003	A
C-A	847			847			
A-B	0			0			
A-C	1131			1131			

11:00 - 11:15

Stream	Total Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	217	538	0.403	216	0.7	11.149	B
B-A	2	360	0.005	2	0.0	10.055	B
C-AB	216	532	0.406	215	0.7	11.326	B
C-A	1011			1011			
A-B	0			0			
A-C	1350			1350			

11:15 - 11:30

Stream	Total Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	265	474	0.559	263	1.2	16.865	C
B-A	2	260	0.008	2	0.0	13.979	B
C-AB	264	469	0.563	262	1.2	17.169	C
C-A	1239			1239			
A-B	0			0			
A-C	1654			1654			

11:30 - 11:45

Stream	Total Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	265	474	0.559	265	1.2	17.196	C
B-A	2	259	0.009	2	0.0	14.011	B
C-AB	264	469	0.563	264	1.3	17.517	C
C-A	1239			1239			

A-B	0			0			
A-C	1654			1654			

11:45 - 12:00

Stream	Total Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	217	538	0.403	219	0.7	11.362	B
B-A	2	359	0.005	2	0.0	10.082	B
C-AB	216	532	0.406	218	0.7	11.553	B
C-A	1011			1011			
A-B	0			0			
A-C	1350			1350			

12:00 - 12:15

Stream	Total Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	181	584	0.311	182	0.5	8.989	A
B-A	2	432	0.003	2	0.0	8.367	A
C-AB	181	577	0.313	182	0.5	9.128	A
C-A	847			847			
A-B	0			0			
A-C	1131			1131			

2035+Dev, PM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	Munlochy Junction	T-Junction	Two-way		2.29	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D6	2035+Dev	PM	ONE HOUR	16:15	17:45	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
A - A9 (N)		✓	1282	100.000
B - B9161		✓	218	100.000
C - A9 (S)		✓	1951	100.000

Origin-Destination Data

Demand (Veh/hr)

	To			
From		A - A9 (N)	B - B9161	C - A9 (S)
	A - A9 (N)	0	0	1282
	B - B9161	1	0	217
	C - A9 (S)	1653	298	0

Vehicle Mix

Heavy Vehicle Percentages

	To			
From		A - A9 (N)	B - B9161	C - A9 (S)
	A - A9 (N)	0	0	0
	B - B9161	0	0	0
	C - A9 (S)	0	4	0

Detailed Demand Data

Demand for each time segment

Arm	Time Segment	Demand (Veh/hr)	Demand in PCU (PCU/hr)
A - A9 (N)	16:15-16:30	965	965
	16:30-16:45	1152	1152
	16:45-17:00	1412	1412
	17:00-17:15	1412	1412
	17:15-17:30	1152	1152
	17:30-17:45	965	965
B - B9161	16:15-16:30	164	164
	16:30-16:45	196	196
	16:45-17:00	240	240
	17:00-17:15	240	240
	17:15-17:30	196	196
	17:30-17:45	164	164
C - A9 (S)	16:15-16:30	1469	1478
	16:30-16:45	1754	1765
	16:45-17:00	2148	2161
	17:00-17:15	2148	2161
	17:15-17:30	1754	1765
	17:30-17:45	1469	1478

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS
B-C	0.43	11.41	0.7	B
B-A	0.00	14.46	0.0	B
C-AB	0.62	17.60	1.6	C
C-A				
A-B				
A-C				

Main Results for each time segment

16:15 - 16:30

Stream	Total Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	163	639	0.256	162	0.3	7.534	A
B-A	0.75	427	0.002	0.75	0.0	8.455	A
C-AB	224	612	0.366	222	0.6	9.170	A
C-A	1244			1244			
A-B	0			0			
A-C	965			965			

16:30 - 16:45

Stream	Total Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	195	603	0.323	195	0.5	8.797	A
B-A	0.90	353	0.003	0.90	0.0	10.237	B
C-AB	268	579	0.463	267	0.8	11.499	B
C-A	1486			1486			
A-B	0			0			
A-C	1152			1152			

16:45 - 17:00

Stream	Total Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	239	554	0.431	238	0.7	11.333	B
B-A	1	251	0.004	1	0.0	14.415	B
C-AB	328	532	0.617	325	1.5	17.178	C
C-A	1820			1820			
A-B	0			0			
A-C	1412			1412			

17:00 - 17:15

Stream	Total Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	239	554	0.431	239	0.7	11.410	B
B-A	1	250	0.004	1	0.0	14.458	B

C-AB	328	532	0.617	328	1.6	17.602	C
C-A	1820			1820			
A-B	0			0			
A-C	1412			1412			

17:15 - 17:30

Stream	Total Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	195	603	0.323	196	0.5	8.867	A
B-A	0.90	351	0.003	0.91	0.0	10.269	B
C-AB	268	579	0.463	271	0.9	11.787	B
C-A	1486			1486			
A-B	0			0			
A-C	1152			1152			

17:30 - 17:45

Stream	Total Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	163	639	0.256	164	0.3	7.593	A
B-A	0.75	426	0.002	0.76	0.0	8.474	A
C-AB	224	612	0.366	226	0.6	9.331	A
C-A	1244			1244			
A-B	0			0			
A-C	965			965			

Junctions 9

PICADY 9 - Priority Intersection Module

Version: 9.5.0.6896

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Filename: Munlochy Slip Road.j9
Path: O:\50610325 - Chancery Lane Projects\Development Planning Projects\00000-A9 Junction Modelling\03 WIP\Transport Planning\02 CAD-BIM Models\20201119
Report generation date: 11/23/2020 5:18:25 PM

Summary of junction performance

	AM				Sat				PM			
	Queue (Veh)	Delay (s)	RFC	LOS	Queue (Veh)	Delay (s)	RFC	LOS	Queue (Veh)	Delay (s)	RFC	LOS
	2020											
Stream B-AC	0.0	0.00	0.00	A	0.0	5.77	0.03	A	0.0	6.10	0.02	A
Stream C-AB	0.0	0.00	0.00	A	0.0	0.00	0.00	A	0.0	0.00	0.00	A
	2035+Dev											
Stream B-AC	0.0	0.00	0.00	A	0.0	5.84	0.04	A	0.0	6.18	0.02	A
Stream C-AB	0.0	0.00	0.00	A	0.0	0.00	0.00	A	0.0	0.00	0.00	A

Values shown are the highest values encountered over all time segments. Delay is the maximum value of average delay per arriving vehicle.

File summary

File Description

Title	
Location	
Site number	
Date	10/14/2020
Version	
Status	(new file)
Identifier	

Client	
Jobnumber	
Enumerator	CORP\INVN01911
Description	

Units

Distance units	Speed units	Traffic units input	Traffic units results	Flow units	Average delay units	Total delay units	Rate of delay units
m	kph	Veh	Veh	perHour	s	-Min	perMin

Analysis Options

Calculate Queue Percentiles	Calculate residual capacity	RFC Threshold	Average Delay threshold (s)	Queue threshold (PCU)
		0.85	36.00	20.00

Demand Set Summary

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D1	2020	AM	ONE HOUR	07:15	08:45	15
D2	2020	Sat	ONE HOUR	10:45	12:15	15
D3	2020	PM	ONE HOUR	16:15	17:45	15
D4	2035+Dev	AM	ONE HOUR	07:15	08:45	15
D5	2035+Dev	Sat	ONE HOUR	10:45	12:15	15
D6	2035+Dev	PM	ONE HOUR	16:15	17:45	15

Analysis Set Details

ID	Network flow scaling factor (%)
A1	100.000

2020, AM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	Munlochy Slip Road	T-Junction	One-way from A to C		0.00	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description	Arm type
A	B9161 West		Major
B	A9 (N) Slip Road		Minor
C	B9161 East		Major

Major Arm Geometry

Arm	Width of carriageway (m)	Has kerbed central reserve	Width of kerbed central reserve (m)	Has right turn bay	Visibility for right turn (m)	Blocks?	Blocking queue (PCU)
C - B9161 East	5.20	✓	0.80			✓	

Geometries for Arm C are measured opposite Arm B. Geometries for Arm A (if relevant) are measured opposite Arm D.

Minor Arm Geometry

Arm	Minor arm type	Lane width (m)	Visibility to left (m)	Visibility to right (m)
B - A9 (N) Slip Road	One lane	4.28	36	11

Slope / Intercept / Capacity

Priority Intersection Slopes and Intercepts

Junction	Stream	Intercept (Veh/hr)	Slope for A-B	Slope for A-C	Slope for C-A	Slope for C-B
1	B-A	568	0.082	0.208	0.131	0.297
1	B-C	712	0.088	0.223	-	-
1	C-B	574	0.180	0.180	-	-

The slopes and intercepts shown above do NOT include any corrections or adjustments.
Streams may be combined, in which case capacity will be adjusted.
Values are shown for the first time segment only; they may differ for subsequent time segments.

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D1	2020	AM	ONE HOUR	07:15	08:45	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
A - B9161 West		✓	129	100.000
B - A9 (N) Slip Road		✓	2	100.000
C - B9161 East		✓	0	100.000

Origin-Destination Data

Demand (Veh/hr)

	To			
		A - B9161 West	B - A9 (N) Slip Road	C - B9161 East
From	A - B9161 West	0	0	129
	B - A9 (N) Slip Road	0	0	2
	C - B9161 East	0	0	0

Vehicle Mix

Heavy Vehicle Percentages

	To			
		A - B9161 West	B - A9 (N) Slip Road	C - B9161 East
From	A - B9161 West	0	0	9
	B - A9 (N) Slip Road	0	0	7
	C - B9161 East	0	0	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS
B-AC	0.00	0.00	0.0	A
C-AB	0.00	0.00	0.0	A
C-A				
A-B				
A-C				

Main Results for each time segment

07:15 - 07:30

Stream	Total Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	0	588	0.000	0	0.0	0.000	A
C-AB	0	555	0.000	0	0.0	0.000	A
C-A	0			0			
A-B	0			0			
A-C	97			97			

07:30 - 07:45

Stream	Total Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	0	583	0.000	0	0.0	0.000	A
C-AB	0	551	0.000	0	0.0	0.000	A

C-A	0			0			
A-B	0			0			
A-C	116			116			

07:45 - 08:00

Stream	Total Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	0	577	0.000	0	0.0	0.000	A
C-AB	0	546	0.000	0	0.0	0.000	A
C-A	0			0			
A-B	0			0			
A-C	142			142			

08:00 - 08:15

Stream	Total Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	0	577	0.000	0	0.0	0.000	A
C-AB	0	546	0.000	0	0.0	0.000	A
C-A	0			0			
A-B	0			0			
A-C	142			142			

08:15 - 08:30

Stream	Total Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	0	583	0.000	0	0.0	0.000	A
C-AB	0	551	0.000	0	0.0	0.000	A
C-A	0			0			
A-B	0			0			
A-C	116			116			

08:30 - 08:45

Stream	Total Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	0	588	0.000	0	0.0	0.000	A
C-AB	0	555	0.000	0	0.0	0.000	A
C-A	0			0			
A-B	0			0			
A-C	97			97			

2020, Sat

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	Munlochy Slip Road	T-Junction	One-way from A to C		0.49	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D2	2020	Sat	ONE HOUR	10:45	12:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
A - B9161 West		✓	219	100.000
B - A9 (N) Slip Road		✓	20	100.000
C - B9161 East		✓	0	100.000

Origin-Destination Data

Demand (Veh/hr)

		To		
		A - B9161 West	B - A9 (N) Slip Road	C - B9161 East
From	A - B9161 West	0	0	219
	B - A9 (N) Slip Road	0	0	20
	C - B9161 East	0	0	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		A - B9161 West	B - A9 (N) Slip Road	C - B9161 East
From	A - B9161 West	0	0	1
	B - A9 (N) Slip Road	0	0	2
	C - B9161 East	0	0	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS
B-AC	0.03	5.77	0.0	A
C-AB	0.00	0.00	0.0	A

C-A				
A-B				
A-C				

Main Results for each time segment

10:45 - 11:00

Stream	Total Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	15	663	0.023	15	0.0	5.558	A
C-AB	0	544	0.000	0	0.0	0.000	A
C-A	0			0			
A-B	0			0			
A-C	165			165			

11:00 - 11:15

Stream	Total Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	18	656	0.027	18	0.0	5.646	A
C-AB	0	538	0.000	0	0.0	0.000	A
C-A	0			0			
A-B	0			0			
A-C	197			197			

11:15 - 11:30

Stream	Total Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	22	646	0.034	22	0.0	5.771	A
C-AB	0	530	0.000	0	0.0	0.000	A
C-A	0			0			
A-B	0			0			
A-C	241			241			

11:30 - 11:45

Stream	Total Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	22	646	0.034	22	0.0	5.771	A
C-AB	0	530	0.000	0	0.0	0.000	A
C-A	0			0			
A-B	0			0			
A-C	241			241			

11:45 - 12:00

Stream	Total Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	18	656	0.027	18	0.0	5.646	A
C-AB	0	538	0.000	0	0.0	0.000	A
C-A	0			0			
A-B	0			0			

A-C	197			197			

12:00 - 12:15

Stream	Total Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	15	663	0.023	15	0.0	5.561	A
C-AB	0	544	0.000	0	0.0	0.000	A
C-A	0			0			
A-B	0			0			
A-C	165			165			

2020, PM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	Munlochy Slip Road	T-Junction	One-way from A to C		0.20	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D3	2020	PM	ONE HOUR	16:15	17:45	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
A - B9161 West		✓	272	100.000
B - A9 (N) Slip Road		✓	9	100.000
C - B9161 East		✓	0	100.000

Origin-Destination Data

Demand (Veh/hr)

		To		
		A - B9161 West	B - A9 (N) Slip Road	C - B9161 East
From	A - B9161 West	0	0	272
	B - A9 (N) Slip Road	0	0	9
	C - B9161 East	0	0	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		A - B9161 West	B - A9 (N) Slip Road	C - B9161 East
From	A - B9161 West	0	0	4
	B - A9 (N) Slip Road	0	0	7
	C - B9161 East	0	0	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS
B-AC	0.02	6.10	0.0	A
C-AB	0.00	0.00	0.0	A
C-A				
A-B				
A-C				

Main Results for each time segment

16:15 - 16:30

Stream	Total Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	7	620	0.011	7	0.0	5.866	A
C-AB	0	536	0.000	0	0.0	0.000	A
C-A	0			0			
A-B	0			0			
A-C	205			205			

16:30 - 16:45

Stream	Total Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	8	612	0.013	8	0.0	5.963	A
C-AB	0	528	0.000	0	0.0	0.000	A

C-A	0			0			
A-B	0			0			
A-C	245			245			

16:45 - 17:00

Stream	Total Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	10	600	0.017	10	0.0	6.101	A
C-AB	0	518	0.000	0	0.0	0.000	A
C-A	0			0			
A-B	0			0			
A-C	299			299			

17:00 - 17:15

Stream	Total Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	10	600	0.017	10	0.0	6.101	A
C-AB	0	518	0.000	0	0.0	0.000	A
C-A	0			0			
A-B	0			0			
A-C	299			299			

17:15 - 17:30

Stream	Total Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	8	612	0.013	8	0.0	5.965	A
C-AB	0	528	0.000	0	0.0	0.000	A
C-A	0			0			
A-B	0			0			
A-C	245			245			

17:30 - 17:45

Stream	Total Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	7	620	0.011	7	0.0	5.869	A
C-AB	0	536	0.000	0	0.0	0.000	A
C-A	0			0			
A-B	0			0			
A-C	205			205			

2035+Dev, AM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	Munlochy Slip Road	T-Junction	One-way from A to C		0.00	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D4	2035+Dev	AM	ONE HOUR	07:15	08:45	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
A - B9161 West		✓	142	100.000
B - A9 (N) Slip Road		✓	2	100.000
C - B9161 East		✓	0	100.000

Origin-Destination Data

Demand (Veh/hr)

		To		
		A - B9161 West	B - A9 (N) Slip Road	C - B9161 East
From	A - B9161 West	0	0	142
	B - A9 (N) Slip Road	0	0	2
	C - B9161 East	0	0	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		A - B9161 West	B - A9 (N) Slip Road	C - B9161 East
From	A - B9161 West	0	0	9
	B - A9 (N) Slip Road	0	0	7
	C - B9161 East	0	0	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS
B-AC	0.00	0.00	0.0	A
C-AB	0.00	0.00	0.0	A

C-A				
A-B				
A-C				

Main Results for each time segment

07:15 - 07:30

Stream	Total Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	0	585	0.000	0	0.0	0.000	A
C-AB	0	553	0.000	0	0.0	0.000	A
C-A	0			0			
A-B	0			0			
A-C	107			107			

07:30 - 07:45

Stream	Total Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	0	581	0.000	0	0.0	0.000	A
C-AB	0	549	0.000	0	0.0	0.000	A
C-A	0			0			
A-B	0			0			
A-C	128			128			

07:45 - 08:00

Stream	Total Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	0	574	0.000	0	0.0	0.000	A
C-AB	0	543	0.000	0	0.0	0.000	A
C-A	0			0			
A-B	0			0			
A-C	156			156			

08:00 - 08:15

Stream	Total Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	0	574	0.000	0	0.0	0.000	A
C-AB	0	543	0.000	0	0.0	0.000	A
C-A	0			0			
A-B	0			0			
A-C	156			156			

08:15 - 08:30

Stream	Total Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	0	581	0.000	0	0.0	0.000	A
C-AB	0	549	0.000	0	0.0	0.000	A
C-A	0			0			
A-B	0			0			

A-C	128			128			

08:30 - 08:45

Stream	Total Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	0	585	0.000	0	0.0	0.000	A
C-AB	0	553	0.000	0	0.0	0.000	A
C-A	0			0			
A-B	0			0			
A-C	107			107			

2035+Dev, Sat

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	Munlochy Slip Road	T-Junction	One-way from A to C		0.49	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D5	2035+Dev	Sat	ONE HOUR	10:45	12:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
A - B9161 West		✓	240	100.000
B - A9 (N) Slip Road		✓	22	100.000
C - B9161 East		✓	0	100.000

Origin-Destination Data

Demand (Veh/hr)

		To		
		A - B9161 West	B - A9 (N) Slip Road	C - B9161 East
From	A - B9161 West	0	0	240
	B - A9 (N) Slip Road	0	0	22
	C - B9161 East	0	0	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		A - B9161 West	B - A9 (N) Slip Road	C - B9161 East
From	A - B9161 West	0	0	1
	B - A9 (N) Slip Road	0	0	2
	C - B9161 East	0	0	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS
B-AC	0.04	5.84	0.0	A
C-AB	0.00	0.00	0.0	A
C-A				
A-B				
A-C				

Main Results for each time segment

10:45 - 11:00

Stream	Total Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	17	659	0.025	16	0.0	5.602	A
C-AB	0	541	0.000	0	0.0	0.000	A
C-A	0			0			
A-B	0			0			
A-C	181			181			

11:00 - 11:15

Stream	Total Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	20	651	0.030	20	0.0	5.699	A
C-AB	0	535	0.000	0	0.0	0.000	A

C-A	0			0			
A-B	0			0			
A-C	216			216			

11:15 - 11:30

Stream	Total Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	24	641	0.038	24	0.0	5.839	A
C-AB	0	526	0.000	0	0.0	0.000	A
C-A	0			0			
A-B	0			0			
A-C	264			264			

11:30 - 11:45

Stream	Total Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	24	641	0.038	24	0.0	5.839	A
C-AB	0	526	0.000	0	0.0	0.000	A
C-A	0			0			
A-B	0			0			
A-C	264			264			

11:45 - 12:00

Stream	Total Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	20	651	0.030	20	0.0	5.702	A
C-AB	0	535	0.000	0	0.0	0.000	A
C-A	0			0			
A-B	0			0			
A-C	216			216			

12:00 - 12:15

Stream	Total Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	17	659	0.025	17	0.0	5.602	A
C-AB	0	541	0.000	0	0.0	0.000	A
C-A	0			0			
A-B	0			0			
A-C	181			181			

2035+Dev, PM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	Munlochy Slip Road	T-Junction	One-way from A to C		0.21	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D6	2035+Dev	PM	ONE HOUR	16:15	17:45	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
A - B9161 West		✓	298	100.000
B - A9 (N) Slip Road		✓	10	100.000
C - B9161 East		✓	0	100.000

Origin-Destination Data

Demand (Veh/hr)

		To		
		A - B9161 West	B - A9 (N) Slip Road	C - B9161 East
From	A - B9161 West	0	0	298
	B - A9 (N) Slip Road	0	0	10
	C - B9161 East	0	0	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		A - B9161 West	B - A9 (N) Slip Road	C - B9161 East
From	A - B9161 West	0	0	4
	B - A9 (N) Slip Road	0	0	7
	C - B9161 East	0	0	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS
B-AC	0.02	6.18	0.0	A
C-AB	0.00	0.00	0.0	A

C-A				
A-B				
A-C				

Main Results for each time segment

16:15 - 16:30

Stream	Total Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	8	616	0.012	7	0.0	5.914	A
C-AB	0	532	0.000	0	0.0	0.000	A
C-A	0			0			
A-B	0			0			
A-C	224			224			

16:30 - 16:45

Stream	Total Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	9	607	0.015	9	0.0	6.022	A
C-AB	0	524	0.000	0	0.0	0.000	A
C-A	0			0			
A-B	0			0			
A-C	268			268			

16:45 - 17:00

Stream	Total Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	11	594	0.019	11	0.0	6.178	A
C-AB	0	513	0.000	0	0.0	0.000	A
C-A	0			0			
A-B	0			0			
A-C	328			328			

17:00 - 17:15

Stream	Total Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	11	594	0.019	11	0.0	6.178	A
C-AB	0	513	0.000	0	0.0	0.000	A
C-A	0			0			
A-B	0			0			
A-C	328			328			

17:15 - 17:30

Stream	Total Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	9	607	0.015	9	0.0	6.022	A
C-AB	0	524	0.000	0	0.0	0.000	A
C-A	0			0			
A-B	0			0			

A-C	268			268			

17:30 - 17:45

Stream	Total Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	8	616	0.012	8	0.0	5.915	A
C-AB	0	532	0.000	0	0.0	0.000	A
C-A	0			0			
A-B	0			0			
A-C	224			224			

Junctions 9

ARCADY 9 - Roundabout Module

For sales and distribution information, program advice and maintenance, contact TRL:
+44 (0)1344 379777 software@trl.co.uk www.trlsoftware.co.uk

Filename: Tore Roundabout.j9
Path: O:\50610325 - Chancery Lane Projects\Development Planning Projects\00000-A9 Junction Modelling\03 WIP\Transport Planning\02 CAD-BIM Models\20201119
Report generation date: 11/25/2020 9:26:42 AM

Summary of junction performance

	AM				Sat				PM			
	Queue (Veh)	Delay (s)	RFC	LOS	Queue (Veh)	Delay (s)	RFC	LOS	Queue (Veh)	Delay (s)	RFC	LOS
	2020											
A - A9/ Thurso (N)	1.8	10.22	0.65	B	2.6	13.76	0.73	B	1.7	9.58	0.64	A
B - A832 (E)	0.3	5.09	0.23	A	0.3	5.29	0.24	A	0.4	4.94	0.26	A
C - A9 (S)	1.3	4.00	0.56	A	1.0	3.30	0.50	A	3.7	8.24	0.79	A
D - A832 (S)	0.4	4.47	0.30	A	0.3	3.91	0.22	A	0.4	5.03	0.28	A
E - A835 (W)	2.0	12.47	0.67	B	3.1	16.02	0.76	C	2.1	14.39	0.69	B
	2035+Dev											
A - A9/ Thurso (N)	2.8	14.63	0.74	B	4.7	23.29	0.83	C	2.6	13.25	0.73	B
B - A832 (E)	0.4	5.74	0.27	A	0.4	6.05	0.28	A	0.4	5.55	0.30	A
C - A9 (S)	1.6	4.64	0.62	A	1.2	3.69	0.55	A	6.5	13.55	0.87	B
D - A832 (S)	0.5	5.06	0.35	A	0.3	4.25	0.25	A	0.5	5.91	0.34	A
E - A835 (W)	3.4	19.31	0.78	C	6.1	29.27	0.87	D	3.9	24.18	0.81	C

Values shown are the highest values encountered over all time segments. Delay is the maximum value of average delay per arriving vehicle.

File summary

File Description

Title	

Location	
Site number	
Date	10/14/2020
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	CORP\INVN01911
Description	

Units

Distance units	Speed units	Traffic units input	Traffic units results	Flow units	Average delay units	Total delay units	Rate of delay units
m	kph	Veh	Veh	perHour	s	-Min	perMin

Analysis Options

Vehicle length (m)	Calculate Queue Percentiles	Calculate detailed queueing delay	Calculate residual capacity	RFC Threshold	Average Delay threshold (s)	Queue threshold (PCU)
5.75				0.85	36.00	20.00

Demand Set Summary

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D1	2020	AM	ONE HOUR	07:15	08:45	15	✓
D2	2020	Sat	ONE HOUR	10:45	12:15	15	✓
D3	2020	PM	ONE HOUR	16:15	17:45	15	✓
D4	2035+Dev	AM	ONE HOUR	07:15	08:45	15	✓
D5	2035+Dev	Sat	ONE HOUR	10:45	12:15	15	✓
D6	2035+Dev	PM	ONE HOUR	16:15	17:45	15	✓

Analysis Set Details

ID	Include in report	Network flow scaling factor (%)	Network capacity scaling factor (%)
A1	✓	100.000	100.000

2020, AM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Tore Roundabout	Standard Roundabout		A, B, C, D, E	7.10	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description
A	A9/ Thurso (N)	
B	A832 (E)	
C	A9 (S)	
D	A832 (S)	
E	A835 (W)	

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit only
A - A9/ Thurso (N)	3.60	9.40	16.2	39.7	99.2	40.0	
B - A832 (E)	3.00	9.00	15.8	27.2	99.2	26.0	
C - A9 (S)	7.20	8.00	5.8	25.6	99.2	15.0	
D - A832 (S)	3.90	8.80	9.7	23.9	99.2	16.0	
E - A835 (W)	3.70	9.10	9.7	21.3	99.2	35.0	

Slope / Intercept / Capacity

Arm Intercept Adjustments

Arm	Type	Reason	Direct intercept adjustment (PCU/hr)
A - A9/ Thurso (N)	Direct		-300
B - A832 (E)	None		
C - A9 (S)	None		
D - A832 (S)	None		
E - A835 (W)	Direct		-300

Roundabout Slope and Intercept used in model

Arm	Final slope	Final intercept (PCU/hr)
A - A9/ Thurso (N)	0.474	1590
B - A832 (E)	0.466	1776
C - A9 (S)	0.575	2497
D - A832 (S)	0.483	1848
E - A835 (W)	0.445	1385

The slope and intercept shown above include any corrections and adjustments.

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D1	2020	AM	ONE HOUR	07:15	08:45	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)

✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
A - A9/ Thurso (N)		ONE HOUR	✓	582	100.000
B - A832 (E)		ONE HOUR	✓	192	100.000
C - A9 (S)		ONE HOUR	✓	1041	100.000
D - A832 (S)		ONE HOUR	✓	319	100.000
E - A835 (W)		ONE HOUR	✓	539	100.000

Origin-Destination Data

Demand (Veh/hr)

		To				
		A - A9/ Thurso (N)	B - A832 (E)	C - A9 (S)	D - A832 (S)	E - A835 (W)
From	A - A9/ Thurso (N)	0	53	503	24	2
	B - A832 (E)	40	1	45	43	63
	C - A9 (S)	438	40	1	144	418
	D - A832 (S)	9	33	267	1	9
	E - A835 (W)	3	49	484	3	0

Vehicle Mix

Heavy Vehicle Percentages

		To				
		A - A9/ Thurso (N)	B - A832 (E)	C - A9 (S)	D - A832 (S)	E - A835 (W)
From	A - A9/ Thurso (N)	0	19	9	24	0
	B - A832 (E)	17	17	20	5	21
	C - A9 (S)	15	42	0	10	16
	D - A832 (S)	25	0	5	0	25
	E - A835 (W)	0	7	5	33	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)
A - A9/ Thurso (N)	0.65	10.22	1.8	B	534	801
B - A832 (E)	0.23	5.09	0.3	A	176	264
C - A9 (S)	0.56	4.00	1.3	A	955	1433
D - A832 (S)	0.30	4.47	0.4	A	293	439
E - A835 (W)	0.67	12.47	2.0	B	495	742

Main Results for each time segment

07:15 - 07:30

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
A - A9/ Thurso (N)	438	110	658	1134	0.386	436	368	0.0	0.6	5.138	A
B - A832 (E)	145	36	962	1112	0.130	144	132	0.0	0.1	3.716	A
C - A9 (S)	784	196	133	2081	0.377	781	973	0.0	0.6	2.765	A
D - A832 (S)	240	60	753	1343	0.179	239	161	0.0	0.2	3.257	A
E - A835 (W)	406	101	623	1020	0.398	403	369	0.0	0.7	5.811	A

07:30 - 07:45

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
A - A9/ Thurso (N)	523	131	789	1074	0.487	522	440	0.6	0.9	6.504	A
B - A832 (E)	173	43	1153	1031	0.167	172	158	0.1	0.2	4.194	A
C - A9 (S)	936	234	159	2066	0.453	935	1166	0.6	0.8	3.179	A
D - A832 (S)	287	72	901	1264	0.227	286	193	0.2	0.3	3.682	A
E - A835 (W)	485	121	745	962	0.504	483	442	0.7	1.0	7.501	A

07:45 - 08:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
A - A9/ Thurso (N)	641	160	963	994	0.644	638	539	0.9	1.8	9.995	A
B - A832 (E)	211	53	1408	921	0.230	211	193	0.2	0.3	5.068	A
C - A9 (S)	1146	287	194	2045	0.560	1144	1424	0.8	1.3	3.987	A
D - A832 (S)	351	88	1103	1157	0.304	351	236	0.3	0.4	4.464	A
E - A835 (W)	593	148	912	882	0.673	590	541	1.0	2.0	12.139	B

08:00 - 08:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
A - A9/ Thurso (N)	641	160	968	992	0.646	641	539	1.8	1.8	10.225	B
B - A832 (E)	211	53	1415	918	0.230	211	194	0.3	0.3	5.093	A
C - A9 (S)	1146	287	195	2045	0.560	1146	1431	1.3	1.3	4.004	A
D - A832 (S)	351	88	1104	1156	0.304	351	237	0.4	0.4	4.474	A
E - A835 (W)	593	148	914	882	0.673	593	542	2.0	2.0	12.467	B

08:15 - 08:30

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
A - A9/ Thurso (N)	523	131	795	1071	0.488	527	441	1.8	1.0	6.647	A
B - A832 (E)	173	43	1162	1026	0.168	173	159	0.3	0.2	4.221	A
C - A9 (S)	936	234	160	2066	0.453	938	1176	1.3	0.8	3.198	A
D - A832 (S)	287	72	903	1263	0.227	287	194	0.4	0.3	3.691	A
E - A835 (W)	485	121	748	961	0.504	488	443	2.0	1.0	7.685	A

08:30 - 08:45

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
A - A9/ Thurso (N)	438	110	664	1131	0.387	439	369	1.0	0.6	5.214	A
B - A832 (E)	145	36	970	1109	0.130	145	133	0.2	0.2	3.737	A
C - A9 (S)	784	196	133	2081	0.377	785	981	0.8	0.6	2.778	A
D - A832 (S)	240	60	756	1341	0.179	240	162	0.3	0.2	3.273	A
E - A835 (W)	406	101	626	1019	0.398	407	371	1.0	0.7	5.900	A

2020, Sat

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Tore Roundabout	Standard Roundabout		A, B, C, D, E	8.97	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D2	2020	Sat	ONE HOUR	10:45	12:15	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
A - A9/ Thurso (N)		ONE HOUR	✓	626	100.000
B - A832 (E)		ONE HOUR	✓	195	100.000

C - A9 (S)		ONE HOUR	✓	989	100.000
D - A832 (S)		ONE HOUR	✓	237	100.000
E - A835 (W)		ONE HOUR	✓	656	100.000

Origin-Destination Data

Demand (Veh/hr)

		To				
		A - A9/ Thurso (N)	**B - A832 (E)**	**C - A9 (S)**	**D - A832 (S)**	**E - A835 (W)**
From	**A - A9/ Thurso (N)**	1	34	573	12	6
	B - A832 (E)	44	1	57	35	58
	C - A9 (S)	387	57	1	150	394
	D - A832 (S)	14	31	186	1	5
	E - A835 (W)	6	68	573	8	1

Vehicle Mix

Heavy Vehicle Percentages

		To				
		A - A9/ Thurso (N)	**B - A832 (E)**	**C - A9 (S)**	**D - A832 (S)**	**E - A835 (W)**
From	**A - A9/ Thurso (N)**	0	26	13	20	0
	B - A832 (E)	9	0	19	16	11
	C - A9 (S)	11	18	33	9	6
	D - A832 (S)	45	14	7	0	0
	E - A835 (W)	20	4	4	29	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)
A - A9/ Thurso (N)	0.73	13.76	2.6	B	574	862
B - A832 (E)	0.24	5.29	0.3	A	179	268
C - A9 (S)	0.50	3.30	1.0	A	908	1361
D - A832 (S)	0.22	3.91	0.3	A	217	326
E - A835 (W)	0.76	16.02	3.1	C	602	903

Main Results for each time segment

10:45 - 11:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
A - A9/ Thurso (N)	471	118	694	1095	0.430	468	339	0.0	0.7	5.716	A
B - A832 (E)	147	37	1019	1109	0.132	146	143	0.0	0.2	3.738	A
C - A9 (S)	745	186	125	2215	0.336	743	1040	0.0	0.5	2.441	A
D - A832 (S)	178	45	713	1341	0.133	178	155	0.0	0.2	3.094	A
E - A835 (W)	494	123	543	1065	0.464	490	348	0.0	0.9	6.232	A

11:00 - 11:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
A - A9/ Thurso (N)	563	141	831	1034	0.544	561	406	0.7	1.2	7.585	A
B - A832 (E)	175	44	1221	1019	0.172	175	171	0.2	0.2	4.264	A
C - A9 (S)	889	222	150	2201	0.404	888	1246	0.5	0.7	2.741	A
D - A832 (S)	213	53	853	1273	0.167	213	185	0.2	0.2	3.394	A
E - A835 (W)	590	147	649	1015	0.581	588	417	0.9	1.4	8.393	A

11:15 - 11:30

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
A - A9/ Thurso (N)	689	172	1014	953	0.724	684	497	1.2	2.5	13.145	B
B - A832 (E)	215	54	1488	900	0.239	214	209	0.2	0.3	5.245	A
C - A9 (S)	1089	272	183	2181	0.499	1088	1519	0.7	1.0	3.290	A
D - A832 (S)	261	65	1045	1182	0.221	261	226	0.2	0.3	3.907	A
E - A835 (W)	722	181	795	946	0.764	716	510	1.4	3.0	15.202	C

11:30 - 11:45

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
A - A9/ Thurso (N)	689	172	1020	950	0.726	689	498	2.5	2.6	13.757	B
B - A832 (E)	215	54	1499	895	0.240	215	210	0.3	0.3	5.287	A
C - A9 (S)	1089	272	184	2181	0.499	1089	1530	1.0	1.0	3.296	A
D - A832 (S)	261	65	1046	1181	0.221	261	227	0.3	0.3	3.911	A
E - A835 (W)	722	181	796	946	0.764	722	511	3.0	3.1	16.016	C

11:45 - 12:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
A - A9/ Thurso (N)	563	141	840	1030	0.546	568	407	2.6	1.2	7.885	A
B - A832 (E)	175	44	1236	1012	0.173	176	173	0.3	0.2	4.304	A
C - A9 (S)	889	222	151	2200	0.404	890	1261	1.0	0.7	2.752	A

D - A832 (S)	213	53	855	1272	0.167	213	186	0.3	0.2	3.402	A
E - A835 (W)	590	147	651	1014	0.582	597	418	3.1	1.4	8.760	A

12:00 - 12:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
A - A9/ Thurso (N)	471	118	700	1092	0.431	473	341	1.2	0.8	5.833	A
B - A832 (E)	147	37	1029	1104	0.133	147	144	0.2	0.2	3.760	A
C - A9 (S)	745	186	126	2215	0.336	745	1050	0.7	0.5	2.452	A
D - A832 (S)	178	45	716	1339	0.133	179	155	0.2	0.2	3.103	A
E - A835 (W)	494	123	545	1064	0.464	496	350	1.4	0.9	6.363	A

2020, PM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Tore Roundabout	Standard Roundabout		A, B, C, D, E	8.95	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D3	2020	PM	ONE HOUR	16:15	17:45	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
A - A9/ Thurso (N)		ONE HOUR	✓	605	100.000
B - A832 (E)		ONE HOUR	✓	233	100.000
C - A9 (S)		ONE HOUR	✓	1484	100.000
D - A832 (S)		ONE HOUR	✓	253	100.000
E - A835 (W)		ONE HOUR	✓	499	100.000

Origin-Destination Data

Demand (Veh/hr)

		To				
		A - A9/ Thurso (N)	B - A832 (E)	C - A9 (S)	D - A832 (S)	E - A835 (W)
From	A - A9/ Thurso (N)	0	58	522	17	8
	B - A832 (E)	55	1	55	56	66
	C - A9 (S)	568	63	2	267	584
	D - A832 (S)	11	39	200	0	3
	E - A835 (W)	9	70	416	4	0

Vehicle Mix

Heavy Vehicle Percentages

		To				
		A - A9/ Thurso (N)	B - A832 (E)	C - A9 (S)	D - A832 (S)	E - A835 (W)
From	A - A9/ Thurso (N)	0	24	10	7	0
	B - A832 (E)	7	0	26	16	12
	C - A9 (S)	29	6	0	5	4
	D - A832 (S)	0	4	3	0	0
	E - A835 (W)	0	5	5	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)
A - A9/ Thurso (N)	0.64	9.58	1.7	A	555	833
B - A832 (E)	0.26	4.94	0.4	A	214	321
C - A9 (S)	0.79	8.24	3.7	A	1362	2043
D - A832 (S)	0.28	5.03	0.4	A	232	348
E - A835 (W)	0.69	14.39	2.1	B	458	687

Main Results for each time segment

16:15 - 16:30

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
A - A9/ Thurso (N)	455	114	595	1166	0.390	453	482	0.0	0.6	5.030	A
B - A832 (E)	175	44	875	1164	0.151	175	173	0.0	0.2	3.637	A
C - A9 (S)	1117	279	155	2110	0.529	1113	895	0.0	1.1	3.593	A
D - A832 (S)	190	48	1010	1248	0.153	190	258	0.0	0.2	3.401	A

E - A835 (W)	376	94	704	965	0.389	373	496	0.0	0.6	6.059	A

16:30 - 16:45

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
A - A9/ Thurso (N)	544	136	713	1114	0.488	543	577	0.6	0.9	6.288	A
B - A832 (E)	209	52	1048	1089	0.192	209	207	0.2	0.2	4.091	A
C - A9 (S)	1334	334	186	2093	0.637	1332	1072	1.1	1.7	4.713	A
D - A832 (S)	227	57	1209	1141	0.199	227	309	0.2	0.2	3.939	A
E - A835 (W)	449	112	843	895	0.501	447	593	0.6	1.0	8.014	A

16:45 - 17:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
A - A9/ Thurso (N)	666	167	870	1044	0.638	663	705	0.9	1.7	9.382	A
B - A832 (E)	257	64	1280	989	0.259	256	253	0.2	0.3	4.911	A
C - A9 (S)	1634	408	227	2070	0.789	1626	1309	1.7	3.6	7.989	A
D - A832 (S)	279	70	1477	997	0.279	278	377	0.2	0.4	5.004	A
E - A835 (W)	549	137	1030	801	0.686	545	725	1.0	2.1	13.851	B

17:00 - 17:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
A - A9/ Thurso (N)	666	167	875	1041	0.640	666	708	1.7	1.7	9.580	A
B - A832 (E)	257	64	1287	986	0.260	257	254	0.3	0.4	4.936	A
C - A9 (S)	1634	408	228	2069	0.790	1634	1315	3.6	3.7	8.244	A
D - A832 (S)	279	70	1483	994	0.280	279	379	0.4	0.4	5.033	A
E - A835 (W)	549	137	1034	799	0.688	549	728	2.1	2.1	14.395	B

17:15 - 17:30

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
A - A9/ Thurso (N)	544	136	720	1111	0.490	547	581	1.7	1.0	6.422	A
B - A832 (E)	209	52	1058	1085	0.193	210	209	0.4	0.2	4.116	A
C - A9 (S)	1334	334	187	2093	0.638	1342	1081	3.7	1.8	4.842	A
D - A832 (S)	227	57	1217	1136	0.200	228	311	0.4	0.3	3.965	A
E - A835 (W)	449	112	848	892	0.503	453	597	2.1	1.0	8.278	A

17:30 - 17:45

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service

A - A9/ Thurso (N)	455	114	600	1164	0.391	457	485	1.0	0.6	5.098	A
B - A832 (E)	175	44	883	1161	0.151	176	174	0.2	0.2	3.654	A
C - A9 (S)	1117	279	156	2110	0.530	1120	902	1.8	1.1	3.645	A
D - A832 (S)	190	48	1016	1244	0.153	191	260	0.3	0.2	3.420	A
E - A835 (W)	376	94	708	963	0.390	377	499	1.0	0.6	6.164	A

2035+Dev, AM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Tore Roundabout	Standard Roundabout		A, B, C, D, E	9.73	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D4	2035+Dev	AM	ONE HOUR	07:15	08:45	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
A - A9/ Thurso (N)		ONE HOUR	✓	639	100.000
B - A832 (E)		ONE HOUR	✓	210	100.000
C - A9 (S)		ONE HOUR	✓	1143	100.000
D - A832 (S)		ONE HOUR	✓	351	100.000
E - A835 (W)		ONE HOUR	✓	594	100.000

Origin-Destination Data

Demand (Veh/hr)

		To				
		A - A9/ Thurso (N)	B - A832 (E)	C - A9 (S)	D - A832 (S)	E - A835 (W)
From	A - A9/ Thurso (N)	0	58	553	26	2
	B - A832 (E)	44	1	49	47	69
	C - A9 (S)	481	44	1	158	459
	D - A832 (S)	10	36	294	1	10
	E - A835 (W)	4	54	532	4	0

Vehicle Mix

Heavy Vehicle Percentages

		To				
		A - A9/ Thurso (N)	B - A832 (E)	C - A9 (S)	D - A832 (S)	E - A835 (W)
From	A - A9/ Thurso (N)	0	19	9	24	0
	B - A832 (E)	17	17	20	5	21
	C - A9 (S)	15	42	0	10	16
	D - A832 (S)	25	0	5	0	25
	E - A835 (W)	0	7	5	33	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)
A - A9/ Thurso (N)	0.74	14.63	2.8	B	586	880
B - A832 (E)	0.27	5.74	0.4	A	193	289
C - A9 (S)	0.62	4.64	1.6	A	1049	1573
D - A832 (S)	0.35	5.06	0.5	A	322	483
E - A835 (W)	0.78	19.31	3.4	C	545	818

Main Results for each time segment

07:15 - 07:30

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
A - A9/ Thurso (N)	481	120	724	1104	0.436	478	404	0.0	0.8	5.725	A
B - A832 (E)	158	40	1057	1071	0.148	157	145	0.0	0.2	3.936	A
C - A9 (S)	861	215	145	2074	0.415	858	1069	0.0	0.7	2.955	A
D - A832 (S)	264	66	826	1304	0.203	263	177	0.0	0.3	3.457	A
E - A835 (W)	447	112	684	991	0.451	444	405	0.0	0.8	6.548	A

07:30 - 07:45

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
A - A9/ Thurso (N)	574	144	867	1038	0.553	573	484	0.8	1.2	7.692	A
B - A832 (E)	189	47	1266	982	0.192	189	173	0.2	0.2	4.538	A
C - A9 (S)	1028	257	174	2057	0.500	1026	1281	0.7	1.0	3.490	A
D - A832 (S)	316	79	989	1217	0.259	315	212	0.3	0.3	3.989	A
E - A835 (W)	534	133	819	926	0.576	532	485	0.8	1.3	9.075	A

07:45 - 08:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
A - A9/ Thurso (N)	704	176	1056	952	0.739	698	592	1.2	2.7	13.851	B
B - A832 (E)	231	58	1543	863	0.268	231	211	0.2	0.4	5.688	A
C - A9 (S)	1258	315	213	2035	0.619	1256	1561	1.0	1.6	4.609	A
D - A832 (S)	386	97	1210	1099	0.352	386	259	0.3	0.5	5.039	A
E - A835 (W)	654	164	1002	839	0.779	646	593	1.3	3.2	17.985	C

08:00 - 08:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
A - A9/ Thurso (N)	704	176	1064	948	0.742	703	593	2.7	2.8	14.626	B
B - A832 (E)	231	58	1555	858	0.270	231	212	0.4	0.4	5.744	A
C - A9 (S)	1258	315	214	2034	0.619	1258	1572	1.6	1.6	4.640	A
D - A832 (S)	386	97	1212	1098	0.352	386	260	0.5	0.5	5.058	A
E - A835 (W)	654	164	1004	838	0.780	653	595	3.2	3.4	19.315	C

08:15 - 08:30

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
A - A9/ Thurso (N)	574	144	878	1033	0.556	580	486	2.8	1.3	8.051	A
B - A832 (E)	189	47	1284	974	0.194	189	175	0.4	0.2	4.588	A
C - A9 (S)	1028	257	175	2056	0.500	1030	1298	1.6	1.0	3.514	A
D - A832 (S)	316	79	992	1215	0.260	316	213	0.5	0.4	4.009	A
E - A835 (W)	534	133	822	925	0.577	542	487	3.4	1.4	9.582	A

08:30 - 08:45

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
A - A9/ Thurso (N)	481	120	731	1101	0.437	483	406	1.3	0.8	5.848	A
B - A832 (E)	158	40	1068	1067	0.148	158	146	0.2	0.2	3.965	A

C - A9 (S)	861	215	146	2073	0.415	862	1080	1.0	0.7	2.976	A
D - A832 (S)	264	66	830	1302	0.203	265	178	0.4	0.3	3.475	A
E - A835 (W)	447	112	688	989	0.452	449	407	1.4	0.8	6.698	A

2035+Dev, Sat

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Tore Roundabout	Standard Roundabout		A, B, C, D, E	14.56	B

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D5	2035+Dev	Sat	ONE HOUR	10:45	12:15	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
A - A9/ Thurso (N)		ONE HOUR	✓	687	100.000
B - A832 (E)		ONE HOUR	✓	215	100.000
C - A9 (S)		ONE HOUR	✓	1086	100.000
D - A832 (S)		ONE HOUR	✓	260	100.000
E - A835 (W)		ONE HOUR	✓	720	100.000

Origin-Destination Data

Demand (Veh/hr)

		To				
		A - A9/ Thurso (N)	B - A832 (E)	C - A9 (S)	D - A832 (S)	E - A835 (W)
From	A - A9/ Thurso (N)	1	37	629	13	7
	B - A832 (E)	49	1	63	38	64
	C - A9 (S)	424	63	1	165	433
	D - A832 (S)	15	34	204	1	6
	E - A835 (W)	7	74	629	9	1

Vehicle Mix

Heavy Vehicle Percentages

		To				
		A - A9/ Thurso (N)	B - A832 (E)	C - A9 (S)	D - A832 (S)	E - A835 (W)
From	A - A9/ Thurso (N)	0	26	13	20	0
	B - A832 (E)	9	0	19	16	11
	C - A9 (S)	11	18	33	9	6
	D - A832 (S)	45	14	7	0	0
	E - A835 (W)	20	4	4	29	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)
A - A9/ Thurso (N)	0.83	23.29	4.7	C	630	946
B - A832 (E)	0.28	6.05	0.4	A	197	296
C - A9 (S)	0.55	3.69	1.2	A	997	1495
D - A832 (S)	0.25	4.25	0.3	A	239	358
E - A835 (W)	0.87	29.27	6.1	D	661	991

Main Results for each time segment

10:45 - 11:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
A - A9/ Thurso (N)	517	129	761	1065	0.485	513	372	0.0	0.9	6.480	A
B - A832 (E)	162	40	1118	1065	0.152	161	156	0.0	0.2	3.976	A
C - A9 (S)	818	204	138	2208	0.370	815	1141	0.0	0.6	2.580	A
D - A832 (S)	196	49	784	1308	0.150	195	170	0.0	0.2	3.234	A
E - A835 (W)	542	136	595	1040	0.521	538	384	0.0	1.1	7.109	A

11:00 - 11:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
A - A9/ Thurso (N)	618	154	911	999	0.619	615	445	0.9	1.6	9.322	A
B - A832 (E)	193	48	1339	967	0.200	193	187	0.2	0.2	4.651	A
C - A9 (S)	976	244	165	2192	0.445	975	1366	0.6	0.8	2.958	A
D - A832 (S)	234	58	938	1234	0.189	234	203	0.2	0.2	3.598	A
E - A835 (W)	647	162	712	985	0.657	644	459	1.1	1.9	10.466	B

11:15 - 11:30

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
A - A9/ Thurso (N)	756	189	1105	912	0.829	746	545	1.6	4.3	20.395	C
B - A832 (E)	237	59	1622	841	0.282	236	228	0.2	0.4	5.951	A
C - A9 (S)	1196	299	202	2170	0.551	1194	1657	0.8	1.2	3.681	A
D - A832 (S)	286	72	1148	1133	0.253	286	248	0.2	0.3	4.247	A
E - A835 (W)	793	198	872	910	0.871	778	562	1.9	5.6	24.912	C

11:30 - 11:45

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
A - A9/ Thurso (N)	756	189	1118	906	0.835	755	546	4.3	4.7	23.287	C
B - A832 (E)	237	59	1643	831	0.285	237	230	0.4	0.4	6.052	A
C - A9 (S)	1196	299	202	2170	0.551	1196	1677	1.2	1.2	3.695	A
D - A832 (S)	286	72	1149	1132	0.253	286	249	0.3	0.3	4.255	A
E - A835 (W)	793	198	873	909	0.872	791	563	5.6	6.1	29.274	D

11:45 - 12:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
A - A9/ Thurso (N)	618	154	931	990	0.624	629	447	4.7	1.7	10.298	B
B - A832 (E)	193	48	1370	953	0.203	194	190	0.4	0.3	4.747	A
C - A9 (S)	976	244	166	2191	0.446	978	1397	1.2	0.8	2.970	A
D - A832 (S)	234	58	940	1232	0.190	234	204	0.3	0.2	3.606	A

E - A835 (W)	647	162	714	984	0.658	664	460	6.1	2.0	11.770	B

12:00 - 12:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
A - A9/ Thurso (N)	517	129	769	1062	0.487	520	374	1.7	1.0	6.687	A
B - A832 (E)	162	40	1132	1059	0.153	162	158	0.3	0.2	4.015	A
C - A9 (S)	818	204	139	2207	0.370	818	1155	0.8	0.6	2.595	A
D - A832 (S)	196	49	787	1306	0.150	196	170	0.2	0.2	3.245	A
E - A835 (W)	542	136	598	1039	0.522	546	385	2.0	1.1	7.351	A

2035+Dev, PM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Tore Roundabout	Standard Roundabout		A, B, C, D, E	13.90	B

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D6	2035+Dev	PM	ONE HOUR	16:15	17:45	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
A - A9/ Thurso (N)		ONE HOUR	✓	666	100.000
B - A832 (E)		ONE HOUR	✓	256	100.000
C - A9 (S)		ONE HOUR	✓	1630	100.000
D - A832 (S)		ONE HOUR	✓	279	100.000
E - A835 (W)		ONE HOUR	✓	547	100.000

Origin-Destination Data

Demand (Veh/hr)

		To				
		A - A9/ Thurso (N)	B - A832 (E)	C - A9 (S)	D - A832 (S)	E - A835 (W)
From	A - A9/ Thurso (N)	0	64	574	19	9
	B - A832 (E)	60	1	60	62	73
	C - A9 (S)	624	69	2	294	641
	D - A832 (S)	12	43	220	0	4
	E - A835 (W)	10	76	456	5	0

Vehicle Mix

Heavy Vehicle Percentages

		To				
		A - A9/ Thurso (N)	B - A832 (E)	C - A9 (S)	D - A832 (S)	E - A835 (W)
From	A - A9/ Thurso (N)	0	24	10	7	0
	B - A832 (E)	7	0	26	16	12
	C - A9 (S)	29	6	0	5	4
	D - A832 (S)	0	4	3	0	0
	E - A835 (W)	0	5	5	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)
A - A9/ Thurso (N)	0.73	13.25	2.6	B	611	917
B - A832 (E)	0.30	5.55	0.4	A	235	352
C - A9 (S)	0.87	13.55	6.5	B	1496	2244
D - A832 (S)	0.34	5.91	0.5	A	256	384
E - A835 (W)	0.81	24.18	3.9	C	502	753

Main Results for each time segment

16:15 - 16:30

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
A - A9/ Thurso (N)	501	125	652	1141	0.439	498	529	0.0	0.8	5.575	A
B - A832 (E)	193	48	961	1127	0.171	192	189	0.0	0.2	3.848	A
C - A9 (S)	1227	307	172	2101	0.584	1222	982	0.0	1.4	4.070	A
D - A832 (S)	210	53	1108	1195	0.176	209	285	0.0	0.2	3.649	A

E - A835 (W)	412	103	773	930	0.443	409	545	0.0	0.8	6.861	A

16:30 - 16:45

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
A - A9/ Thurso (N)	599	150	781	1083	0.553	597	633	0.8	1.2	7.375	A
B - A832 (E)	230	58	1151	1044	0.220	230	227	0.2	0.3	4.419	A
C - A9 (S)	1465	366	206	2082	0.704	1462	1176	1.4	2.3	5.767	A
D - A832 (S)	251	63	1326	1078	0.233	250	341	0.2	0.3	4.349	A
E - A835 (W)	492	123	925	854	0.576	490	652	0.8	1.3	9.830	A

16:45 - 17:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
A - A9/ Thurso (N)	733	183	950	1008	0.727	728	771	1.2	2.5	12.618	B
B - A832 (E)	282	70	1402	936	0.301	281	276	0.3	0.4	5.494	A
C - A9 (S)	1795	449	251	2056	0.873	1779	1432	2.3	6.2	12.353	B
D - A832 (S)	307	77	1615	923	0.333	306	415	0.3	0.5	5.836	A
E - A835 (W)	602	151	1128	751	0.801	593	794	1.3	3.6	21.601	C

17:00 - 17:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
A - A9/ Thurso (N)	733	183	959	1004	0.730	733	777	2.5	2.6	13.245	B
B - A832 (E)	282	70	1414	931	0.303	282	278	0.4	0.4	5.546	A
C - A9 (S)	1795	449	252	2056	0.873	1793	1443	6.2	6.5	13.553	B
D - A832 (S)	307	77	1627	916	0.335	307	418	0.5	0.5	5.912	A
E - A835 (W)	602	151	1135	748	0.805	601	800	3.6	3.9	24.180	C

17:15 - 17:30

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
A - A9/ Thurso (N)	599	150	795	1077	0.556	604	641	2.6	1.3	7.696	A
B - A832 (E)	230	58	1169	1037	0.222	231	230	0.4	0.3	4.470	A
C - A9 (S)	1465	366	207	2081	0.704	1482	1193	6.5	2.4	6.161	A
D - A832 (S)	251	63	1343	1069	0.235	252	345	0.5	0.3	4.410	A
E - A835 (W)	492	123	935	848	0.580	502	660	3.9	1.4	10.653	B

17:30 - 17:45

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
A - A9/ Thurso (N)	501	125	659	1138	0.441	503	533	1.3	0.8	5.690	A
B - A832 (E)	193	48	971	1122	0.172	193	191	0.3	0.2	3.874	A
C - A9 (S)	1227	307	173	2100	0.584	1231	992	2.4	1.4	4.162	A
D - A832 (S)	210	53	1117	1190	0.176	210	287	0.3	0.2	3.674	A
E - A835 (W)	412	103	778	927	0.444	414	549	1.4	0.8	7.047	A

Appendix H

TRAFFIC GROWTH REPORT (TMFS)

A9 North Kessock to Tore - Modelled Flows

Client name	Project name	Date	Project number
WSP (via Transport Scotland)	LATIS Lot 1	17 November 2020	60531876

Prepared by
[redacted]

Approved by
[redacted]

Checked by
[redacted]

Revision History

Revision	Revision date	Details	Authorised	Name	Position

Introduction

WSP is supporting the Transport Scotland Road Safety team in the A9 North Kessock to Tore Study and wish to apply growth rates extracted from TMfS. This technical note provides the data extracted from TMfS, alongside a brief overview of the process undertaken and the scenarios used.

Model Scenarios

The latest available Do Minimum forecast scenarios for TMfS14 have been used to extract the required flows. These are detailed in Table 1.

Table 1: TMfS14 Scenarios Used

Year	Network	Demand
2017	BGACO	DRO
2022	CHAA	DRT
2027	DHAA	DTO
2032	EHAA	DTR
2037	ZHAA	ZTT
2042	ZHAA	DTW

In the Highland Council area, these scenarios include the following pieces of additional infrastructure:

- Inverness West Link 2022
- Inverness to Nairn 2022
- Dalcross Station 2022
- Inshes to Smithton 2027
- Longman Roundabout 2027
- A9 Dualling Programme 2027

Study Area

WSP's study area for the project as provided to AECOM is shown in Figure 1.

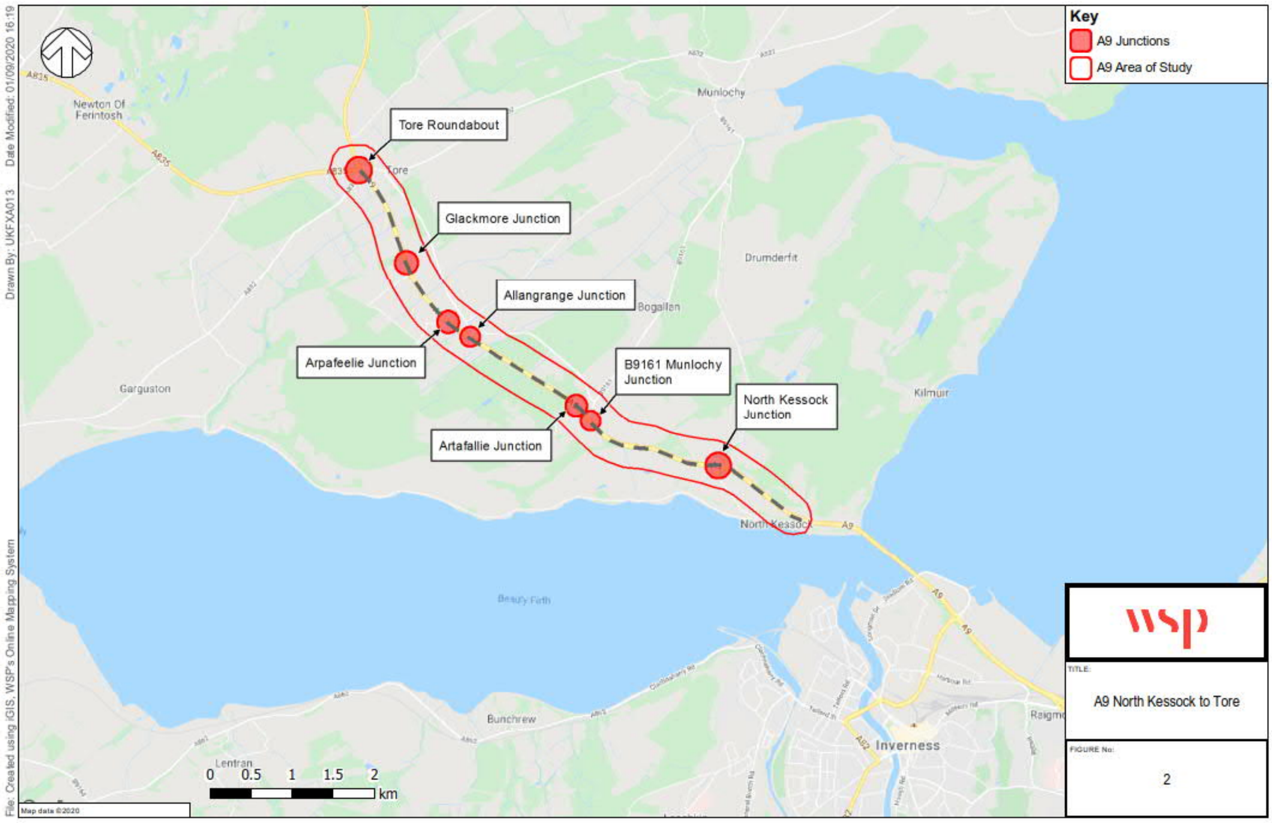

Figure 1: Study Area

This area as modelled in TMfS14 is shown in Figure 2, with modelled links shown in blue.

Figure 2: TMfS Representation of Study Area

As can be seen in Figure 2, TMfS has no representation of any of the junctions in the study area with the exception of Tore Roundabout. As such, the model can only report flows by direction through the study area.

Methodology

Assigned highway networks from TMfS were filtered to a single Northbound and Southbound link along the route[1]. The modelled flows were then converted from PCUs to vehicles, and annualised in line with the latest annualisation factors[2] generated for LATIS Lot 1 to provide AADT values. This includes the five roads model modes found in TMfS:

- Car In-Work;
- Car Non-Work Commute;
- LGV; and
- HGV.

Results

The annualised flows by year, rounded to the nearest vehicle, can be seen in Table 2. The modelled hourly totals by time period are additionally provided in Appendix A.

[1] Northbound – 53276-53300, Southbound – 53301-53292
[2] *LATIS Lot 1 Tech Note 13 – Annualisation Factors* (v2.2, 09/11/2020). Annualisations at MFTM level

Table 2: AADT Flows by Direction and Year

Direction	2017	2022	2027	2032	2037	2042
NB	13419	14200	14841	15077	15452	15712
SB	14687	15554	16186	16336	16843	17191

A simple visualisation of these flows is shown in Figure 3.

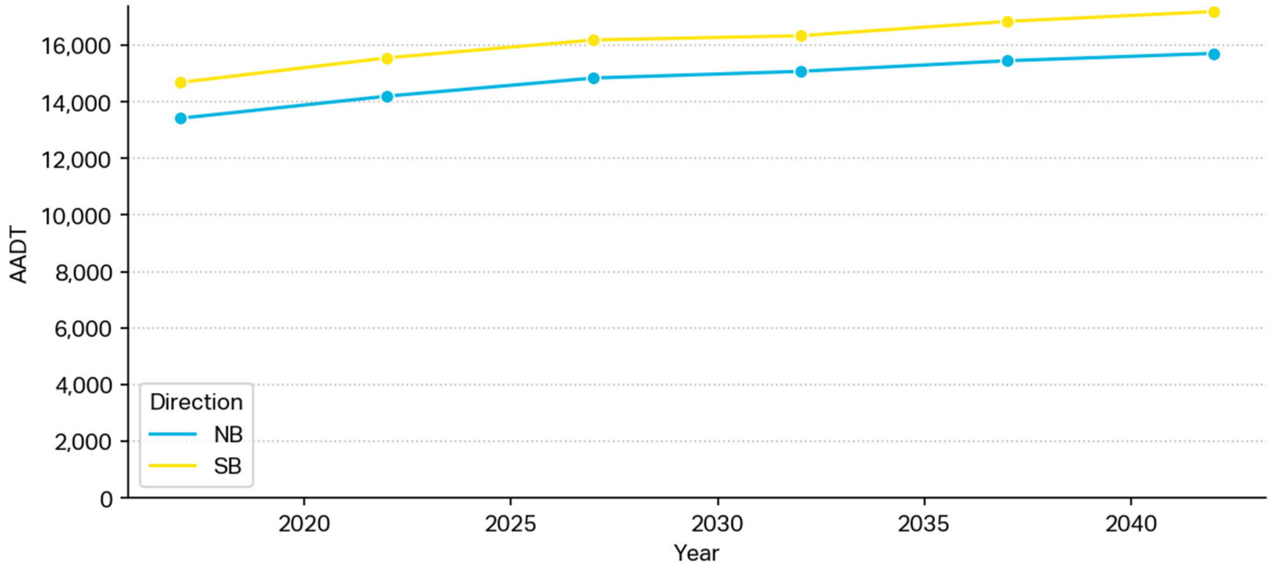

Figure 3: Plot of AADT Flows by Year

Appendix A – Time Period Flows

Flows here are presented as total vehicles per hour.

Direction	Time Period	2017	2022	2027	2032	2037	2042
NB	AM	1066	1133	1205	1226	1270	1300
NB	IP	1008	1070	1111	1129	1156	1174
NB	PM	1748	1827	1930	1957	2003	2034
SB	AM	1802	1817	1898	1950	2005	2024
SB	IP	1107	1188	1232	1242	1283	1310
SB	PM	1378	1456	1527	1521	1563	1610

Appendix I

CONFLICT STUDY DATA

Appendix I

Selected Images from the Conflict Study – Tore Roundabout

<u>Location/time:</u> A9 Tore Roundabout looking south – 12 September 2020
<u>Description:</u> NMU Crossing Point - Cyclist pushing bike quickly to cross the southbound carriageway

<u>Location/time:</u> A9 Tore Roundabout looking south 12 September 2020
<u>Description:</u> Pedestrian walking along southbound verge to Bus Lay-by

<u>Location/time:</u> A9 Tore Roundabout Looking north 10 September 2020 looking north
<u>Description:</u> Pedestrian and cyclist moving north of the crossing point to improve the visibility to the north

Location/time: A9 Tore Roundabout looking towards the A9 north exit 11 September 2020
Description: Cyclist moved quickly to be avoid being hit by car

Location/time: A9 Tore Roundabout looking towards the A9 south exit 10 September 2020
Description: Low-loader and tractor and trailer entered roundabout from A832(E) heading west causing southbound vehicles to break

Location/time: A9 Tore Roundabout looking towards the A9 south exit 10 September 2020
Description: Brown car turned left from A832(E) grey car had to move to lane 2 to avoid brown car

Location/time: A9 Tore Roundabout A9 Southbound 10 September 2020 16:55
Description: Longest queue of 29 vehicles stuck behind tractor and trailer

Location/time: A9 Tore Roundabout A823(E) 10 September 2020 17:09
Description: Longest queue of 19 vehicles stuck behind Combine Harvester

Location/time: A9 Tore Roundabout A823(W) 10 September 2020 07:16
Description: Longest queue of 20 vehicles stuck behind crane

Location/time: A9 Tore Roundabout A835 11 September 2020 16:10
Description: Longest queue of 39 vehicles stuck behind horse box

Selected Images from the Conflict Study – Munlochy Junction

<u>Location/time:</u> A9 Munlochy Junction looking south 11 September 2020
<u>Description:</u> Four vehicles merging and white car attempt to move to lane 2 but narrowly misses car in lane 2

<u>Location/time:</u> A9 Munlochy Junction looking south 11 September 2020
<u>Description:</u> Van has to break and stop on merge taper as van in lane 1 couldn't move into lane 2

<u>Location/time:</u> A9 Munlochy Junction looking south 10 September 2020
<u>Description:</u> Two cars have to break and stop on merge taper as HGV in lane 1 couldn't move into lane 2

<u>Location/time:</u> A9 Munlochy Junction looking east 10 September 2020
<u>Description:</u> Vehicles enter lane 2 prior to the vehicle in lane 1 of the southbound lane has past the junction

Location/time: A9 Munlochy Junction looking east 10 September 2020
Description: Vehicles carrying out U-turns at Munlochy junction

Location/time: A9 Munlochy Junction looking south 10 September 2020
Description: Two vehicles both turning right almost collide within the junction

<u>Location/time:</u> A9 Munlochy Junction looking south 10 September 2020
<u>Description:</u> Queuing traffic of 25 vehicles almost reaching back to full extent of the right turn lane

Selected Images from the Conflict Study – Intermediate Junctions

Location/time: A9 Artafeelie Junction 10 September 2020 07:53
Description: Vehicle having to sit at an angle to fit in central reservation

Location/time: A9 Allangrange Junction 11 September 2020 14:48
Description: Tractor and trailer crossing both carriageways in one manoeuvre

Location/time: A9 Allangrange Junction 12 September 2020 15:38
Description: Tractor and trailer people carrier waiting in central reservation with rear in lane 2 of southbound carriageway

<u>Location/time:</u> A9 Glackmore Junction looking north - 10 September 2020
<u>Description:</u> Car and trailer having to wait parallel with road in central reservation

Appendix J

LIST OF STAKEHOLDERS

A9 North Kessock to Tore Study - stakeholders that took part in the study

Transport Scotland	
- Network	[redacted]
- Development	[redacted]
- Development	[redacted]
- Transport Planning	[redacted]
BEAR Scotland	[redacted]
	[redacted]
	[redacted]
Police Scotland	
- H&I Roads Policing	[redacted]
- North Safety Camera Unit	[redacted]
- Trunk Roads Policing	[redacted]
MSPs and their staff	
	[redacted]
	[redacted]
	[redacted]
	[redacted]
Councillor (Highland Council)	
	[redacted]
	[redacted]
	[redacted]
	[redacted]
	[redacted]
	[redacted]
	[redacted]
- Chair of EI Committee	[redacted]
The Highland Council	
- Road Safety	[redacted]
- Roads and Transport	[redacted]
- Head of Service, Trapnsport Planning and Local Plans	[redacted]
- Local Development Plan	[redacted]
- Planning Applications	[redacted]
- Passenger and School Transport	[redacted]
- Area Roads Team	[redacted]
- Policy and Programmes Manager Road and Transport	[redacted]
- Transport Planning	[redacted]
Ward Manager (8 and 9)	[redacted]
HiTRANS	
- Partnership Manager	[redacted]
Scottish Ambulance Service	[redacted]
Scottish Fire and Rescue Service	[redacted]
Stagecoach	[redacted]
	[redacted]
	[redacted]

Community Council	
- Avoch and Killen	[redacted]
- Cromarty	[redacted]
- Ferintosh	[redacted]
- Fortrose	[redacted]
- Killearnan	[redacted]
- Knockbain	[redacted]
- Resolis	[redacted]
Invited to participate but did not take part	
MSPs and their staff	
	[redacted]
	[redacted]
	[redacted]
	[redacted]
	[redacted]
	[redacted]
	[redacted]
NHS Highland	[redacted]
Local business groups / chambers of commerce	
- Inverness Chamber of Commerce	[redacted]
- Federation of Small Businesses	[redacted]
- Scottish Council for Development and Industry	[redacted]
- Confederation of Passenger Transport	[redacted]
- Logistics UK (formerly Freight Transport Association (FTA))	[redacted]
- IAM Road Smart	[redacted]

Appendix K

LONGLIST OF OPTIONS

Option Number	Option Timeframe	*Source of Option*	Option Name	Option Description	Performance against			
					TPO1 - NMUs	TPO2 - Munlochy	TPO3 - Tore	TPO4 - Intermediate junctions
			Speed Reduction Options					
1	Short	*Workshop / Kate Forbes*	Speed limit reduction to Munlochy	Reduce the speed limit to 50 mph and extend from North Kessock to North of Munlochy	O	✓	O	O
2	Short	*Workshop*	Speed limit reduction on approaches to Tore Rbt	Reduce speed limit at approach to Tore to support pedestrian movements	✓	O	✓	O
3	Short	*Workshop*	Blanket speed limit reduction around Tore Rbt	Reduce the speed limit within a one-mile radius of Tore roundabout	✓	O	✓	✓
4	Short	*WSP*	Speed limit reduction along whole study area	Reduce the speed limit to 50 mph and extend from North Kessock to Tore	✓	✓	O	✓
5	Short	*Workshop*	Install speed cameras - A9 southbound	Install a speed camera on the A9 southbound carriageway just before Munlochy junction	O	✓	O	O
6	Short	*Workshop / Kate Forbes survey*	Install 50mph speed cameras - average speed cameras	Extend the 50mph average speed cameras up to Tore roundabout	O	✓	✓	✓
7	Medium	*Workshop*	ITS Gantry System	Install an ITS Gantry System with signage	O	✓	O	✓
			Options to improve visibility and driver awareness of the junctions (to be considered as part of a package of measures)					
8	Short	*Workshop*	Paint the kerbs	Use fluorescent paint to improve the visibility of kerbs, especially at Munlochy junction [as part of package of interventions to improve the visibility of junctions]	O	✓	O	✓
9	Short	*Kate Forbes survey*	Road Markings Rumble strips	Construct Rumble strips either side of junction to reduce speed	O	✓	O	O
10	Short	*Workshop*	Vehicle Separation chevrons	Add gap markings (chevrons) to allow cars to leave enough space	O	✓	O	✓
11	Short	*Workshop*	Warning signs for queueing traffic	Add warning signs at Munlochy to warn northbound vehicles of queueing traffic waiting to turn right onto the B9161	O	✓	O	O

12	Short	*Workshop*	Improve Tore roundabout visibility	Measures to improve visibility of Tore roundabout, which could include additional signage or relocation of signage, re-lining, review of street clutter, etc.	O	O	✓	O
13	Short	*Workshop / Kate Forbes*	Educate road users on double give-ways	Conduct road user education regarding 'double give way' markings at junctions along A9 in study area (such as Munlochy junction). The current double set of give-way lines at (for RTs into and out of B9161) can cause uncertainty around who has right of way.	O	✓	O	✓
14	Short	*Workshop / Kate Forbes*	Amend road signage to Cromarty	Change signs to instruct drivers travelling to Cromarty to go via Tore roundabout instead of going through Munlochy	O	✓	×	×
15	Short	*Workshop / Kate Forbes*	Amend road signage for visitors and tourists	Make signage at Tore Roundabout clearer for visitors and those unfamiliar with the area, e.g. no awareness of uncontrolled pedestrian crossing. Carry out a signing review to see if the current signs meet the current requirements.	✓	O	O	O
16	Short	*Workshop*	Lighting at Munchlochy junction (non-powered)	Add solar studs to Munlochy junction	O	✓	O	O
17	Short	*Workshop*	Lighting at Munchlochy junction (powered)	Add lighting to Munlochy junction	O	✓	O	O
18	Short	*Workshop / Kate Forbes*	Activated warning signs	Install electronic warning signs that activate when there is traffic ahead or vehicles joining or crossing the A9 carriageway, especially buses and agricultural vehicles	O	✓	O	✓
19	Short	*Workshop*	Enhanced road markings	Improve lane discipline at Tore roundabout by adding enhanced markings or studs	O	O	✓	O
			Options to influence route choice					
20	Short	*Project Team / Kate Forbes Workshop*	Strategy to discourage traffic from using the B9161	Deploy a strategy to discourage traffic from using the B9161 (and shift to A832), which could include speed reduction measures along the B9161 and/or restrictions on movements through Munlochy (i.e. to reduce through traffic).	O	✓	×	×
			Options to restrict turning movements					
21	Short	*Workshop*	Prohibit right turns from side roads	Prohibit right turn movements coming from side roads onto the A9, with left-out only from side roads	O	✓	×	✓
22	Short	*Workshop*	Prohibit u-turns at intermediate junctions (including Munlochy Junction)	Prohibit u-turns at intermediate junctions (including Munlochy Junction)	O	✓	×	✓
23	Short	*Workshop / Kate Forbes*	Prohibit all right turns at Munlochy junction	Prohibit right turns out of and into the A9 at Munlochy junction	×	✓	×	O
24	Short	*Project team*	Prohibit right turn from B9161 at Munlochy junction to A9 Northbound	Prohibit right turn from B9161 at Munlochy junction to A9 Northbound	O	✓	O	×
			Public transport and pedestrian/cycling options					
25	Medium	*Workshop*	Create public transport hub	Create a public transport interchange hub or a Park and Ride at Tore	✓	✓	✓	✓

26	Medium	*Workshop*	Promote modal shift	Promote behaviour change through promotion of travelling by public transport through advertising of services, benefits of mode shift and other incentives (ticket reductions etc.)	✓	✓	✓	✓
27	Short	*Workshop*	Relocate bus stops	Consider revising the location of current bus stops at Tore to better integrate with bus services, walking/cycling routes and encourage bus use	✓	O	O	O
28	Short	*Workshop*	Improve pedestrian routes - integration with bus stops	Integrate pedestrian routes with bus stops, especially at Tore for residential properties	✓	O	O	O
29	Short	*Workshop*	Improve pedestrian routes - footpaths	Improve footpaths at Tore roundabout	✓	O	O	O
30	Short	*Workshop*	Improve pedestrian routes - controlled crossing at Tore Rbt	Install a controlled crossing on the A9 south of Tore roundabout	✓	O	O	O
31	Short	*Workshop*	Enhanced signage for cyclists	Enhance the signage for the cycling route – add one on the southbound carriageway at Tore	✓	O	O	O
			Road layout and operational changes					
32	Medium	*Workshop / Kate Forbes survey*	Improve on-slip at Munlochy junction	The on-slip from B9161 onto the A9 should be improved/extended to better facilitate the merging of traffic with the A9 southbound	O	✓	O	O
33	Medium	*Workshop*	Install traffic lights	Install traffic lights at Tore roundabout which includes a controlled pedestrian crossing	✓	O	✓	O
34	Medium	*Kate Forbes survey*	Extend the right turn lane from the A9 to the B9161	Extend the existing right-turn lane from the A9 into the B9161	O	✓	O	O
35	Long	*Workshop*	Widen central reservations	All junctions need wider central reservations as the current ones are too narrow for larger vehicles	O	✓	O	✓
36	Long	*Workshop / Kate Forbes survey*	Pedestrian bridge or underpass at Tore Rbt	On the northern section of Tore roundabout, build a pedestrian bridge or add underpass for better connectivity to the school	✓	O	O	O
37	Long	*Kate Forbes survey*	Convert Munlochy junction into a roundabout	Convert Munlochy junction into a roundabout which incorporates Artafallie junction	O	✓	O	✓
38	Long	*Workshop / Kate Forbes survey*	Create single improved junction at Munlochy junction	Close the intermediate junctions and create a single new junction for local connector roads to link into the A9 at a grade separated junction arrangement	O	✓	O	✓

39	Long	*Workshop / Kate Forbes survey*	Grade separation at Munlochy junction	Change Munlochy junction to a grade-separated junction, e.g. by adding in an underpass at Munlochy junction similar to the one at North Kessock	O	✓	✓	✓
40	Long	*Workshop*	New road connection between Munlochy and North Kessock juction	Add a new road connection into North Kessock junction from Munlochy road, combined with either full or partial closure of Munlochy junction.	O	✓	✓	✓

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