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A92 Freuchie, Balfarg and Cadham

Case for Change: Pre-Appraisal and Initial Appraisal Study

Transport Scotland

October 2018

Quality information

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Executive Summary

Executive Summary

The A92 Trunk Road in Fife has been subject to a significant level of attention in recent years with a parliamentary petition lodged and numerous campaigns promoted by community groups to highlight road safety concerns and make the case for improvements. Despite the completion of previous studies of the route, community concerns have remained and in 2018 AECOM was commissioned by Transport Scotland to prepare Pre-Appraisal and Initial Appraisal studies of the A92 at Freuchie, Balfarg and Cadham.

These studies have been developed in line with the appraisal principles described in Scottish Transport Appraisal Guidance (STAG) comprising the following approach:

- Review of previous studies and key documents;
- Review of key problems and opportunities on the corridor;
- Development of transport planning objectives for the study;
- Generation of a long list of options; and
- A high level appraisal to sift the long list of options into a shorter list for more detailed consideration.

An assessment of the principal problems and issues impacting the route and key junctions has been undertaken based on an evidence base which has incorporated a review of previous studies and analysis of traffic, travel demand and socio-economic datasets. The review highlighted the important role of the A92 as a key commuter corridor for communities located along the route, with AADT ranging from approximately 12,000 vehicles per day at Freuchie to approximately 23,000 vehicles per day in the Balfarg / Cadham area. Traffic delay data for junctions on the corridor, alongside a review of accident statistics and conflict studies have also been reviewed to understand the scale of problems and issues in the study area. The conflict studies in particular highlighted a range of conflict issues involving vehicles and other road users, including vulnerable road users, at each of the junctions under consideration.

Informed by the identified problems and opportunities, a number of Transport Planning Objectives (TPOs) have been developed to guide the study, as follows:

- TPO1 – Reduce road user conflict at junctions on the A92;
- TPO2 – Encourage increased active travel use and improve access to public transport by reducing severance caused by A92 traffic volumes;
- TPO3 – Maintain journey times and journey time reliability on the A92 by reducing the potential for incident and delay at junctions along the route; and
- TPO4 – Enhance access to local employment and services through improving vehicular accessibility of the strategic road network for communities on the A92.

An option generation process has been carried out principally focused on infrastructure measures to address the identified problems and opportunities. Following a process of option sifting, options were packaged to a level of detail that represented a differing magnitude of intervention and to a scale suitable for initial appraisal.

A total of five option packages were identified for each study area comprising infrastructure improvements such as road standard upgrade and junction improvements to more localised measures designed to support safe active travel. The initial appraisal comprised a high level assessment of the performance of each of the options against a Do-Minimum Scenario, with each option assessed in terms of its performance against the project TPOs, implementability criteria (feasibility, affordability and public acceptability) and national transport criteria (environment, safety, economy, integration, and accessibility and social inclusion). On the basis of the assessment, the tables below summarise the key findings including recommendations on which options should be progressed to more detailed future assessment.

Freuchie

Option Package	Retain / Reject	Rationale
FOP1 – Sustainable Transport	Retain	Option generally performs positively against the TPOs and is considered feasible in terms of deliverability. It is recommended that this option is taken forward for further consideration.
FOP2 – Localised Road Junction and Safety Improvements	Retain	Option generally performs positively against the TPOs, albeit to a lesser extent than other option packages. It is recommended that this option is retained for further consideration. Specific options within this package may merit consideration as part of a shorter term approach.
FOP3 – Road Junction Upgrade: Signalise Both Kettlebridge and Cross Keys Junctions	Retain	Option has the potential to deliver a number of the TPOs, particularly enhancing access to the strategic road network for the Freuchie community and reducing the potential for vehicular and pedestrian conflicts. It is recommended this option is taken forward for more detailed design and assessment work to understand the quantitative impacts of this intervention on A92 strategic traffic.
FOP4 – Road Junction Upgrade: Staggered Junction at Kettlebridge	Retain	While the benefits of this package in terms of performance against TPOs is not considered to be as positive as FOP3 and FOP5, it is recommended that there is merit in taking this option forward for further consideration.
FOP5 – Road Junction Upgrade: Roundabout at Kettlebridge	Retain	Option has the potential to deliver positive impacts against the TPOs albeit may introduce some adverse impacts for strategic traffic. It is recommended this option be taken forward for more detailed design and assessment work to understand the quantitative impacts of this intervention on A92 strategic traffic.

Balfarg

Option Package	Retain / Reject	Rationale
BOP1 – Sustainable Transport	Retain	Option performs positively against the TPOs, deliverability and STAG criteria and it is recommended that this option is taken forward for further consideration.
BOP2 – Localised Road Junction and Safety Improvements	Reject	This option generally has a negligible impact against the TPOs and STAG criteria, and is unlikely to be public acceptable given the historic concerns relating to the need for intervention to address local road safety and conflict concerns at junctions in Balfarg. Accordingly, it is recommended this option be sifted at this stage, although specific options within this package may merit further consideration as part of a shorter term approach.
BOP3 – Road Junction Upgrade: Signalised Junction	Retain	This option has the potential to deliver positive impacts against a number of the TPOs, particularly enhancing access to the strategic road network. It is recommended this option is taken forward for more detailed design and assessment work to understand the quantitative impacts of this intervention on A92 strategic traffic.
BOP4 – Road Junction Upgrade: Roundabout	Retain	This option has the potential to deliver positive impacts against the TPOs and would likely perform positively in terms of public acceptability. It is recommended this option be taken forward for more detailed design and assessment work to understand the quantitative impacts of this intervention on A92 strategic traffic.
BOP5 – Road Junction Upgrade: Grade Separated Junction	Reject	While the option does have the potential to address a number of the TPOs, particularly around safety, it is considered that there could be a number of significant uncertainties regarding the feasibility of the option. In addition, alternative options have the potential to deliver similar benefits at a lower cost. It is therefore recommended that this option be rejected from further consideration at this stage.

Cadham

Option Package	Retain / Reject	Rationale
COP1 – Sustainable Transport	Retain	Option generally performs positively against the TPOs and is considered feasible in terms of deliverability. It is recommended that this option is taken forward for further consideration.

Option Package	Retain / Reject	Rationale
COP2 – Localised Road Junction and Safety Improvements	Retain	Specific measures proposed as part of this package could directly address identified conflict issues at this junction and therefore merit further consideration.
COP3 – Road Junction Upgrade: Signalised Junction	Retain	While there are a number of question marks over the deliverability of this option, including its impacts on strategic traffic, the option does have the potential to address a number of the TPOs. Accordingly, it is recommended that this option package is taken forward for more detailed assessment.
COP4 – Strategic Road Improvement: Linking from Cadham Road to Tullis Russell Roundabout	Retain	This option has the potential to support delivery across the suite of TPOs and is recommended for further consideration as part of the detailed appraisal stage.
COP5 – Strategic Road Improvement: Realigned A92 carriageway	Reject	While this option performs positively against the study TPOs, the option would be anticipated to have a major negative environmental impact which could present significant deliverability and technical risks. Public acceptability of this option may also be lower than alternatives as a result of these potential planning issues. In addition, it is unlikely to be justifiable from an affordability perspective and as an intervention to address specific issues at Cadham Road. Accordingly, it is recommended this option is sifted from further consideration at this stage, though may merit further consideration to address wider strategic objectives for the development of the A92 trunk road network over the longer term.

This study has outlined the findings from the Pre-Appraisal and Initial Appraisal phases of a STAG study into the case for interventions at junctions in the study areas of Freuchie, Balfarg and Cadham. It is recommended that further development work is undertaken for those options identified as suitable for taking forward to more detailed assessment at the Detailed Appraisal stage.

While the best performing options emerging from the initial appraisal are centred on large scale, strategic infrastructure improvements, despite not performing as favourably in the assessment, to address immediate concerns there may be merit in Transport Scotland and its partners to consider the implementation of some of the more localised options as ‘quick wins’. It is to be noted however that some of these measures could be abortive if strategic measures are subsequently implemented.

Introduction

01

1. Introduction

1.1 Study Overview

AECOM have been commissioned by Transport Scotland to undertake a study involving the production of three Scottish Transport Appraisal Guidance (STAG) Pre-Appraisal and Initial Appraisal studies of the A92 Trunk Road (T) in Fife.

The three studies concern the A92 at Freuchie, Balfarg and Cadham, and focus on the specific junctions within these study areas summarised in **Table 1.1**.

Table 1.1: Junctions Considered in Studies

Study	Junctions Under Consideration
A92 (T) Cadham	Cadham Road Priority Junction.
A92 (T) Balfarg	Star Road Priority Junction;
	Western Avenue Priority Junction.
A92 (T) Freuchie	Cross Keys Priority Junction;
	Kettlebridge Priority Junction.

1.2 Locational Context

The wider locational context of the A92 section under consideration is shown in **Figure 1.1**Error! Reference source not found. whilst detailed mapping demonstrating the extent of the three study areas and the location of relevant junctions is identified in **Figure 1.2.**

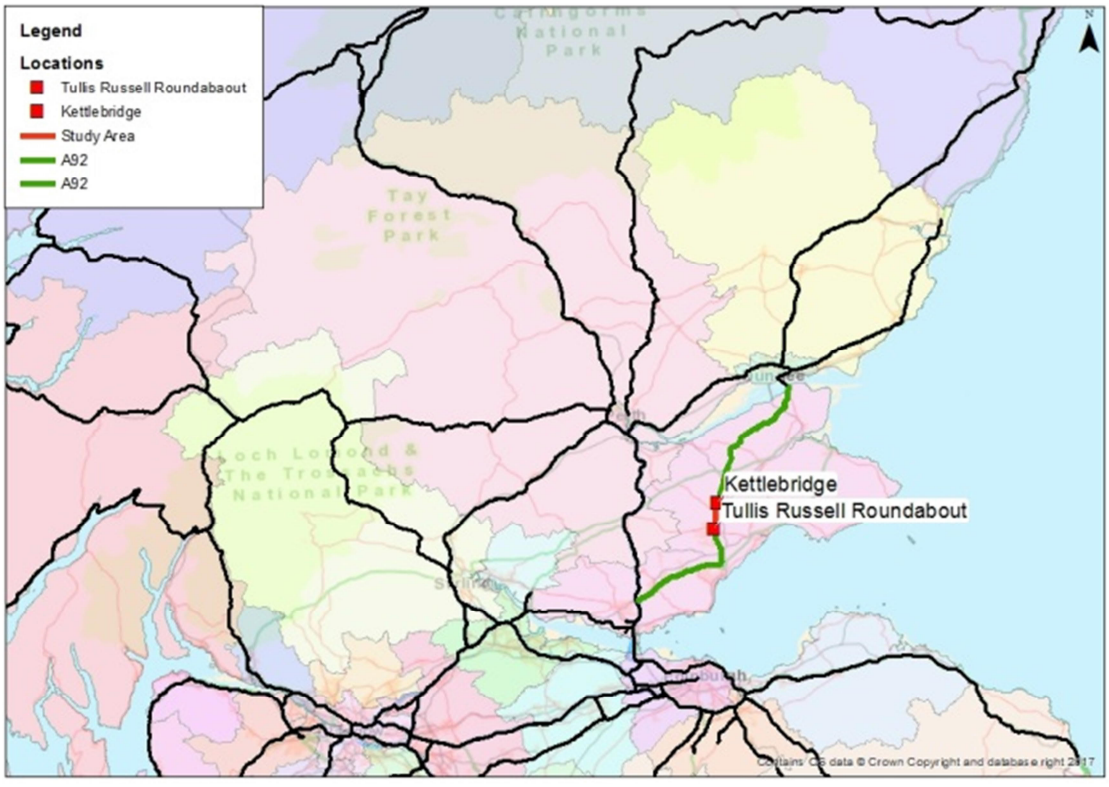


Figure 1.1: Wider Locational Context Map

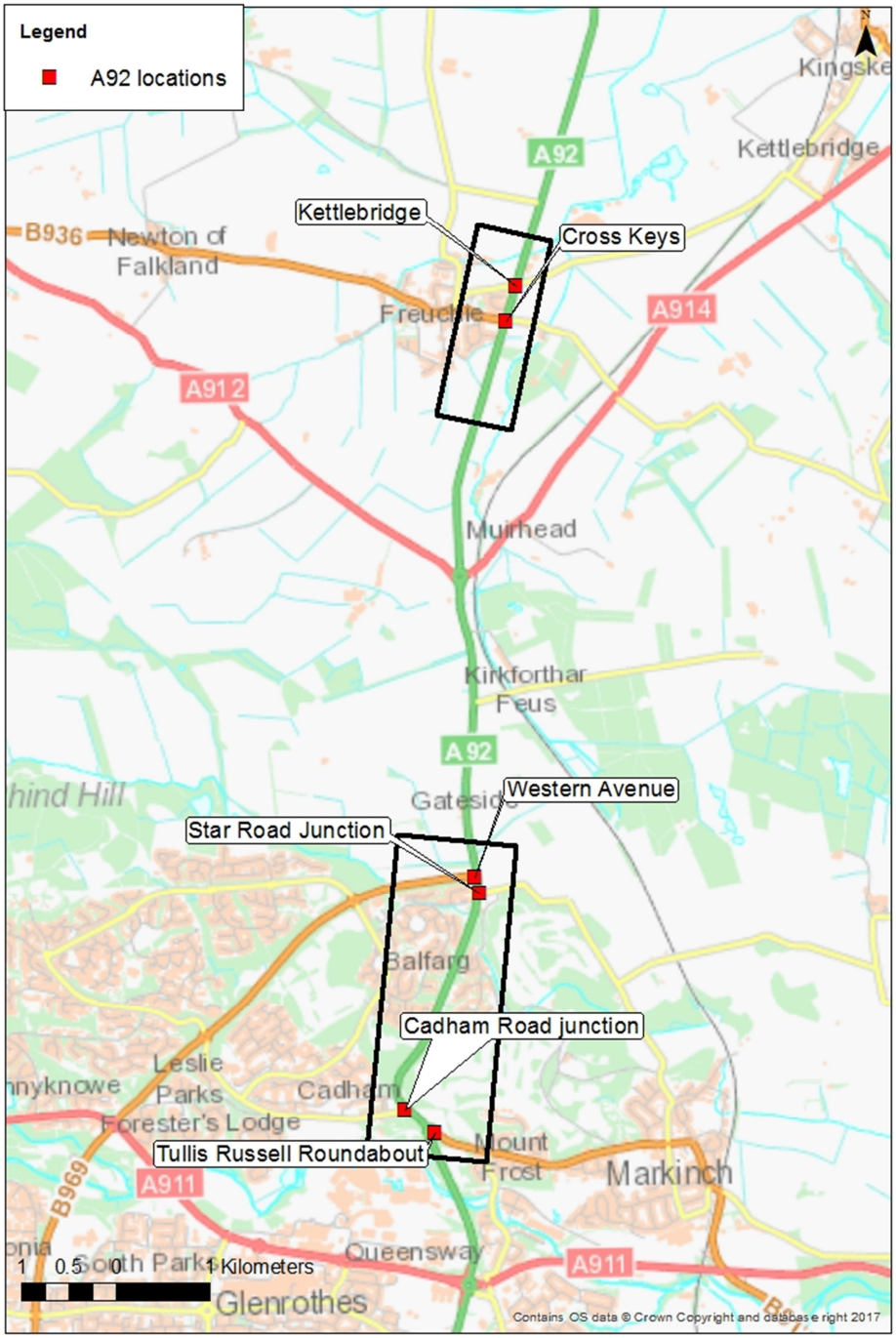


Figure 1.2: Detailed Study Area Map

The three study areas are located on a 5.5km stretch of the A92 between the access junction to the former Tullis Russell paper mill site north of Glenrothes and the petrol filling station located at the periphery of Freuchie.

Given the proximity of the junctions within the study area, in considering problems and opportunities to be addressed, this has been undertaken at the study area level and documented collectively within this report. However, the case for improvements has been considered at the junction level, with specific findings for each junction presented individually within this report.

1.3 STAG Appraisal

This study has been developed in accordance with STAG with this report presenting the findings from the Pre-Appraisal and Initial Appraisal stages of the study.

The Pre-Appraisal phase constitutes the first stage of the STAG process[1] and is designed to:

- Establish evidence for problems and issues linked to transport with consideration to the study network;
- Identify opportunities and constraints that could exacerbate transport issues in the future and influence the development of solutions;
- Develop initial transport planning objectives to clarify the aims of any interventions and to guide the development of solutions;
- Develop a long list of possible options to tackle identified problems; and
- Undertake an initial and robust sift of options and set out those options recommended for progression towards the Initial Appraisal.

The subsequent stage of the STAG process, the Initial (or Part 1) Appraisal phase involves a more detailed consideration of the feasibility and performance of options to tackle the identified transport-related problems and opportunities. This appraises the likely impact of options against a number of criteria including Transport Planning Objectives, STAG Criteria, established policy directives and the feasibility, affordability and likely public acceptability of the options.

1.4 Structure of Report

Following this introduction, the report contains the following chapters:

- **Chapter 2:** Policy Context and Previous Studies;
- **Chapter 3:** Problems and Opportunities;
- **Chapter 4:** Transport Planning Objectives;
- **Chapter 5:** Option Generation, Sifting and Development;
- **Chapter 6:** Initial Appraisal; and
- **Chapter 7:** Summary and Next Steps.

[1] https://www.transport.gov.scot/media/41507/j9760.pdf

Policy Context and Previous Studies

02

2. Policy Context and Previous Studies

2.1 Introduction

This chapter sets out a review of previous studies undertaken on the A92 and key policy documents to provide context for this study. Within this, the objectives of previous work and key issues that require consideration in taking forward this study have been reviewed.

2.2 Policy Context

Figure 2.1 illustrates where the A92 STAG Studies fit in relation to wider local, regional and national plans and strategies of relevance to this study. Important to note is that Transport Scotland are soon to embark on the process for preparing its second Strategic Transport Projects Review (STPR2) to inform the Scottish Government's investment plan for major transport interventions over the next twenty years; there is an expectation that strategic interventions that emerge from the A92 STAG work will be fed into the STPR2 appraisal process, for consideration alongside other strategic transport improvements across the country.

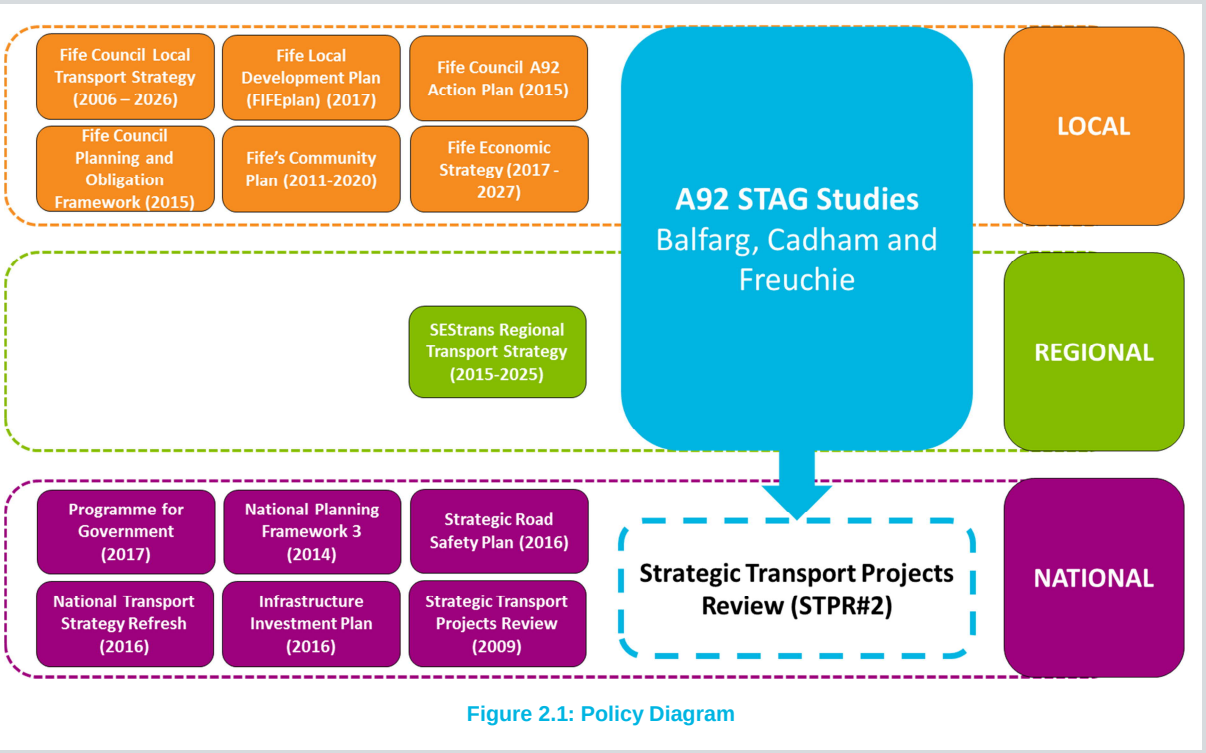


Figure 2.1: Policy Diagram

A concise review of relevant national, regional and local plans which provide useful context for this study is set out below.

2.2.1 National Policies and Strategies

National Transport Strategy (2006) and Refresh (2016)

The National Transport Strategy (NTS) was produced in 2016 as a refresh of the previous NTS published in 2006. The NTS Refresh provides a contextual update and determines the necessity of a more fundamental reformulated strategy; a new NTS is currently in preparation at the time of writing.

The vision, objectives and strategic outcomes of the 2016 NTS remained unchanged from the previous version, with the following five objectives identified:

1. **Promote economic growth** by building, enhancing, managing and maintaining transport services, infrastructure and networks to maximise their efficiency;
2. **Promote social inclusion** by connecting remote and disadvantaged communities and increasing the accessibility of the transport network;

3. **Protect our environment and improve health** by building and investing in public transport and other types of efficient and sustainable transport which minimises emissions and consumption of resources and energy;
4. **Improve safety of journeys** by reducing accidents and enhancing the personal safety of pedestrians, drivers, passengers and staff; and
5. **Improve integration** by making journey planning and ticketing easier and working to ensure smooth connection between different forms of transport.

Of these objectives, the desire to improve safety of journeys is most relevant to these STAG studies. The objectives which concern protecting the environment and promoting economic growth are also pertinent given the strategic function of the A92.

Strategic Transport Projects Review (2009)

The purpose of Transport Scotland's first Strategic Transport Projects Review (STPR), which was finalised in 2009, was to plan the forthcoming twenty years of transport investment for Scotland's rail and trunk road network. The A92 was reviewed through the STAG process as part of STPR and was not identified for any major infrastructure improvement works.

Project 5 of the STPR entitled *'Route Management'* aims to *"optimise the road network along key corridors through active route management and targeted individual investments."* The A92 (Edinburgh – Dundee) was identified as one of six corridors for these targeted investments. It identified that *"specific plans will ensure that these roads are safe and suitably maintained for the expected levels of traffic and may, for instance, including realigning sections of road, individual junction improvements, creating 2+1 lanes, or; where appropriate, stretches of dualing."*

Strategic Road Safety Plan (2016)

The Strategic Road Safety Plan[2] (SRSP) identifies how Transport Scotland promotes road safety on the trunk road network. The plan forms part of the national road safety strategy, '*Scotland's Road Safety Framework to 2020.*'

A number of key actions within the Strategic Road Safety Plan relevant for consideration in the study are summarised in **Table 2.1** below.

Table 2.1: Strategic Road Safety Plan Key Actions

Key Action	Description
Action 1 – Trunk Road Analysis and Collision Screening	Review of network's safety performance and implementation of an evidence led casualty reduction programme.
Action 7– Safer Active Travel	Engagement with key partners to identify and implement specific improvement measures for pedestrians and cyclists as a means to reduce accidents involving active travel modes and to encourage a greater uptake.
Action 12 – Review of Speed Limits	Continuous monitoring of speeds on the trunk road and identification of speed limit changes where evidence suggests this would support causality reduction or significant change to the network.
Action 14 – Speed Management in Towns and Villages	Development and implementation of appropriate speed management measures to positively influence driver behaviour and deliver benefits to vulnerable road users.

The potentially most relevant action in the context of this study concerns Trunk Road Analysis and Collision Screening where the Road Safety Plan identifies that *"many of our accident cluster sites have been largely treated by lower cost accident remedial measures…We should consider higher value road safety improvements to engineer out risk at locations where most significant investment is needed. Improvements such as roundabouts, junction amends and carriageway widening should be considered where there are demonstrable safety needs."*

In addition, this action identifies the desire to address safety at rural junctions: *"improving rural junction safety, considering elements such as protected right turns and improving sightlines, or revising the junction provision, may have a positive influence on our targets to reduce the number of road users killed or seriously injured."*

[2] Chapter 10, Strategic Road Safety Plan (2016)

2.2.2 Regional Strategies

SEStran Regional Transport Strategy (2015)

The SEStran Regional Transport Strategy (RTS)[3] sets out a number of transport initiatives designed to deliver an economically successful area, accommodating growing prosperity and population in a much less car-dependent way, whilst improving access for the most excluded and vulnerable groups.

The main objectives from RTS are summarised below:

- Economy: Ensure transport facilitates economic growth, regional prosperity and vitality in a sustainable manner
- Accessibility: Improve accessibility for those with limited transport choice (including disabled people) or no access to a car, particularly those who live in rural areas.
- Environment Ensure that development is achieved in an environmentally sustainable manner.
- Safety and Health Promote a healthier and more active SEStran area population.

The “Safety and Health” and “Accessibility” objectives which focus on improving safety of journeys and improving community accessibility are particularly relevant to this study. In addition, the objectives which concern protecting the environment and promoting economic growth are also pertinent given the strategic function of the A92.

The A92 is identified as a transport corridor within the RTS albeit no specific reference is made to the potential for improvements at the junctions subject to investigation as part of this study.

2.2.3 Local Strategies

Fife Local Transport Strategy (2006)

Local Transport Strategy (LTS)[4] has an important role in ensuring national policies and initiatives are successfully delivered at the local level. The key objectives in LTS were categorised into Transport Themes and Travel Choices. **Table 2.2** summarises the LTS objectives.

Table 2.2: Local Transport Strategy Objectives

Category	Objective	Description
Transport Theme	Access for All	To improve access to all key needs and services for all (including employment, education, health and leisure opportunities).
	Travel Safety	To improve safety for all forms of transport
	Management and Maintenance of Transport Infrastructure	To manage and maintain road networks in an acceptable, safe and sustainable condition.
	Integrated Transport Networks	To widen travel choice through the provision of integrated transport networks
Travel Choices	Walking and Cycling	To encourage walking and cycling for short trips and as part of an integrated journey to promote a healthier lifestyle.

Improving access, travel safety and the promotion of a more integrated transport network that encourages safe active travel use are relevant in line with the calls for improvements at junctions within the study areas.

Fife Council Planning Obligations Supplementary Guidance (2017)

The Fife Council Planning Obligations Supplementary Guidance is an accompanying document to the Fife Local Development Plan (2017) adopted in August 2018 and forms a material consideration in terms of the determination of planning applications. It sets out developer contribution mechanisms to fund strategic infrastructure improvement measures, including transport schemes.

Figure 4 of the document indicates that the Cadham study area is located within the Glenrothes Core zone whilst the Balfarg and Freuchie study areas are located within the Glenrothes intermediate 5km zone; relevant planning applications located within these areas are required to pay a contribution to Strategic Transport Interventions.

[3] http://sestran.gov.uk/wp-content/uploads/2017/01/SEStran_Regional_Transport_Strategy_Refresh_2015_as_published.pdf
[4] http://publications.fifedirect.org.uk/c64_LocalTransportStrategy.pdf

There are two intervention zones within Glenrothes that funding has been allocated for: Bankhead Roundabout and North Glenrothes (Preston/Leslie/Cadham/Balfarg junctions). The detailed interventions within the North Glenrothes zone are identified as *"Preston Roundabout and A92 improvements"* (anticipated total cost of £8.3M).

2.3 Previous Studies

The A92 has been subject to a significant level of study in previous years with numerous studies produced by Transport Scotland, BEAR Scotland, Community Councils and others which are of relevance to the three study areas under consideration. These studies have primarily concentrated on addressing road safety concerns at specific junctions on the A92.

Figure 2.2 provides a historical timeline of studies progressed over the years and highlights the level of work previously undertaken. Further details about the purpose of each study and the key points of relevance made in relation to the junctions under consideration as part of this study is described in **Table 2.3.**

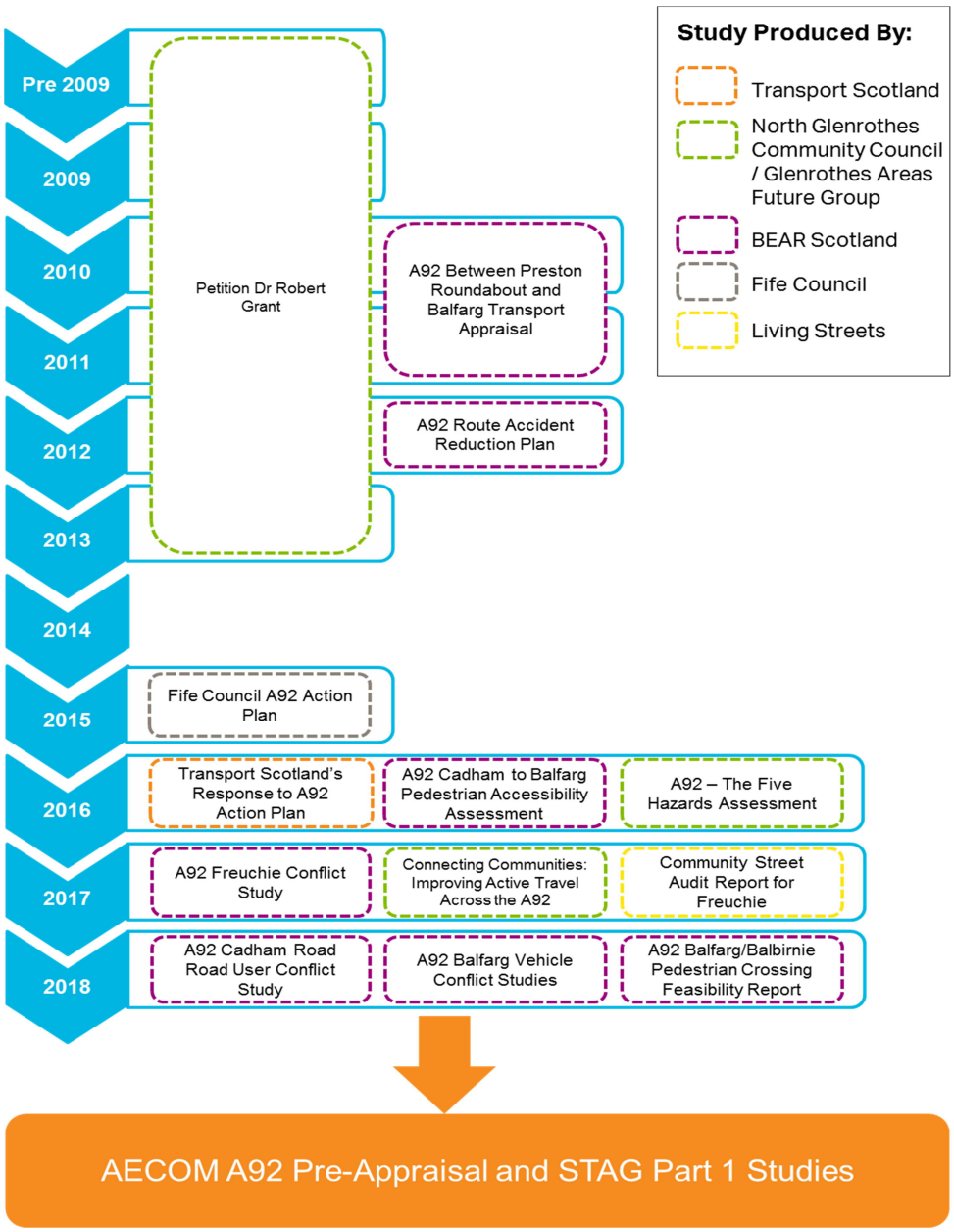


Figure 2.2: Summary of Previous Studies Undertaken

Table 2.3: Previous Studies Review

Study Name	Producer	Date(s)	Purpose	Relevance to Balfarg and Cadham Study Areas	Relevance to Freuchie Study Area
Petition Dr Robert Grant[5]	Glenrothes Area Futures Group (GAFG)	January 2006 – July 2013	A petition with 3,250 signatures was lodged to the Scottish Parliament in July 2013 which called *"on the Scottish Parliament to urge the Scottish Government to immediately improve and upgrade the A92 trunk road, in particular between Prestonhall roundabout and Balfarg junction, to reduce the number of hazards and accidents and bring about improved benefits to the local and wider economy."*	• A total of five specific points concerns were raised by GAFG in the petition submission: 1. The Balfarg Junction on the A92 at Western Avenue: Concern was expressed that the junction remained unsafe given its perception as a complicated junction where many motorists are unclear of priorities; 2. The Junction at Cadham Road: There was a perception that vehicles emerging from Cadham Road encounter hazardous conditions given the presence of "fast" cars; 3. The Single Lane A92 Stretch of Road between the Preston and the New Tullis Russell Roundabout: It was proposed that the that this section should be upgraded to dual carriageway; 4. The Single Lane of the A92 North of the New Tullis Russell Roundabout to Balbirnie Mains: Calls were made for the existing single carriageway section between Tullis Russell and Balfarg to be upgraded to dual carriageway; and 5. The whole A92 from Glenrothes to the Tay Bridge to Become Dual Carriageway. • The petition process involved correspondence between GAFG, Transport Scotland and BEAR Scotland. This resulted in an A92 Transport Appraisal Study (see below).	• Not Applicable
A92 between Preston Roundabout and Balfarg Transport Appraisal [6]	BEAR Scotland	June 2011	Following the ongoing GAFG petition process at the time, a Transport Appraisal of the A92 was undertaken in accordance with STAG.	• The study identified the following transport related problems following community consultation and data review: risk of an accident arising at the Balfarg junction from priorities confusion and limited visibility and risk of accidents arising at the Cadham junction due to limited visibility for emerging traffic. • The objective of the study was to *"Reduce identified road safety risks while undertaking junction manoeuvres on the A92 by 2013."* • Identified options which progressed to appraisal included: - New roundabout at Balfarg; - Signalised Junction at Balfarg; - Grade separation at Balfarg; - Banned right turns at Balfarg; - Banning right turn from Western Avenue at Balfarg; and - Signalised Junction at Cadham	• Not Applicable

[5] http://www.parliament.scot/GettingInvolved/Petitions/PE01175
[6] http://www.parliament.scot/S3_PublicPetitionsCommittee/Submissions_08/08-PE1175P(ii).pdf

Study Name	Producer	Date(s)	Purpose	Relevance to Balfarg and Cadham Study Areas	Relevance to Freuchie Study Area
				• Following appraisal, no options were recommended for further consideration with the STAG study identifying that none of the shortlisted options were justifiable on the grounds of (economic?) appraisal. Monitoring was to be undertaken to review the effectiveness of improvement works completed at the junctions in 2008 and 2010.	
A92 Route Accident Reduction Plan[7]	BEAR Scotland	2013	The study reviewed accident data on the A92 from Halbeath to the Tay Bridge with a view to proposing low cost measures to address accident issues.	• The Report recommended minor improvements at the Cadham Road junction including refreshing road markings and installation of warning signage. • In addition, recommend were made around the relocation of warning signage, vehicle activated signage, refreshing road marking and red texture central reserve surfacing.	• The report recommended renewing signage, establishing bus boarder at bus stops and tactile paving at crossings.
Fife Council Action Plan[8]	Fife Council	2015	Action Plan produced by Fife Council and submitted to the Minister for Transport and Islands, to detail measures that could be carried out on the A92 from Halbeath to the Tay Road Bridge in the short, medium and long term to address local concerns regarding road safety for both vehicle and pedestrian movements.	• Short term measures included assigning a consistent 40mph speed limit, installing a pedestrian crossing north of Cadham junction, installing traffic signals at Cadham Road junction and banning right turn movements from B969 Western Avenue on to A92 at Balfarg Junction. • Medium term actions included the installation of a roundabout with pedestrian signals at the Balfarg junction.	• Short term actions included a new right turn into the petrol station, reducing the speed limit from 40mph to 30mph, reducing / removing Cromdale Cottage boundary wall [subsequently completed] and installing a pedestrian crossing to connect with bus stops and for school children. • Medium term action included installing full size illuminated roundabout at Millfield Place / C57 junction.
A92 Freuchie Pedestrian Accessibility Assessment	BEAR Scotland	2015	The study analysed existing pedestrian facilities on the A92 in Freuchie to ascertain their suitability and evaluate potential options to deliver improvements.	• Surveys were undertaken over the period 23rd January to 29th January 2015. The counts covered the 12hr period 0700-1900 each day. • A series of options aimed at improving conditions for active travel users were developed including provision of Refuge Islands/Buildouts, Signal Controlled Crossing • The study recommended installing additional general road safety measures such as: high friction surfacing and provision of a 'STOP' signs, also the study recommends provision of Schoolchildren' Warning Signs.	• Not Applicable.
A92 Cadham to Balfarg Pedestrian	BEAR Scotland	May 2016	The study analysed existing pedestrian facilities on the A92	• Surveys undertaken in 2015 recorded approximately 600 pedestrians and cyclists crossing the A92 during an average week. • A series of options aimed at improving conditions for active travel users	• Not Applicable.

[7] Provided by Transport Scotland
[8] http://publications.fifedirect.org.uk/c64_FifeA92ActionPlan.pdf

Study Name	Producer	Date(s)	Purpose	Relevance to Balfarg and Cadham Study Areas	Relevance to Freuchie Study Area
Accessibility Assessment[9]			between Cadham and Balfarg to ascertain their suitability and evaluate potential options to deliver improvements.	were developed including a speed limit reduction, fencing, uncontrolled crossings, signalised crossings, grade-separated crossings and an A92 footpath link. • The study recommended a speed limit reduction to 40mph, an extension of the footway on the east side of the A92 and further investigation works to establish the feasibility of an uncontrolled crossing point with central refuge island.	
Transport Scotland's Response to Fife Council Action Plan[10]	Transport Scotland	November 2016	Transport Scotland's response to Fife Council's Action Plan which reviews each of the proposals and their potential to improve safety on the route. This was partly informed by a Working Group including Fife Council, Transport Scotland and Police Scotland.	• In response to the Action Plan proposals for Balfarg and Cadham, Transport Scotland noted the following points: - The 2011 appraisal outlined that banning right turns from Western Avenue to the A92 at Balfarg may result in the increase of accidents elsewhere on the network and was not implemented. - The 2011 appraisal identified that a new roundabout junction at Balfarg could generate additional delay and a small negative environmental impact and was not recommended. - Speed limits would be reduced from 50mph to create a continuous 40mph stretch between south of Tullis Russell and north of Balfarg junctions. - A further feasibility assessment of a pedestrian crossing at Balbirnie on the A92 would be undertaken - Installation of a signalised Cadham junction was considered in the 2011 appraisal and ruled out on the grounds that it may increase accidents numbers and introduce delay for A92 traffic. - TS identified that the 2011 appraisal did not consider dualling of the A92, however, strategic upgrades to the A92 would be considered as part of the forthcoming STPR 2 process.	• In response to the Action Plan proposals for Freuchie, Transport Scotland noted the following points: - No economic business case existed to support a new right turn lane into the petrol station and instead proposed consulting with the landowner to apply new road markings to better define the petrol station entrance / exit. - There was no evidence to underpin an economic business case to support a new roundabout at Millfield Place / C57 and instead new gateway signing and bus boarder and tactile paving at pedestrian crossings were proposed. - Further discussions with the landowner would occur and a conflict study would be undertaking to understand the requirement to remove Cromdale Cottage wall - A pedestrian safety study did not identify a requirement for a new pedestrian crossing and instead proposed rationalisation of signage. - It was not considered that there was a required to reduce speed limits from 40 mph to 30 mph given the findings of a 2012

[9] Provided by Transport Scotland
[10] https://www.fifedirect.org.uk/publications/index.cfm?fuseaction=publication.pop&pubid=B331D80A-A7C0-50A8-AD64DF4DF2C3BE71

Study Name	Producer	Date(s)	Purpose	Relevance to Balfarg and Cadham Study Areas	Relevance to Freuchie Study Area
					Speed Limit Review and Police Scotland's ongoing enforcement of speeds.
A92 - The Five Hazards Assessment[11]	North Glenrothes Community Council	November 2016	To undertake a review of existing data on the A92 between north of Preston roundabout to north of the Balfarg junction and to outline the Community Council's position on the suitability of the A92.	• The Community Council identified that the A92 north of Preston roundabout was *"not fit for purpose"* and that a roundabout at Balfarg is the most popular request for investment. • It was stated that improvements identified in the STPR have not resulted in a reduction in accidents on the route.	• Not Applicable
A92 Freuchie Conflict Study[12]	BEAR Scotland	Surveys undertaken June 2016. Report dated January 2017	To undertake a road safety review of the two crossroad junctions in Freuchie through reviewing video footage of the junction for a continuous seven day period in June 2016.	• Not Applicable	• A total of 27 conflicts were observed at the A92 Kettlebridge Crossroads. Observations included: - Left turning HGVs from the A92 crossing into the opposite carriageway of the minor road and conflicting with waiting vehicles at the give way line; - HGVs turning right into the minor arm across oncoming vehicles; and - Overtaking manoeuvres occurring through the junction on the A92. • A total of nine conflicts were observed at the Cross Keys junction including: - Left turning vehicles conflicting with vehicles in the minor road; and - The proximity of bus stops to the junction results in unsafe overtaking manoeuvres and limited visibility.
Community Street Audit Report for Freuchie[13]	Living Streets Ltd.	November 2017	Living Streets undertook a study examining the barriers to active travel in Freuchie and potential improvements to address these.	• Not Applicable	• The outcomes of a community street audit identified that the key issues affecting Freuchie are the need for a safe pedestrian crossing of both A92 junctions in the town and the need to reduce vehicular speeds, particularly agricultural vehicles. • Short term recommendations included a

[11] Provided by Transport Scotland
[12] Provided by Transport Scotland
[13] Provided by Transport Scotland

Study Name	Producer	Date(s)	Purpose	Relevance to Balfarg and Cadham Study Areas	Relevance to Freuchie Study Area
					pedestrian crossing at Kettlebridge crossroads, installing traffic lights and pedestrian facilities at the *'Cross Keys'* junction and enforcing the 20mph speed limit through the village. • Long term recommendations included installing a roundabout at the Kettlebridge crossroads.
Connecting Communities: Improving Active Travel Across the A92[14]	North Glenrothes Community Council	August 2017	To identify existing the existing active travel network in the vicinity of the A92 north of Prestonhall roundabout and outline the Community Council's position on the suitability of pedestrian and cyclist crossing provision.	• The report identified that crossing points on the A92 are inadequate considering the presence of existing core paths, cycle networks and the forthcoming Pilgim Way. • The report recommends a puffin crossing at Balfarg, formalisation of the crossing at Tofthill with puffin crossing and signalisation of Cadham Road junction.	• Not Applicable
A92 Balfarg Junctions Vehicle Conflict Study [15]	BEAR Scotland	Surveys undertaken March 2017. Report dated February 2018	To undertake a road safety review of the Balfarg staggered crossroads junction through reviewing video footage of the junction for a continuous seven day period in March 2017.	• Observations identified a series of incidents. Key incidents included: - Multiple vehicles waiting in the central reservation concurrently resulting in swerving for straight through movements on the main carriageway; - Issues with HGVs turning out from Western Avenue to the A92 (N); - Pedestrians crossing the A92 at undesignated crossings; - Vehicles turning right from Western Avenue pulling out into oncoming traffic A92 southbound; - Vehicles in the incorrect lane; and - Near misses and one collision involving vehicles emerging from Star Road	• Not Applicable
A92 Cadham Road End – Road User Conflict Study[16]	BEAR Scotland	Surveys undertaken March 2017. Report dated February 2018	To undertake a road safety review of the Cadham priority junction through reviewing video footage of the junction for a continuous seven day period in March 2017.	• A total of 172 conflicts were observed. 77% of these were classified as having a conflict grade greater than zero (i.e. poor driving exhibited or illegal manoeuvre that did not result in a conflict). • Observations identified including the following key conflicts: - A92 southbound traffic ignoring signage and turning right into Cadham junction (42 incidents). Six road users subsequently travelled westbound in the eastbound lane of Cadham Road;	• Not Applicable

[14] Provided by Transport Scotland
[15] Provided by Transport Scotland
[16] Provided by Transport Scotland

Study Name	Producer	Date(s)	Purpose	Relevance to Balfarg and Cadham Study Areas	Relevance to Freuchie Study Area
				- A92 northbound traffic turning left into Cadham junction and travelling westbound in the eastbound lane of Cadham Road; and - Northbound vehicles slowing down to access car wash resulting in following vehicles braking suddenly.	
A92 Balfarg/ Balbirnie Pedestrian Crossing Feasibility Report[17]	BEAR Scotland	March 2018	Following the death of a nine year old pedestrian on the A92 between Cadham and Balfarg, a detailed investigation was undertaken to assess the viability of providing a new uncontrolled pedestrian crossing on the A92 at this location.	• Two design proposals for the crossing are considered to facilitate the installation of a pedestrian refuge island. • The report recommends that to achieve the crossing, the carriageway is widened on the east side of the A92 with an associated cost of approximately £670,000. • The report suggests that the crossing facility would require to be integrated with the local footpath network.	• Not Applicable

[17] Provided by Transport Scotland

Table 2.3 demonstrates that community concerns regarding perceived road safety problems on the A92 has been a driving factor behind the production of further studies produced by Transport Scotland, BEAR Scotland and Fife Council. These studies have sought to investigate and develop interventions to improve safety through reducing both vehicular conflicts and providing safe accessibility/crossing opportunities for active travel modes.

While all studies present information that will be considered in the development of this study, of particular note is the 2011 Transport Appraisal which concluded that the assessed improvement options located between Balfarg and the Preston Roundabout were not justifiable in appraisal terms. Fife Council's 2015 A92 Action Plan also identified a series of desirable junction upgrades located on the A92 within the study network. The subsequent response from Transport Scotland reiterated the findings from the 2011 Transport Appraisal, however, also identified further improvements that could be undertaken at the junctions.

Since completion of the 2011 Appraisal, it is to be recognised that the transport policy context has changed to one with a greater focus on the promotion of active travel modes, while in the field of road safety, there has been an increasing emphasis on a Safe Systems Approach, which encompasses all aspects of safety i.e. not only focusing on engineering approaches but also measures to influence safer road user behaviours. These changes have been reflected by the recent studies on addressing perceived safety issues relating to active travel connectivity in both the Freuchie and Balfarg study areas. More recent reports produced by BEAR Scotland, the North Glenrothes Community Council and Living Streets have also sought to investigate opportunities to improve the accessibility of active travel users. In short therefore, it is recognised that while the previous studies provide an excellent baseline from which to develop this study, this 2018 STAG study is being taken forward in a different policy context from previous years.

2.4 Historical Improvements

2.4.1 Historical Improvements

As noted, a number of previous studies have resulted in relatively minor works being implemented to address concerns. Informed by a review of previous studies and discussions with Transport Scotland, Table 2.4 summarises historical improvements that have been implemented in each of the study areas since 2008.

Table 2.4: Historical Improvements in Study Areas[18]

Study Area	Improvements (2008 – 2018)
Freuchie	• Renewal of gateway signage on passive safe sign posts on approach to the Kettlebridge Junction. • Resurfacing and residual widening of the unclassified road which forms the eastern arm of the Kettlebridge junction between the A92 junction and the Orkie Farm access. • Installation of a bus boarder and tactile paving at pedestrian crossings in the vicinity of Cross Keys junction. • Cromdale Cottage Boundary Wall has been lowered adjacent to the B936 at the Cross Keys Junction.
Balfarg	• Reduction of Speed Limit from 50mph to 40mph through the Balfarg junctions. • Relocation of Vehicular Activated Sign at junction. • Rationalisation of general signage at junction. • Relocation of directional signage from Western Avenue and Star Road to central reserve. • Extension of central reserve safety fencing and installation of full height terminal. • Extension of pedestrian footpath on the east side of the junction.
Cadham	• Lane reconfiguration at Tullis Russell Roundabout. • Renewal of southbound directional signage on the A92 including lane destination signage. • Removal of advertisement board from the Cadham Road visibility splay. • Replacement of warning signage on approach to junction. • Relocation of splitter island bollard further back into the junction.

In addition, a number of committed future improvements have been confirmed through discussions with Transport Scotland. These are set out in Chapter 5 in relation to definition of a 'Do-Minimum' Scenario against which potential future transport interventions will be assessed.

[18] Transport Scotland's Response to Fife Council A92 Action Plan (2017), information provided by Transport Scotland.

2.4.2 Committed Future Improvements

Discussions with Transport Scotland and BEAR Scotland have confirmed that there are committed future improvements within the study areas. These are identified in **Table 2.5**.

Table 2.5: Committed Improvements in Study Areas[19]

Study Area	Committed Improvements
Freuchie	Inclusion of a physical island at petrol station junction to the north of the Kettlebridge junction
Balfarg	Installation of a Toucan crossing facility across A92 approximately 700m to the south of the Balfarg junction.
Cadham	None

The most notable committed improvement constitutes the installation of a pedestrian crossing facility within the Balfarg study area.

2.5 Summary

This chapter has summarised the main findings from previous studies, underlining that work previously undertaken on the route has concentrated primarily on road safety issues. The importance of road safety is also outlined in local and regional policy documents. Key problems and opportunities noted have been considered as part of the data analysis and evidence gathering stage discussed in Chapter 3. Several options have been listed in the reviews of previous studies, which have been noted for consideration and inclusion in the Option Generation process, discussed in Chapter 5.

[19] Information provided by Transport Scotland and BEAR Scotland

Problems and Opportunities

03

3. Problems and Opportunities

3.1 Introduction

This chapter presents the key problems and opportunities identified for the study area, based on a review of previous studies, the outcomes from previous consultations, and the development of an updated evidence base drawing on an analysis of relevant socio-economic, traffic and transport data for the study area.

3.2 Transport Provision – Existing Infrastructure and Service Provision

3.2.1 Road Network Overview

The A92 (T) is the principal road link between Dunfermline and Dundee. At approximately 37 miles in length, all of which lies within the Fife Council boundary, the A92 meets the M90 (T) at the Halbeath Interchange in the south, and with the Tay Road Bridge in the north. The road is made up of a combination of single and dual carriageway. Traffic on the route is generally subject to national speed limits however a number of localised limits through urban areas are also in operation.

As set out in Chapter 1, this study is specifically focused on Freuchie, Balfarg and Cadham, which are located on a 5.5km stretch of the A92 between the access junction to the former Tullis Russell Paper Mill site north of Glenrothes and the petrol filling station located at the periphery of Freuchie.

3.2.2 Public Transport (Bus and Rail)

The study corridor is served by a public transport network consisting of rail and bus services.

In terms of bus services, Freuchie is served by two bus stops located on either side of the A92; both which are located in the vicinity of the Cross Keys Junction (see **Figure 3.1**). These are both served by a number of services, as summarised in **Table 3.1**, providing access to Glenrothes and further afield including Edinburgh, Dundee and St Andrews. School bus services also utilise these stops.

In the Balfarg study area, there are two bus stops located approximately 250m to the north of the Western Avenue Junction on the A92. These are served by broadly the same bus routes as the stops in Freuchie. In addition, there are also two further stops located on Star Road adjacent to the A92 junction which are served by local services routing between Kingskettle and Glenrothes (Service 67).

There are no bus stops on the A92 in the vicinity of the Cadham Road junction, however, there are two bus stops located on Cadham Road itself. These are served by the X37 which connects with Kirkcaldy.

The nearest rail stations to the Freuchie study area is Ladybank which is located approximately 4km to the north of the town.

Figure 3.1: Bus Stop Locations in Freuchie

Markinch is the closest station to both Cadham and Balfarg. Both stations are situated on the same line with half hourly to hourly services to Edinburgh, Perth, Inverness and Dundee. Both stations are not located within the immediate vicinity of the study area but are large public transport attractors.

Table 3.1: Bus Services serving Freuchie Bus Stops

Service	Operator	Route description	Mon-Fri	Saturday	Sunday
36	Stagecoach	To Glenrothes	From 07:00 till 20:00 every hour.	From 08:00 till 20:00 every hour.	From 12:00 till 18:00 every 2 hours.
53	Stagecoach	To Glenrothes	From 21:00 till 24:00 every hour.	From 21:00 till 24:00 every hour.	From 11:00 till 23:00 every 2 hours.
54	Stagecoach	To Bell Baxter	9:00 AM service only	No Service	No Service
64	Stagecoach	To Glenrothes	From 07:00 till 09:00 every hour. From 11:00 till 23:00 every 2 hours.	From 07:00 till 23:00 every 2 hours.	From 13:00 till 21:00 every 4 hours.
64A	Stagecoach	To Glenrothes	From 10:00 till 22:00 every 2 hours.	From 10:00 till 22:00 every 2 hours.	From 11:00 till 19:00 every 4 hours.
X54	Stagecoach	To Edinburgh	From 8:00 till 21:00 every hour. (Except 9:00 AM)	From 08:00 till 21:00 every hour.	No Service

3.2.3 Active Travel

The study area benefits from a variety of active travel opportunities provided though the core paths network as well as both the local and national cycle route network. As shown in **Figure 3.3**, National Cycle Route 1 passes through the Cross Keys junction while a local cycle route passes through Kettlebridge junction in Freuchie. In the Balfarg and Cadham areas, local cycling routes are available around the Western Avenue, Star Road and Cadham junctions. Some of those routes on the east side lead to the National Cycle Route 766.

In addition to the existing cycling routes and core paths shown in **Figure 3.2**, a new 70 mile heritage walking route known as *"the Pilgrim Way"* is due for completion by the end of 2018[20]. This will connect North Queensferry, with St. Andrews.

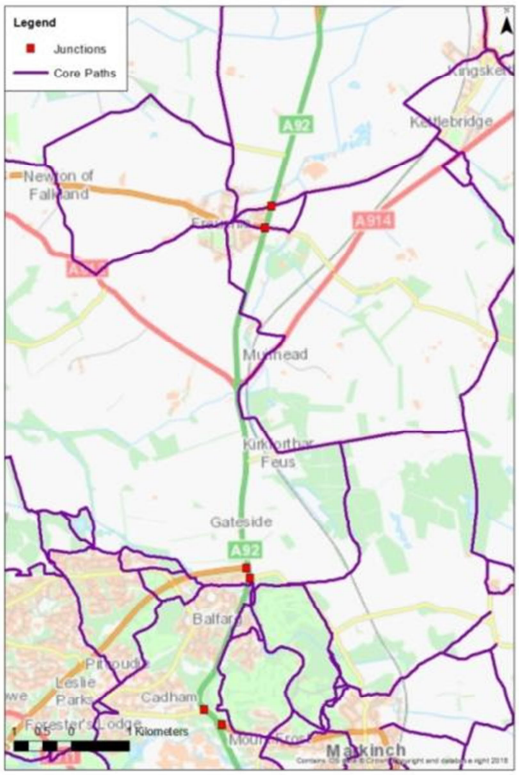


Figure 3.2: Core Path Network

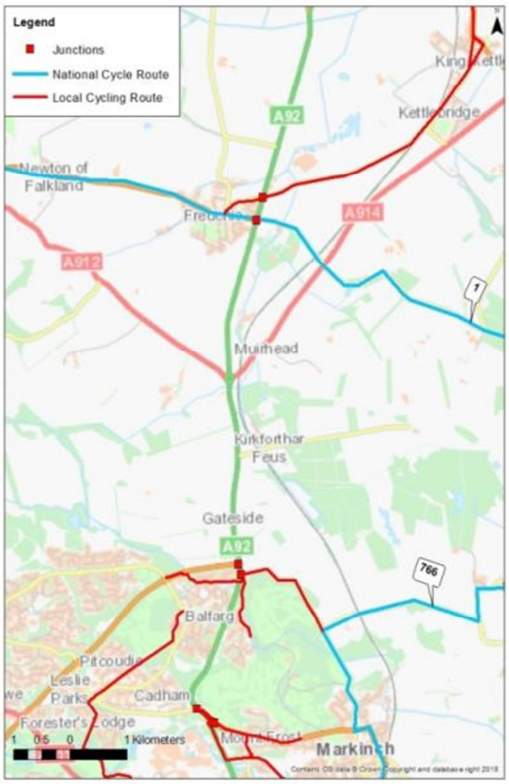


Figure 3.3: Cycle Network

[20] http://fifecoastandcountrysidetrust.co.uk/Fife-Pilgrim-Way_68.html

While the study area provides access to various active travel opportunities, as set out in **Chapter 2**, a number of previous studies have highlighted concerns regarding access to active travel routes and opportunities to enhance provision through the delivery of improved shared path links and pedestrian/cycle crossings.

3.3 Population and Socio-Economic Profile

3.3.1 Introduction

To provide a better understanding of the profile of transport users in the study areas under review, a review of relevant population and socio-economic datasets from the Census and Scottish Index of Multiple Deprivation (SIMD) has been undertaken, as presented in the sections that follow.

3.3.2 Population

Population information has been extracted from the 2016 mid-year National Records of Scotland (NRS) for the surrounding area in the vicinity of the A92 study network and is summarised within **Table 3.2**. Data has been extracted from the Glenrothes North, Leslie and Markinch Electoral Ward (2007 Boundary) and the Freuchie locality and includes a comparison with equivalent data for the Fife local authority and Scotland as a whole.

Table 3.2: 2016 Mid-Year Estimates Population Summary[21]

Output Area	Number of Residents
Glenrothes North, Leslie and Markinch (2007 Electoral Ward)	18,075
Freuchie North & New Inn (Datazone)	656
Freuchie South & Muirhead (Datazone)	643
Fife (Local Authority)	370,330
Scotland	5,404,700

The detailed population density distribution within the vicinity of the A92 is contained within **Figure 3.4**. This utilises 2014 mid-year population estimates which is the most recent data available.

The most populous area is located towards the south of the A92 study network in the residential areas of Balfarg, Cadham, Balbirnie and Pitcoudie. Given its rural nature, the area between the B969 / A92 junction and junctions located in Freuchie is more sparsely populated.

Figure 3.4: 2014 Mid-Year Population Estimates Distribution

[21] https://knowfife.fife.gov.uk/profiles/profile?profileId=75

3.3.3 Age Structure

The age structure for the study areas compared with the Fife and national averages is shown in Figure 3.5[22].

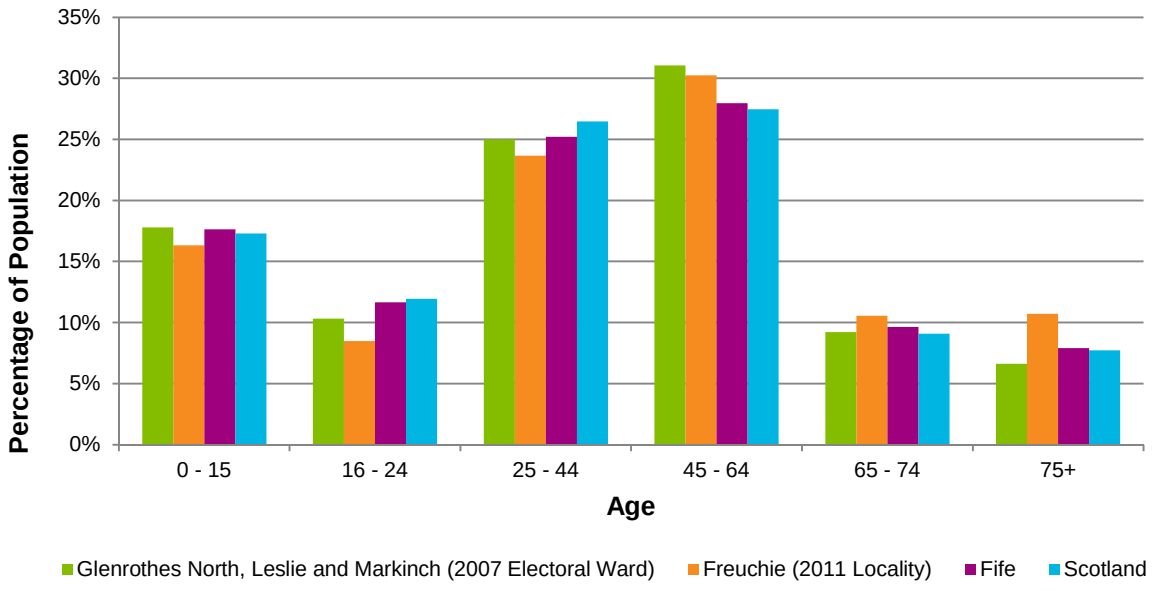


Figure 3.5: Population Age Composition Summary

The Glenrothes North, Leslie and Markinch ward has a broadly similar population age structure to the equivalent figures for Fife and Scotland as a whole, however there is a noticeably lower proportion of residents in the +75 age group. This is likely to be attributable to the legacy of Glenrothes' historical designation as a new town in the post-war era. In contrast, Freuchie has a marginally older age composition considering 10.5% of its residents are aged 75 and over.

3.3.4 Economic Activity

Table 3.3 provides a summary of economic activity rates for the two output areas under consideration[23].

Table 3.3: Economic Activity Rates

Economic Activity	Glenrothes North, Leslie and Markinch Electoral Ward		Freuchie Locality	
	No. of People	%	No. of People	%
Economically Active: Part Time	1901	13.9%	108	12.2%
Economically Active: Full Time	5635	41.2%	401	45.3%
Economically Active: Self-Employed	902	6.6%	69	7.8%
Economically Active: Unemployed	773	5.6%	22	2.5%
Economically Active: Full-Time Student	359	2.6%	24	2.7%
Economically Inactive: Retired	2175	15.9%	182	20.6%
Economically Inactive: Student	527	3.9%	27	3.1%
Economically Inactive: Looking after home or family	471	3.4%	25	2.8%
Economically Inactive: Long-term sick or disabled	732	5.3%	17	1.9%
Economically Inactive: Other	208	1.5%	10	1.1%
Total	**13,683**	**100%**	**885**	**100%**

[22] *2011 Census KS102SC – Age Structure*
[23] 2011 Census KS601SC – Economic Activity

Approximately 70% of residents in the Glenrothes North, Leslie and Markinch ward and Freuchie wards are economically active. Freuchie does however have a noticeably higher proportion of residents who are retired (20.6%) compared to the Glenrothes North, Leslie and Markinch ward (15.9%). It is also noticeable that unemployment levels in Freuchie are less than half the equivalent level of Glenrothes North, Leslie and Markinch.

A comparison with equivalent economic activity figures from Scotland and Fife is presented in **Figure 3.6**.

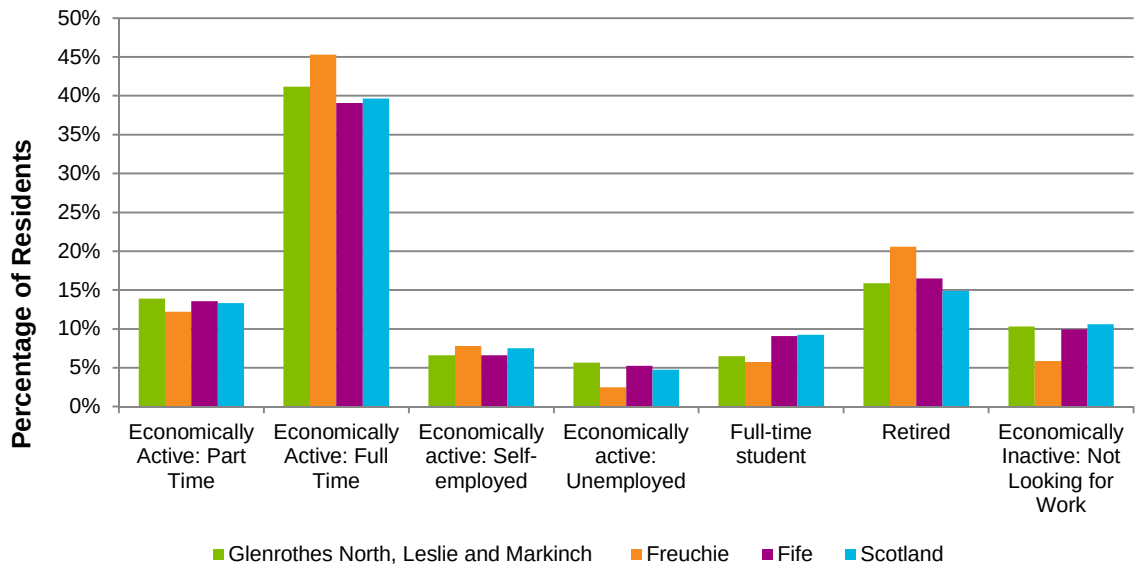


Figure 3.6: Economic Activity Comparison

3.3.5 Jobs by Sector

Analysis of employees' jobs by sector / industry, extracted from the 2011 Census, is presented in **Table 3.4**.

Table 3.4: Jobs by Sector[24]

Industry	Glenrothes North, Leslie and Markinch	Freuchie	Fife	Scotland
All people aged 16 – 74 in employment	8,699	598	167,326	2,516,895
Agriculture, forestry and fishing	1.0%	2.5%	1.2%	1.7%
Mining and quarrying	1.0%	0.7%	0.8%	1.4%
Manufacturing	15.1%	10.7%	10.4%	8.0%
Electricity, gas, steam and air conditioning supply	0.6%	0.5%	0.7%	0.8%
Water supply, sewerage, waste management and remediation activities	0.7%	0.7%	0.7%	0.8%
Construction	8.0%	9.4%	8.2%	8.0%
Wholesale and retail trade; repair of motor vehicles and motorcycles	14.7%	15.2%	14.5%	15.0%
Transport and storage	3.5%	2.0%	4.1%	5.0%
Accommodation and food service activities	4.6%	4.8%	5.6%	6.3%
Information and communication	2.3%	3.3%	3.0%	2.7%
Financial and insurance activities	2.5%	3.0%	4.8%	4.5%
Real estate activities	1.2%	0.8%	1.0%	1.2%

[24] 2011 Census KS605SC – Industry

Professional scientific and technical activities	3.5%	3.8%	4.0%	5.2%
Administrative and support service activities	3.7%	1.7%	4.1%	4.3%
Public administration and defence; compulsory social security	9.1%	7.5%	7.8%	7.0%
Education	7.7%	11.0%	9.0%	8.4%
Human health and social work activities	15.4%	17.1%	14.8%	15.0%
Other	5.4%	5.2%	5.2%	4.9%

The sector job proportions are generally comparable to the equivalent figures for Fife and Scotland, however, the proportion of those employed in the manufacturing sector in the study areas is noticeably higher (15.1% in Glenrothes North, Leslie and Markinch - nearly double the national level). It is worth noting that as these figures date from the 2011 Census, they are likely to capture residents who may have formerly been employed at the Tullis Russell; Paper Mill which closed in 2015.

3.3.6 Qualifications

Qualification information has also been extracted from the 2011 Census and is contained within **Figure 3.7** alongside comparisons with Scotland and Fife. Qualifications are categorised into four levels:

- No Qualifications;
- Level 1: O Grade, Standard Grade, GSCE;
- Level 2: Higher, Advanced Higher, A Level, AS Level;
- Level 3: HNC, HND, SVQ Level 4; and
- Level 4: Degree, Postgraduate Qualifications, Masters, PhD.

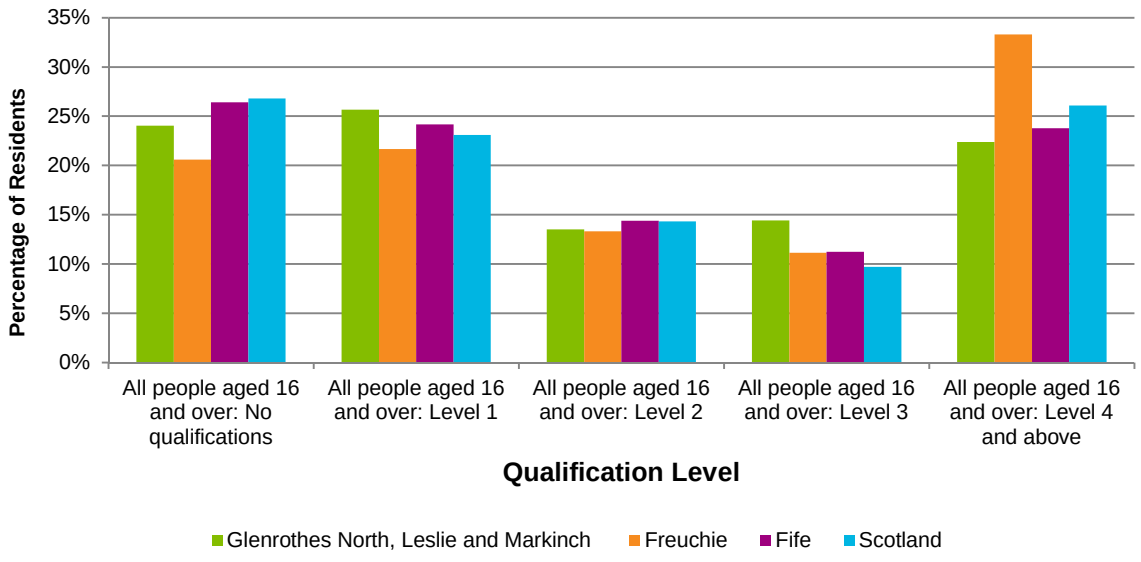


Figure 3.7: Qualification Comparison

Figure 3.7 demonstrates that residents within the Glenrothes North, Leslie and Markinch electoral ward have broadly similar education qualifications compared to the Fife and Scotland average. By comparison, Freuchie has a higher proportion of its residents with education qualifications of Level 4 and above.

3.3.7 Deprivation

SIMD is an indicator which applies multi-criteria analysis to measure the level of deprivation across small areas (data zones). The data zones are then ranked from 1 to 6,976; with those ranked lowest being the most deprived and those ranked highest being the least deprived. The rankings are based upon: Income; Employment; Health; Education / Skills; Housing; Geographic Access; and Crime.

Figure 3.8 provides an overview of the 2016 SIMD ranking for output areas within the vicinity of the A92 study areas. Areas shaded in red demonstrate the highest level of deprivation whilst those shaded in blue represent the lowest level of deprivation.

It demonstrates that there is a large contrast in SIMD rankings within the vicinity of the A92 study areas. The area towards the north end of the A92 under consideration has a high SIMD ranking; particularly in Freuchie itself which has an SIMD ranking in the top 10% of all Scottish households. In comparison, areas to the north of Glenrothes including Cadham, Pitcoudie, Balfarg, Pitcairn and Coul have much lower SIMD rankings. The north area of Cadham, in particular, is ranked amongst the lowest 10% of all households across Scotland.

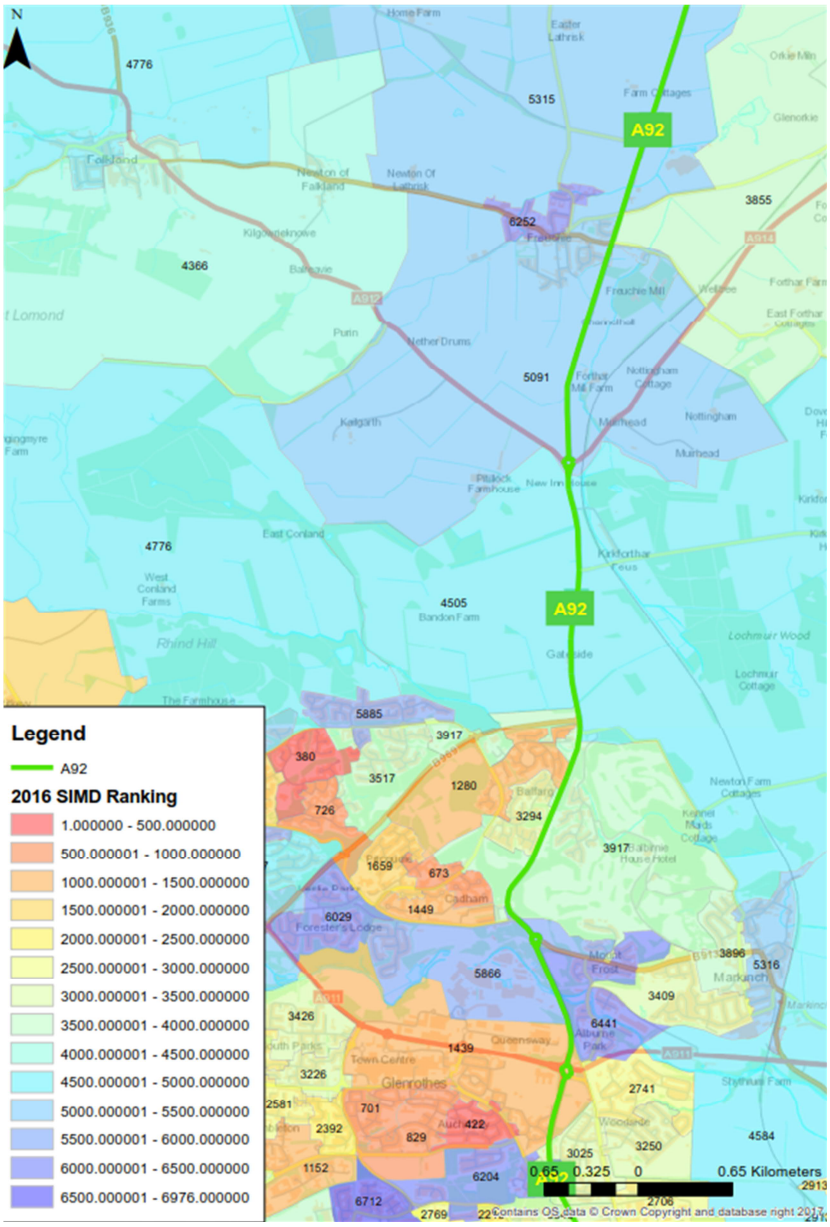


Figure 3.8: SIMD Overall Ranking Analysis

Population and Socio-Economic Review Key Findings:

- The residential communities surrounding both the Balfarg and Cadham study areas are more densely populated than those in proximity to the Freuchie study area.
- Freuchie has a higher proportion of those aged 75 and over in comparison to those living in proximity to the Balfarg and Cadham study areas.
- Output areas to the west of the Balfarg and Cadham study areas generally have a low SIMD ranking including an output area ranked in the lowest 10% of all Scottish households. Output areas in Freuchie have a high SIMD ranking.

3.4 Current Demand and Travel Patterns

3.4.1 Introduction

To better understand current demand for travel in the study area and the key transport related problems to be addressed through this study, a range of data sources and approaches have been used, including:

- Census Data on Car Availability, Commuting Origin/Destinations and Mode of Travel to Work/Education;
- Traffic Growth and Traffic Profiles information drawing on Automatic Traffic Counts in the study area;
- Results of a peak time junction turning surveys on the A92 undertaken in 2016 to understand key flows, as well as waiting time surveys to understand the scale of the issues for local road traffic accessing the A92;
- Analysis of accident data for the study area provided by Transport Scotland;
- Analysis of journey times and journey time reliability using INRIX data (to be completed);
- Analysis of Speed Survey Data;
- Review of the findings from previous survey work in the study areas including:
  - Conflict Studies undertaken in Freuchie (June 2017), Balfarg (March 2017) and Cadham (March 2017); and
  - Pedestrian survey work in Freuchie (January 2015) and Balfarg (August and September 2015).

3.4.2 Car Availability

Car ownership data from the 2011 Census has been extracted for the Glenrothes North, Leslie and Markinch electoral ward and the Freuchie locality as well as for Fife and Scotland as a whole, as shown in **Figure 3.9**[25].

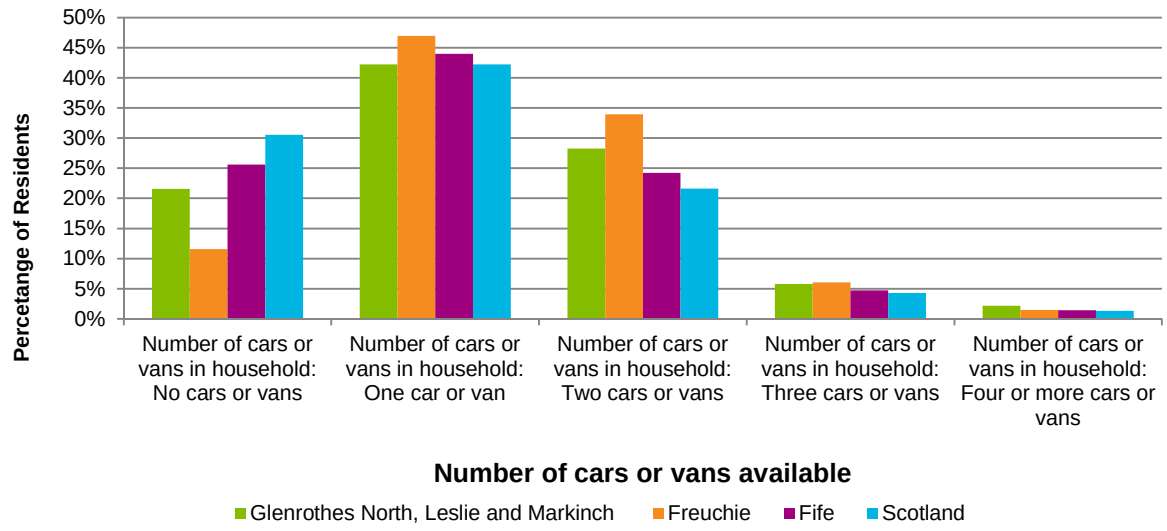


Figure 3.9: Car Availability Comparison

The data shows that households in the Freuchie locality generally have access to more cars than the Fife and Scottish averages. Car ownership rates within the Glenrothes North, Leslie and Markinch output area are generally in line with the regional and national averages. Results for Freuchie are likely due to the more rural nature of this area, as well as the higher levels economic activity compared to other parts of the study area.

3.4.3 Workplace Location

Census information from the Datashine Scotland Commute resource[26] has been extracted to identify commuting destinations from key origins within the vicinity of the A92 study network.

Results are shown within **Figure 3.10** to **Figure 3.13**. Note the Origin is identified by bold black boundary.

[25] *2011 Census KS404SC*
[26] http://scotlandcommute.datashine.org.uk/

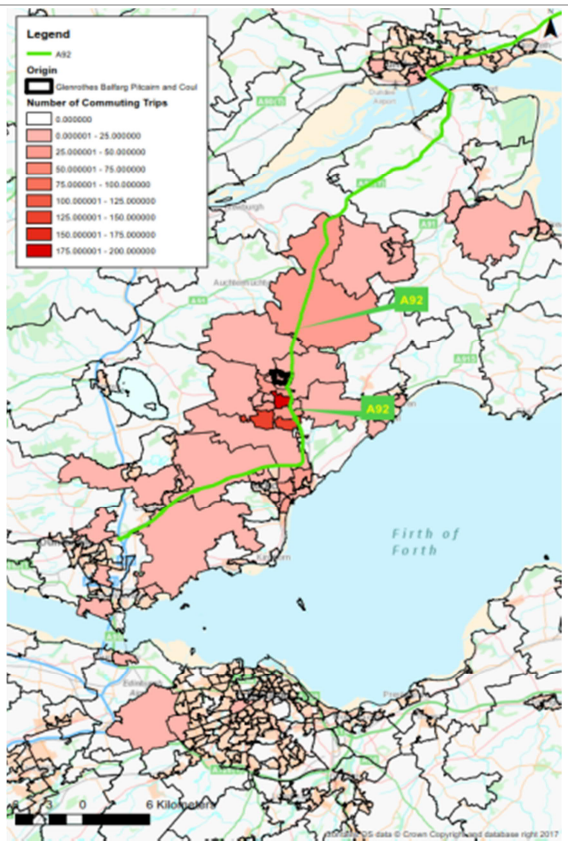


Figure 3.10: Commuting Destinations from Glenrothes Balfarg, Pitcairn and Coul Output Area

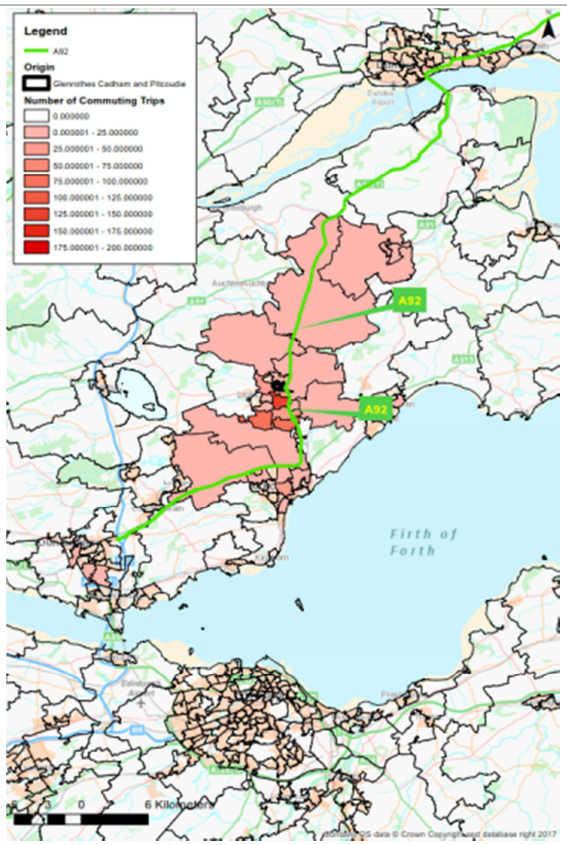


Figure 3.11: Commuting Destinations from Glenrothes Cadham and Pitcoudie Output Area

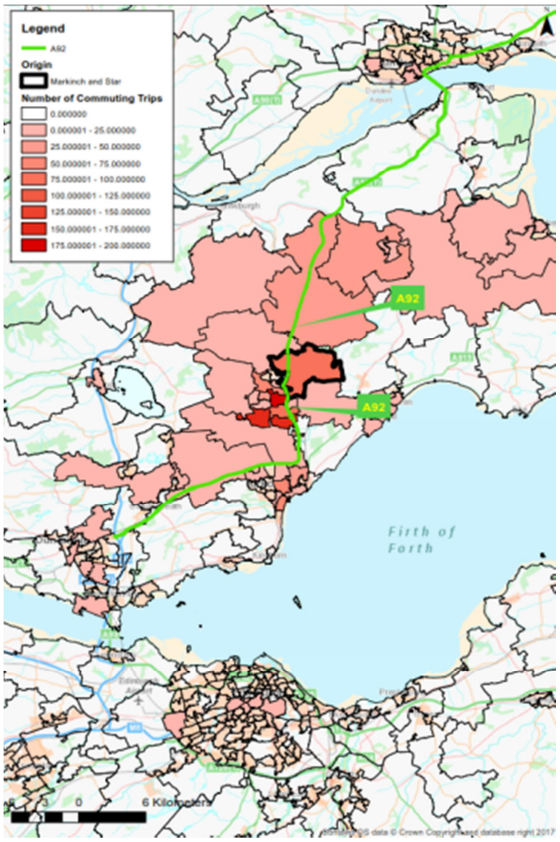


Figure 3.12: Commuting Destinations from Markinch and Star Output Area

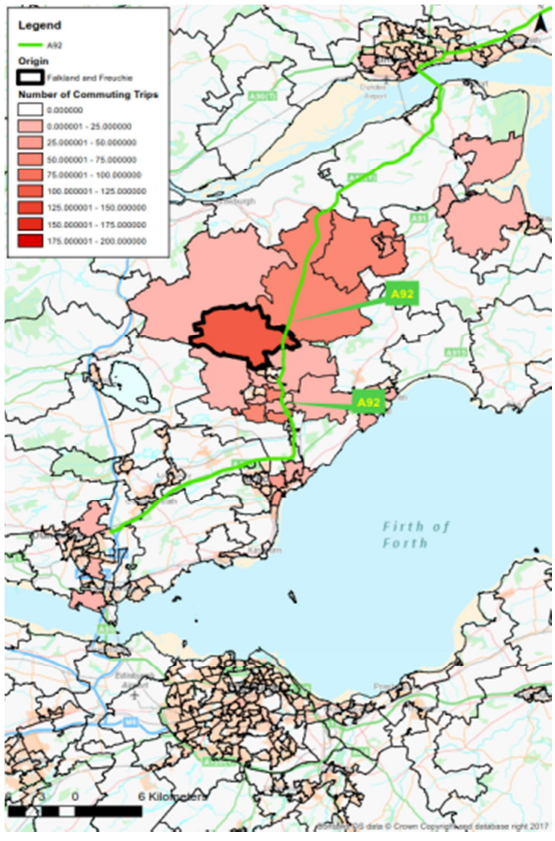


Figure 3.13: Commuting Destinations from Falkland and Freuchie Output Area

Figure 3.10 - **Figure 3.13** demonstrates that the majority of residents living within the vicinity of the A92 study area work within Glenrothes, however, residents also commute to locations further afield including Cupar, St Andrews, Dunfermline, Dundee and Edinburgh. It is also evident that commuting destinations are mostly located along the A92 corridor; thus emphasising its importance as commuter route.

3.4.4 Distance Travelled to Work or Study

Figure 3.14[27] provides a summary of distance travelled to work amongst residents within close proximity of the A92 study network.

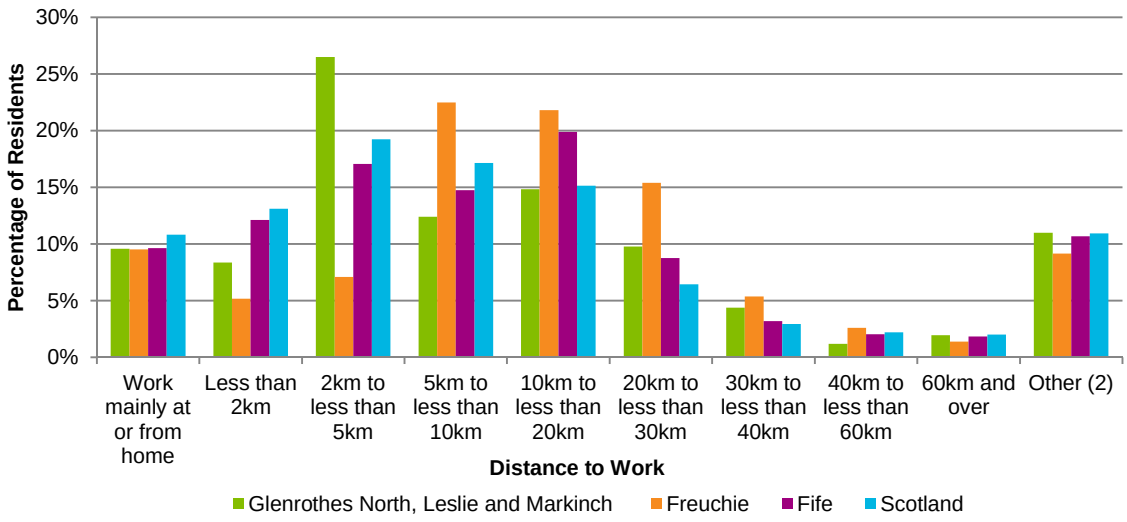


Figure 3.14: Distance Travelled to Work Comparison

The data indicates that residents living to the North of Glenrothes including areas such as Cadham, Balfarg, Pitcairn and Coul generally travel a shorter distance to access their work place than the equivalent figures for Fife and Scotland. In contrast, residents within Freuchie generally travel further.

3.4.5 Mode of Travel

Mode of travel to work or study data has been extracted from the 2011 Census and is shown in **Figure 3.15**[28].

[27] 2011 Census QS703SC – Distance Travelled to Work
[28] *2011 Census QS702SC – Method of Travel to Work or Study*

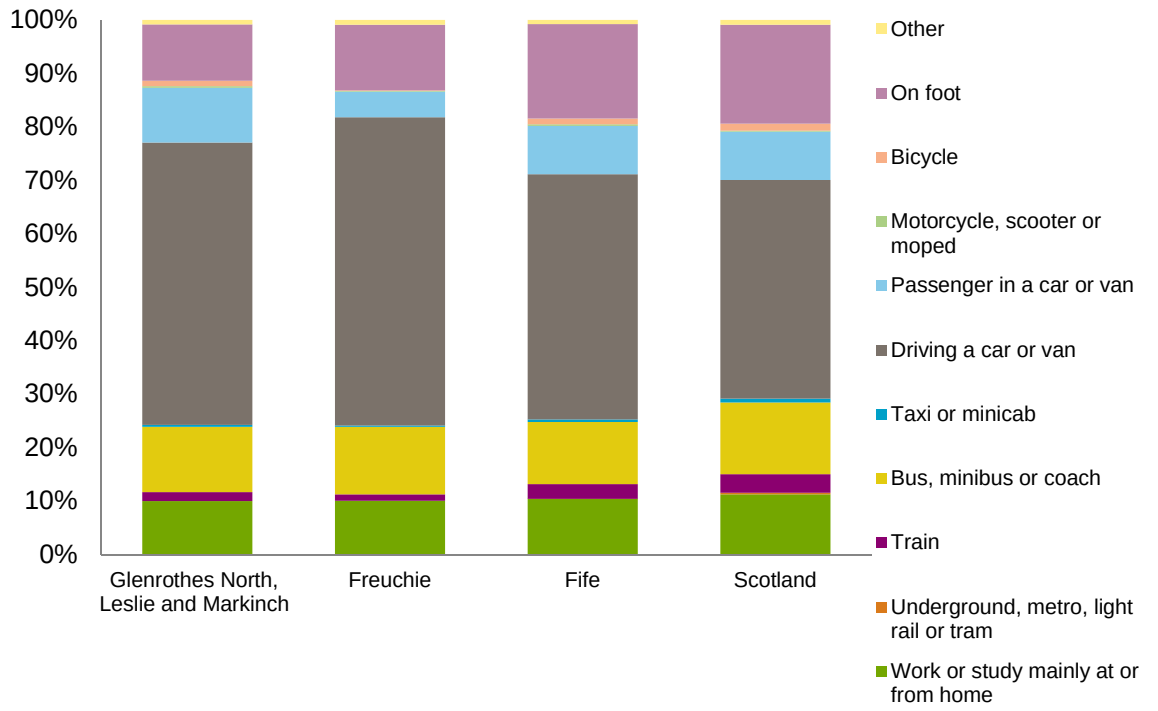


Figure 3.15: Mode of Travel to Work or Study

The most popular method of commuting amongst residents living in areas located within the vicinity of the A92 is as a car driver with 52.8% of residents in Glenrothes North, Leslie and Markinch and 57.6% of residents in Freuchie travelling by this mode; above the equivalent Fife and Scottish averages. In contrast, the use of active travel modes is marginally lower in the study area than regional and national figures.

Existing Travel Characteristics and Behaviour Key Findings:

- Car ownership rates in Freuchie are higher than the Fife and Scottish averages whilst near Balfarg and Cadham they are broadly similar to the average.
- The majority of residents across the study areas work in Glenrothes, however, residents also commute to other locations such as Cupar, St Andrews, Dundee and Dunfermline all along the A92 corridor.
- The proportion of those driving to their place of work or study is higher in Freuchie than in the communities near Balfarg and Cadham. The use of active travel modes across the corridor is lower than the Fife and Scottish average.

3.4.6 Vehicle Flows and Traffic Growth

Automatic Traffic Count (ATC) data has been obtained from the National Roads Traffic Database (NTDS) for multiple sites on the A92 for a continuous five year period from 2012 to 2017. In addition to trunk road ATCs, available data has been obtained for local roads via Fife Council. Historical trend ATC data has not been provided by Fife Council and therefore it has not been possible to calculate traffic growth for these counters. A summary is provided in **Figure 3.16**.

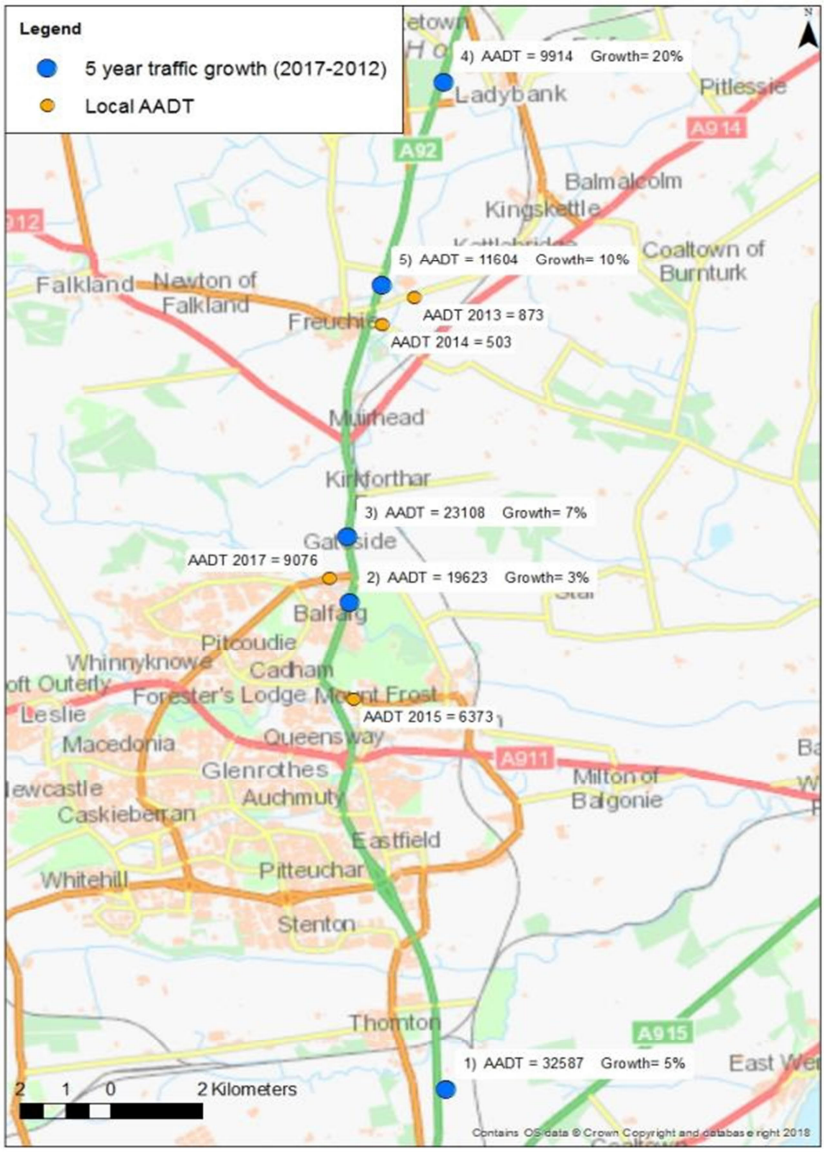


Figure 3.16: ATC Traffic Flows and Historical Five Year Growth

As shown, the average annual daily traffic flow (Annual Average Daily Traffic (AADT) flows for the study areas show:

- Traffic levels are around 11,600 vehicles on the A92 north of the Kettlebridge junction in Freuchie.
- Local roads located to the east of the Freuchie junctions have AADTs ranging between 500 – 900 vehicles.
- At the A92 north of the Balfarg junctions, flows increase to approximately 23,100 vehicles;
- Western Avenue has an AADT of approximately 9,000 vehicles; and
- The A92 north of the Cadham junction has an AADT of approximately 19,600 vehicles.
- Sites on the A92 near Freuchie show a higher level of growth ranging from 10%-20% compared to sites in the Balfarg and Cadham areas which range between 3%-7%.

In addition, analysis has been undertaken of weekly traffic profiles (**Figure 3.17** and **Figure 3.18**). The weekly profile presented is based on data for site JTC00324 in the A92 Balfarg area, however, broadly similar trends have been identified at other count locations across the study area.

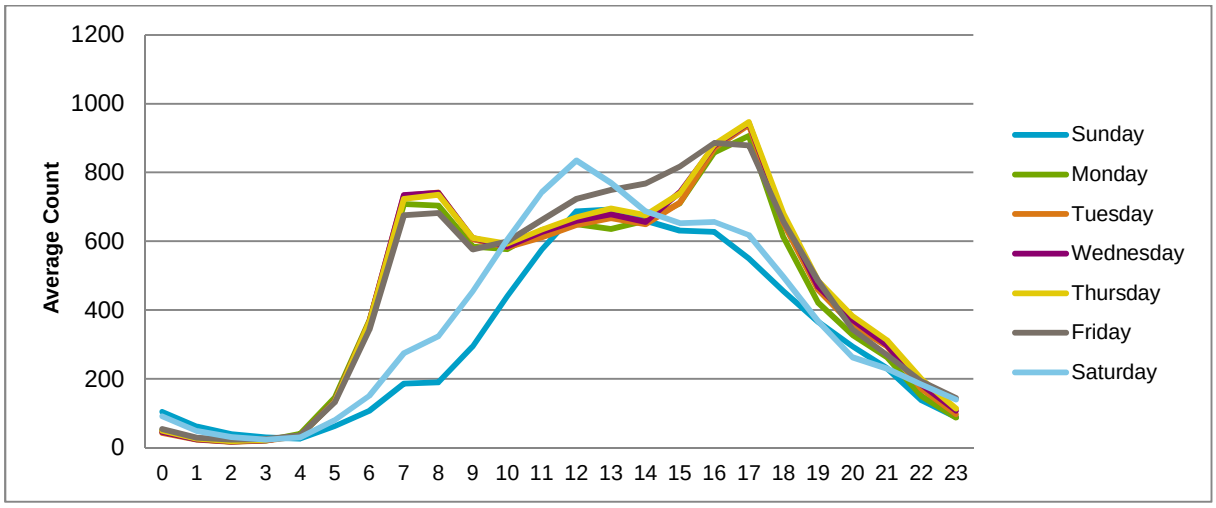


Figure 3.17: JTC00324 NB Daily Profiles

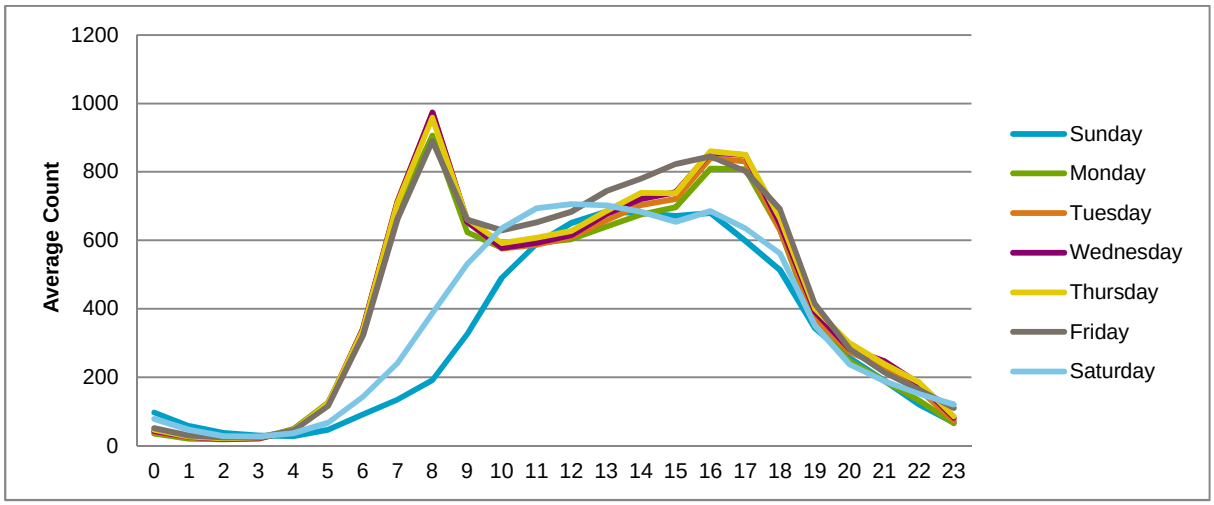


Figure 3.18: JTC00324 SB Daily Profiles

Key findings from review of the traffic flow profile at the above site are as follows:

- There is a pronounced AM peak on weekdays at around 0800 and a slightly less pronounced PM peak at 1600.
- Friday presents a higher inter-peak flow across the day from late morning onwards, including a higher flow after the PM peak period.
- Traffic flows on the A92 demonstrate a fairly typical profile for weekday car traffic. However, on Fridays, while the car traffic flows are similar to the rest of the week, after 9am, they are higher along the whole corridor for both directions.
- In terms of the composition of vehicles along the route, cars make up on average 81% of all traffic, with LGVs comprising 17%, and HGVs and motorbikes accounting for 1% each.

3.4.7 Junction Turning Counts

To provide a detailed understanding of travel movements areas, the results from junction turning counts (JTC) provided by BEAR Scotland have been analysed. **Figure 3.19** and **Figure 3.20** shows turning count values for the Kettlebridge and Cross Keys junctions in Freuchie based on JTC surveys undertaken in June 2016.

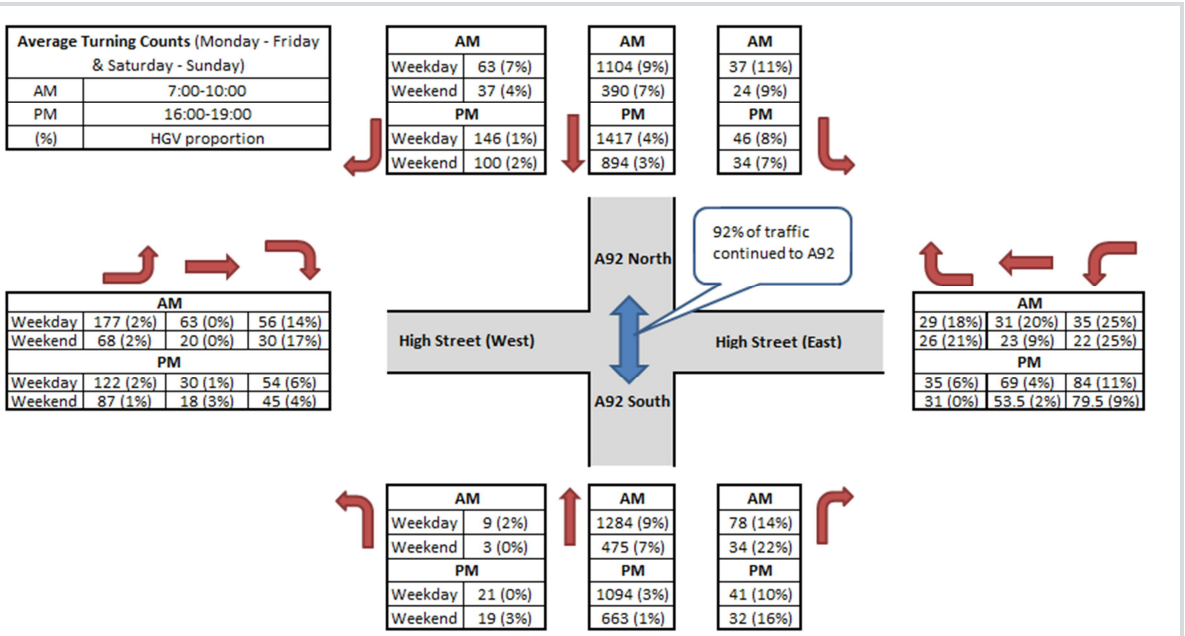


Figure 3.19: Kettlebridge (Freuchie) Junction Turning Counts[29]

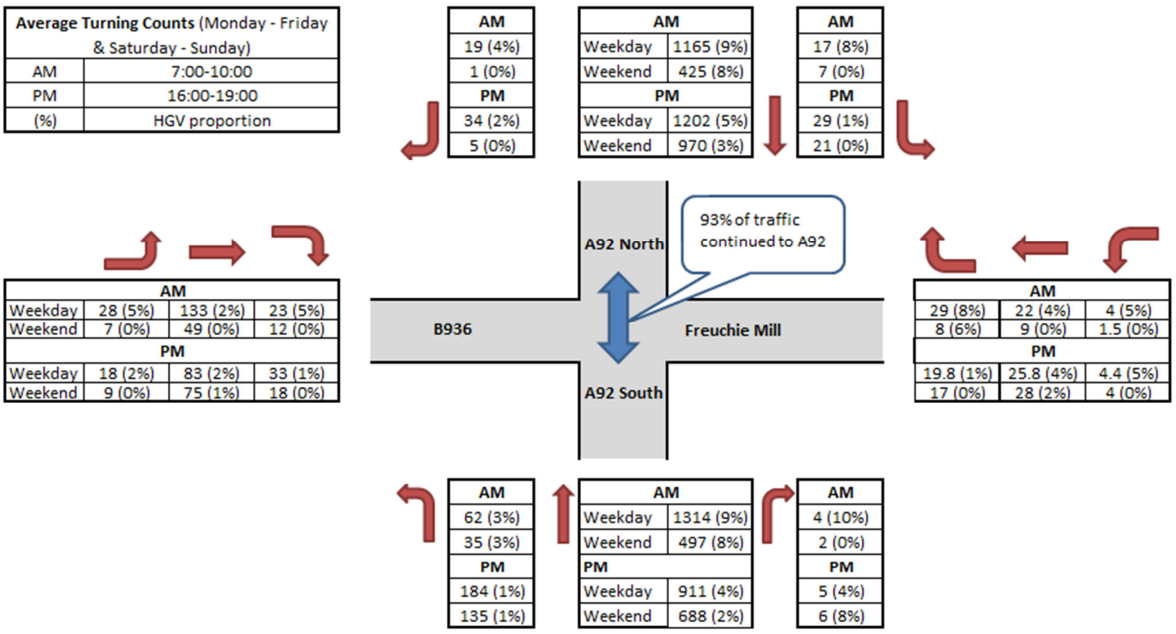


Figure 3.20: Cross Keys (Freuchie) Junction Turning Counts[30]

Key findings from the JTC surveys in Freuchie are:

- Local arms of the junction at the Kettlebridge junction were busier in comparison to the Cross Keys junction;
- The predominant movement at the Kettlebridge junction is between the A92 (North) and the High Street (West) arm of the junction. The converse of this was true at the Cross Keys Junction with the predominant movement between the A92 south and East End (B936).

[29] JTC Surveys were undertaken from 6th to 12th June 2016 at Freuchie. Counts were undertaken for an AM peak period from 07:00 to 10:00 and PM peak period from 16:00 to 19:00 for both weekdays and at the weekend. Values shown represent the average value for Weekdays and the average value for Weekends.

- During an average weekday, the total volume of vehicles continuing on the A92 is significantly higher than the total number of traffic turning onto minor roads at both junctions. At Kettlebridge A92 strategic traffic travelling in a north or southbound direction constitutes 92% of all movements at the junction whilst at Crosskeys this equivalent figure is 93%[31].

- The proportion of strategic A92 traffic comprising an HGV through both junctions is less than 10%. Higher proportions are evident on movements to and from High Street (East) at the Kettlebridge junction where the proportion of HGVs makes up to 25% of vehicles turning right out of the junction in the AM period.

Figure 3.21 shows turning count values at the Western Avenue and Star Road junctions in Balfarg, based on JTCs undertaken by BEAR Scotland in March 2017[32]. A summary of key points from the JTC analysis is presented below:

- The Western Avenue junction was the busier across both a weekday and weekend. For example, traffic emerging from Western Avenue in the weekday peak period constituted 1,213 vehicles in comparison to the equivalent figure of 409 vehicles emerging from Star Road.

- There is a high right turn flow from the A92 to Western Avenue in both the morning (702) and evening (928) weekday peak periods. This has to give way to a high opposing A92 northbound flow of approximately 2,100 vehicles in each of these peak periods. By contrast, right turning traffic at the Star Road junction is lower.

- On an average weekday the total number of vehicles continuing on the A92 is much higher than the total vehicle numbers turning onto minor roads; albeit not to the same extent as for junctions in Freuchie. This represents 78% of all traffic at the Western Avenue junction and 92% of all traffic at the Star Road junction[33].

- The proportion of HGVs was on average 6% on the A92, in comparison to 2% on Western Avenue and 3% on Star Road.

[31] This is based upon the total proportion of A92 North – South traffic at the junctions compared against the overall collected volumes at the junction. For example in the morning peak period at Kettlebridge, 1104 vehicles in the morning period continued southbound on the A92 in comparison to 100 vehicles that turned onto minor roads (i.e. 92% A92 Strategic Traffic).
[32] JTC Surveys were undertaken for a continuous 24 hour period from 4th to 10th March 2017
[33] This is based upon the total proportion of A92 North – South traffic at the junctions compared against the overall collected volumes at the junction. For example in the morning peak at the Western Avenue junction, 2133 vehicles continued southbound on the A92 in comparison to 702 vehicles that right on to Western Avenue (i.e. 78% of all traffic).

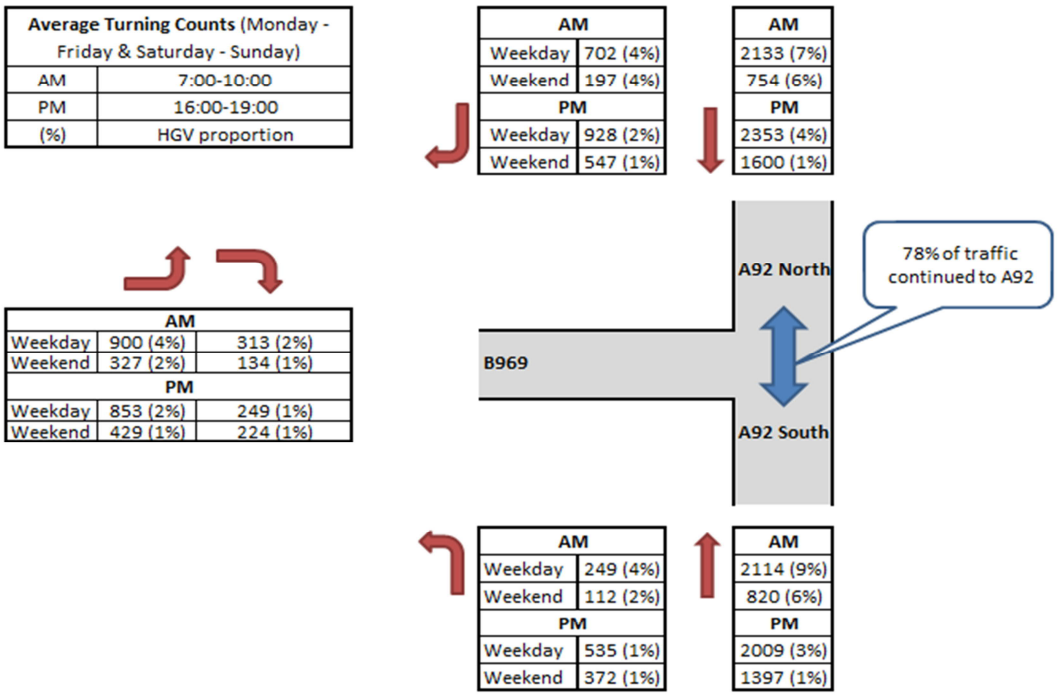


Figure 3.21: Western Avenue (Balfarg) Junction Turning Counts

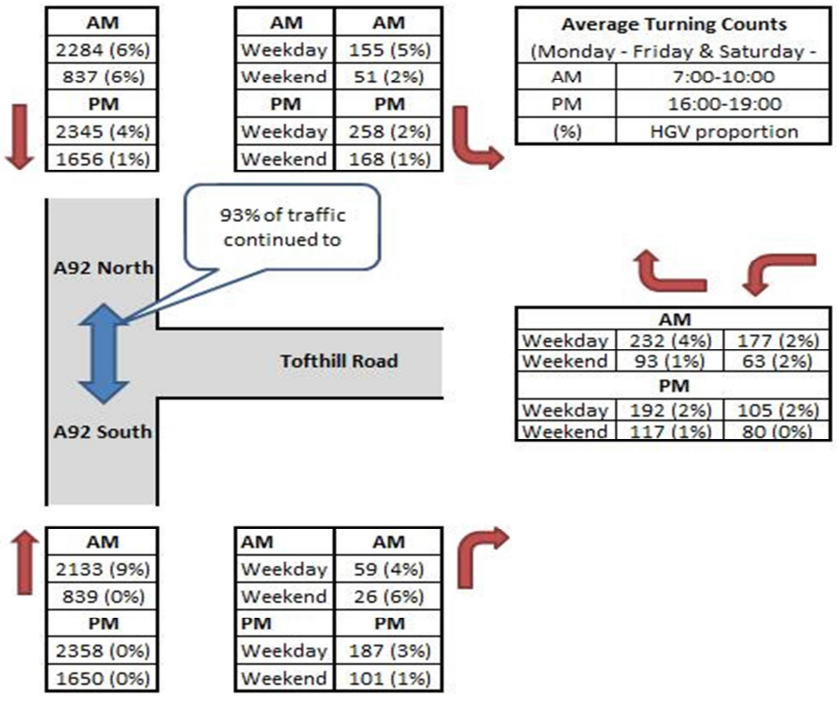


Figure 3.22: Star Road (Balfarg) Junction Turning Counts

Figure 3.23 shows junction turning count results at the Cadham Road junction undertaken by BEAR Scotland in March 2017[34].

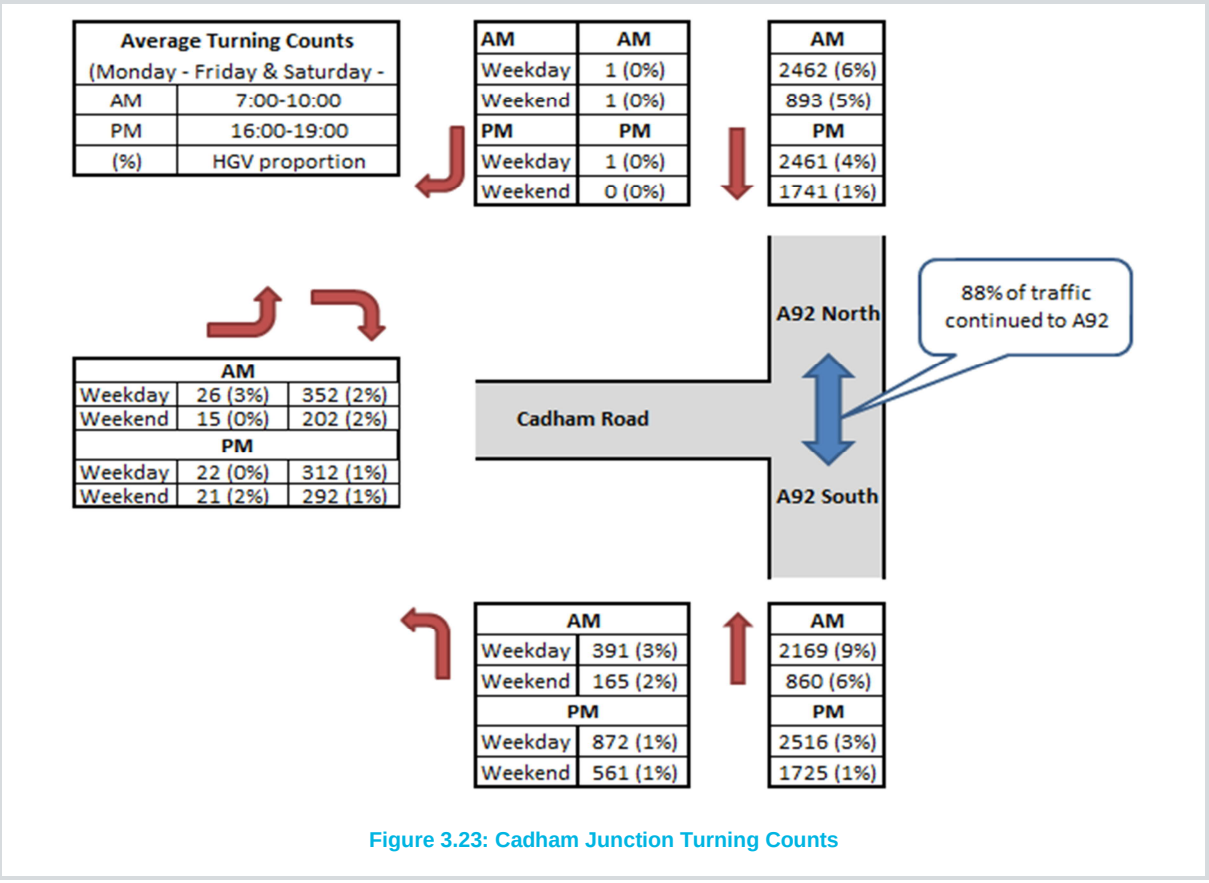


Figure 3.23: Cadham Junction Turning Counts

A summary of key points from analysis of the JTC surveys at Cadham is presented below:

- There were some vehicles recorded ignoring the right turn ban from the A92 to Cadham Road. Across the week this equated to a total of 42 vehicles.
- On an average weekday the total number of vehicles continuing along the A92 is significantly higher than the total number of vehicles turning onto minor roads. For example, 2169 vehicles in the morning continued travel northbound on A92 in comparison to 391 vehicles that turned left onto the minor road. Overall 88% of trips from the A92 continued on the A92, with the rest (12%) travelling to Cadham.
- The largest turning counts were recorded from the A92 northbound to the Cadham Road (872 vehicles) in the afternoon peak and from Cadham Road to the A92 southbound (352 vehicles) in the morning peak.
- The proportion of HGVs was on average 5% on A92, in comparison to 2% on minor road.

Vehicular Flows Key Findings

- Traffic on the A92 in Freuchie is up to approximately 12,000 vehicles per day, whereas in the Balfarg / Cadham area it is up to approximately 23,000 vehicles per day.
- Local roads located to the east of the Freuchie junctions have AADT flows ranging between 500 – 900 vehicles. The AADT on Western Avenue at the Balfarg junction is approximately 9,000 vehicles.
- Sites on the A92 near Freuchie show a higher level of growth ranging from 10%-20% compared to sites in the Balfarg and Cadham areas which range between 3%-7%.
- In Freuchie, local arms of the junction at the Kettlebridge junction were busier in comparison to the Cross Keys junction. At the Kettlebridge junction, there were high proportions of HGVs (approximately 25%) on movements to and from High Street (East).
- At Balfarg, there is a high right turn flow from the A92 to Western Avenue in both the morning and evening weekday periods when the number of right turning vehicles can reach up to approximately 900.
- At Cadham, there were some vehicles recorded ignoring the right turn ban from the A92 to Cadham Road. Across the week this equated to a total of 42 vehicles.

[34] JTC Surveys were undertaken for a continuous 24 hour period from 4th to 10th March 2017

3.4.8 Junction Turning Wait Times

Freuchie

A video survey of the two crossroads junctions in Freuchie (Kettlebridge and Cross Keys) was undertaken in June 2016, by BEAR Scotland, to assess waiting times for vehicles to exit the minor roads and enter the A92, with the results summarised in **Table 3.5** and **Table 3.6**[35].

Table 3.5: Kettlebridge Junction Waiting Time Survey Results

Survey Day	Monday		Tuesday		Wednesday		Thursday		Friday	
Time Period	AM	PM	AM off-peak	PM off-peak	AM	PM	AM off-peak	PM off-peak	AM	PM
Vehicles Entering A92	151	167	90	36	239	77	80	44	180	n/a
Vehicles Movements Analysed	45	94	49	21	75	93	46	17	92	n/a
Average Time (Seconds)	26	20	15	14	20	17	17	14	14	n/a
Median (Seconds)	27	14.5	11	8.5	11	13	11	11	14	n/a
Maximum (Seconds)	57	67	60	79	99	59	85	45	50	n/a

Table 3.6: Cross Keys Junction Waiting Time Survey Results

Survey Day	Monday		Tuesday		Wednesday		Thursday		Friday	
Time Period	AM	PM	AM off-peak	PM off-peak	AM	PM	AM off-peak	PM off-peak	AM	PM
Vehicles Entering A92	60	72	31	31	101	74	39	23	96	n/a
Vehicles Movements Analysed	47	57	24	26	82	62	30	20	71	n/a
Average Time (Seconds)	15	25	15	10	18	24	13	9	19	n/a
Median	11	19	10	8	15	16	11.5	6	13	n/a
Maximum	61	138	59	34	71	252	35	31	64	n/a

As shown, the maximum times taken to enter the A92 are significantly higher at Cross Keys crossroads than at Kettlebridge. The Wednesday PM peak survey observed a maximum time to enter the A92 of 252 seconds and during the Monday PM peak the maximum wait was 138 seconds. These greatly exceed the maximum time taken to enter the A92 at Kettlebridge crossroads, with the maximum time taken to enter the A92 99 seconds during the AM peak on Wednesday.

Balfarg

Drive time data provided by BEAR Scotland has been analysed to understand how long it takes motorists to access the A92 from both Western Avenue and Star Road junctions[36]. The main results for Western Avenue and Star Road junctions are summarised below in **Figure 3.24**.

[35] Data provided by BEAR Scotland from the "A92 Freuchie- Vehicle Conflict Study" (2016). It should be noted that results appears to be based on a small sample size only, and it is unclear whether the delay times recorded captures the full extent of vehicle queuing (potentially only capturing times from the front of a queue at the junction).
[36] Again, it is to be noted that that the data appears to be based on a relatively small sample size only and does not appear to reflect the full time it takes to make a manoeuvre – only time from reaching the front of the queue.

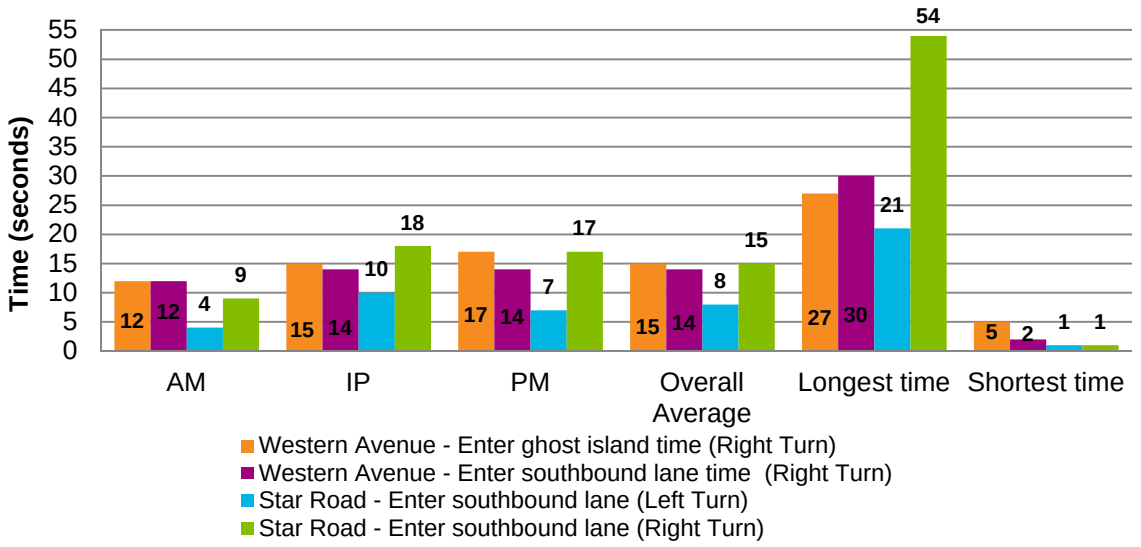


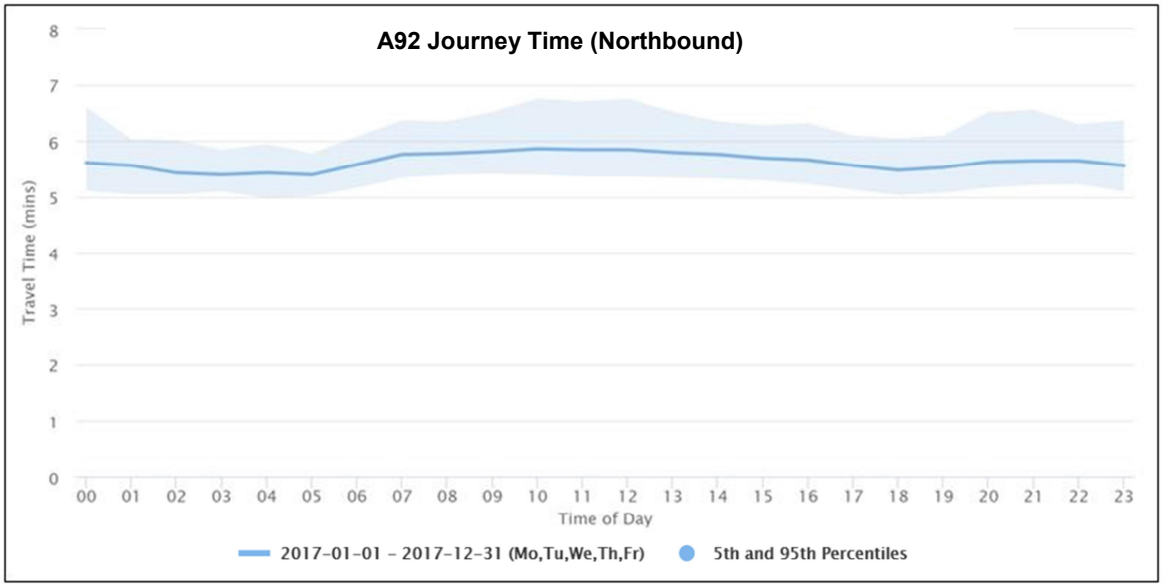
Figure 3.24: Balfarg (Western Avenue and Star Road) Junctions Waiting Time Survey Results

As shown in **Figure 3.24**, it takes on average 15 seconds to enter the ghost island[37] and an extra 14 seconds to enter the southbound lane[38] at the Western Avenue junction. The longest time to access the Ghost Island and the southbound lane was 27 and 30 seconds. A long waiting time in a central reserve potentially introduces conflicts and risk taking manoeuvres. The results show that it takes less time on average to make a right turn at Star Road junction.

3.4.9 INRIX Journey Times

To provide further understanding of journey times, average journey time information has been reviewed based on INRIX data obtained for the route. The data reviewed covered average journey time information for 2017[39]. **Figure 3.25** demonstrates the average journey time profiles for A92 from Kettlebridge junction to Tullis Russel Roundabout by direction.

[37] Enter Ghost island time = Time from waiting at the front of the queue to enter the ghost island
[38] Enter southbound lane time = Time waiting at Central Reservation to access southbound lane turn
[39] Data covered 1st of January to 31st of December for 24 hour per day, weekdays only (Monday to Friday).



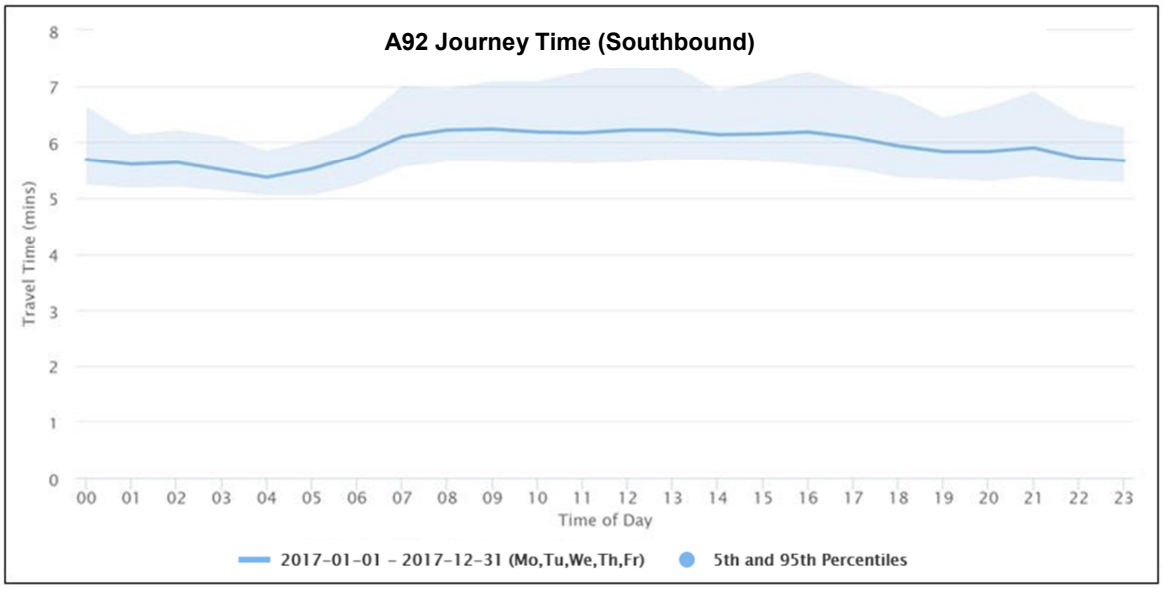


Figure 3.25: Journey Time Kettlebridge to Tullis Russell Roundabout

Figure 3.25 demonstrates that the average journey times for the section of the A92 between Freuchie and Cadham is similar for both directions and that the average journey times are consistent across time periods and by direction. The average journey time between Freuchie and Cadham, for example, is:

- For the AM period: 5 minutes 48 seconds (Northbound) vs 6 minutes 11 seconds (Southbound)
- For the PM period: 5 minutes 34 seconds (Northbound) vs 6 minutes (Southbound)
- For Northbound traffic, the average speed is 41.8 mph for the AM and 43.6 mph for the PM
- For Southbound traffic, the average speed is 39.3 mph for the AM and 40.4 mph for the PM

Figure 3.26 illustrates the average journey times to pass through Cross Keys and Western Avenue junctions for both directions. Journey times were obtained for 1 km distance.

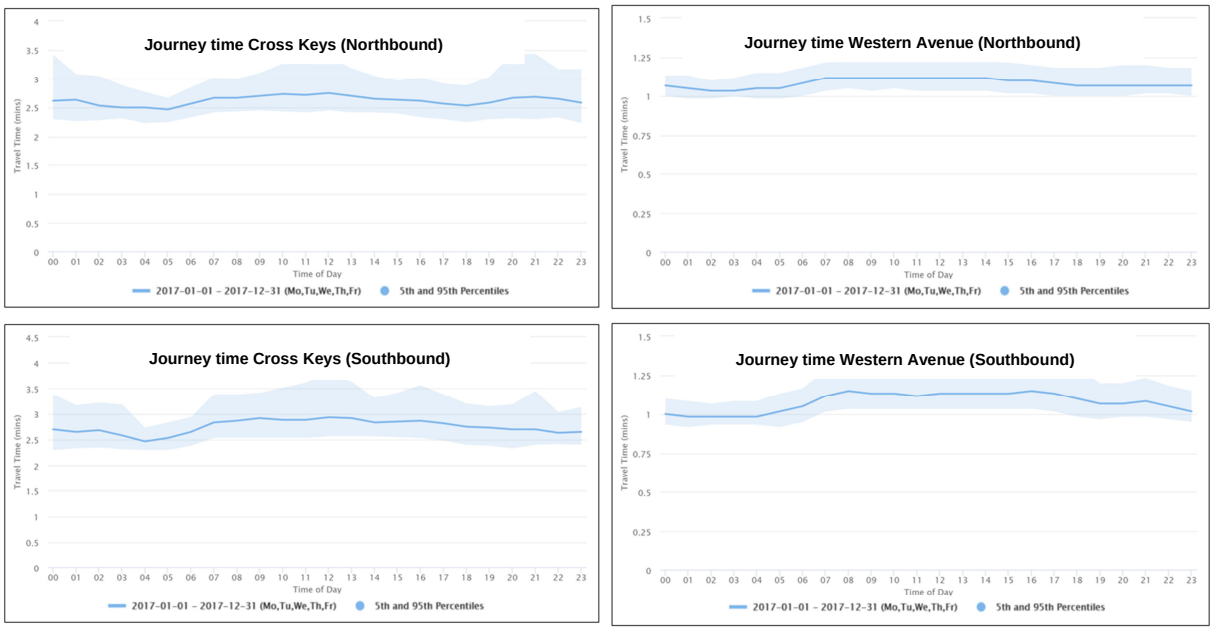


Figure 3.26: Journey Time Cross Keys & Western Avenue junctions

The main findings from the analysis of the INRIX data are shown below:

- The average journey time to pass through the Cross Keys junction northbound in the AM period is 2 minutes 41 seconds and 2 minutes 35 seconds in the PM period whereas to pass through Western Avenue junction it takes 1 minute 7 seconds during the AM period and 1 minute 5 seconds during the PM period.
- The average journey time to pass through the Cross Keys junction southbound in the AM period is 2 minutes 53 seconds and 2 minutes 48 seconds in the PM period, whereas to pass through Western Avenue junction it takes 1 minute 8 seconds in the AM period and 1 minute 7 seconds in the PM period.
- The average journey time to access the A92 from the B936 road (Freuchie) at Cross Keys is 44 seconds during the AM period and 48 seconds during the PM period. The data suggests it takes 1 minute 15 seconds to access the A92 from Freuchie Mill Road during the AM period and 1 minute 32 seconds during the PM period.
- The average journey time to access the A92 from the local road at Western Avenue is 48 seconds during the AM period and 47 seconds during PM period. In addition, it takes approximately the same time to make a right or left turn from Western Avenue road, for example during the AM period it takes around 50 seconds, whereas for the PM period it takes on average 46 seconds to turn left and 50 seconds to turn right.

3.4.10 Speed Surveys

Table 3.7 Error! Reference source not found. presents 85th percentile speed data for the A92 and demonstrates that in the ten year period 2008 to 2018, the average speed in Balfarg has reduced from around 47mph to 39mph in both directions. Average speed results confirm that the 40mph speed limit introduced in Balfarg in 2016 has positively contributed to a reduction in vehicles speeds on this part of the network.

In Freuchie, speed data covering the period 2008 to 2014 indicates that the average speed on vehicles on this part of the network has slightly increased for northbound traffic from around 50mph to 53mph but has stayed at around 52mph for traffic travelling in a southbound direction.

It is to be noted that although the data provides a useful snapshot of speeds at specific points on the A92, these speeds are not necessarily indicative of the entire route.

Table 3.7: 85th Percentile Historic Traffic Speed Data (MPH)

Location	Counter	Direction	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Balfarg Area	JTC00324	South	47.4	47.7	-	46.9	47.0	45.7	47.8	46.1	46.1	40.2	39.0
	JTC00324	North	45.4	45.9	-	45.6	45.5	45.7	48.0	44.9	44.8	39.6	39.0
Freuchie Area	148754	South	49.9	49.5	49.2	53.0	52.6	52.3	52.6	-	-	-	-
	148754	North	52.4	52.3	51.8	52.5	52.2	52.3	52.3	-	-	-	-

Journey Time and Speed Key Findings

- At both junctions in Freuchie some delay can occur for vehicles accessing the A92 during the weekday peak periods, with the maximum waiting time ranging from 2 to 4 minutes.
- At Balfarg, drivers can spend up to 30 seconds waiting in the central reserve to access the A92 from the minor arms. A long waiting time in a central reserve potentially introduces conflicts and risk taking manoeuvres.
- The results from the INRIX data analysis indicates that on the whole, journey times would appear to be consistent across time periods and by direction.

3.4.11 Accidents

Accident data provided by Transport Scotland[40] covering the period 2008 to 2017 has been analysed to provide an overview of safety issues in the study areas.

Freuchie

Figure 3.27 provides a summary of the number and severity of historical accidents that have occurred at the Freuchie junctions.

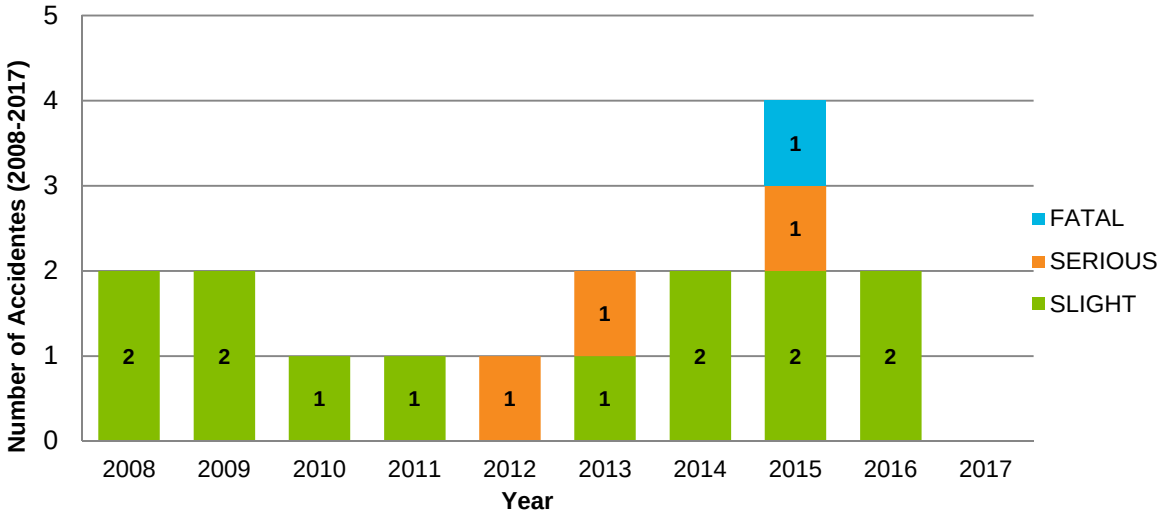


Figure 3.27: Frequency of Accidents by Severity per Year (Freuchie)

In February 2015, a 73 year old car passenger received fatal injuries as a result of a road collision on the A92 at Freuchie. In addition, a total of three serious accidents involved both cars and motorcycles. The primary reasons of serious accidents were poor driving and weather conditions, such as: “Loss of control”, “Careless driving” and “Dazzling sun”. All serious accidents occurred during daylight hours when the road surface was dry.

The spatial distribution of these accidents contained within **Figure 3.28** demonstrates that more recent accidents, including the recent fatality, have occurred at the Kettlebridge junction in comparison to the Cross Keys Junction.

[40] It is to be noted that the accident data analysed does not capture “damage only” accidents

Figure 3.28: Accidents Locations Freuchie (2008-2017)

Balfarg / Cadham

Figure 3.29 provides a summary of the number and severity of historical accidents that have occurred at the Balfarg and Cadham junctions.

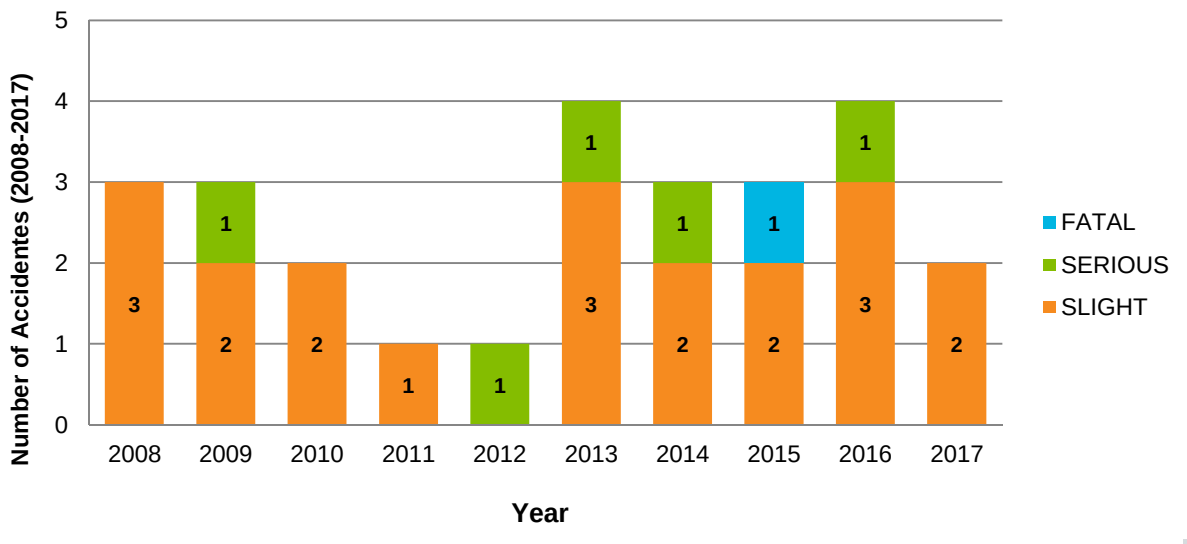


Figure 3.29: Frequency of Accidents by Severity per Year (Balfarg/Cadham)

As shown in Figure 3.29 above, there were a total of five serious road accidents in the Balfarg/Cadham area between 2008 and 2017; of which one was fatal. Four accidents involved either cars or motorcycles and one accident involved a cyclist. According to the accident data, the main reason of serious accidents that involved cars was poor driving, such as: “Failed to look properly” or “Poor turn or manoeuvre”, whereas for motorcyclists the reason was attributable to poor road conditions, namely “Slippery road surface” or “Disobeyed road marking”.

The location of where these accidents occurred is shown in Figure 3.30 and Figure 3.31.

Figure 3.30: Accidents Locations Balfarg (2008-2017)

Figure 3.31: Accidents Locations Cadham (2008-2017)

As shown in **Figure 3.30** above, a clear clustering of accidents is evident at the Western Avenue junction, whereas a single accident was identified at the Star Road junction. At Cadham, there were significantly fewer accidents in total in this study area compared to Balfarg.

Local accident rates (accidents per million vehicle kilometres) have also been calculated for both Balfarg/Cadham and Freuchie study areas. Rates have been calculated in accordance to NESA Manual (2014). To calculate local accidents rates, accident data provided by Transport Scotland for the five year period (2017-2012) and 2017 AADT data for the A92 has been used. The A92 has also been split into sections by road type in order to calculate more accurate accident rates, with results presented in **Table 3.8**. It should be noted that the rates provided are approximate.

Table 3.8: Study Area Local Accident Rates

Section	Section Road Type	Local Rate (2017)
Cadham Junction -Balfarg	Rural, Single Carriageway	0.047
Balfarg -Western Avenue junction	Rural, Dual Carriageway	0.338
Freuchie	Rural, Single Carriageway	0.184

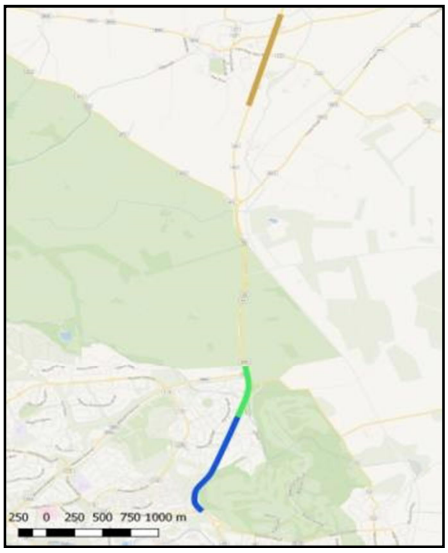


Table 3.8 indicates that local accident rates vary significantly for each section. For Cadham section of A92 the local accident rate is the lowest of all junction in the study area; it is to be noted that accidents occurring at Tullis Russell Roundabout were not included in the Cadham accident rate calculations, as the roundabout falls just outside the study area.

The highest local accident rate was observed for the Balfarg area (0.338). This section includes both Star Road and Western Avenue junctions where, as reported above, a cluster of slight and serious accidents are evident.

Accidents Key Findings

- In Freuchie one fatal and three serious accidents have occurred since 2008, with the majority of accidents occurring at or near the Crosskeys junction.
- At Balfarg, five serious accidents have occurred since 2008, with the majority of the accidents occurring at the Western Avenue Junction. A fatal accident involving a pedestrian occurred 20m to the south of the Star Road junction.
- At Cadham, one serious accident has occurred since 2008.
- The highest local accident rate is 0.338 for dual carriageway at Balfarg, where a cluster of serious and slight accidents have occurred in the five year period from 2012 to 2017.

3.4.12 Conflict Studies

Freuchie

Video recordings of Kettlebridge and Cross Keys junctions undertaken by BEAR Scotland in June 2016[41] have been reviewed to identify conflicts and incidents at these locations. **Figure 3.32** below shows a selection of images which provide a snapshot of the nature of incidents and conflicts at Kettlebridge and Cross Keys junctions.

[41] Surveys took place at Kettlebridge from Monday 6th June to Sunday 12th June and at Cross Keys from period Monday 6th June to Friday 10th June

HGVs Conflicting with Cyclist at Kettlebridge	Overtaking through Cross Keys Junction
	
Right turning vehicles causing delay and conflict	**Tight radii results in bus giving way to minor arm**
	

Figure 3.32: Freuchie Conflict Studies Summary[42]

As shown in **Figure 3.32**, the following key issues were noted from the conflict studies at Freuchie:

- At Kettlebridge junction, 27 incidents or conflicts were observed across the one week survey period. No actual incidents or conflicts resulting in a collision were observed.
- At Cross Keys junction, 9 incidents or conflicts have been identified over a five day survey. Similarly to Kettlebridge junction no actual incidents or conflicts resulting in a collision were observed.
- There is a conflict between turning HGVs and other road users, including cyclists, at the Kettlebridge junction due to the tight corner radii;
- Right turning vehicles from the A92 at both Kettlebridge and Cross Keys result in a delay to strategic A92 traffic due to the lack of storage space which can lead to incidents of following drivers attempting to pass right turning vehicles on the inside across the give way markings of the minor arm of the junction; and
- There were limited instances of vehicles recorded overtaking on the A92 through or near the junction which were not observed by waiting traffic from the minor arms of the junctions.

[42] Snapshots were obtained from the “A92 Freuchie- Vehicle Conflict Study” (2016).

Balfarg

Conflict video surveys were undertaken for a 12 hour period in March 2017[43]. A selection of snapshot images from incidents observed at these junctions is shown in **Figure 3.33**.

Remote Pedestrian Crossing at Western Avenue	HGV Overhang at Western Avenue
	
Two Queuing Vehicles Abreast at Star Junction	**Blocking of Central Reserve at Star Junction**
	

Figure 3.33: Balfarg Conflict Studies Summary[44]

The following key issues were noted from the conflict studies at Balfarg:

- In total, 216 incidents or conflicts were observed during the survey period at the Western Avenue junction whilst at the Star Road junction, 149 incidents or conflicts were observed during the survey period
- The majority of incidents (119) at the Western Avenue junction related to drivers exiting the minor road when there is a vehicle in the central reserve which leads to queuing in the central reserve and reduced visibility for vehicles at the end of the queue. Furthermore long queues could obstruct driving on the main carriageway.
- Another incident identified at the Western Avenue Junction related to pedestrians walking on the verge and crossing the A92 inappropriately. Overall, 10 occurrences of pedestrians crossing the A92, or walking along its verge, were identified.
- The majority of incidents at the Star Road junction (39) were caused by multiple vehicles queuing side-by-side in central reserve. This manoeuvre can reduce visibility for the vehicle waiting in the central reserve and potentially applies pressure on the driver of the vehicle in the central reservation to accept a gap in traffic that may not be suitable.

[43] Surveys were undertaken from Saturday 4th March to Friday 10th March of 2017
[44] Snapshots were obtained from the “A92 Balfarg Junctions” (2017).

Cadham

The video recordings of Cadham junction undertaken in March 2017[45] have been reviewed to identify conflicts and incidents with a selection of incident images shown below in **Figure 3.34**.

Banned Right Turn Movement from A92	Right Turning Vehicle Misjudging Gap
	
Left Turning Vehicle in Opposing Carriageway	**Following Vehicle Braking Sharply**
	

Figure 3.34: Conflicts at Cadham junction[46]

The following key issues were noted from the conflict studies at Cadham:

- 172 incidents or conflicts have been observed during the survey period.
- Overall, 66 incidents were observed caused by vehicles entering the car wash. It is considered that road user confusion arises due to the access to the car wash being situated directly at the junction, thus vehicles following behind do not expect to slow down so abruptly to enter the car wash.
- 40 incidents involved right turning vehicles exiting Cadham Road conflicting with approaching vehicles. Twelve of these incidents resulted in slight braking and another 27 incidents involved more sudden breaking.
- In addition, 42 drivers were identified to illegally turn right from the southbound A92 to enter Cadham Road, including some turning into the opposing carriageway of Cadham Road.

Conflict Studies Key Findings

- Conflict studies have shown that a variety of different conflicts were identified at the junctions in the study area. The majority of incidents were related to drivers exiting minor roads onto the A92. The primary cause of these incidents appeared to be related to junction geometry.
- Average speed results confirm that the 40mph speed limit introduced in Balfarg in 2016 has positively contributed to a reduction in vehicles speeds on this part of the network.

[45] The video records have been reviewed for 12 hours period from Saturday 4th to Friday 10th March 2017.
[46] Snapshots were obtained from the "A92 Cadham Road End – Road User Conflict Study" (2017).

3.4.13 Pedestrian and Cyclists Surveys

Freuchie

In Freuchie, a pedestrian survey was undertaken by BEAR Scotland in January 2015[47].

A summary of the key findings is provided in Figure 3.36 and Figure 3.35.

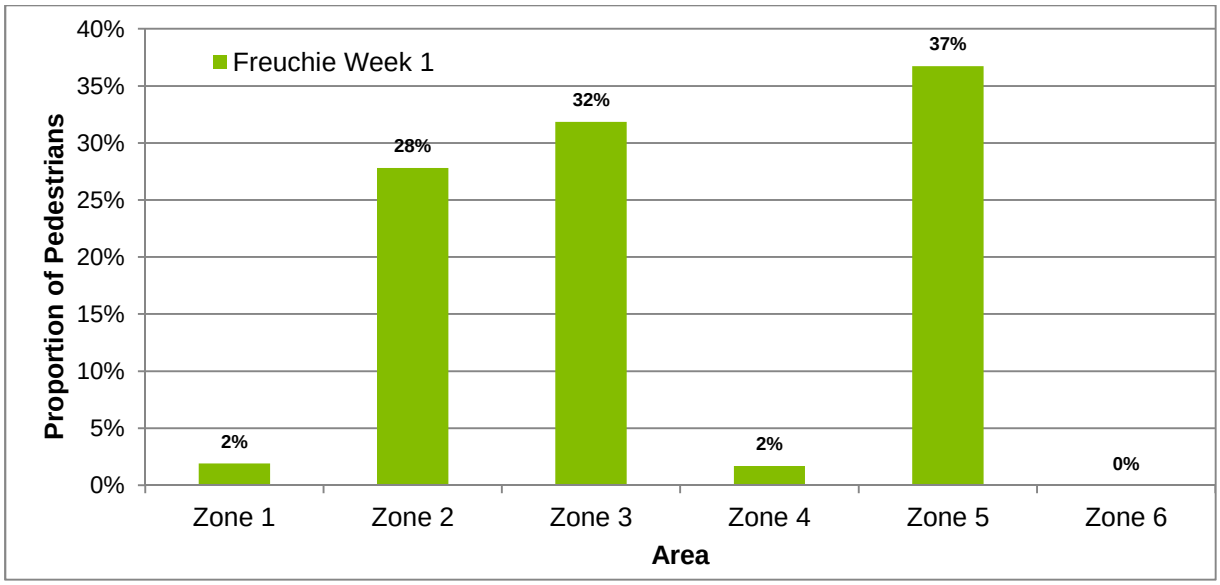


Figure 3.36: Proportion of pedestrian crossings in Freuchie

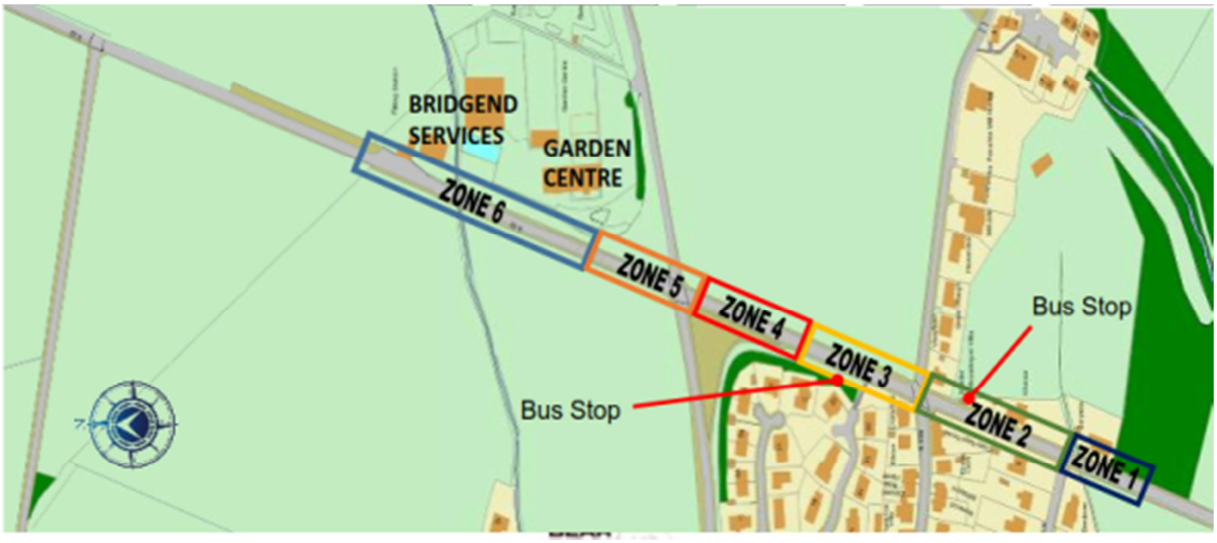


Figure 3.35: Zone locations in Freuchie[1]

37% or 173 pedestrians were observed crossing the A92 in Zone 5, followed by Zone 3 and Zone 2 where 32% or 150 pedestrians and 28% or 131 pedestrians crossed the road. Both Zone 2 and Zone 3 are located in the vicinity of Cross Keys junction, whereas Zone 5 is located further north and covers area of Kettlebridge junction.

Bus stop location is considered to be the main reason why pedestrians crossed near to the Cross Keys junction more actively than in other zones. It is assumed that pedestrians are accessing the Garden Centre, Kettle Produce and the service station in the vicinity of Zone 5.

Overall, 454 pedestrians were recorded crossing the A92 over the seven day survey period (an average of six per hour) with 131 and 150 pedestrians recorded in Zone 2 and Zone 3 and 173 pedestrians recorded in Zone 5.

[47] Surveys were completed over a 12hr period (0700-1900) across the period 23rd January to 29th January 2015. It is to be noted that given the time period of surveys, it may be expected that numbers could be lower than at other times of the year; while the hours of daylight may also have impacted survey results.

Table 3.9: Freuchie Pedestrian Survey Summary

	No. of pedestrians	Sample used to calculate Wait/Cross Times	Average Wait Time (secs)	Min/Max Wait Time (secs)	Average Time to Cross (secs)	Min/Max Cross Time (secs)
Zone 2	131	75	8.4	0/60	6.7	3/12
Zone 3	150	18	5.8	0/20	6.3	4/10
Zone 5	173	38	12.7	0/96	9.2	5/20
Total	**454**	-	-	-	-	-

Crossing and waiting times were recorded to identify any delays or difficulties pedestrians experienced crossing the A92. Average values for each day were calculated and the lowest and the highest values for the survey period identified. As shown in **Table 3.9**, the average waiting time to cross the A92 ranges from around 6 to 13 seconds, with a maximum waiting time of 96 seconds in Zone 5. Average crossing time for pedestrians ranges from 6 to 9 seconds, with a maximum crossing time of 20 seconds in Zone 3.

In addition, analysis of junction turning count data provides an indication of how many cyclists cross the A92 in Freuchie. The number of cyclists crossing the A92 at each junction across the 7 day (24hr) count period is summarised below:

- At Kettlebridge, 10 cyclists cross the A92 on an average day from the west side of High street to the east side.
- At Cross Keys, 20 cyclists cross the A92 on an average day from the Freuchie Mill road to Freuchie.

Balfarg

To understand pedestrian activity in the study area, pedestrian surveys were undertaken by BEAR Scotland was in August and September 2015[48]. The survey was carried out over two different weeks, with the first survey undertaken during the school holidays and the second survey undertaken when pupils had returned to school.

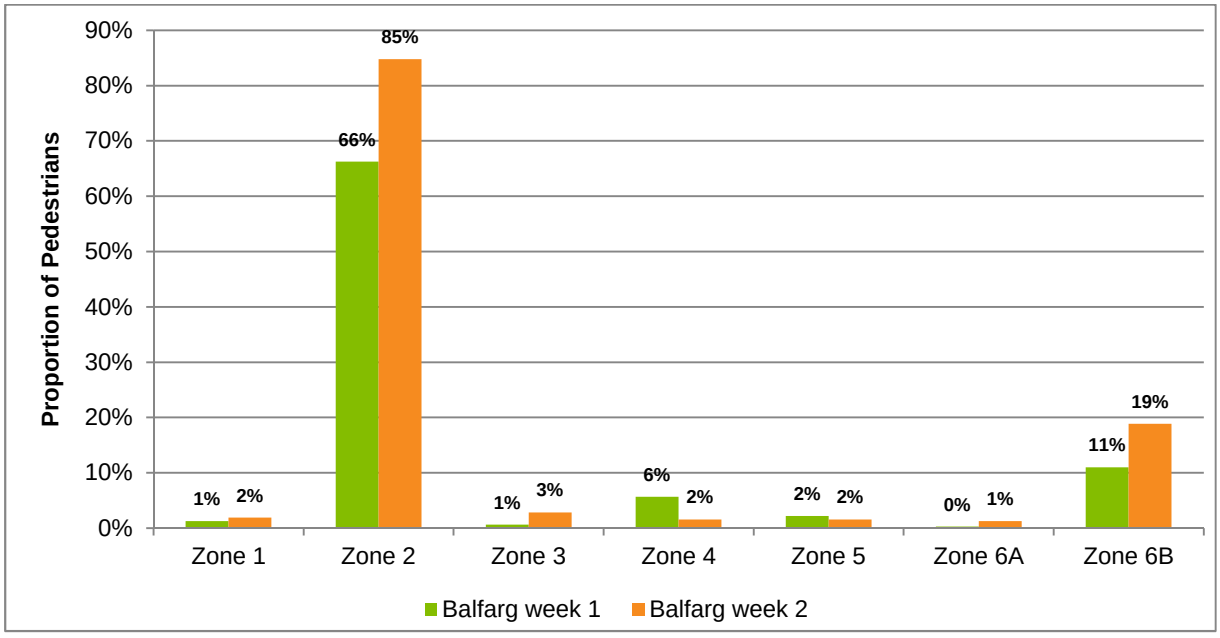


Figure 3.37: Proportion of pedestrian crossings in Balfarg

[48] Surveys were carried out over a seven days (24hr) period on two separate occasions, from Monday 10th to Sunday 16th August 2015 and from Monday 31st August to Sunday 6th September 2015.

As indicated in Figure 3.37, the vast majority of pedestrian crossings (66% - 85%) were recorded in Zone 2, which is located to the south of Star Road junction. Crossing in zone 2 is an uncontrolled pedestrian crossing with the central island over the dual section of A92.

The second most popular area for crossing was Zone 6B, the location near the former junction of Balbirnie Park, where 11%-19% of crossings for the study area occurred.

As shown in Table 3.4.14-1, over the two week survey period, 637 pedestrians were recorded crossing in Freuchie, with 481 pedestrians recorded crossing in Zone 2. The tables also shows that the number of pedestrians crossing the A92 in other zones is significantly lower than Zone 2 e.g. only, 60 pedestrians crossed the A92 at Zone 6B in Week 2 and just 9 pedestrians at Zone 3.

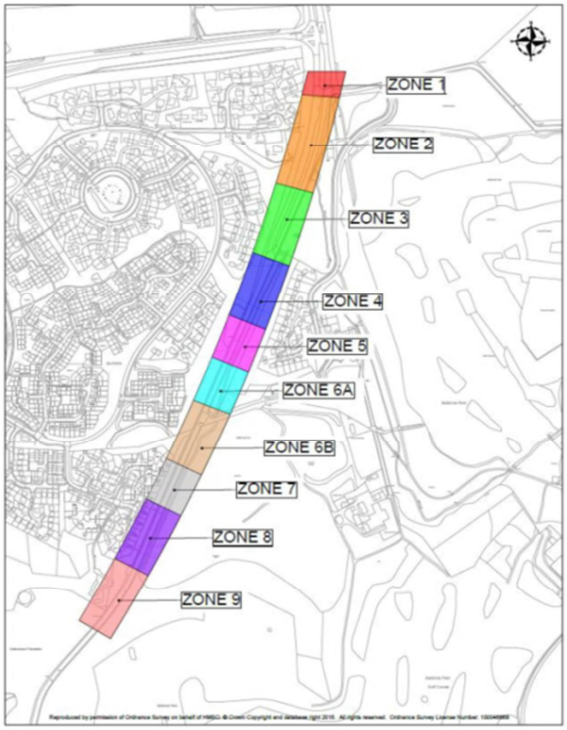


Figure 3.38: Pedestrian Zone Locations

Crossing and waiting times for Zone 2 were recorded to understand any delays or difficulty which occurred for pedestrians attempting to cross the A92. Average values for each day were calculated and the lowest and the highest values for the survey period were identified. These are also shown in **Table 3.10**, which indicates that the average waiting time to cross the A92 is around 9 seconds, with a minimum recorded waiting time of 5 seconds and a maximum average waiting time of 18 seconds.

Table 3.10: Balfarg Pedestrian Survey Summary

	Number of pedestrians	Average Waiting Time (secs)	Min/Max Waiting Time (secs)	Average Time to Cross (secs)	Min/Max Cross Time (secs)
Week 1	211	9.6	6/18	17.9	16/19
Week 2	270	9.0	5/14	18.1	12/22
Total	481	-	-	-	-

The average time to cross the A92 varies but is around 18 seconds on average with the minimum average crossing time of 12 seconds and the maximum average crossing time of 22 seconds. It should be noted that a central island in Zone 2 allows pedestrians to cross a single lane of traffic at a time, thus the actual time to cross the carriageway is assumed to be longer.

In addition, analysis of junction turning count data also provides an indication of how many cyclists cross the A92 at Balfarg. The turning counts surveys were conducted over 7 days and cover a 24 hours period. The number of cyclists crossing the A92 at each junction in Balfarg is summarised below:

- At Western Avenue, 3 cyclists on average cross the A92 during an average day from the northern A92 arm of the junction to Balfarg.
- At the Star Road junction, no cyclists were observed crossing the A92 during the average day from the southern arm of the junction on to Star Road.

Pedestrian and Cyclist Surveys Key Findings

- In Freuchie, the majority of pedestrians were observed to cross the single carriageway section of A92 to the north of Kettlebridge junction, where there is no appropriate crossing facility.
- In Balfarg, the majority of pedestrians cross the dual carriageway section of A92 to the south of Star Road junction. That junction is an uncontrolled pedestrian crossing with the central island.

3.5 Stakeholder Engagement

Given previous consultation activities in the study areas, at an early stage of this study it was agreed that no new consultation would be undertaken, with this stage in the process instead focused on consolidating a record of previous consultations and engagement activities. The following section presents an overview of stakeholder engagement activities undertaken as part of the development of previous studies and reports, and highlights the long history and strong community views on the need for actions to improve junctions in the study areas.

A summary of public and stakeholder engagement conducted from previous relevant studies is presented below:

- **A92 Upgrade Petition – petitioned by Dr Robert Grant on behalf of GAFG:** As set out in Table 2 earlier in this report, the petition was submitted to the Scottish Parliament in July 2013 with 3,250 figures urging for immediate improvements and upgrades to the A92. As a result of the petition, Transport Scotland and BEAR Scotland carried out a Transport Appraisal, in the line with STAG, on the section between Preston Roundabout and Balfarg junction, to the north east of Glenrothes.

- **A92 Preston to Balfarg STAG – BEAR Scotland:** The A92 transport appraisal involved a stakeholder consultation workshop attended by various parties including Local Councillors, officials from Fife Council, members of the local community, MSP's representatives and representatives of Transport Scotland and BEAR Scotland. The workshop was used to discuss transport issues within and in close proximity to the study area, develop draft transport objectives and generate a list of potential improvement options. The views of stakeholders which emerged at the consultation workshop informed the various stages of the Transport Appraisal study.

- **Fife A92 Action Plan – Fife Council:** Detailed consultation was carried out through public meetings, liaising with Community Councils, local groups and local Members. Over 80 people attended a public meeting in March 2015 hosted by GAFG which included representatives of BEAR Scotland, Transport Scotland, Fife Council, Police Scotland as well as a number of local Members. Consultation fed into the formulation of a comprehensive list of feedback and proposals for the A92 north of Glenrothes. In response to the A92 Action Plan, the then Minister for Transport and Islands instructed Transport Scotland to review each of the proposals in the Action Plan in terms of their potential to further improve safety on the route and to report back to the local community. Transport Scotland established a Technical Working Group to facilitate joint working between those responsible for road improvements in Fife, including Fife Council, Police Scotland, and BEAR Scotland. The group met in November 2015 to explore the evidence base, benefits and costs of a range of safety improvements. Transport Scotland provided a detailed response to the priority proposals in the Action Plan and confirmed the steps that Transport Scotland had taken and planned to take, to further improve safety on the A92.

- **A92 Consultation on a One-Way concept for Cross Keys & Bridgend junctions, Freuchie – Fife Council:** Fife Council supported Freuchie Community Council to undertake a widespread consultation in the village on the concept of a one-way traffic system to the west of the A92 trunk road. 650 questionnaires were distributed to local residents and businesses in Freuchie, of which 264 responses were received. The questionnaire asked for a Yes or No vote for the support of a one-way system in Freuchie, reasons for this answer and any other comments about the A92 through Freuchie. Of the 258 responses that provided a vote; 170 were in favour of a one-way system and 88 against therefore showing that the majority were in favour of the concept. Common themes raised in the majority of comments related to:

    - It was not considered that a one-way system (good or bad) would address the bigger issue of getting on to the A92, or into the village form the A92;
    - A roundabout or traffic light junction would be needed at Kettlebridge. Without a roundabout, it would be made more difficult to exit the junction with two lanes due to sightlines being blocked;
    - Traffic speed on the A92 was considered to be a more major issue and reduced speed limit would help getting on and off the A92 and a roundabout would help to slow traffic;
    - A pedestrian crossing at Cross Keys and better general pedestrian facilities were felt to be needed on the A92; and
    - The one-way would require all agricultural vehicles that currently cross over the Bridgend junction to make a left turn southbound on the A92 then turn right at Cross Keys junction and through the village causing greater concern and potential longer queuing on the A92.

Despite the overall majority of the community being in favour of the one-way concept, there were also clear view expressed that the concept would not provide a very obvious or straightforward solution to a problem that many felt has never been clearly identified, based on factual data. The Freuchie Community Council expressed a view in their correspondence that an experimental one-way system may be the most appropriate way to proceed if the concept was considered viable.

- **Community Street Audit Report, Freuchie – Living Streets:** Living Streets worked with Transport Scotland to engage with local residents in Freuchie to explore barriers to walking in the vicinity of the A92 and identify improvements. In September 2017, a community street audit (CSA) was conducted with local residents, walking key routes and discussing and recording issues that encouraged or discouraged everyday walking. Twelve people took part in the CSA, including seven members of the local community, representatives of Fife Council and BEAR Scotland and two individuals representing Stagecoach. In addition to the CSA, wider consultation was carried out with groups and individuals who could not partake in the walk. A 'walk to school' was undertaken with seventeen children from the local school. Discussions were also had with a representative of local older people, the Chair of the "Over-50s" group and a representative of local younger adults. Following the consultations, barriers identified by participants were outlined alongside suggested practical solutions to overcome them.

Over the years, there have been a number of Community Council consultations regarding issues on the A92 corridor. Representatives of the GAFG met the former Transport Minister and Transport Scotland officials in March 2017 at Holyrood to discuss long-standing calls to improve a number of reported accident black spots on the route. The Transport Minister subsequently visited the site in March 2018. Most recently, officers from Transport Scotland and BEAR Scotland attended meetings with the respective Community Councils of Freuchie and Glenrothes in April 2018. The following section summarises key outcomes and main issues that arose from each meeting:

- Freuchie Community Council meeting, April 2018: Various actions were agreed on the back of this meeting, including arranging signing improvements and alterations to signs and landscaping and inviting a represented from Kettle Produce to future meetings of the Group. Concerns were raised over Kettle Produce's application for increased parking and overhanging vegetation around Cross Keys. It was also questioned whether vehicle activated signing could be installed at busy junctions.
- North Glenrothes Community Council meeting, April 2018: Following this meeting, Transport Scotland was requested to provide accident data whilst the Community Council was to invite the local MSP to future meetings.
- North Glenrothes Community Council meeting, August 2017: Actions arising from this meeting included: progress the design for the traffic signs and road markings to detailed design, road markings to be replaced by BEAR Scotland, community to press for a bus service into Tofthills Estate and Transport Scotland were to share the A92 Balfarg/Balbirnie Pedestrian Crossing Feasibility Report when approved. The group also discussed the current status and initial key findings of the conflict studies undertaken at the two Balfarg junctions and at Cadham Road junction. Next steps involved BEAR Scotland finalising the Cadham Road End junction Conflict Study for review by Transport Scotland for review.
- Freuchie Community Council meeting, August 2017: Actions arising from this meeting included: BEAR Scotland to continue to liaise with Kettle Produce in consultation with Police Scotland to encourage improved driver behaviour amongst employees, delivery vehicles and subcontractors, Transport Scotland were to investigate the planning application further and whether they have been consulted, Fife Council to review diversion strategy at Kettlebridge Junction, BEAR Scotland to investigate the installation of a traffic island at Freuchie Filling Station and to check the contact details held for the Community Councils to ensure that details of future works be passed to affected groups.

It is also noted that the Community Councils of North Glenrothes, Markinch and Freuchie all have highly active Facebook pages with a combined total of over 2000 followers. There is also a dedicated 'Make the A92 Safe!' Facebook page which has over 300 followers and regular posts on latest news including accidents on the A92.

As part of this study, consultation has also been undertaken with the Road Haulage Association (RHA)[49] to understand any impacts on (contact was also made with the Freight Transport Association, but no response was received). Discussion identified the following points in relation to the A92:

[49] Call with Chris Little at RHA on 26/07/18 and summary of discussion verified electronically 30/07/18.

- RHA members contacted prior to the discussion identified no issues relating to haulage vehicles manoeuvring at any of the junctions on the A92 study network.
- It was identified that anecdotal information relating to difficulties with HGV negotiating junctions located in Freuchie and Balfarg was not necessarily uncommon across the trunk road. A comparison was drawn to the A1 and the A90 north of Dundee which has a number of junctions with similar constraints
- Whilst there was no specific reported issues at the Balfarg junction, it was identified more generally that junctions with central reservations are always problematic to accommodate right turning HGVs due to the limited storage space they allow for these larger vehicles. At these junctions with central reservations, HGVs are often required to turn right from a minor arm in one movement which can present safety risks and delay to journey times.
- Any improvement implemented at these junctions would be welcomed by the RHA.
- In terms of option development, it was emphasised that north – south journey times on the A92 should be considered when developing options given that shorter journey times has multiple benefits for hauliers from both a road safety and fuel consumption perspective.
- With cognisance of this, the most desirable option from RHA's perspective is that trunk road junctions are grade separated in nature given that this would not adversely impact upon north-south journey times on the A92. However, it was acknowledged that there may be constraints which would inhibit the delivery of grade separated junctions at these locations.
- In light of this, a roundabout at both Balfarg and at Freuchie was regarded by the RHA as a logical potential solution to explore further.

3.6 Future Impacts on the Corridor

3.6.1 Local Development Plan Allocations

The Fife Local Development Plan (2017) (FIFE plan), which was adopted by Fife Council in September 2017[50], identifies the planning policies and proposals for the development and use of the land across Fife.

FIFE plan allocates a number of potential development sites within the vicinity of the study network which could have a potential future impact on the junctions under consideration on the A92.

Figure 3.39 shows the location of allocations within a close proximity to the junctions under consideration while **Table 3.11** provides further detail on the respective allocations.

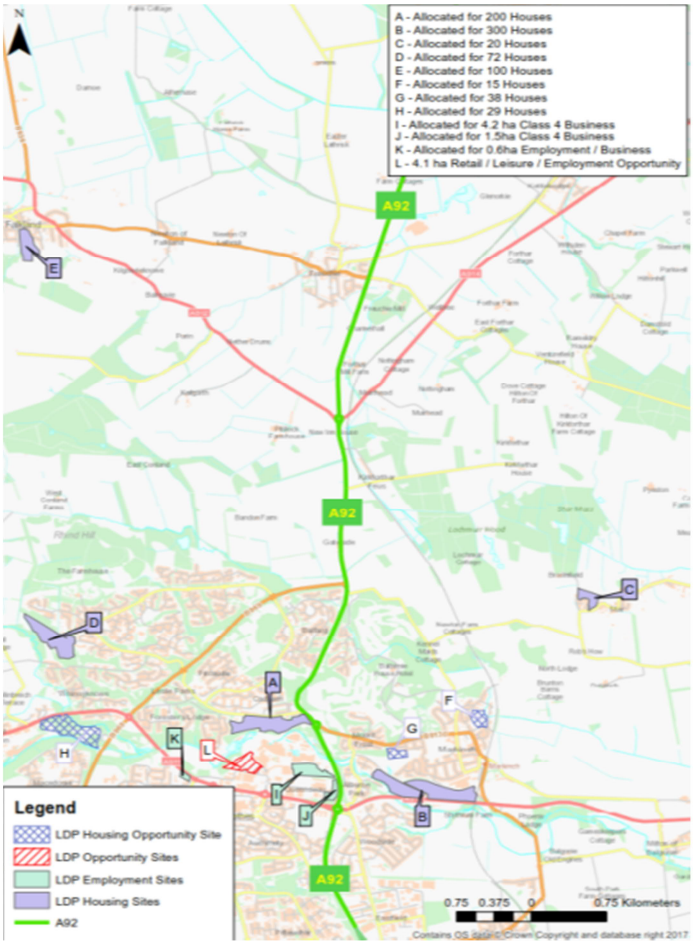


Figure 3.39: FIFEplan Allocations in Proximity to A92 Study Area

[50] https://www.fifedirect.org.uk/topics/index.cfm?fuseaction=page.display&p2sid=D61AC1F5-DD4B-CE6A-51E3BDDED79D5ABC&themeid=2B482E89-1CC4-E06A-52FBA69F838F4D24

Table 3.11: FIFEplan Development Land Allocations[51]

Map Ref	FIFEplan Ref	Site Name	Size	Development Allocation	Anticipated Impact on A92 Junctions
A	GLE024	South of Cadham Road	9.9 ha	• 200 House (Estimated)	• FIFEPlan specifies that primary access to the site should be taken from A92 Tullis Russell access. • Likely to result in an increase in traffic demand at A92 junctions on the study network compared to the existing situation.
B	MAR001	Markinch South	13.8 ha	• 300 Houses (Estimated)	• May result in a marginal increase in traffic demand at A92 junctions in the study network compared to the existing situation.
C	SOM001	West End Dairy	1.7 ha	• 20 Houses (Estimated)	• Limited Impact
D	GLE001	Balgeddie Riding School	9.2 ha	• 72 Houses (Under Construction)	• Limited impact
E	FAL001	St John's Works	3.7 ha	• 100 Houses (Estimated) • 0.5 ha Employment Land	• May result in a marginal increase in traffic demand at A92 junctions in the study network compared to the existing situation.
F	MAR003	Brunton Road	2.4 ha	• Housing Opportunity Site for 15 Houses (Estimated)	• Limited Impact
G	MAR002	Sweetbank Park Terrace	1.5 ha	• Housing Opportunity Site for 38 Houses (Estimated)	• Limited Impact
H	LES001	Leslie House	10 ha	• 29 Houses (Planning Permission Granted)	• Limited Impact
I	GLE024, GLE025	Queensway Expansion	9.3 ha	• 200 Houses • 4.2 ha of specialist Class 4 Employment Land	• Likely to result in an increase in traffic demand at A92 junctions on the study network compared to the existing situation.
J	GLE024, GLE025	Queensway East	3.8 ha	• 1.5ha of Class 4 Employment Land	• Likely to result in an increase in traffic demand at A92 junctions in the study network compared to the existing situation.
K	GLE015	Land at Leslie Road	0.6 ha	• 0.6ha of Employment / Business Land	• Limited Impact
L	GLE030	Queensgate	4.1 ha	• Opportunity Site for 4.1 ha of retail, leisure, employment. Site has current planning consent for bulky goods retailing.	• May result in a marginal increase in traffic demand at A92 junctions in the study network, particularly HGVs, compared to the existing situation.

3.6.2 Live Planning Applications

It is understood that there are current proposals to redevelop the Former Tullis Russell Paper Mill. A Planning Application for a Planning Permission in Principle (PPiP) (Planning Reference: 18/01756/EIA) was submitted to Fife Council in June 2018. It should be noted that this is a live planning application that has not yet been considered by Fife Council and therefore does not have any planning consent.

The boundary of the application site, which is identified in **Figure 3.40** is made up of the following

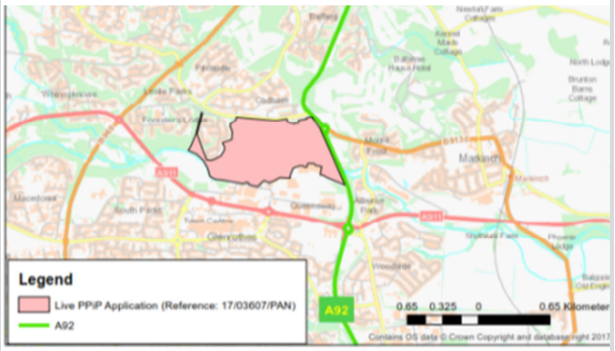


Figure 3.40: Rothes Mill Re-Development Site Boundary

[51] FIFEplan (2017)

sites identified in the Fife Council Local Development Plan (LDP):

- GLE004 - Land to South of Cadham Road, Housing (Est. 200)
- GLE025 - Queensway Expansion, Employment
- GLE030 – Queensgate, Development Opportunity Site/Retail/ Leisure/ Employment

It is understood from review of relevant documents attached to the planning application that the intended development content constitutes a mixed use development which would include approximately 850 homes as well as various industrial, commercial, retail and leisure uses.

Vehicular access to the site is proposed from the existing A92 / B9130 roundabout, two priority junctions located on Cadham Road and the existing Queensgate roundabout. In addition, the development proposals incorporate an internal link road which would connect the Rothes Mill / A92 roundabout with Cadham Road.

A Transport Assessment (TA) has been prepared by Systra Ltd. which involved a detailed micro-simulation modelling assessment of the proposed development on the surrounding road network. At the time of writing, Transport Scotland has yet to be formally consulted on the planning application and therefore has not yet been issued a copy of the TA for audit.

The model extents include the A92 between the A92 / Queensway / A911 roundabout and the A92 / B969 priority junction. Outcomes of the TA including the modelling assessment led to the identification of the following off-site traffic related mitigation:

- Upgrade of the A92 / B9130 roundabout to traffic signal control (including pedestrian infrastructure);
- A contribution to FIFEplan strategic improvements to the upgrade of the A92 / A911 / Queensway / Woodside Way Roundabout;
- A contribution to FIFEplan strategic improvements to the upgrade of the A92 / B921 / Woodside Way Roundabout.

In addition, Paragraph 6.6.2 of the TA identifies that the delivery of the internal link road *"will offer an alternative route to existing drivers currently using the problematic A92 / Cadham Road junction. While out with the powers of the developer, this new road may also provide Fife Council with an opportunity to potentially close the existing A92 / Cadham Road junction (subject to the provisions of the Roads {Scotland} Act 1984)."*

3.7 Wider Constraints and Opportunities

In addition to analysis of problems and opportunities, STAG requires consideration of wider constraints and opportunities. A summary of identified constraints and opportunities based on review of previous documents, a high level environmental baseline review, and site visit is presented below.

3.7.1 Constraints

A high level review of constraints in the study areas have been undertaken, with key constraints summarised below:

- Environmental Constraints: An environmental baseline review has been undertaken as presented in **Figure 3.41**. This shows that across the study area, there are numerous areas of woodland sites. There are also a notable number of archaeological sites, particularly around Balfarg.
- Physical Constraints: While design work would be required to understand the potential land requirement for options, it is noted that the junctions under consideration in this study are located in close vicinity to various residential and other physical constraints e.g. the Cross Keys junction is located in close vicinity to nearby residential properties while there is a car wash service at the Cadham Road junction. Previous studies have also suggested that geometry of the A92 itself contributes to visibility issues on the road.

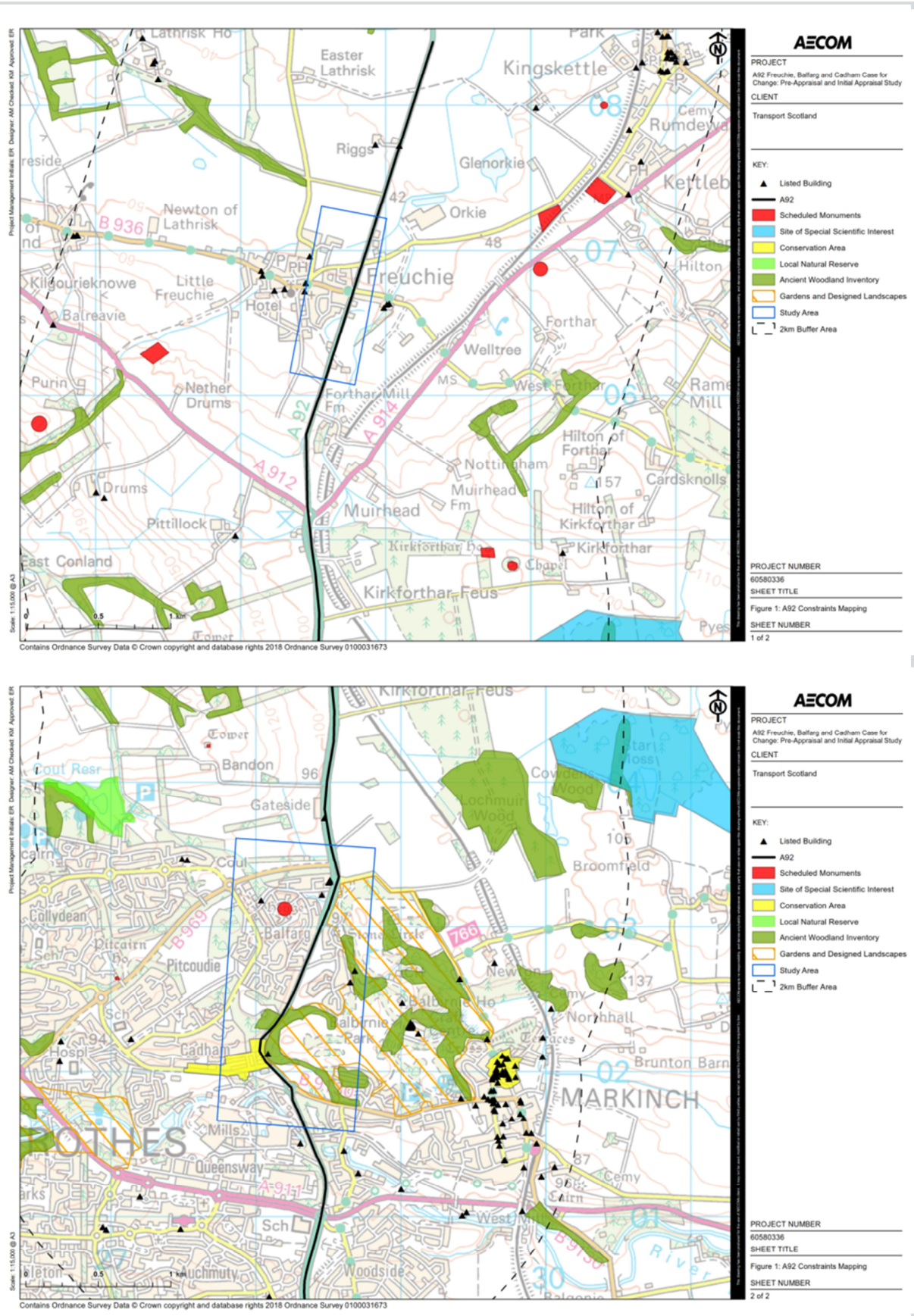


Figure 3.41: Environmental Constraints Mapping

3.7.2 Opportunities

An analysis of opportunities in the study areas which the development of transport improvements could help to realise are summarised below:

- Promoting Active Travel: As set out in the review of travel trends, car remains the dominant mode of transport in the study areas, including for journeys under 5km in distance; trips which are commutable by active travel with the right infrastructure in place.
- National Cycle Network: It is understood that previous discussions have taken place between Sustrans and local stakeholders regarding the potential to realign the National Cycle Network (NCN) within the study area. Any changes could have implications for the need for active travel enhancements to connect in with a realigned NCN.
- Funding Opportunities: Over recent years, in line with the increasing policy focus given to active travel, increased funding has been made available through various sources for the implementation of pedestrian and cycle facilities. The availability of additional funding may support the development of active travel infrastructure in the study areas.
- Development Opportunities: Transport Assessment work for the redevelopment of the former Tullis Russell paper mill has indicated the potential for the development proposal to address wider issues in the study area, including the potential closure of Cadham Road.

3.8 Problems and Opportunities Summary

Based on the evidence gathered in Sections 3.2 to 3.7, a summary of problems and opportunities for each junction has been prepared as set out in the following sections.

3.8.1 Freuchie

Problems
Severance: No dedicated crossings or footways at Kettlebridge; **Limited Public Transport Provision:** Absence of bus stop facilities at Kettlebridge junction; **Conflict:** Radii results in turning HGVs encroaching onto opposite carriageway, resulting in drivers overtaking and undertaking through junctions; **Community Safety Concerns:** One fatal and two serious accidents at the junctions within the last 5 years; **Delay and Conflict:** Right turning A92 traffic causes minor delay for strategic traffic and creates conflict as a result. There is also delay for pedestrians crossing the road due to high traffic volumes and limited gaps to cross; and **Constrained Visibility:** Vertical visibility issue to the south at the Cross Keys junction.
Issues
High HGV Usage: Kettlebridge Road heavily used by HGVs; **Pedestrian Trip Attractors:** Petrol station, garden centre, bus stops, Kettle Produce located to east of A92; **Cycle Routes:** Junctions located on key designated cycle routes including NCN Route 1 and both are relatively well used by cyclsts. **Ageing Population:** Freuchie's ageing population may increase the number of vulnerable pedestrians in the future that look to cross in the study area; **School Pupils:** School pupils use bus stops on the A92 for journeys to school; and **Driver Confusion:** Historic crossroads configuration causes driver confusion over right of way
Opportunities
Potential Land Availability: Land adjacent to Kettlebridge junction for any future junction improvements; **Encouraging greater active travel:** Given the presence of pedestrian trip attractors on the east side of the A92, there is an opportunity to encourage greater active use. Recent study work undertaken in the area provides a basis to take forward improvements.
Constraints
Residential Premises: Cross Keys junction is constrained by nearby residential properties.

3.8.2 Balfarg

Problems
Conflict: Right turning vehicles from minor arms can block central reservation, queue abreast and HGVs can overhang; **Driver Confusion:** Drivers unclear on assumed priority at the Western Avenue junction; **Delay:** Some evidence to suggest delay for right turning vehicles in both directions at the Western Avenue junction; **Community Safety Concerns:** Cluster of historical collisions at Western Avenue junction; and **Severance:** Pedestrian provision across A92 to access bus stops north of Western Avenue junction poor
Issues
Potential Pedestrian Uplift: Pedestrian crossing south of Star Junction to become designated as Pilgrim Way.
Opportunities
Improved Bus Stop Access: Opportunity to improve access to bus stops located on the east side of the A92; **Committed new crossing:** May improve opportunities to reduce delay for right turning vehicles and will improve pedestrian connectivity; **Increased Active Travel:** 40% of local residents commute to workplaces that are located within 5km.
Constraints
Environmental: The junction is located adjacent to ancient woodland area, archaeological sites and gardens and designated landscapes.

3.8.3 Cadham

Problems
Conflict: Drivers (42 per week) not adhering to the right turn ban, vehicles travelling westbound in the eastbound lane on Cadham Road, vehicles accessing the car wash result in following vehicles breaking sharply; **Delay and Conflict:** Visibility is severely constrained for right turning traffic from Cadham Road; **Poor Active Travel Connectivity:** High vehicular flow and lack of facilities creates difficulty crossing, particularly for cyclists.
Issues
Potential future unconsented development: May increase vehicular and active travel demand at junction; **Bus Movements:** Bus routes utilise Cadham Road and turn right out of the junction; **Off-road local cycle routes:** Located immediately adjacent to the junction and serve as main route to Markinch Railway Station.
Opportunities
Potential Future Unconsented Development: Opportunity to close Cadham Road; **Committed new crossing:** May improve opportunities to reduce delay for right turning vehicles; **Increased Active Travel:** 40% of local residents commute to workplaces that are located within 5km whilst Markinch Railway Station is located less than 2km to the east.
Constraints
Environment: The junction is located adjacent to ancient woodland area, conservation area, a listed building and gardens and designated landscapes. **Car Wash:** Located immediately adjacent to the junction; **Road Geometry and Woodland Area:** Visibility issue constrained by A92 geometry and woodland area.

Transport Planning Objectives

04

4. Transport Planning Objectives

4.1 Introduction

Objective setting is a key stage of the STAG process and is necessary to ensure the objective appraisal of transport options. The 'objectives' central to the process are:

- The Transport Planning Objectives (i.e. those adopted for the study in question);
- The STAG Criteria; and
- The Scottish Government's established policy directives, including the Purpose and National Outcomes.

As specified in STAG, Transport Planning Objectives (TPOs) should:

- Be based on a comprehensive understanding of the problems and opportunities associated with the study area; and
- Confirm the outcomes sought by the study, but not any interventions that may facilitate their achievement;
- Provide clarity in the appraisal of transport options, and facilitate objective-led, informed outcomes.

Any application for Scottish Government funding, support or approval will be partly assessed on the extent to which there is a clear and justified objective setting exercise.

4.2 Objective Development

TPOs for the study have been developed based on the outcomes of the tasks outlined in Chapters 2 and 3. The TPOs have also been subject to internal discussion with Transport Scotland and BEAR Scotland. Consultation revealed broad levels of agreement with the TPOs, with stakeholders agreeing that the TPOs reflected the aims and aspirations for how the junctions subject to assessment in this study should perform in the future.

The TPOs developed for the study are detailed in **Table 4.1**.

Table 4.1: Study Transport Planning Objectives

Objective
TPO1 – Reduce road user conflict at junctions on the A92.
TPO2 – Encourage increased active travel use and improve access to public transport by reducing severance caused by A92 traffic volumes.
TPO3 – Maintain journey times and journey time reliability on the A92 by reducing the potential for incident and delay at junctions along the route.
TPO4 – Enhance access to local employment and services through improving vehicular accessibility of the strategic road network for communities on the A92.

The STAG process requires the development of TPOs that are SMART (i.e. Specific, Measurable, Attainable, Relevant and Timed). Within these criteria, the objectives have been subject to the following assessment:

Criterion	Assessment of Objective
Specific	Does the objective say in precise terms what is being sought? o What does the objective want to accomplish? o Why do we want to achieve the objective? o Who will be involved? o Where is it going to happen?
Measurable	Does the objective say how the achievement will be measured? o How will progress towards the objective be measured?
Attainable	Can the objective be reached? o How will the objective be accomplished?

Relevant	Is the objective relevant to the study? Is it worthwhile? Does it meet the needs of the study?
Timed	What are the timescales for the objective? What is the target date for achieving the outcomes?

Table 4.2 demonstrates how the TPOs have been developed to align with SMART principles.

Further interpretation of the evidence-based approach used to develop the TPOs is shown in **Appendix A** which demonstrates how the TPOs align with the principal problems identified in Chapter 3.

Table 4.2: Development of SMART TPOs

TPO	*Source*	Specific	Measurable	Attainable	Relevant	Timed
TPO1: Reduce road user conflict at junctions on the A92.	*Review of accident data indicate a clustering of accidents, particularly around the Balfarg junctions. Previous studies have indicated conflicts and the perception of road safety risks due to conflicts at junctions in the study area.*	Objective relates to reducing the number of accidents and conflicts occurring at the junctions within the study area.	Review of accidents data. Completion of Conflict Studies post-implementation of improvement measures (using previous Conflict Studies for baseline comparison purposes).	Requires investment in Infrastructure to address problems and issues identified for respective junctions.	Accident data and previous studies indicate a clustering of accidents at junctions in the study area and perceived road safety concerns associated with the potential for vehicle conflicts.	This objective should be related to 20-year period (in line with STPR).
TPO2: Encourage increased active travel use and improve access to public transport by reducing severance caused by A92 traffic volumes.	*Previous study has shown that there is limited provision for active travel infrastructure in the study area, with recent studies highlighting concerns over access for active travelers including access to public transport facilities.*	Objective relates to encouraging active travel, in line with wider modal shift policy aspirations, particularly for short trips.	Proportion (modal share) of trips made by pedestrians and cyclists. Data collected via pedestrian surveys and from traffic counts.	Requires the implementation of improved active travel infrastructure and measures to improve safety (actual and perceived) of road users on the A92.	Both Balfarg and Freuchie provide access to a number of local and national cycle paths and core paths network, thus there is an opportunity to encourage more active travel trips by providing improved crossing facilities on the A92.	This objective should be related to 20-year period (in line with STPR).
TPO3: Maintain journey times and journey time reliability on the A92 by reducing the potential for incident and delay at junctions along the route.	*Access to/from the local roads was identified as an issue which results in a level of delay for strategic traffic on the A92, with junction turning data highlighting longer times during morning hours.*	Objective relates to reducing the potential for incidents at A92 junctions, supporting increased route resilience through the maintenance of journey times and journey time reliability for strategic journeys on the A92.	Journey time surveys across the study area as well as recording of the number of accidents associated with delays, repeated post-implementation of improvements at junctions.	Requires implementation of measures which reduce the potential for conflicts (and therefore incidents and delays) at junctions on the A92.	This objective aims to support resilient journey times and journey time reliability on the A92, recognising the importance of the trunk road as a strategic route, by reducing the potential for delays associated with incidents at A92 junctions.	This objective should be related to 20-year period (in line with STPR).
TPO4: Enhance access to local employment and services through improving vehicular accessibility of the strategic road network for communities on the A92.	*Review of previous studies and consultations highlighted concerns related to access onto the A92 for communities across the study area. Census data indicates the importance of the A92 as a route to employment for communities in the study area.*	Objective relates to improving vehicular accessibility of the A92 so that it provides better access to local services and employment for communities in the study area.	Turning count surveys and traffic data to show higher traffic volumes and reduced delay for those travelling to and from local communities.	Requires implementation of measures to improve vehicular access onto the A92 from local road junctions.	Access to/from the local road network was identified as an issue in the study area. Turning count data highlighted longer wait times during morning hours.	This objective should be related to 20-year period (in line with STPR).

Option Generation, Sifting and Development

05

5. Option Generation, Sifting and Development

5.1 Introduction

This chapter outlines the long list of options which have been identified to address the problems for each of the three study areas and presents the results from an option sifting exercise which has been undertaken to identify which of the long list of options is progressed to the initial appraisal stage. Following this sifting exercise; the options have been combined to create a series of option packages which each represent a differing magnitude of improvement approach.

5.2 Do-Minimum Scenario

The STAG guidance identifies that any generated improvement options must be appraised against a 'Do-Minimum' situation which constitutes transport improvement commitments that have policy and funding approval.

It is understood that there are a series of improvement schemes relevant to the study areas which Transport Scotland or Fife Council (with regards to The Pilgrim Way) have already committed funding to deliver and therefore comprise part of the Do-Minimum scenario. The Do-Minimum scenario considered for each study area is identified in **Table 5.1**.

Table 5.1: Do-Minmum Scenarios for Study Areas[52]

Study Area	Do-Minimum Scenario
Freuchie	• Lining Improvement at Freuchie Petrol Station
Balfarg	• Installation of a new toucan crossing facility across the A92 and associated pedestrian and cyclist infrastructure located approximately 500m to the south of the A92 / Star Road junction • Establishment of long-distance cycle route, The Pilgrim Way.
Cadham	• Lining improvements to Tullis Russell Roundabout

5.3 Option Generation

5.3.1 Approach to Option Generation

Improvement options have been developed to address the evidence led problems and opportunities previously outlined within the three study areas. These options have been based upon a variety of sources, including:

- Outcomes from previous community and stakeholder engagement process (options provided by Transport Scotland);
- Review of previous studies undertaken;
- Review of the identified problems and opportunities;
- Discussions with Transport Scotland and BEAR Scotland at a Study Team workshop in August 2018; and
- On-site observations.

5.3.2 Freuchie Study Area

Table 5.2 identifies the long list of options for the Freuchie study area.

[52] Provided by Transport Scotland and BEAR Scotland

Table 5.2: Freuchie Long List of Options

Category	Option Name	Description	Source
Sustainable Travel	**ST1:** Toucan Crossing across A92 at Cross Keys Junction	This option seeks to reduce the risk of vehicle to pedestrian conflicts on the A92 by providing a signalised toucan crossing facility in the vicinity of the Cross Keys junction. This would reduce the risk of vehicle to pedestrian and cyclist conflicts and is expected to reduce severance.	Outcomes of the previous stakeholder and community engagement process (Option provided by Transport Scotland)
	ST2: New Shared Use Path on east side of A92	This option involves installing an additional shared use path along the eastern side of the A92 between the Cross Keys and Kettlebridge Junctions. Providing the upgraded pedestrian facilities could potentially reduce the risk of vehicle to pedestrian conflicts and is expected to reduce severance. It would also improve connectivity for cyclists between NCN Route 1 and the Local Cycle Route.	Outcomes of the previous stakeholder and community engagement process (Option provided by Transport Scotland)
	ST3: Footbridge over A92 at Kettlebridge Junction	This option involves providing a pedestrian / cyclist footbridge over the A92. It is assumed that due to a lack of land availability at the Cross Keys junction, this would be located in the vicinity of the Kettlebridge Junction. Providing a footbridge would improve connectivity to the east of the A92 for active travel modes thus reduce severance between the community whilst it may also reduce the risk of vehicle to pedestrian / cyclist conflicts.	Outcomes of the previous stakeholder and community engagement process (Option provided by Transport Scotland)
	ST4: New Footway on north side of Kettlebridge Road	This option involves installing a new footway on the north side of Kettlebridge Road from the A92 junction to the junction with Kettle Produce. This would improve connectivity for pedestrians to trip attractors and reduce severance.	On-site observations
	ST5: Toucan Crossing across A92 at Kettlebridge Junction	This option seeks to reduce the risk of vehicle to pedestrian conflicts on the A92 by providing a signalised toucan crossing facility in the vicinity of the Kettlebridge junction. This would reduce the risk of vehicle to pedestrian and cyclist conflicts and is expected to reduce the feeling of severance.	On-site observations, review of problems and opportunities
	ST6: Widening of existing footway on west side of A92	This option involves the widening of the existing footway located on the west side of the A92 to deliver a shared use path. This would improve the amenity of the route for pedestrians and would additionally improve connectivity for cyclists between NCN Route 1 and the Local Cycle Route.	On-site observations, review of problems and opportunities
	ST7: Dropped kerb crossing over A92 at Kettlebridge Junction	This option involves the provision of a dropped kerb and tactile paving crossing facility across the A92 in the vicinity of the Kettlebridge Junction. This would improve pedestrian connectivity to trip attractors located on the east side of the A92 and would reduce severance.	Outcomes of the previous stakeholder and community engagement process (Option provided by Transport Scotland)
	ST8: Simple Dropped kerb crossing facility over East End (B936) at Cross Keys Junction	This option involves the provision of a simple dropped kerb and tactile paving crossing facility across East End in the vicinity of the Cross Keys Junction. This would improve pedestrian connectivity to the existing bus stops located on either side of the A92 for local residents.	On-site observations
	ST9: New bus stop facilities on the A92 to the north of Kettlebridge Junction	This option involves the provision of new bus stop facilities located on the A92 to the north of the Kettlebridge junction. This would improve accessibility to public transport for the Freuchie community located in the north of the town.	Outcomes of the previous stakeholder and community engagement process

Category	Option Name	Description	Source
Road – Existing Junction Modifications	**R1:** Improve radii and widen at Kettlebridge Junction	This option seeks to reduce the risk of near-misses by increasing the radii and widening the eastern junction at Kettlebridge crossroads. Widening the junction would allow larger vehicles to turn into the minor arms safely without having to encroach into the opposite lane of the side road; thus reducing the risk of conflicts with both other road users as well as with pedestrians and cyclists.	Outcomes of the previous stakeholder and community engagement process (Option provided by Transport Scotland)
	R2: Improve radii and widen at Cross Keys Junction	This option seeks to reduce the risk of near-misses by increasing the radii and widening the eastern junction at Cross Keys crossroads. Widening the junction would allow larger vehicles to turn into the minor arms safely without having to encroach into the opposite lane of the side road; thus reducing the risk of conflicts with both other road users as well as with pedestrians and cyclists.	On-site observations, review of problems and opportunities
	R3: Provide nearside A92 southbound diverge at Kettlebridge Junction	This option seeks to reduce the risk of near-misses by providing a southbound diverge facility for the eastern junction at Kettlebridge crossroads. Providing a diverge facility would allow vehicles, particularly HGVs, to carry out the left-turn manoeuvre safely by allowing them time to decelerate on a dedicated diverge lane, reducing the risk of conflicts on the A92.	Outcomes of the previous stakeholder and community engagement process (Option provided by Transport Scotland)
	R4: Provide right turn storage lanes on the A92 at Kettlebridge	This option seeks to reduce the risk of near-misses and reduce delay for A92 strategic traffic by providing two right-turn facilities on the A92 at Kettlebridge crossroads. Providing right-turn facilities would allow for right-turning vehicles to slow and wait within a dedicated area, reducing the risk of PIA and near-misses associated with right-turning vehicles.	Outcomes of the previous stakeholder and community engagement process (Option provided by Transport Scotland)
	R5: Prohibit overtaking on the A92 through Freuchie	This option seeks to reduce the risk of near-misses by prohibiting overtaking on the A92 through both Kettlebridge and Cross Keys junctions. Prohibiting overtaking will reduce the risk of conflicts caused by this manoeuvre through both junctions.	Outcomes of the previous stakeholder and community engagement process (Option provided by Transport Scotland)
	R6: Improve approach grade of local roads at Kettlebridge Junction	This option seeks to reduce the risk of near-misses by simplifying manoeuvres from the junctions at both side roads at Kettlebridge crossroads. Improving the grades of the approach roads could reduce complexity of manoeuvres by removing the requirement for drivers to use their handbrake whilst waiting at the junction. This could make exit manoeuvres easier, potentially reducing hesitancy and risk of conflicts involving vehicles turning out of the side roads.	Outcomes of the previous stakeholder and community engagement process (Option provided by Transport Scotland)
Road – Junction Upgrade	**R7:** New staggered junction at Kettlebridge with right turn storage	This option seeks to reduce the risk of PIA and near-misses by providing a right-left staggered junction with right-turn facility at the Kettlebridge junction. Providing a staggered junction with right-turn facility would improve the situation for road users at this location by reducing many of the conflicts that currently occur at the crossroads involving vehicles turning in and out of the junction. Road user confusion would be reduced at this location due to greater certainty over the manoeuvres vehicles at the junction are intending to make.	Outcomes of the previous stakeholder and community engagement process (Option provided by Transport Scotland)
	R8: New roundabout junction at Kettlebridge	This option involves the construction of a roundabout at the Kettlebridge junction. The introduction of a roundabout would remove conflicts associated with existing manoeuvres at Kettlebridge Crossroads and Cross Keys crossroads and could potentially reduce waiting times from side roads.	Outcomes of the previous stakeholder and community engagement process (Option provided by Transport Scotland)

Category	Option Name	Description	Source
	R9: New signalised junctions at Kettlebridge and Cross Keys	This option comprises the provision of traffic signal-controlled junctions on the A92 at the Kettlebridge junction. The introduction of signalised junctions would remove all conflicts associated with existing manoeuvres and could potentially reduce access times from side roads.	Outcomes of the previous stakeholder and community engagement process (Option provided by Transport Scotland)
Road – Speed Limit	**R10:** A92 30mph speed limit reduction	This option involves reducing the speed limit from 40mph to a 30mph speed limit on the A92 throughout the extent of the junctions. Reducing the speed could reduce the risk of conflicts by increasing the time drivers have to react and improve gaps in the traffic flow for emerging and right turning vehicles. This option could also improve amenity for active travel modes travelling alongside the A92.	Outcomes of the previous stakeholder and community engagement process (Option provided by Transport Scotland)
Road - Restricting Movements	**R11:** Introduce one way system	This option proposed the introduction of a one way system through Freuchie with the Cross Keys junction being designated for westbound traffic only and the Kettlebridge junction being designated for eastbound traffic.	Fife Council Consultation on a One-Way concept for Cross Keys & Bridgend junctions
	R12: Close Cross Keys Junction	This option involves closing East End junction at Cross Keys crossroads and diverting traffic to Kettlebridge crossroads. Closing this junction would remove all conflicts associated with existing manoeuvres to and from East End. As part of this option, there also exists the possibility of closing the Freuchie Mill Road, however, this would be subject to further data review to understand the potential impact on residents to the east of Freuchie.	Outcomes of the stakeholder and community engagement process (Option provided by Transport Scotland)
	R13: Closure of Kettlebridge Road	This option proposes the closure of Kettlebridge Road immediately to the east of Kettle Produce to vehicles. Beyond this point, it would remain open for pedestrians and cyclists. This may improve conditions for active travel modes and also reduce traffic demand from the Kettlebridge arm of the junction on the A92.	Review of problems and opportunities
Other Measures	**O1:** Vehicular Activated Signage north of Kettlebridge Junction	This option involves providing Vehicle Activated Signs located to the north of the Kettlebridge crossroads to warn of turning vehicles ahead. The introduction of VAS could provide advanced warning of turning vehicles to encourage them to decelerate in time, reducing the risk of late braking and shunt type accidents.	Outcomes of the stakeholder and community engagement process (Option provided by Transport Scotland)
	O2: Education Programme	This option involves providing a programme of education with Orkie Farm, and other local hauliers that use the junction, to encourage improved driver behaviour. The introduction of an education programme could go some way to reducing the risk of incidents at Kettlebridge crossroads.	Outcomes of the stakeholder and community engagement process (Option provided by Transport Scotland)

5.3.3 Balfarg Study Area

Table 5.3 identifies the long list of options generated for the Balfarg study area.

Table 5.3: Balfarg Long List of Options

Category	Option Name	Description	Source
Sustainable Travel	**ST1** - Installing Footways / Cycleways in verge to west of A92	This option involves providing a combined shared use path for walking and cycling on the west side of the A92 to connect to existing footway facilities south of the Western Avenue Junction. Directional signage would also be installed to direct pedestrians and cyclists to the existing crossing points. Providing the additional footway and signing would potentially reduce the risk of vehicle to pedestrian conflicts and is expected to somewhat reduce severance between the community, particularly Gateside Cottages.	Outcomes of the stakeholder and community engagement process (Option partially provided by Transport Scotland); On-site Observation
	ST2 – Installing Footways / Cycleways in verge to east of A92 north of Star Junction	This option involves providing a combined shared use path for walking and cycling on the east side of the A92 to connect to existing footway facilities south of the Star Road Junction and to the existing bus stop in proximity to Gateside Cottages. Directional signage would also be installed to direct pedestrians and cyclists to the existing crossing points. Providing the additional footway and signing would potentially reduce the risk of vehicle to pedestrian conflicts and is expected to somewhat reduce severance between the community.	Outcomes of the stakeholder and community engagement process (Option partially Provided by Transport Scotland); On-site Observation
	ST3 – Completion of footway on east side of A92 south of Star Junction.	This option involves completion of the footway on the east side of the A92 to provide a continuous walking route between the Balfarg and Cadham Junctions. This could enhance pedestrian connectivity and reduce community severance.	Outcomes of the stakeholder and community engagement process (Option partially provided by Transport Scotland); On-site Observation
	ST4 - Upgrade Uncontrolled Crossing Point to north of Western Avenue Junction	This option involves upgrading the uncontrolled (dropped kerb) pedestrian/cycle crossing point over the A92 to the north of Western Avenue junction, and altering the barrier in the central reservation to accommodate a crossing. Providing the upgraded pedestrian facilities could potentially reduce the risk of vehicle to pedestrian conflicts and could reduce severance by improving connectivity with southbound bus stops.	Outcomes of the stakeholder and community engagement process (Option provided by Transport Scotland)
	ST5 – Providing Dropped Kerb Crossing Facility Across Western Avenue	This option involves installing a dropped kerb crossing facility across Western Avenue in proximity to the A92 junction. This could improve pedestrian and cyclist connectivity and reduce severance between the community.	On-Site Observation
	ST6 – Pedestrian footbridge at Star Road Junction	This option involves providing a footbridge over the A92 in the vicinity of the Star Road Junction, linking the east and west communities. Providing a footbridge could reduce the risk of vehicle to pedestrian conflicts and could reduce severance between the community.	Outcomes of the stakeholder and community engagement process (Option provided by Transport Scotland)
	ST7 - Signalised Toucan Crossing Facility at Star Road Junction	This option involves providing a toucan crossing facility across the A92 at the Star Road Junction. This could reduce the risk of vehicle to pedestrian conflicts and could reduce severance between the community.	Outcomes of the stakeholder and community engagement process (Option provided by Transport Scotland)

Category	Option Name	Description	Source
Road – Existing Junction Modifications	**R1** – Signing and Lining Improvements at both Western Avenue and Star Road Junctions	This option involves: • Altering the central reserve road marking arrangement (Western Ave and Star Rd Junctions) • Remove hatching from the offside edge of traffic splitter island (Western Ave Junction) • Improve road markings and traffic signs on the approach to, and at the northbound diverge (Western Ave Junction) • Relocate give-way road marking (Star Rd Junction) The above measures could assist in addressing incidents involving near-misses that were recorded relating to positioning and general awareness of the junction layouts and central reservation waiting areas at Western Avenue and Star Road.	Outcomes of the stakeholder and community engagement process (Option provided by Transport Scotland)
	R2 - Improve Radii of A92 Northbound Merge Taper at Western Avenue Junction	This option involves increasing the radii of the northbound merge taper at Western Avenue to accommodate larger vehicles. Increasing the radii of the northbound merge taper would provide larger vehicles with more room to manoeuvre which could decrease the risk of overrunning into the northbound lane, thus reducing the risk of conflicts with A92 northbound traffic.	Outcomes of the stakeholder and community engagement process (Option provided by Transport Scotland)
	R3 – Install kerbed splitter islands at Star Road Junction	This option involves installing kerbed traffic splitter islands to improve lane selection and allow for improved signing at the Star Road Junctions. This could reduce the risk of vehicle conflict for emerging vehicles at this junction.	Outcomes of the stakeholder and community engagement process (Option provided by Transport Scotland)
	R4 - Increase Length of A92 Offside Northbound Deceleration Lane at Star Road Junction	This option involves increasing the length of the deceleration lane at Star Road junction. Increasing the length of the deceleration lane would allow for larger vehicles to be accommodated, reducing the risk of queuing onto the northbound carriageway, thus reducing the risk of conflicts with A92 northbound traffic.	Outcomes of the stakeholder and community engagement process (Option provided by Transport Scotland)
	R5 – Improve vertical alignment of A92 carriageway	This option involves improving the vertical alignment of the A92 carriageway which could aid in reducing the number and severity of personal injury accidents.	Outcomes of the stakeholder and community engagement process (Option provided by Transport Scotland)
Road – Restricting Movements	**R6** – Banning right-turn out of Western Avenue	This option involves banning right-turn manoeuvres out of Western Avenue. Traffic could instead be directed to the north where they would be required to U-turn at the New Inn roundabout. Right turning traffic in to Western Avenue from the A92 would still be permitted. This option would remove the risk of conflicts associated with right-turn manoeuvres out of Western Avenue.	Outcomes of the stakeholder and community engagement process (Option provided by Transport Scotland)
	R7 – Banning right-turn in to Western Avenue	This option involves banning right-turn manoeuvres in to Western Avenue. Traffic could instead be directed to the south where they would be required to U-turn at the Tullis Russell Roundabout. This option would remove the risk of conflicts associated with right-turn manoeuvres in to Western Avenue.	Review of Problems and Opportunities

Category	Option Name	Description	Source
	R8 – Closure of Central Reserve at Western Avenue Junction	This option seeks to reduce the risk of PIA and near-misses by removing conflicts associated with right-turn manoeuvres into and out of Western Avenue. Traffic could be directed to the New Inn roundabout or Tullis Russell Roundabouts where they would be required to undertake a U-turn manoeuvre instead. In addition to removing right-turn manoeuvres from central reservations, this option would also remove conflicts within the central reservation waiting areas.	Outcomes of the stakeholder and community engagement process (Option provided by Transport Scotland)
	R9 - Closure of Central Reserve at both Western Avenue and Star Road Junctions	This option involves closing the central reserve gaps at both Western Avenue and Star Road junctions and diverting right-turning vehicles via either New Inn or Tullis Russell Roundabout. This option seeks to reduce the risk of PIA and near-misses by removing conflicts associated with the central reservations. In addition to removing right-turn manoeuvres from central reservations, this option would also remove conflicts within the central reservation waiting areas.	Review of Problems and Opportunities
Road – Junction Upgrade	**R10 –** New Grade Separated Junction	This option involves the provision of a Grade Separated Junction with associated exit and entry slip roads encompassing both the Star Road and Western Avenue junctions. This would encompass: • Overbridge constructed from Western Avenue to a realigned Star Road; and • Link road constructed from overbridge to A92 northbound and southbound carriageways. The introduction of a grade separated junction where the local road and A92 trunk road flows would be separated would remove all conflicts associated with existing right turn manoeuvres at Western Avenue and Star Road junctions and associated central reservations. Such a facility would improve overall traffic flow and reduce disruption for both side road traffic and mainline traffic. In addition the overbridge could be equipped with pedestrian facilities. For context, DMRB TD 40/94 identifies that full grade separation may be economically justifiable with design flows of above 30,000 AADT on the main line carriageway; however, compact grade separation may be justifiable on roads with flows of above 12,500 AADT.	Outcomes of the stakeholder and community engagement process (Option provided by Transport Scotland)
	R11 – New Signalised Junction	This option comprises the provision of a single traffic signal-controlled junction on the A92. The introduction of a signalised junction would reduce conflicts associated with existing manoeuvres at Western Avenue and Star Road junctions and associated central reservations. A signalised junction could also provide the opportunity for formal crossing points for pedestrians.	Outcomes of the stakeholder and community engagement process (Option provided by Transport Scotland)
	R12 – New Roundabout	This option involves the construction of a roundabout on the A92 with arms on Western Avenue and Star Road. While there are a number of potential layouts, it is envisaged that any roundabout would be centred on the junction with Western Avenue, with Star Road realigned to connect into a four-arm roundabout. The introduction of a roundabout could remove conflicts associated with existing manoeuvres and associated central reservations.	Outcomes of the stakeholder and community engagement process (Option provided by Transport Scotland)

Category	Option Name	Description	Source
Road – Speed Limit	**R13 –** A92 30mph speed limit reduction	This option involves introducing a 30mph speed limit on the A92 throughout the extent of the junctions. Reducing the speed along the A92 through the extents of the junctions could reduce the severity of PIA and would go some way to reducing risk of conflicts by increasing driver reaction times. This option could also improve amenity for active travel modes travelling alongside or crossing the A92.	Outcomes of the stakeholder and community engagement process (Option provided by Transport Scotland)
	R14 - Increase Conspicuity of the Existing A92 40mph Speed Limit	This option involves increasing the conspicuity of the existing 40mph speed limit on the A92 throughout the extents of the junctions. Increasing the number of repeaters signs could potentially encourage lower speeds throughout the extents of the junctions which could potentially reduce the severity of PIA along the A92 for through traffic. A reduction in speed could also improve amenity for active travel modes travelling alongside or crossing the A92.	Outcomes of the stakeholder and community engagement process (Option provided by Transport Scotland)

5.3.4 Cadham Study Area

Table 5.4 identifies the long list of options for the Cadham study area.

Table 5.4: Cadham Long List of Options

Category	Option Name	Description	Source
Sustainable Travel	**ST1 -** Provide toucan crossing facility across A92	This option seeks to reduce the risk of vehicle to pedestrian conflicts by providing a toucan crossing facility across the A92 to the south of the Cadham junction. This could reduce the risk of vehicular – pedestrian conflicts, enhance east – west connectivity and reduce community severance.	Outcomes of the stakeholder and community engagement process (Option provided by Transport Scotland)
	ST2 – Upgrade of existing footway on east side of A92	This option involves the upgrading of the existing footway located on the east side of the A92 to deliver a continuous shared footway / cycleway for pedestrians and cyclists between the Cadham and Balfarg junctions. This could enhance connectivity for active travel modes and reduce community severance.	On-site observation; review of problems and opportunities
	ST3 – Provide dropped kerb crossing facility across Cadham Road	This option involves the installation of a dropped kerb crossing facility with tactile paving across Cadham Road to provide connectivity between footways located on the north and south side of the carriageway. This could reduce the risk of vehicular – pedestrian conflicts and reduce severance.	On-site observation; review of problems and opportunities
Road – Existing Junction Modifications	**R1 -** Provide Diverge Lane for Car Wash	This option seeks to reduce the risk of near-misses by providing a northbound diverge facility for the car wash at Cadham Road junction. Currently, access to the car wash is via the A92 immediately south of Cadham Road junction. Providing a dedicated access to the car wash could reduce the risk of conflicts associated with this manoeuvre on the A92.	Outcomes of the stakeholder and community engagement process (Option provided by Transport Scotland)
	R2 - Signing and Lining Improvements	This option involves providing the following junction modifications: • Signing & lining improvements: and • Adjustment to traffic splitter island Adjusting the existing splitter island to deter right turn manoeuvres could reduce the risk of near-misses on the eastern approach to Cadham Road junction. Introducing additional 'no right turn' lining and signage on the A92 southbound approach would also go some way to reminding vehicles of the prohibited manoeuvre.	Outcomes of the stakeholder and community engagement process (Option provided by Transport Scotland)
	R3 – Improve drainage and grip in the vicinity of A92 West Lodge	This option proposes improving drainage and making the A92 surface anti-skid in the vicinity of West Lodge on the A92, located to the north of the Cadham Junction. This could reduce the risk of vehicular conflicts in wet conditions.	A92 Fife Action Plan (2015)
	R4 – Change Access to Car Wash	This option involves relocating the access to the car wash to Cadham Road. This option seeks to reduce the risk of near-misses by relocating the access to the car wash to Cadham Road. Relocating the access to the car wash could reduce the risk of conflicts associated with these manoeuvres on the A92.	Outcomes of the stakeholder and community engagement process (Option provided by Transport Scotland)
Road – Restricting Movements	**R5** – Banning Right-Turn from Cadham Road	This option involves banning right-turn manoeuvres out of Cadham Road at the junction with the A92 and diverting traffic to U-turn at New Inn Roundabout. This option seeks to reduce the risk of PIA and near-misses by removing conflicts associated with right-turn manoeuvres out of Cadham Road.	Outcomes of the stakeholder and community engagement process (Option provided by Transport Scotland)

Category	Option Name	Description	Source
	R6 – Closure of Cadham Road Junction	This option involves the total closure of the Cadham Road junction such that drivers would have to divert to other available junctions at Balfarg or the Preston Roundabout to access the A92. This option seeks to reduce the risk of PIA and near-misses on the A92 at Cadham by removing all existing manoeuvres.	Review of problems and opportunities
Road – Junction Upgrade	**R7 –** New Signalised Junction	This option comprises providing a signalised junction at Cadham. Under the option, it is assumed that the right turn from the A92 into Cadham Road would be permitted. The introduction of a signalised junction could reduce conflicts associated with existing manoeuvres at Cadham. A signalised junction could also provide formal crossing points for pedestrians.	Outcomes of the stakeholder and community engagement process (Option provided by Transport Scotland)
Road – Strategic Improvement	**R8** - Link Cadham Road to Tullis Russell Roundabout and Close Cadham Road Junction	This option proposes linking Cadham Road directly with Tullis Russell Roundabout and stopping up the existing Cadham Road junction. This option seeks to reduce the risk of PIA and near-misses on the A92 at Cadham by removing all existing manoeuvres given that the introduction of a link road would provide a safer means for vehicles to access and exit Cadham Road by making use of Tullis Russell Roundabout.	Outcomes of the stakeholder and community engagement process (Option provided by Transport Scotland)
	R9 – New A92 alignment between Tullis Russell Roundabout and Balbirnie.	This option proposes re-aligning the A92 between Tullis Russell roundabout and Balbirnie, to the east of its current location. Re-aligning the A92 and removing A92 through traffic past Cadham Road junction could provide a safer means for vehicles to access and exit Cadham Road and reduce the risk of PIA and near-misses at the junction. The new aligned carriageway could be accessed through the provision of an additional arm on the Tullis Russell Roundabout.	Outcomes of the stakeholder and community engagement process (Option provided by Transport Scotland)
Road – Speed Limit	**R10** – 30mph A92 Speed Limit Reduction	This option seeks to reduce the risk of near-misses and severity of PIA at Cadham Road junction by introducing a reduced 30mph speed limit on the A92 between the Balfarg and Cadham Road junctions. Reducing the speed along the A92 could go some way to reducing risk of conflicts by increasing driver reaction times. This option could also improve amenity for active travel modes travelling alongside or crossing the A92.	Outcomes of the stakeholder and community engagement process (Option provided by Transport Scotland)
Other Measures	**O1 -** Right Turn Ban Camera Enforcement	This option involves introducing permanent cameras at the Cadham Road junction to enforce the right turn ban. This could assist in reducing the risk of near misses associated with this banned manoeuvre.	Outcomes of the stakeholder and community engagement process (Option provided by Transport Scotland)

5.4 Option Sifting

5.4.1 Approach to Option Sifting

The options list developed through previous exercises have been further reviewed and refined to identify a shorter list of options for further assessment. This sifting exercise has focused on a review of option performance against the study TPOs as well as a high level assessment of the option performance in terms of its deliverability from a feasibility, affordability and public acceptability perspective.

The following criteria has been applied to classify each option's performance against the criteria applied.

Table 5.5: Option Sifting Key

Ref	
	Broadly negative impact on assessed criteria
	Broadly neutral impact on assessed criteria
	Broadly positive impact on assessed criteria

It should be noted that the sifting process is based upon a broad high-level qualitative assessment only. A detailed appraisal of options is included in **Chapter 6**.

5.4.2 Freuchie Study Area

Table 5.6 presents the results of the option sifting exercise, and importantly contains a clear statement or rationale for those options that have been sifted at this stage for the Freuchie study area.

Table 5.6: Freuchie Option Sifting Matrix

Option	Performance vs. TPOs				Deliverability			Select / Reject?	Rationale
	TPO1	TPO2	TPO3	TPO4	Feasibility	Affordability	Acceptability		
ST1: Toucan Crossing across A92 at Crosskeys Junction								Select	It is considered this option would broadly satisfy the study TPOs and Deliverability Criteria and therefore merits further consideration as part of Initial Appraisal.
ST2: New Shared Use Path on east side of A92								Select	It is considered this option would broadly satisfy the study TPOs and Deliverability Criteria and therefore merits further consideration as part of Initial Appraisal.
ST3: Footbridge over A92 at Kettlebridge Junction								Reject	Visual impact and potential planning issues; The introduction of a bridge still results in a hindrance to pedestrian and cyclist movement; Potential land-take required for ramps may impinge other junction improvement measures; Scale of funding required unlikely to be proportionate to the scale of problem.
ST4: New Footway on north side of Kettlebridge Road								Select	It is considered this option would broadly satisfy the study TPOs and Deliverability Criteria and therefore merits further consideration as part of Initial Appraisal.
ST5: Toucan Crossing across A92 at Kettlebridge Junction								Select	It is considered this option would broadly satisfy the study TPOs and Deliverability Criteria and therefore merits further consideration as part of Initial Appraisal.
ST6: Widening of existing footway on west side of A92								Select	It is considered this option would broadly satisfy the study TPOs and Deliverability Criteria and therefore merits further consideration as part of Initial Appraisal.
ST7: Dropped kerb crossing over A92 at Kettlebridge Junction								Select	It is considered this option would broadly satisfy the study TPOs and Deliverability Criteria and therefore merits further consideration as part of Initial Appraisal.
ST8: Simple Dropped kerb crossing facility over East End (B936) at Crosskeys Junction								Select	It is considered this option would broadly satisfy the study TPOs and Deliverability Criteria and therefore merits further consideration as part of Initial Appraisal.

Option	Performance vs. TPOs				Deliverability			Select / Reject?	Rationale
	TPO1	TPO2	TPO3	TPO4	Feasibility	Affordability	Acceptability		
ST9: New bus stop facilities on the A92 to the north of Kettlebridge Junction								Select	Option has the potential to contribute to the study TPOs as part of a wider package of improvements and therefore merits further consideration as part of Initial Appraisal.
R1: Improve radii and widen at Kettlebridge Junction								Select	It is considered this option would broadly satisfy the study TPOs and Deliverability Criteria and therefore merits further consideration as part of Initial Appraisal. Positive impact on TPO2 anticipated considering this could reduce conflict between HGVs and cyclists at junction. Neutral impact on Acceptability criteria anticipated considering this may not fulfil the community's desire for a roundabout at this location.
R2: Improve radii and widen at Crosskeys Junction								Reject	Positive impact on TPO2 anticipated considering this could reduce conflict between HGVs and cyclists at junction. Junction tightly bound by residential properties and would likely require CPO / demolishment to deliver option which may not be publically acceptable.
R3: Provide nearside A92 southbound diverge at Kettlebridge Junction								Select	Negative impact on TPO2 anticipated given the additional difficulty introducing a wider carriageway may have on pedestrians crossing the A92. It is considered this option would broadly satisfy the study TPOs and Deliverability Criteria and therefore merits further consideration as part of Initial Appraisal. Neutral impact on Acceptability criteria anticipated considering this may not fulfil the community's desire for a roundabout at this location.
R4: Provide right turn storage lanes on the A92 at Kettlebridge								Select	Negative impact on TPO2 anticipated given the additional difficulty introducing a wider carriageway may have on pedestrians crossing the A92. Neutral impact on Acceptability criteria anticipated considering this may not fulfil the community's desire for a roundabout at this location. It is considered this option would broadly satisfy the study TPOs and Deliverability Criteria and therefore merits further consideration as part of Initial Appraisal.
R5: Prohibit overtaking on the A92 through Freuchie								Reject	Outcomes of workshop with Transport Scotland and BEAR Scotland did not deem this to be an appropriate measure at this location

Option	Performance vs. TPOs				Deliverability			Select / Reject?	Rationale
	TPO1	TPO2	TPO3	TPO4	Feasibility	Affordability	Acceptability		
R6: Improve approach grade of local roads at Kettlebridge Junction								Select	Neutral impact on Acceptability criteria anticipated considering this may not fulfil the community's wishes for a roundabout at this location. It is considered this option would broadly satisfy the study TPOs and Deliverability Criteria and therefore merits further consideration as part of Initial Appraisal.
R7: New staggered junction at Kettlebridge with right turn storage								Select	Negative impact on TPO2 anticipated given the additional difficulty introducing a wider carriageway may have on pedestrians crossing the A92. It is considered this option would broadly satisfy the study TPOs and Deliverability Criteria and therefore merits further consideration as part of Initial Appraisal.
R8: New roundabout junction at Kettlebridge								Select	Option has the potential to contribute to the study TPOs as part of a wider package of improvements and therefore merits further consideration as part of Initial Appraisal.
R9: New signalised junctions at Kettlebridge and Crosskeys								Select	It is considered this option would broadly satisfy the study TPOs and Deliverability Criteria and therefore merits further consideration as part of Initial Appraisal.
R10: A92 30mph speed limit reduction								Select	It is considered this option would broadly satisfy the study TPOs and Deliverability Criteria and therefore merits further consideration as part of Initial Appraisal.
R11: Introduce one way system								Select	It is considered this option would broadly satisfy the study TPOs and Deliverability Criteria and therefore merits further consideration as part of Initial Appraisal.
R12: Close Crosskeys Junction								Select	It is considered this option would broadly satisfy the study TPOs and Deliverability Criteria and therefore merits further consideration as part of Initial Appraisal.
R13: Closure of Kettlebridge Road								Reject	Negative impact on HGVs routing from Kettle Produce as well as agricultural vehicles from local farms; Issues over deliverability of option given its remoteness from the trunk road network (non-trunk road); Public acceptability of option likely to be unfavourable, particularly amongst Kettlebridge residents.

Option	Performance vs. TPOs				Deliverability			Select / Reject?	Rationale
	TPO1	TPO2	TPO3	TPO4	Feasibility	Affordability	Acceptability		
O1: Vehicular Activated Signage north of Kettlebridge Junction								Select	Neutral impact on Acceptability criteria anticipated considering this may not fulfil the community's desire for a roundabout at this location. It is considered this option would broadly satisfy the study TPOs and Deliverability Criteria and therefore merits further consideration as part of Initial Appraisal.
O2: Education Programme								Select	Neutral impact on Acceptability criteria anticipated considering this may not fulfil the community's desire for a roundabout at this location. Option has the potential to contribute to the study TPOs as part of a wider package of improvements and therefore merits further consideration as part of Initial Appraisal.

5.4.3 Balfarg Study Area

Table 5.7 presents the results of the option sifting exercise, and importantly contains a clear statement or rationale for those options that have been sifted at this stage for the Balfarg study area.

Table 5.7: Balfarg Option Sifting Matrix

Option	Performance vs. TPOs				Deliverability			Select / Reject?	Rationale
	TPO1	TPO2	TPO3	TPO4	Feasibility	Affordability	Acceptability		
ST1 - Installing Footways / Cycleways in verge to west of A92								Select	A positive impact is anticipated on TPO1 considering this may reduce incidence of pedestrians crossing the A92 carriageway out with designated crossing location. It is considered this option would broadly satisfy the study TPOs and Deliverability Criteria and therefore merits further consideration as part of Initial Appraisal.
ST2 – Installing Footways / Cycleways in verge to east of A92 north of Star Junction								Select	A positive impact is anticipated on TPO1 considering this may reduce incidence of pedestrians crossing the A92 carriageway out with designated crossing location. It is considered this option would broadly satisfy the study TPOs and Deliverability Criteria and therefore merits further consideration as part of Initial Appraisal.
ST3 – Completion of footway on east side of A92 south of Star Junction.								Select	It is considered this option would broadly satisfy the study TPOs and Deliverability Criteria and therefore merits further consideration as part of Initial Appraisal.
ST4 - Upgrade Uncontrolled Crossing Point to north of Western Avenue Junction								Select	It is considered this option would broadly satisfy the study TPOs and Deliverability Criteria and therefore merits further consideration as part of Initial Appraisal.
ST5 – Providing Dropped Kerb Crossing Facility Across Western Avenue								Select	It is considered this option would broadly satisfy the study TPOs and Deliverability Criteria and therefore merits further consideration as part of Initial Appraisal.
ST6 – Pedestrian footbridge at Star Road Junction								Select	It is considered this option would broadly satisfy the study TPOs and Deliverability Criteria and therefore merits further consideration as part of Initial Appraisal.
ST7 - Signalised Toucan Crossing Facility at Star Road Junction								Select	It is considered this option would broadly satisfy the study TPOs and Deliverability Criteria and therefore merits further consideration as part of Initial Appraisal.
R1 – Signing and Lining Improvements at both Western Avenue and Star Road Junctions								Select	Option has the potential to contribute to the study TPOs as part of a wider package of improvements and therefore merits further consideration as part of Initial Appraisal.

Option	Performance vs. TPOs				Deliverability			Select / Reject?	Rationale
	TPO1	TPO2	TPO3	TPO4	Feasibility	Affordability	Acceptability		
R2 - Improve Radii of A92 Northbound Merge Taper at Western Avenue Junction								Select	Option has the potential to contribute to the study TPOs as part of a wider package of improvements and therefore merits further consideration as part of Initial Appraisal.
R3 – Install kerbed splitter islands at Star Road Junction								Select	Option has the potential to contribute to the study TPOs as part of a wider package of improvements and therefore merits further consideration as part of Initial Appraisal.
R4 - Increase Length of A92 Offside Northbound Deceleration Lane at Star Road Junction								Select	Option has the potential to contribute to the study TPOs as part of a wider package of improvements and therefore merits further consideration as part of Initial Appraisal.
R5 – Improve vertical alignment of A92 carriageway								Select	Option has the potential to contribute to the study TPOs as part of a wider package of improvements and therefore merits further consideration as part of Initial Appraisal.
R6 – Banning right-turn out of Western Avenue								Select	Option has the potential to contribute to the study TPOs as part of a wider package of improvements and therefore merits further consideration as part of Initial Appraisal.
R7 – Banning right-turn in to Western Avenue								Reject	Unlikely to be acceptable from a public acceptability perspective, particularly amongst locals in the Balfarg area. Option would not close the central reservation therefore right turning vehicles from the A92 may ignore any ban in any case, thus creating further potential conflicts. Option may increase risk of accident migration to Cadham Road junction which already has conflict issues with drivers ignoring the right turn ban.
R8 – Closure of Central Reserve at Western Avenue Junction								Reject	Option would reduce accessibility of strategic road network. Unlikely to be acceptable from a public acceptability perspective, particularly amongst locals in the Balfarg area. Option may increase the risk of accident migration to Cadham Road junction which already has conflict issues with drivers ignoring the right turn ban.

Option	Performance vs. TPOs				Deliverability			Select / Reject?	Rationale
	TPO1	TPO2	TPO3	TPO4	Feasibility	Affordability	Acceptability		
R9 - Closure of Central Reserve at both Western Avenue and Star Road Junctions								Reject	Option would reduce accessibility of strategic road network. Unlikely to be acceptable from a public acceptability perspective, particularly amongst locals in the Balfarg area. Option may increase the risk of accident migration to Cadham Road junction which already has conflict issues with drivers ignoring the right turn ban. High volumes of traffic which currently make this movement would be re-routed to the Tullis Russell Roundabout or the New Inn Roundabout to perform a U-turn, which may result in further delay and conflict at these junctions.
R10 – New Grade Separated Junction								Select	A positive impact is anticipated on TPO2 considering an overbridge could incorporate footway facilities to enhance connectivity across the A92. It is considered this option would broadly satisfy the study TPOs and therefore merits further consideration as part of Initial Appraisal.
R11 – New Signalised Junction								Select	It is considered this option would broadly satisfy the study TPOs and Deliverability Criteria and therefore merits further consideration as part of Initial Appraisal.
R12 – New Roundabout								Select	It is considered this option would broadly satisfy the study TPOs and Deliverability Criteria and therefore merits further consideration as part of Initial Appraisal.
R13 – A92 30mph speed limit reduction								Select	It is considered this option would broadly satisfy the study TPOs and Deliverability Criteria and therefore merits further consideration as part of Initial Appraisal.
R14 - Increase Conspicuity of the Existing A92 40mph Speed Limit								Reject	Speed data suggests speed has reduced as a result of the new speed limit being in place. Speed data shows limited evidence of speeding. On-site observation identified speed limit signage already observed to be very clear.

5.4.4 Cadham Study Area

Table 5.8 presents the results of the option sifting exercise, and importantly contains a clear statement or rationale for those options that have been sifted at this stage for the Cadham study area.

Table 5.8: Cadham Option Sifting Matrix

Option	Performance vs. TPOs				Deliverability			Select / Reject?	Rationale
	TPO1	TPO2	TPO3	TPO4	Feasibility	Affordability	Acceptability		
ST1 - Provide toucan crossing facility across A92								Select	It is considered this option would broadly satisfy the study TPOs and Deliverability Criteria and therefore merits further consideration as part of Initial Appraisal.
ST2 – Upgrade of existing footway on east side of A92								Select	It is considered this option would broadly satisfy the study TPOs and Deliverability Criteria and therefore merits further consideration as part of Initial Appraisal.
ST3 – Provide dropped kerb crossing facility across Cadham Road								Select	It is considered this option would broadly satisfy the study TPOs and Deliverability Criteria and therefore merits further consideration as part of Initial Appraisal.
R1 - Provide Diverge Lane for Car Wash								Select	It is considered this option would broadly satisfy the study TPOs and Deliverability Criteria and therefore merits further consideration as part of Initial Appraisal.
R2 - Signing and Lining Improvements								Select	It is considered this option would broadly satisfy the study TPOs and Deliverability Criteria and therefore merits further consideration as part of Initial Appraisal.
R3 – Improve drainage and grip in the vicinity of A92 West Lodge								Select	It is considered this option would broadly satisfy the study TPOs and Deliverability Criteria and therefore merits further consideration as part of Initial Appraisal.
R4 – Change Access to Car Wash								Reject	It is considered that deliverability of this option could be challenging given it would involve relocating a private access junction.
R5 – Banning Right-Turn from Cadham Road								Select	It is considered this option would broadly satisfy the study TPOs and Deliverability Criteria and therefore merits further consideration as part of Initial Appraisal.
R6 – Closure of Cadham Road Junction								Reject	Public acceptability unlikely to be favourable. Cadham Road currently forms a bus route and therefore this could exacerbate public transport access to the strategic road network.
R7 – New Signalised Junction								Select	It is considered this option would broadly satisfy the study TPOs and Deliverability Criteria and therefore merits further consideration as part of Initial Appraisal.

Option	Performance vs. TPOs				Deliverability			Select / Reject?	Rationale
	TPO1	TPO2	TPO3	TPO4	Feasibility	Affordability	Acceptability		
R8 - Link Cadham Road to Tullis Russell Roundabout and Close Cadham Road Junction								Select	It is considered this option would broadly satisfy the study TPOs and Deliverability Criteria and therefore merits further consideration as part of Initial Appraisal.
R9 – New A92 alignment between Tullis Russell Roundabout and Balbirnie.								Select	It is considered this option would broadly satisfy the study TPOs and Deliverability Criteria and therefore merits further consideration as part of Initial Appraisal.
R10 – 30mph A92 Speed Limit Reduction								Reject	No PIA recorded on this section has been associated with excessive speed. Speed data does not suggest high levels of speeding. Unlikely to be acceptable from a public perspective given recent speed reduction. Option would result in a reduction in strategic A92 journey times.
O1 – Right Turn Ban Camera Enforcement								Select	Option has the potential to contribute to the study TPOs as part of a wider package of improvements and therefore merits further consideration as part of Initial Appraisal.

5.5 Option Packaging and Development

5.5.1 Approach to Option Packaging

The sifting exercise report above has resulted in the sifting of only a number of options where it has been considered that the options would clearly not address the study TPOs or could be better delivered by alternative options. In order to sift this list into a more manageable list to take forward for assessment as part of the Initial Appraisal process (presented in Chapter 6), a further option development exercise has been carried out focused on the packaging of options into alternative approaches to delivering the outcomes sought by the TPOs. The final option packages are outlined in the following sections.

Each of the option packages have been assigned an indicative cost banding by applying the definitions identified in **Table 5.9**. These represent the estimated cumulative costs for the delivery of all core measures within each of the option packages.

Table 5.9: Cost Bandings Definitions

Cost Definition	Indicative Cost
Low	<£250,000
Medium	£250,000 - £1,000,000
High	£1,000,000 – £5,000,000
Very High	>£5,000,000

5.5.2 Freuchie Study Area

Ref	Package Name	Purpose	Core Measures	Optional Measures	Comments	Indicative Cost Banding
1	**Sustainable Transport**	To address the identified problem relating to pedestrian severance associated with the A92, improving access to local bus stops and enhancing connectivity for cyclists to local and national routes.	**ST1:** Toucan Crossing across A92 at Cross Keys Junction **ST2:** New shared use path on east side of A92 **ST4:** New footway on north side of Kettlebridge Road **ST5:** Toucan crossing across A92 at Kettlebridge Junction **ST6:** Widening of existing footway on west side of A92 **ST7:** Dropped kerb crossing over A92 at Kettlebridge Junction **ST8:** Dropped kerb crossing over East End at Cross Keys **ST9:** New bus stops on the A92 to the north of Kettlebridge Junction	*See Comments*	It would not be possible to deliver all options given that some represent a choice of differing levels of provision at the same location (e.g. between crossing type etc.)	Low
2	**Localised Road Junction and Safety Improvements**	To address identified problems relating to road safety conflicts which currently occur at the junctions through relatively low cost interventions within the confines of the existing crossroad junctions' form.	**R1:** Improve radii and widen at Kettlebridge Junction **R3:** Provide nearside A92 southbound diverge at Kettlebridge Junction **R4:** Provide right storage lanes on the A92 at Kettlebridge Junction **R6:** Improve approach grade of local roads at Kettlebridge Junction **R10:** A92 30mph speed limit reduction **O1:** Vehicular Activated Signage north of Kettlebridge Junction **O2:** Education Programme	**R11:** Introduce one way system	Potential exists to incorporate a one-way system at each of the junctions on East End and High Street towards Freuchie, (this would require consideration by Fife Council). Package would additionally contain a selection of relevant measures identified from the Sustainable Transport Package.	Low - Medium

Ref	Package Name	Purpose	Core Measures	Optional Measures	Comments	Indicative Cost Banding
3	**Road Junction Upgrade:** Signalise Both Kettlebridge and Cross Keys Junctions	To address identified problems relating to road safety conflicts and journey time delays which currently occur at the junctions through the installation of signals within the confines of the existing crossroad junctions' form.	**R9:** Signalised junctions at both Kettlebridge and Cross Keys Junctions	**R10:** A92 30 mph speed limit reduction **R11:** Introduce one-way system **R12:** Close Cross Keys Junction	Potential for speed limit reduction to complement signalised junctions. Potential exists to incorporate a one-way system at each of the junctions on East End and High Street towards Freuchie. Potential exists to only signalise Kettlebridge junction and close the Cross Keys junction which could deliver positive safety benefits i.e. reduction in conflicts Signalised facilities could include pedestrian provision, however, package would include a selection of other relevant measures identified from Sustainable Transport Package	Medium
4	**Road Junction Upgrade:** Staggered Junction at Kettlebridge	To address identified problems relating to road safety conflicts and journey time delays which currently occur at the junctions through the installation of a modern staggered junction with right turn provision at Kettlebridge.	**R6:** Improve approach grade of local roads at Kettlebridge Junction **R7:** New staggered junction at Kettlebridge with right turn storage **R12:** Close Cross Keys Junction (potential to be considered further)	**R10:** A92 30mph speed limit reduction	Option assumes realignment of High Street and / or Kettlebridge Road. Assumes approach grade of local roads would be improved as part of junction upgrade. Potential for speed limit reduction. Option assumes closure of the Cross Keys junction which could deliver positive safety benefits i.e. reduction in conflicts Package would additionally contain a selection of relevant measures identified from the Sustainable Transport Package.	High
5	**Road Junction Upgrade:** Roundabout at Kettlebridge	To address identified problems relating to road safety conflicts and journey time delays which currently occur at the junctions through the installation of a new roundabout junction at Kettlebridge.	**R8:** New roundabout junction at Kettlebridge **R12:** Close of Cross Keys Junction (potential to be considered further)	**R10:** A92 30mph speed limit reduction	Option assumes closure of the Cross Keys junction which could deliver positive safety benefits i.e. reduction in conflicts Package would additionally contain a selection of relevant measures identified from the Sustainable Transport Package. Potential for speed limit reduction to complement roundabout	High

5.5.3 Balfarg Study Area

Ref	Package Name	Purpose	Core Measures	Optional Measures	Comments	Indicative Cost Banding
1	**Sustainable Transport**	To address the identified problem relating to pedestrian and cyclist severance caused by the A92 and enhancement of connectivity to existing bus stop facilities on the A92.	**ST1**: Installing Footways / Cycleways in verge to west of A92 **ST2:** Installing Footways / Cycleways in verge to east of A92 north of Star Junction **ST3:** Completion of footway on east side of A92 south of Star Junction. **ST4**: Upgrade Uncontrolled Crossing Point to north of Western Avenue Junction **ST5:** Providing Dropped Kerb Crossing Facility across Western Avenue **ST6:** Pedestrian footbridge at Star Road Junction **ST7:** Signalised Toucan Crossing Facility at Star Road Junction	*See Comments*	It would not be possible to deliver all options given that some represent a choice of differing levels of provision at the same location (e.g. between crossing type etc.) Indicative cost represents a *'worst case scenario'* i.e. includes for the construction of a footbridge.	Low - High
2	**Localised Road Junction and Safety Improvements**	To reduce identified problems relating to road safety conflicts which currently occur at the junctions through relatively low cost interventions within the confines of the existing staggered junction form.	**R1:** Signing and Lining Improvements at both Western Avenue and Star Road Junctions **R2:** Improve Radii of A92 Northbound Merge Taper at Western Avenue Junction **R3:** Install kerbed splitter islands at Star Road Junction **R4:** Increase Length of A92 Offside Northbound Deceleration Lane at Star Road Junction **R5:** Improve vertical alignment of A92 carriageway **R6:** Banning right-turn out of Western Avenue **R13:** A92 30mph speed limit reduction	.	Package would additionally contain a selection of relevant measures identified from the Sustainable Transport Package.	Medium

Ref	Package Name	Purpose	Core Measures	Optional Measures	Comments	Indicative Cost Banding
3	**Road Junction Upgrade**: Signalised Junction	To address identified problems relating to road safety conflicts and journey time delays which currently occur for traffic travelling to and from the minor arms at the junctions through the installation of signals within the confines of the existing junction form. Given the close proximity of the two junctions, signal junctions would be operated via the same controller.	**R11:** New signalised junction	**R5:** Improve vertical alignment of A92 carriageway **R6:** Banning right-turn out of Western Avenue **R13:** A92 30mph speed limit reduction – see comment.	Potential for speed limit reduction to complement signalised junction. The provision of a signalised junction is not reliant on a reduction in the speed limit. Potential exists to improve vertical alignment of carriageway Potential exists to ban right turn out of Western Avenue which may offer efficiencies in junction operation. Signalised facilities would offer potential of including pedestrian provision, however, would include a selection of other relevant measures identified from Sustainable Transport Package	Medium
4	**Road Junction Upgrade**: Roundabout	To address identified problems relating to road safety conflicts and journey time delays which currently occur for traffic travelling to and from the minor arms at the junctions through the installation of a roundabout. This would involve the realignment of either the Western Avenue and / or the Star Road junction approaches to create a four arm roundabout.	**R12:** New Roundabout	**R13:** A92 30mph speed limit reduction – see comment.	Potential for speed limit reduction to complement roundabout. The provision of a roundabout is not reliant on a reduction in the speed limit. Package would additionally contain a selection of relevant measures identified from the Sustainable Transport Package.	High
5	**Road Junction Upgrade**: Grade Separated Junction	To address identified problems relating to road safety conflicts and journey time delays which currently occur for traffic travelling to and from the minor arms at the junctions through the installation of a grade separated junction. This would involve the realignment of either the Western Avenue and / or the Star Road junction approaches and the provision of an overbridge across the A92.	**R10:** New Grade Separated Junction		Package would likely incorporate pedestrian infrastructure on the overbridge, however, would additionally contain a selection of relevant measures identified from the Sustainable Transport Package.	Very High

5.5.4 Cadham Study Area

Ref	Package Name	Purpose	Core Measures	Optional Measures	Comments	Indicative Cost Banding
1	**Sustainable Transport Package**	To address the identified problem relating to pedestrian severance associated with the A92 and connectivity for cyclists to local and national routes.	**ST1:** Provide toucan crossing across the A92 **ST2:** Upgrade of existing footway on east side of A92 **ST3:** Provide dropped kerb crossing facility across Cadham Road			Low
2	**Local Road and Safety Improvements**	To address identified problems relating to road safety conflicts which currently occur at the junction through relatively low cost interventions within the confines of the existing junction form.	**R1:** Provide diverge lane for car wash **R2:** Signing and lining improvement **R3:** Improve drainage and grip in the vicinity of A92 West Lodge **O1:** Right turn ban camera enforcement		Package would additionally contain a selection of relevant measures identified from the Sustainable Transport Package.	Low
3	**Road Junction Upgrade:** Signalised Junction	To address identified problems relating to road safety conflicts and journey time delays which currently occur at the junction through the installation of signals at the existing junction layout.	**R7:** New signalised junction	**R1:** Provide diverge lane for car wash **R3:** Improve drainage and grip in the vicinity of A92 West Lodge **O1:** Right turn ban camera enforcement	Potential for diverge lane for car wash to be incorporated as part of this package. Potential to improve drainage and grip on the A92 to complement signalised junction. Potential exists to install right turn ban enforcement at junction Signalised facilities could include pedestrian provision, however, package would include a selection of other relevant measures identified from Sustainable Transport Package Under the option, it is assumed that the right turn from the A92 into Cadham Road would be permitted.	Low

Ref	Package Name	Purpose	Core Measures	Optional Measures	Comments	Indicative Cost Banding
4	**Strategic Road Improvement:** Linking from Cadham Road to Tullis Russell Roundabout	To address identified problems relating to road safety conflicts and journey time delays which currently occur for traffic emerging from Cadham Road through the provision of a new link road between Cadham Road and the western arm of the Tullis Russell Roundabout, thus allowing the closure of the Cadham Road junction.	**R8:** Link Cadham Road to Tullis Russell Roundabout and Close Cadham Road Junction	**R1:** Provide diverge lane for car wash **R3:** Improve drainage and grip in the vicinity of A92 West Lodge	Potential for diverge lane for car wash to be incorporated as part of this package. Potential to improve drainage and grip on the A92 to complement signalised junction. Signalised facilities would include pedestrian provision, however, package would include a selection of other relevant measures identified from Sustainable Transport Package	High
5	**Strategic Road Improvement:** Realigned A92 carriageway	To address identified problems relating to road safety conflicts and journey time delays which currently occur at the junction through the installation of new dualled carriageway between the Tullis Russell Roundabout and the Balfarg Junction. The A92 past the Cadham Road junction would then revert to a local road.	**R9:** New A92 alignment between Tullis Russell Roundabout and Balbirnie		Package would additionally contain a selection of relevant measures identified from the Sustainable Transport Package	Very High

5.6 Summary

This chapter has outlined the option development and sifting processes undertaken to arrive at a final set of options for assessment as part of the Initial Appraisal, described in the following chapter. A plan showing the location of the packages taken forward to the initial appraisal is presented in **Appendix B**.

Initial Appraisal

06

6. Initial Appraisal

6.1 Introduction

This chapter sets out an initial appraisal of the final packaged options identified in Chapter 5.

In line with STAG, the options have been appraised against the study Transport Planning Objectives, the five STAG Criteria, and Implementability Criteria.

6.2 Approach to Appraisal

This section confirms the approach which will be taken to appraise the study options. The key assessment criteria for the options are set out in the sections below.

In line with previous sections, the appraisal has been undertaken for the three respective study areas/junctions being considered. Therefore, following an outline of the approach to the appraisal below, the appraisal findings are summarised in the following sections:

- **Section 6.3** – Freuchie Initial Appraisal
- **Section 6.4** – Balfarg Initial Appraisal
- **Section 6.5** – Cadham Initial Appraisal

6.2.1 Do-Minimum

Each option will be appraised against the Do-Minimum scenario defined in **Section 5.2.**

6.2.2 Transport Planning Objectives

Each option will be subject to a qualitative appraisal against the Transport Planning Objectives that have been established for the study:

- TPO1: Reduce road user conflict at junctions on the A92.
- TPO2: Encourage increased active travel use and improve access to public transport by reducing severance caused by A92 traffic volumes.
- TPO3: Maintain journey times and journey time reliability on the A92 by reducing the potential for incident and delay at junctions along the route.
- TPO4: Enhance access to local employment and services through improving vehicular accessibility of the strategic road network for communities on the A92.

6.2.3 Implementability Criteria

Options will also be assessed in terms of their implementability, as set out in the STAG Guidance.

Table 6.1: Implementability Criteria

Implementability Criteria	Description
Technical	Initial assessment of the feasibility of construction or implementation of an option as well as any associated cost, timescale or deliverability risks.
Operational	An assessment of who would operate the option and any other issues which may impact on its operation.
Affordability	An assessment of the scale of financial burden on the promoting authority and other possible funding organisations, as well as associated risks.
Public Acceptability	An assessment of the likely public response to an option. This includes consideration of the outcomes of previous consultation activities undertaken on the study area, referred to in **Section 3.5** of this report.

With regards to the affordability assessment, which takes account of the anticipated option costs, for the purposes of the STAG Part 1 appraisal a high level costing exercise has been undertaken to assess the likely costs associated with implementing the study options with options qualified as low, medium, high or very high cost[53].

6.2.4 STAG Criteria

Each option will also be subject to an initial appraisal against each of the five STAG criteria.

Table 6.2: STAG Criteria

STAG Criteria	Description
Environment	Highlights the environmental impacts of an option, against a number of environment sub-criteria.
Safety	Comprises two sub-criteria of accidents and security.
Economy	Comprises three sub-criteria of Transport Economic Efficiency, Wider Economic Benefits and Economic Activity and Location Impacts (EALI).
Integration	Comprises three sub-criteria of Transport Integration, Transport and Land-Use Integration and Policy Integration.
Accessibility and Social Inclusion	Comprises two sub-criteria of Community Accessibility and Comparative Accessibility.

6.2.5 Established Policy Directives

An assessment has been undertaken of option performance against established policy directives using Transport Scotland's Policy Assessment Framework (PAF).

6.2.6 Scale of Impacts

For each assessment criterion, impacts of options will be assessed using the seven-point scale set out in STAG.

Table 6.3: STAG Guidance Seven Point Scale

Impact	Symbol and Shading	Description
Major beneficial impact	✓✓✓	These are benefits or positive impacts which, depending on the scale of benefit or severity of impact, should be a principal consideration when appraising an option.
Moderate beneficial impact	✓✓	The option is anticipated to have a moderate benefit or positive impact, and although they would not be taken in isolation, these scores may be a key consideration in the overall appraisal of an option when considered alongside other factors.
Minor beneficial impact	✓	The option is anticipated to have only a small benefit or positive impact. Small benefits or impacts are those which are worth noting, but are not likely to contribute materially to determining whether an option is taken forward.
No benefit or impact	-	The option is anticipated to have no or negligible benefit or negative impact.
Minor negative impact	×	The option is anticipated to have only a small negative impact. Small impacts are those which are worth noting, but are not likely to contribute materially to determining whether an option is taken forward.
Moderate negative impact	××	The option is anticipated to have a moderate negative impact, and although they would not be taken in isolation these scores may be a key consideration in the overall appraisal of an option when considered alongside other factors.
Major negative impact	×××	These are negative impacts which, depending on the severity of impact, should be a principal consideration when appraising an option.

[53] For the purposes of the study the following high level cost bandings have been assumed primarily for the purposes of option comparison. Low cost = £0-250k; Medium cost = £250k-£1m; High cost = £1m-£5m; and Very High cost = >£5m. It is to be noted that due to the early stage of the study, more detailed option development and design work would be required to develop an accurate estimate of potential option costs.

6.2.7 Rationale for Selection or Rejection

The appraisal of the options against the suite of assessment criteria above will determine whether any option should be rejected from further consideration, or retained for further assessment by Transport Scotland.

6.2.8 Appraisal Summary Tables

Appraisal Summary Tables (ASTs) for each of the options considered in the study are set out in **Appendix C**.

6.3 Freuchie Initial Appraisal

6.3.1 Transport Planning Objective Appraisal

The following section presents a summary of findings from the appraisal of improvement options identified for Freuchie.

Table 6.4: Freuchie TPO Appraisal Summary

Option Package	TPOs			
	TPO1	TPO2	TPO3	TPO4
Do-Minimum	-	-	-	-
FOP1 - Sustainable Transport	✓	✓✓✓	×	-
FOP2 - Localised Road Junction and Safety Improvements	✓	-	✓	✓
FOP3 - Road Junction Upgrade: Signalise Both Kettlebridge and Cross Keys Junctions	✓✓✓	✓✓	××	✓✓✓
FOP4 - Road Junction Upgrade: Staggered Junction at Kettlebridge	✓✓	×	✓	✓
FOP5 - Road Junction Upgrade: Roundabout at Kettlebridge	✓✓✓	-	×	✓✓✓

6.3.2 Objective 1: Reduce road user conflict at junctions on the A92.

Under the Do-Minimum Scenario, there is not anticipated to be any impacts in terms of improving safety through reducing road user conflicts at junctions in Freuchie (TPO1).

It is expected that measures included as part of the Sustainable Transport package (FOP1) would have a minor positive impact in reducing road user conflicts at the junctions given this option incorporates dedicated crossing facilities thereby improving the safety of pedestrians, whilst additional footways on the east side of the A92 could reduce the requirement for pedestrians and cyclists to cross the road. Measures included as part of the Localised Road Junction and Safety Improvements package (FOP2) would likely lead to a minor reduction in conflicts at the Kettlebridge junction, particularly for HGVs, given the presence of a left turn merge and right turn facilities on the main A92 carriageway. Accordingly, this package would be anticipated to have a minor positive impact against this TPO.

More substantial Junction Upgrade measures (FOP3, FOP4 and FOP5) would be anticipated to have a moderate or major benefit against this TPO by reducing existing conflicts, particularly if these are combined with the potential closure of the Cross Keys junction. Of these packages, the installation of a signalised junction (FOP3) or roundabout (FOP5) are expected to deliver the greatest benefits. Depending on the phasing configuration of signals, FOP3 has the potential to eliminate conflict for all movements to and from the minor arms of the junction. While FOP4 would be expected to have a positive impact by providing an improved layout to facilitate safer turning to/from the A92, it does not fully eliminate the potential for conflicts and therefore it is not considered that this option would perform as positively as FOP3 or FOP5. It is expected that FOP5 has the potential to reduce the likelihood for conflict with traffic from the minor arm while the severity of any accidents would also be anticipated to be reduced associated with implementation of a roundabout.

6.3.3 Objective 2: Encourage increased active travel use and improve access to public transport by reducing severance caused by A92 traffic volumes.

Measures incorporated as part of the Do-Minimum scenario are expected to generally have a negligible impact on TPO2 given they do not incorporate any improvement measures for active travel modes.

It is anticipated that the Sustainable Transport package (FOP1) would have a major positive impact on TPO2 given it incorporates formal crossing facilities and footways which would likely reduce severance for pedestrians and improve connectivity to long distance routes including NCN Route 1 for cyclists. The incorporation of these facilities as well as installation of new bus stop facilities north of the Kettlebridge junction are also expected to improve access to public transport for the local community.

The Localised Road Junction and Safety Improvements package (FOP2) would generally be expected to have a negligible impact on TPO2. While a reduction in vehicular speeds to 30mph and improving the corner radii at the Kettlebridge junction could improve conditions for cyclists in particular, road widening to deliver a right turn stacking lane and a left turn filter lane could exacerbate conditions for pedestrians trying to cross the A92 at this point.

Signalisation of the A92 Cross Keys and Kettlebridge junctions (FOP3) would be anticipated to have a major positive impact on this TPO considering the incorporation of integrated crossing facilities for both pedestrians and cyclists. Minor negative impacts would be anticipated with the implementation of a staggered junction (FOP4) given this would require widening of the A92 carriageway, therefore making it more difficult for active travel modes to cross. The introduction of a roundabout junction (FOP5) would be generally be anticipated to have a neutral impact; benefits for pedestrians associated with the presence of splitter islands on the roundabout approaches could be offset by the negative impacts experienced by cyclists at roundabouts.

6.3.4 Objective 3: Maintain journey times and journey time reliability on the A92 by reducing the potential for incident and delay at junctions along the route.

In the absence of any interventions (the Do-Minimum scenario), no impacts or changes would be expected on strategic journey times and journey time reliability on the A92.

The Sustainable Transport Package (FOP1) would be expected to have a minor adverse impact on strategic journey times given this option proposes the implementation of toucan crossings which could introduce delays for strategic traffic on this trunk road route. The incorporation of a right turn storage lane and left turn filter lane at the Kettlebridge junction as part of the Localised Road Junction and Safety Improvements package (FOP2) would be expected to have a minor positive impact as such provision would reduce the potential for strategic A92 traffic to be held up by traffic waiting to turn onto side roads, albeit, there may be a minor adverse impact associated with any speed limit reduction.

The installation of signalised junctions (FOP3) would be expected to result in a moderate negative impact given this option would bring strategic traffic to a stop on the trunk road. This would also likely be the case, albeit to a lesser extent, with the installation of a roundabout at Kettlebridge (FOP5). A staggered right turn junction (FOP4) would be anticipated to reduce delay and result in a minor positive impact for strategic A92 traffic compared to the Do-Minimum scenario considering the presence of right turn storage lanes and the redesign of the crossroad junction form.

6.3.5 Objective 4: Enhance access to local employment and services through improving vehicular accessibility of the strategic road network for communities on the A92.

Measures incorporated as part of the Do-Minimum and the Sustainable Transport Package (FOP1) would generally be expected to have a negligible impact on TPO4.

Localised Road Junction and Safety Improvements (FOP2) would be anticipated to have a minor benefit given measures such as improving the approach grade and radiis of the minor arm junctions may improve the ease in which local traffic can access the A92.

More substantial junction upgrade measures would be predicted to result in a benefit in terms of improving access to the A92 and consequential access to employment and services for local traffic. Both signalised junctions (FOP3) and a roundabout (FOP5) would be anticipated to deliver major benefits given these options would significantly improve opportunities for traffic from local roads to join the A92 compared to the Do-Minimum scenario. A staggered junction (TPO4) would be expected to result in minor beneficial impacts than the other two junction forms considering local traffic would still be subject to a level of delay in accessing the A92, albeit to a lesser extent.

6.3.6 Performance against Implementability Criteria

Table 6.5: Freuchie Implementability Appraisal Summary

Option Package	Implementability Criteria		
	Feasibility	Affordability	Public Acceptability
Do-Minimum	✓✓✓	Low	××
FOP1 - Sustainable Transport	✓✓	Low	-
FOP2 - Localised Road Junction and Safety Improvements	✓	Low - Medium	×
FOP3 - Road Junction Upgrade: Signalise Both Kettlebridge and Cross Keys Junctions	✓	Medium	✓
FOP4 - Road Junction Upgrade: Staggered Junction at Kettlebridge	✓	High	✓
FOP5 - Road Junction Upgrade: Roundabout at Kettlebridge	✓	High	✓✓

6.3.7 Feasibility

In the absence of any major improvement measures, the Do-Minimum scenario is feasible.

In terms of technical and operational feasibility, all options are considered to be feasible. The Sustainable Transport package (FOP1) involves the implementation of relatively low cost package of pedestrian/cyclist infrastructure improvements, whereas each of the Junction Upgrade Options (FOP3, 4 and 5) would require more substantial works. The Localised Road Junction and Safety Improvements package (FOP2) is also considered feasible, albeit it is considered that the implementation of a right turn stacking lane on the A92 Kettlebridge Junction may require a departure from standard given the crossroad junction format.

It is worth noting that if both the Kettlebridge and Cross Keys junctions were designed and built to modern DMRB standards[54] and retained in a priority junction form, the most appropriate junction type for both would be a staggered *'Ghost Island'* based on current traffic flows[55]. It is also to be noted however that guidance suggests that such arrangements are generally not advisable at crossroad junctions and may require a departure from standard. As with all option packages, further design work, including traffic modelling, would be required to enable a fuller understanding of the technical feasibility of options.

6.3.8 Affordability

The Do-Minimum scenario would not involve any works and therefore encounters no issues around affordability.

Construction costs for the Sustainable Transport package (FOP1) would be anticipated to constitute a low cost measure based on the cost bandings established for this study described in **Section 5.5**, while the Localised Road Improvement and Safety package (FOP2) would likely constitute a low-medium cost approach. Junction Upgrade options (FOP3, FOP4 and FOP5) have been estimated to constitute 'high' cost approaches given the requirement for significant engineering works associated with carriageway redesign. While full design work would be required to provide a more accurate estimate of capital and operating costs for each option, previous estimates for FOP5 have suggested implementation of a roundabout would be a "high" cost measure. Options which involve the introduction of traffic signals and crossings (list options) would also likely incur additional operating costs associated with maintenance of these facilities.

6.3.9 Public Acceptability

In the absence of any improvement works to junctions at Freuchie, there is likely to be continued road safety concerns amongst the local community associated with difficulties experienced in accessing the A92 and the risk

[54] Extracted from Table 2/1 and Figure 2/2 contained within *'Geometric Design of Major/Minor Priority Junctions'* http://www.standardsforhighways.co.uk/ha/standards/dmrb/vol6/section2/td4295.pdf
[55] Traffic flows informed by ATC counter information on the trunk road and local roads contained within **Section 3.4.6**

of conflicts with A92 traffic for both vehicles entering from the local road network and active travel users seeking to cross the A92.

From a public acceptability perspective, previous consultations with Freuchie Community Council and representations made by local Members have identified support for the concept of a roundabout (FO5) and therefore of all the potential options, this proposed improvement would be anticipated to perform most positively, and receive (anticipated) strong support by the local community. In contrast, Localised Road Junction and Safety Improvements – based on previous consultations – would be unlikely to address community concerns centred on improving access onto the A92. It is to be noted that no specific public consultation has been undertaken as part of this stage of the study.

6.3.10 Performance against STAG Criteria

Table 6.6: Performance against STAG Criteria

Option	STAG Criteria				
	Environment	Safety	Economy	Integration	Access & SI
Do-Minimum	-	-	-	-	-
FOP1 - Sustainable Transport	-	✓	-	✓✓	✓✓
FOP2 - Localised Road Junction and Safety Improvements	×	✓	-	-	×
FOP3 - Road Junction Upgrade: Signalise Both Kettlebridge and Cross Keys Junctions	×	✓✓✓	×	-	✓
FOP4 - Road Junction Upgrade: Staggered Junction at Kettlebridge	×	✓✓	-	-	×
FOP5 - Road Junction Upgrade: Roundabout at Kettlebridge	×	✓✓✓	×	-	-

6.3.11 Environment

The environmental constraints mapping contained within **Section 3.7** have not identified any specific sensitive receptors adjacent to either the Kettlebridge or Cross Keys junctions.

It is anticipated that the absence of any substantial improvement measures as part of the Do-Minimum scenario would result in a negligible impact from an environmental perspective.

Measures incorporated as part of the Sustainable Transport Package (FOP1) are expected to potentially result in a modal shift away from car-based transport towards more sustainable modes, however, the introduction of toucan crossings could bring traffic to a standstill on the A92, potentially therefore resulting in a detrimental impact for vehicular emissions. Accordingly, a neutral impact is predicted from an environmental perspective.

The Localised Road Junction and Safety Improvements Package (FOP2) is expected to result in a minor negative impact on the Environment criteria given there would likely be additional land take associated with the junction given the widening of the carriageway that would be required. The Road Junction Upgrade packages incorporating signalised junctions (FOP3), a staggered junction at Kettlebridge (FOP4) and a roundabout (FOP5) are also expected to result in similar negative impact given the additional land take that would likely be necessary to facilitate these interventions. There could also likely be a minor detrimental impact associated with increased emissions for FOP3 and FOP5 associated with bringing strategic traffic to a stop on the A92.

6.3.12 Safety

Under the Do-Minimum Scenario, there is not anticipated to be any impacts in terms of improving safety through junctions in Freuchie.

It is expected that measures included as part of the Sustainable Transport package (FOP1) would have a positive impact in improving pedestrian safety given the provision of dedicated crossing facilities, whilst additional

footways on the east side of the A92 could reduce the requirement for pedestrians and cyclists to cross the road. Perceptions of security would also be enhanced with improved provision for active travel users. Measures included as part of the Localised Road Junction and Safety Improvements package (FOP2) would likely lead to a minor reduction in conflicts at the Kettlebridge junction, particularly for HGVs, given the presence of a left turn merge and right turn facilities on the main A92 carriageway. Accordingly, this package would also be anticipated to have a positive impact on safety.

More substantial Junction Upgrade measures (FOP3, FOP4 and FOP5) would be anticipated to have a moderate or major benefit on safety, particularly if these are combined with the potential closure of the Cross Keys junction. Of these packages, the installation of a signalised junction (FOP3) or roundabout (FOP5) are expected to have the greatest benefits. Depending on the phasing configuration of signals, FOP3 has the potential to eliminate conflict for all movements to and from the minor arms of the junction. While FOP4 would be expected to have a positive impact by providing an improved layout to facilitate safer turning to/from the A92, it does not fully eliminate the potential for conflicts and therefore it is not considered that this option would perform as positively as FOP3 or FOP4 in terms of reducing the potential for accidents. It is expected that FOP5 has the potential to reduce the likelihood for conflict with traffic from the minor arm while the severity of any accidents would also be anticipated to be reduced associated with implementation of a roundabout. Both FOP3 and FOP5 could also have a minor benefit for pedestrian security given that the junction upgrade would likely be combined with new street lighting columns and increased sense of security at the Kettlebridge junction.

6.3.13 Economy

It is not anticipated that the Do-Minimum scenario, the Sustainable Transport Package (FOP1), the Localised Road Junction and Safety Improvements (FOP2) and the Staggered Junction Package (FOP4) would have any major economic impact. It is considered that the nature of measures included in these packages would not significantly impact upon A92 strategic journey times and therefore there would be limited economic impact associated with journey time impacts.

The Road Junction Upgrade Package involving the provision of a signalised junction (FOP3) and a roundabout (FOP5) would be expected to have a minor adverse economic impact given these packages would involve the formation of a new junction on the A92 and therefore introduce potentially longer journey times and delays for strategic traffic.

6.3.14 Integration

From a policy integration perspective, it is considered that the Sustainable Transport Package (FOP1) aligns positively with existing governmental policy objectives to encourage increased active travel and increased use of public transport and therefore has been assigned as having a moderate benefit on Integration. The remaining packages incorporating the Do-Minimum, Localised Road Junction and Safety Improvements (FOP2) as well as the Road Junction Upgrade Packages (FOP3, FOP4 and FOP5) are anticipated to have a negligible impact on Integration. In terms of transport integration and facilitating interchange, again the Sustainable Transport Package (FOP1) would be expected to perform positively in this regard given this option includes measures designed to provide safe, improved access to bus stops on the A92, facilitating public transport use.

6.3.15 Accessibility and Social Inclusion

It is anticipated that the Do-Minimum Scenario would have a negligible impact on the Accessibility and Social Inclusion criteria considering the minor nature of measures incorporated under this scenario. The Sustainable Transport Package (FOP1) would likely result in benefits in enhancing access to local services for the Freuchie community given this package incorporates both dedicated pedestrian crossings and new footway facilities to reduce the severance impact currently caused by the A92. Improved ease of crossing would deliver benefits in terms of increasing community connectivity to key trip attractors that are located on the east side of the road. Improved access to public transport facilitated by this package would also deliver benefits in terms of enhancing social inclusion.

Both the Localised Road Junction and Safety Improvements Package (FOP2) and the Staggered Junction Package (FOP4) are anticipated to have a minor negative impact on accessibility considering these options would involve widening of the carriageway at the Kettlebridge junction which has the potential to exacerbate the existing severance issue caused by the A92. It is considered that the potential to integrate signalised crossing facilities as part of the Signalised Junction Package (FOP3) could enhance access to local services for pedestrians. FOP5 would be expected to have a neutral impact on Accessibility and Social Inclusion considering the design could incorporate splitter refuge islands which could enhance connectivity to local services, however,

this is anticipated to be offset by the increased distance pedestrians and cyclists may encounter away from their desire line associated with the provision of a roundabout.

6.3.16 Established Policy Directives

A Policy Assessment Framework has been completed to assess the performance of the proposed option packages against established national policy, with results presented in **Appendix D.**

6.3.17 Summary

This section has presented the results from the initial appraisal of option improvement packages for Freuchie. A summary of the appraisal outcome is presented in **Table 6.7** alongside proposed recommendations as to whether the option packages should be taken forward for further, more detailed consideration at the Detailed Appraisal stage, or sifted from further consideration at this stage.

Table 6.7: Freuchie Appraisal Summary

Option Package	TPOs				Implementability			STAG Criteria					Recommendation
	TPO1	TPO2	TPO3	TPO4	Feasibility	Affordability	Acceptability	Environment	Safety	Economy	Integration	Accessibility & Social Inclusion	
Do-Minimum	-	-	-	-	✓✓✓	Low	××	-	-	-	-	-	**Retain:** Take forward for purposes of comparison.
FOP1 - Sustainable Transport	✓	✓✓✓	×	-	✓✓	Low	✓	-	✓	-	✓✓	✓✓	**Retain:** Option generally performs positively against the TPOs and is considered feasible in terms of deliverability. It is recommended that this option is taken forward for further consideration.
FOP2 - Localised Road Junction and Safety Improvements	✓	-	✓	✓	✓	Low - Medium	×	×	✓	-	-	-	**Retain:** This option generally performs positively against the TPOs, albeit to a lesser extent than other option packages. It is recommended that this option is retained for further consideration. Specific options within this package may merit consideration as part of a shorter term approach.
FOP3 - Road Junction Upgrade: Signalise Both Kettlebridge and Cross Keys Junctions	✓✓✓	✓✓	××	✓✓✓	✓	Medium	✓	×	✓✓✓	×	-	✓	**Retain:** This option has the potential to deliver a number of the TPOs, particularly enhancing access to the strategic road network for the Freuchie community and reducing the potential for vehicular and pedestrian conflicts. It is recommended this option is taken forward for more detailed design and assessment work to understand the quantitative impacts of this intervention on A92 strategic traffic.
FOP4 - Road Junction Upgrade: Staggered Junction at Kettlebridge	✓✓	×	✓	✓	✓	High	✓	×	✓✓	-	-	×	**Retain:** While the benefits of this package in terms of TPO performance is not considered to be as positive as FOP3 and FOP5, it is recommended that there is merit in taking this option forward for further consideration.
FOP5 - Road Junction Upgrade: Roundabout at Kettlebridge	✓✓✓	-	×	✓✓✓	✓	High	✓✓	×	✓✓✓	×	-	-	**Retain:** This option has the potential to deliver positive impacts against the TPOs albeit may introduce some adverse impacts for strategic traffic. It is recommended this option be taken forward for more detailed design and assessment work to understand the quantitative impacts of this intervention on A92 strategic traffic.

6.4 Balfarg Initial Appraisal

The following section summarises the findings from the appraisal of improvement option packages for Balfarg.

6.4.1 Transport Planning Objective Appraisal

Table 6.8: Balfarg TPO Appraisal Summary

Option Package	TPOs			
	TPO1	TPO2	TPO3	TPO4
Do-Minimum	-	-	-	-
BOP1 - Sustainable Transport	✓	✓✓✓	-	-
BOP2 - Localised Road Junction and Safety Improvements	✓	-	-	-
BOP3 - Road Junction Upgrade: Signalised Junction	✓✓✓	✓✓	××	✓✓✓
BOP4 - Road Junction Upgrade: Roundabout	✓✓✓	-	×	✓✓✓
BOP5 - Road Junction Upgrade: Grade Separated Junction	✓✓✓	✓	✓	✓✓✓

6.4.2 Objective 1: Reduce road user conflict at junctions on the A92.

Under the Do-Minimum Scenario, there is not anticipated to be any impacts in terms of improving safety through reducing road user conflicts at the Balfarg junctions.

Measures included as part of the Sustainable Transport Package (BOP1) would be expected to result in a minor positive impact in reducing conflict considering this package would incorporate upgraded crossing facilities, including a potential pedestrian footbridge, as well as footway facilities on both sides of the A92. These measures would be anticipated to reduce the occurrence of pedestrians crossing the main A92 carriageway in the vicinity of the Western Avenue junction. The Localised Road Junction and Safety Improvements Package (BOP2) would also be anticipated to result in a minor positive impact on TPO1 considering the benefits offered by measures including increasing radii at Western Avenue, installing splitter islands and reducing the speed limit.

Junction Upgrade Packages (BOP3, BOP4 and BOP5) would be anticipated to result in a major benefit in terms of improving safety through reducing road user conflict. Depending on the phasing configuration of signals, BOP3 has the potential to eliminate conflict for turning traffic to and from Western Avenue and Star Road. BOP4 also has the potential to reduce the likelihood for conflict with traffic from the minor arms while the severity of any accidents would also be anticipated to be reduced associated with implementation of a roundabout. The installation of a grade separated junction would be expected to perform strongly against this TPO considering that the junction would be replaced with merge and diverge lanes whilst pedestrians and cyclists could be accommodated on an overbridge, thus reducing the risks associated with crossing at-grade on the A92.

6.4.3 Objective 2: Encourage increased active travel use and improve access to public transport by reducing severance caused by A92 traffic volumes.

Under the Do-Minimum scenario, it is anticipated that pedestrian demand for the existing crossing facility south of the Star Road junction may increase, however, this could be offset by the installation of a toucan crossing facility located remotely to the south of the junction; thus resulting in a negligible impact.

Measures incorporated as part of the Sustainable Transport Package (BOP1) would be expected to have a major benefit in reducing pedestrian severance caused by the A92 with upgraded or new crossing facilities enhancing connectivity to existing bus stops and onward pedestrian routes located to the east of the A92. The Localised Road Junction and Safety Improvements Package (BOP2) would be expected to result in a generally negligible impact against this TPO considering it would not incorporate specific provision for active travel modes.

It is anticipated that the installation of a signalised junction and a grade separated junction would result in a positive impact for sustainable transport access. This is particularly the case for a signalised junction (BOP3) with

integrated dedicated crossing facilities which could enhance connectivity across the A92 and deliver a moderate benefit in terms of reducing severance. A grade separated junction (BOP5) could also deliver positive impacts by offering footway facilities on an overbridge across the A92. It is expected that a roundabout (BOP4) would on the whole have a neutral impact; benefits for pedestrians associated with the presence of splitter islands on roundabout approaches could be offset by the negative impacts experienced by cyclists at roundabouts.

6.4.4 Objective 3: Maintain journey times and journey time reliability on the A92 by reducing the potential for incident and delay at junctions along the route.

The Do-Minimum scenario would have a negligible impact on A92 strategic journey times given this scenario proposes no new measures at the Balfarg junction that would impact on journey times of strategic A92 traffic.

The Sustainable Transport Package (BOP1) is anticipated to result in a neutral impact on strategic journey times considering a pedestrian footbridge would likely result in a positive impact given the reduction in likelihood for incident and delay at the junction, although the implementation of a toucan crossing could introduce delays for strategic traffic on this trunk road route. Measures included as part of the Localised Road Junction and Safety Improvements (BOP2) would be expected to have a neutral impact on strategic A92 journey times considering they would potentially reduce the risk of incident and delay at the junction, however, this could be offset by any speed limit reduction.

Installation of signalised junctions (BOP3) would be expected to result in a moderate negative impact on TPO3 given this option would bring high volumes of strategic traffic to a stop on the trunk road. This would also likely be the case, albeit to a lesser extent, with the installation of a roundabout (BOP4). A grade separated junction (BOP5) would likely have a positive impact on A92 journey time reliability by reducing the potential for conflicts.

6.4.5 Objective 4: Enhance access to local employment and services through improving vehicular accessibility of the strategic road network for communities on the A92.

The Do-Minimum and the Sustainable Transport package (BOP1) scenarios would be expected to have a negligible impact against this TPO as this scenario does not entail any measures designed to improve access onto the A92 from local roads.

Localised Road Junction and Safety Improvements (BOP2) would be anticipated to have a neutral impact given measures such as improving the vertical visibility of the carriageway and improving the left turn radii at Western Avenue may improve access, however, this would likely be offset by the banning of right turning manoeuvres from Western Avenue.

It is anticipated that all three junction upgrade packages (BOP3, BOP4 and BOP5) would deliver major benefits in improving access to the A92 and onward access to local employment and services given that these option would be designed to reduce both conflicts and delay and therefore the ease in which traffic could emerge from the minor arms at the junctions.

6.4.6 Performance against Implementability Criteria

Table 6.9: Balfarg Implementability Appraisal Summary

Option Package	Implementability Criteria		
	Feasibility	Affordability	Public Acceptability
Do-Minimum	✓✓✓	Low	×××
BOP1 - Sustainable Transport	✓	Low - High	✓
BOP2 - Localised Road Junction and Safety Improvements	✓✓	Medium	××
BOP3 - Road Junction Upgrade: Signalised Junction	✓	Medium	✓
BOP4 - Road Junction Upgrade: Roundabout	✓	High	✓✓✓
BOP5 - Road Junction Upgrade: Grade Separated Junction	××	Very High	✓✓

6.4.7 Feasibility

In the absence of any major improvement measures and given that committed measures have been subject to design considerations, the Do-Minimum scenario is considered feasible.

In terms of technical and operational feasibility, all other options are considered to be feasible; albeit the Localised Road Junction and Safety Improvements package (BOP2) is considered to be more feasible considering the more localised nature of measures incorporated as part of this package

The Sustainable Transport package (BOP1) mostly involves the implementation of low cost pedestrian/cyclist infrastructure improvements, however, the potential to install a footbridge across the A92 would require more substantial works and therefore further investigation to understand its technical feasibility. The Junction Upgrade Option Packages (BOP3 and BOP4) would also require more substantial works and further assessment of their operational feasibility using modelling software. It is worth noting that if the junction at Western Avenue was designed and built to modern DMRB standards[56]and retained in a priority junction form, the most appropriate junction type would be a Roundabout based on current traffic flows[57].

Based upon a review of DMRB standards (DMRB 40/94[58] and DMRB TD9/93[59]) for grade separated junctions, it is anticipated that BOP5 would perform negatively in feasibility terms. The key issues are as follows:

- It is recommended within DMRB 40/94 that *"attention should be paid to ensuring that there are no major differences in the level of junction provision along a route."* It is considered that a grade separated junction at this location would unlikely to be in keeping with the form of other local upstream and downstream junctions on the A92 which constitute at grade roundabouts and priority junctions;
- DMRB TD9/93 identifies that *"designs involving grade separation of single carriageway roads should be treated with caution…experience has shown that that frequent overbridges and the resulting earthworks can create the impression of a high speed road, engendering a level of confidence in the road alignment that cannot be justified on single carriageways. The provision of regular at grade junctions with ghost islands, local dualling or roundabouts will maintain the impression of a single carriageway road."* It is anticipated that a grade separated junction in proximity to a contrasting single carriageway section of road with an at grade pedestrian crossing facility may introduce a safety risk;
- DMRB 40/94 identifies that full grade separation of a junction to modern standards contained within DMRB TD 22 and DMRB TA 46 can normally be economically justified at design flows of 30,000 AADT on the main carriageway (depending on demand for the minor arms). As demonstrated within **Section 3.4.6**, traffic flows on the main A92 carriageway constitutes approximately 19,000 – 23,000 AADT and therefore it is questionable whether full grade separation at this location would be justified; and
- The scale of works required to introduce a grade separated junction, including the footprint required to deliver this intervention as well as potential visual impact and planning consideration also presents a number of question marks.

As with all option packages, further design and assessment work, including traffic modelling, would be required to enable a fuller understanding of the technical and operational feasibility of proposed options.

6.4.8 Affordability

The Do-Minimum scenario would involve the installation of a new toucan crossing facility to the south of the Star Road junction with costs associated with this scenario anticipated to be within the lowest cost banding based on the bandings established for this study described in **Section 5.5**.

Construction costs for the Sustainable Transport package (BOP1) have been estimated to constitute a low cost measure, however, it is considered likely that the construction of a footbridge across the A92 with facilities to allow step free access would likely constitute *'high'* costs considering the significant engineering works that would be necessary. The Localised Road Improvement and Safety package (BOP2) would likely constitute a *'medium'* cost approach considering the new kerbing and adjustments to the central reservation that may be required.

[56] Extracted from Table 2/1 and Figure 2/2 contained within DMRB TD 42/95 *'Geometric Design of Major/Minor Priority Junctions'* http://www.standardsforhighways.co.uk/ha/standards/dmrb/vol6/section2/td4295.pdf
[57] Traffic flows informed by ATC counter information on the trunk road and local roads contained within **Section 3.4.6**
[58] Informed by DMRB TD 40/94 *'Layout of Compact Grade Separated Junctions'*
[59] Extracted from DMRB TD 9/93 *'Highway Link Design'*
http://www.standardsforhighways.co.uk/ha/standards/dmrb/vol6/section1/td993.pdf

It is anticipated that the Junction Upgrade Option Package involving the installation of signals at both Western Avenue and Star Road (BOP3) would constitute a 'medium' cost given the engineering requirements associated with implementation of traffic signals including ducting required. Traffic signals and crossings would also likely incur additional operating costs associated with maintenance of these facilities. It is expected that the installation of a roundabout would have a 'high' cost whilst the installation of a grade separated junction (BOP5) would have a 'very high' cost given that both would involve significant engineering works associated with carriageway redesign and a new bridge structure.

Full design work would be required to provide a more accurate estimate of capital and operating costs for each option.

6.4.9 Public Acceptability

In the absence of any improvement works to the junctions at Balfarg, there is likely to be continued road safety concerns amongst the local community associated with difficulties experienced in accessing the A92 and the risk of conflicts with A92 traffic for both vehicles entering from the local road network and pedestrians. Accordingly, from a public acceptability perspective, both the Do-Minimum and Localised Road Junction and Safety Improvements Packages (BOP2) are considered to be negative. The Sustainable Transport Package (BOP1) would have a neutral impact in terms of public acceptability given it would likely address pedestrian severance issues across the A92 but would not address perceived vehicular conflict issues at the Western Avenue Junction.

It is considered that each of the junction upgrade packages would likely generate positive support from the local community, with installation of a roundabout anticipated to perform most positively. The provision of a roundabout has previously been identified as a potential solution during previous consultation and in reports produced by North Glenrothes Community Council. It is to be noted that no specific public consultation has been undertaken as part of this stage of the study.

6.4.10 Performance against STAG Criteria

Table 6.10: Performance against STAG Criteria

Option	STAG Criteria				
	Environment	Safety	Economy	Integration	Access & SI
Do-Minimum	-	-	-	✓	✓
BOP1 - Sustainable Transport	-	✓	-	✓✓	✓✓
BOP2 - Localised Road Junction and Safety Improvements	-	✓	-	-	-
BOP3 - Road Junction Upgrade: Signalised Junction	××	✓✓✓	××	-	✓
BOP4 - Road Junction Upgrade: Roundabout	××	✓✓✓	×	-	-
BOP5 - Road Junction Upgrade: Grade Separated Junction	××	✓✓✓	-	-	✓

6.4.11 Environment

It is anticipated that the installation of improved crossing facilities and footways as part of both the Do-Minimum Scenario and the Sustainable Transport Package (BOP1) would likely result in a minor benefit from an environmental perspective given the enhanced connectivity for local communities located on the east of the A92 and the potential to encourage modal shift. This, however, would be offset by the additional impact from the land take for new footpaths, a detrimental impact for vehicular emissions and the visual impact of potential new lighting columns and a footbridge. Accordingly, both the Do-Minimum and BOP1 have been assigned as having a neutral impact. The Localised Road Junction and Safety Improvements Package (BOP2) is expected to result in a negligible impact from an environmental perspective considering it does not involve any additional land take.

The Road Junction Upgrade Packages (BOP3, BOP4 and BOP5) are anticipated to result in a moderate negative impact from an environmental perspective. Both BOP3 and BOP4 would likely have a detrimental impact on emissions given they would both introduce delay for strategic A92 traffic. A grade separate junction would additionally require significant land take and engineering works and may also be detrimental from a visual impact perspective. It is also worth considering the environmental constraints mapping contained within **Section 3.7** identified that there is an area designated for gardens and landscaping which bounds the junction to the east whilst there are listed buildings immediately to the west of the junction. These constraints would also have to be considered in relation to BOP4 and BOP5 which could impact these.

6.4.12 Safety

Under the Do-Minimum scenario, there is not anticipated to be any impacts in terms of improving safety through reducing road user conflicts at the Balfarg junctions.

Measures included as part of the Sustainable Transport Package (BOP1) would be expected to result in a minor positive impact in reducing conflict considering it would incorporate upgraded crossing facilities, including a potential pedestrian footbridge, as well as footway facilities on both sides of the A92. It is anticipated that these measures would reduce the occurrence of pedestrians crossing the main A92 carriageway in the vicinity of the Western Avenue junction. The Localised Road Junction and Safety Improvements Package (BOP2) would also be likely result in a minor positive impact on TPO1 considering the benefits offered by measures including increasing radii at Western Avenue, installing splitter islands and reducing the speed limit.

Junction Upgrade Packages (BOP3, BOP4 and BOP5) would be anticipated to result in a major benefit in terms of improving safety through reducing road user conflict. Depending on the phasing configuration of signals, BOP3 has the potential to eliminate conflict for turning traffic to and from Western Avenue and Star Road. BOP4 also has the potential to reduce the likelihood for conflict with traffic from the minor arms while the severity of any accidents would also be reduced associated with implementation of a roundabout. Installation of a grade separated junction would be expected to perform strongly against this TPO considering that the junction would be replaced with merge and diverge lanes whilst pedestrians and cyclists could be accommodated on an overbridge.

6.4.13 Economy

It is not anticipated that the Do-Minimum scenario, the Sustainable Transport Package (BOP1) and the Localised Road Junction and Safety Improvements (BOP2) would have any major economic impact given that the nature of measures included in these packages would be unlikely to significantly affect A92 strategic journey times.

It is expected that the Road Junction Upgrade Package involving the provision of a signalised junction (BOP3) and the provision of a roundabout would have a minor negative impact from an economic perspective given this would involve the formation of a new junction on the A92, with knock-on impacts in terms of delays for strategic traffic on the A92. A signalised junction, in particular, has the potential to introduce delay and queuing and would likely result in a moderate negative impact on journey times. By contrast, it is considered that the installation of a grade separated junction would likely result in a negligible economic impact given that A92 strategic journey times would remain unaffected.

6.4.14 Integration

It is considered that the Do-Minimum Scenario and the Sustainable Transport Package (BOP1) would align positively with existing governmental policy objectives to encourage increased active travel and increased use of public transport. These option have therefore has been assessed to have a positive impact against this objective. It is considered that the benefits offered through additional footways, a potential footbridge and enhanced connectivity with bus stop facilities would mean that BOP1 performs slightly more favourably than the Do-Minimum Scenario, given the transport integration benefits offered by this option.

The remaining packages incorporating the Localised Road Junction and Safety Improvements (BOP2) as well as the Road Junction Upgrade Packages (BOP3, BOP4 and BOP5) are generally anticipated to have a negligible impact on the Integration criteria.

6.4.15 Accessibility and Social Inclusion

It is anticipated that both the Do-Minimum Scenario and the Sustainable Transport Package (BOP1) would likely result in benefits in enhancing access to local services for the surrounding Balfarg and Balbirnie communities given that both packages would likely reduce the severance impact currently caused by the A92. The potential

benefit offered by the footbridge and additional footways would mean that BOP1 is expected to perform slightly more positively than the Do-Minimum Scenario. It is also worth noting that the junction is located adjacent to areas with low SIMD rankings and these measures could potentially have a minor benefit on addressing the existing social exclusion issues.

It is expected that the measure to reduce the speed limit as part of the Localised Road Junction and Safety Improvements Package (BOP2) could enhance accessibility for pedestrians across the A92, however, the banning of right turning traffic from Western Avenue could have a minor detrimental impact for local communities from a social exclusion perspective. Accordingly, this package has been assessed to have a neutral impact.

Road Junction Upgrade measures involving the installation of traffic signals (BOP3) and the provision of a grade separated junction (BOP5) are anticipated to have a positive impact with regards to enhancing connectivity for pedestrians and cyclists across the A92. In addition, both of these options would likely improve the ease in which local vehicular traffic can access local services and amenities. A negligible impact is predicted for BOP4. The potential to incorporate pedestrian splitter refuge islands on the arms of the roundabout junction as well as improve the ease in which vehicular traffic can emerge onto the A92 is considered to have a minor benefit for enhancing accessibility; however, this is anticipated to be offset by the increased distance pedestrians and cyclists may encounter away from their desire line associated with the provision of a roundabout.

6.4.16 Established Policy Directives

A Policy Assessment Framework has been completed to assess the performance of the proposed option packages against established national policy with results presented in **Appendix D**.

6.4.17 Summary

This section has presented the results from the initial appraisal of option improvement packages for Balfarg. A summary of the appraisal outcome is presented in Table 6.11 alongside proposed recommendations as to whether the option packages should be taken forward for further, more detailed consideration at the Detailed Appraisal stage, or sifted from further consideration at this stage.

Table 6.11: Balfarg Appraisal Summary

Option Package	TPOs				Implementability			STAG Criteria					Recommendation
	TPO1	TPO2	TPO3	TPO4	Feasibility	Affordability	Acceptability	Environment	Safety	Economy	Integration	Accessibility & Social Inclusion	
Do-Minimum	-	-	-	-	✓✓✓	Low	×××	-	-	-	✓	✓	**Retain:** Take forward for purposes of comparison.
BOP1 - Sustainable Transport	✓	✓✓✓	-	-	✓	Low - High	✓	-	✓	-	✓✓	✓✓	**Retain:** Option performs positively against the TPOs, deliverability and STAG criteria and it is recommended that this option is taken forward for further consideration.
BOP2 - Localised Road Junction and Safety Improvements	✓	-	-	-	✓✓	Medium	××	-	✓	-	-	-	**Reject:** This option generally has a negligible impact against the TPOs and STAG criteria, and is unlikely to be public acceptable given the historic concerns relating to the need for intervention to address local road safety and conflict concerns at junctions in Balfarg. Accordingly, it is recommended this option be sifted at this stage, although specific options within this package may merit further consideration as part of a shorter term approach.
BOP3 - Road Junction Upgrade: Signalised Junction	✓✓✓	✓✓	××	✓✓✓	✓	Medium	✓	××	✓✓✓	××	-	✓	**Retain:** This option has the potential to deliver positive impacts against a number of the TPOs, particularly enhancing access to the strategic road network. It is recommended this option is taken forward for more detailed design and assessment work to understand the quantitative impacts of this intervention on A92 strategic traffic.
BOP4 - Road Junction Upgrade: Roundabout	✓✓✓	-	×	✓✓✓	✓	High	✓✓✓	××	✓✓✓	×	-	-	**Retain:** This option has the potential to deliver positive impacts against the TPOs and would likely perform positively in terms of public acceptability. It is recommended this option be taken forward for more detailed design and assessment work to understand the quantitative impacts of this intervention on A92 strategic traffic.

BOP5 - Road Junction Upgrade: Grade Separated Junction	✓✓✓	✓	✓	✓✓✓	××	Very High	✓✓	××	✓✓✓	-	-	✓	**Reject:** While the option does have the potential to address a number of the TPOs, particularly around safety, it is considered that there could be a number of significant uncertainties regarding the feasibility of the option on the grounds that: ▪ DMRB standards suggests it could be inconsistent with other junction forms on the route; ▪ DMRB standards suggest it could be inconsistent with the nearby single carriageway and at grade controlled pedestrian crossing facility ▪ DMRB standards suggest that traffic flows on the A92 may not justify full grade separation; ▪ There may be deliverability issues relating to the scale of works including footprint, visual impact and planning issues. In addition, alternative options have the potential to deliver similar benefits at a lower cost. It is therefore recommended that this option be rejected from further consideration at this stage.

6.5 Cadham Initial Appraisal

The following section presents a summary of findings from the appraisal of the improvement options proposed for Cadham.

6.5.1 Transport Planning Objective Appraisal

Table 6.12: Cadham TPO Appraisal Summary

Option Package	TPOs			
	TPO1	TPO2	TPO3	TPO4
Do-Minimum	-	-	-	-
COP1 - Sustainable Transport	-	✓✓	×	-
COP2 - Localised Road Junction and Safety Improvements	✓	-	-	-
COP3 - Road Junction Upgrade: Signalised Junction	✓	✓✓	××	✓✓
COP4 – Strategic Road Improvement: Linking from Cadham Road to Tullis Russell Roundabout	✓✓	✓	✓	✓✓
COP5 – Strategic Road Improvement: Realigned A92 carriageway	✓✓	✓	✓✓	✓✓

6.5.2 Objective 1: Reduce road user conflict at junctions on the A92.

In the absence of any major interventions, as assumed under the Do-Minimum scenario, it is anticipated there would be no changes in the level of road user conflict at the Cadham junction.

It is anticipated that the Sustainable Transport Package (COP1) would also have a negligible impact against this TPO given that previous conflict studies undertaken at the junction did not identify any problems in terms of pedestrian and cyclist movements at the junction conflicting with traffic. Localised Road Junction and Safety Improvements (COP2) are expected to result in a minor benefit given the camera installation may reduce conflict associated with prohibited right turning traffic that currently takes place at the junction. The car wash diverge lane proposed under this package may also reduce conflict with vehicles breaking sharply on the A92.

The installation of a Signalised Junction (COP3) has the potential to reduce conflicts at the Cadham Road junction given that this option will introduce greater control of traffic movements at the junction, eliminating the potential for conflicts to and from the minor arms of the junction. While benefits would be expected at the junction itself, concerns have been raised that signal implementation could introduce conflicts and the potential for rear shunt accidents as vehicles travelling south around the bend to the north of Cadham Road could suddenly meet traffic forced to queue on the A92 due to traffic signal operation. Accordingly, the benefits of signals could be slightly offset if this option introduces the potential for shunt accidents on the A92.

Strategic improvements involving linking Cadham Road to Tullis Russell Roundabout (COP4) or a new A92 alignment (COP5) would be considered to have a more positive impact against TPO1 considering both options would remove the existing conflict between the traffic travelling to/from Cadham Road junction and the A92.

6.5.3 Objective 2: Encourage increased active travel use and improve access to public transport by reducing severance caused by A92 traffic volumes.

Under the Do-Minimum scenario, it is expected that there would be a negligible impact in terms of improving conditions for active travel modes.

The Sustainable Transport Package (COP1) would likely result in a moderate benefit to TPO2 considering a toucan crossing and upgrading the footway on the east side of the A92 could reduce severance between the east and west footways on the approach to the Tullis Russell Roundabout and additionally enhance accessibility of Markinch Railway Station. It is considered that Localised Road Junction and Safety Improvements (COP2) would

result in a negligible impact on TPO2. The provision of a signalised junction (COP3) would likely reduce severance currently caused by the A92 given the potential to integrate formal crossing facilities within the design.

The Strategic Improvement Package (COP4) involving the closure of Cadham Road would likely result in a minor benefit for sustainable transport (TPO2) given this option may make crossing the A92 in the vicinity of the existing junction more straightforward than at present. Similarly, minor benefits would be anticipated with COP5 given the potential for this option to remove traffic from the current A92 and therefore improve conditions for active travel modes on the existing A92 alignment. There is, however, a potential risk that the new A92 alignment could lead to new severance for communities either side.

6.5.4 Objective 3: Maintain journey times and journey time reliability on the A92 by reducing the potential for incident and delay at junctions along the route.

The Do-Minimum scenario does not propose any interventions that would be expected to impact upon strategic A92 journey times and therefore the performance of the Do-Minimum against this TPO would be negligible.

Implementation of a toucan crossing, as assumed under the Sustainable Transport Package (COP1) would be anticipated to result in minor negative impact against this TPO given that, when activated, the crossing would involve bringing A92 strategic traffic to a stop. It is expected that measures included as part of the Localised Road Junction and Safety Improvements Package (COP2) would have no tangible impact on strategic A92 journey times. Accordingly a negligible impact would be anticipated in terms of this packages performance against TPO3. The installation of a signalised junction (COP3) would be expected to result in a moderate negative impact given this option would bring high volumes of strategic traffic to a stop on the trunk road.

Both strategic improvement packages (COP4 and COP5) would be expected to result in benefits for journey times on the A92 given that both would involve reducing the potential for incidents and delay by eliminating interaction of traffic turning into and out of Cadham Road. Of these two strategic improvement packages, providing a new realigned A92 carriageway (COP5) is predicted to have a more pronounced impact (‘moderate benefit’) considering it would likely incorporate a new dualled section of road and provide overtaking opportunities.

6.5.5 Objective 4: Enhance access to local employment and services through improving vehicular accessibility of the strategic road network for communities on the A92.

No changes or impacts would be anticipated in terms of improving vehicular access to the A92 for communities under the Do-Minimum scenario or as part of the Sustainable Transport Package (COP1).

Measures included as part of the Localised Road Junction and Safety Improvements Package (COP2) are also predicted to have a negligible impact on improving accessibility of the strategic road network given there would continue to be difficulties associated with traffic emerging from Cadham Road as per the existing situation.

The provision of a Signalised Junction (COP3) would likely provide increased opportunities for traffic to emerge onto Cadham Road and therefore enhance accessibility to the strategic road network for the local community. Depending on the signal phasing, permitting right turning traffic from the A92 would further improve access. A moderate positive impact on TPO4 is therefore predicted for this package. The Strategic Road Improvements Packages (COP4 and COP5) would be anticipated to result in a moderate positive impact on enhancing accessibility of the strategic road network considering both packages would result in local traffic emerging on to the A92 via an arm of the Tullis Russell Roundabout.

6.5.6 Performance against Implementability Criteria

Table 6.13: Cadham Implementability Appraisal Summary

Option Package	Implementability Criteria		
	Feasibility	Affordability	Public Acceptability
Do-Minimum	✓✓✓	Low	×
COP1 - Sustainable Transport	✓✓	Low	-
COP2 - Localised Road Junction and Safety Improvements	✓	Low	×
COP3 - Road Junction Upgrade: Signalised Junction	-	Low	✓
COP4 - Strategic Road Improvement: Linking from Cadham Road to Tullis Russell Roundabout	✓	High	✓✓
COP5 - Strategic Road Improvement: Realigned A92 carriageway	××	Very High	×

6.5.7 Feasibility

The Do-Minimum scenario does not propose any major interventions and is therefore considered feasible.

Both the Sustainable Transport package (COP1) and the Localised Road Junction and Safety Improvements package (COP2) are considered feasible given both involve relatively minor works. COP2, however, involves more involved engineering works associated with carriageway widening and installation of a right turn ban enforcement camera which may present challenges; it is understood that this form of technology is relatively untried on the trunk road network. Alternative forms of enforcement (i.e. traffic police) would likely depend on the resources and commitment of Police Scotland and therefore presents question marks over deliverability.

The Road Junction Upgrade Package to deliver a signalised junction (COP3) is considered to present technical deliverability risks given the signals would be sited to the south of an adjacent bend on the main A92 carriageway and there could be signal visibility constraints which may prevent this option being feasible.

The Strategic Road Improvement Option Package (COP4) is considered to be technically feasible, however, further investigations would be required to establish the deliverability of this option given it would likely be reliant upon reaching an agreement with the nearby developer of the Tullis Russell Paper Mill.

It is anticipated that COP5, which involves installing new carriageway presents significant technical and deliverability risks given the scale of intervention and the environmental impact considering it would likely require the traversing of mature woodland currently located to the east of the existing A92 alignment. Depending on the alignment, there could also be a requirement for the demolishing of nearby residential properties. These issues may result in a consequential risk from a planning perspective. Accordingly, this option has been assessed to have a moderate negative impact in feasibility terms.

As with all option packages, further design and assessment work, including traffic modelling, would be required to enable a fuller understanding of the technical feasibility of options.

6.5.8 Affordability

The Do-Minimum scenario does not propose any major interventions and is therefore considered to have *'low'* costs according to the bandings established for this study described in **Section 5.5**.

Construction costs for both the Sustainable Transport package (COP1) and the Localised Road Improvement and Safety Package (COP2) would also likely constitute 'low' costs given the small-scale magnitude of measures proposed. Similarly, the installation of a signalised junction at Cadham Road (COP3) is also considered to have 'low' costs. It is also worth noting that both the installation of signals and the installation of camera enforcement would have ongoing maintenance costs associated with them.

It is anticipated that both strategic improvement measures (COP4 and COP5) would likely have higher construction costs given that both would involve the formation of new carriageway. COP5, in particular, is considered to have 'very high' costs given it would involve significant engineering works constituting the formation of a new 1km dual carriageway section and new junction arm at the Tullis Russell Roundabout.

Full design work would be required to provide a more accurate estimate of capital and operating costs for each option.

6.5.9 Public Acceptability

In the absence of any improvement works to Cadham Road junction, there is likely to be continued road safety concerns amongst the local community associated with difficulties in accessing the A92 both from a conflict and a delay perspective. Accordingly public acceptability for both the Do-Minimum and Localised Road Junction and Safety Improvements Package (COP2) has been assigned as being low. It is anticipated that the Sustainable Transport Package (COP1) would have a neutral public acceptability rating considering it could address pedestrian severance issues across the A92 but would be unlikely to address vehicular conflict issues.

It is considered that the formation of a signalised junction (COP3) would be likely to be well-received from locals within the Cadham community considering this would likely improve access and reduce potential conflicts issues associated with merging onto the A92. Depending on the signal phasing configuration, this could also potentially allow right turning traffic to directly access Cadham Road which would also likely be favoured. Strategic improvements involving connecting Cadham Road to Tullis Russell Roundabout (COP4) would also likely be viewed very favourably considering both would remove the existing conflict that currently occurs with the Cadham Road junction.

The formation of new carriageway (COP5) is predicted to result in a minor negative impact given the likely environmental and planning issues as well as potential local opposition associated with new road building that may ensue which could potentially off-set any positive public views on this option. It is to be noted that no specific public consultation has been undertaken as part of this stage of the study.

6.5.10 Performance against STAG Criteria

Table 6.14: Cadham Performance against STAG Criteria

Option	STAG Criteria				
	Environment	Safety	Economy	Integration	Access & SI
Do-Minimum	-	-	-	-	-
COP1 - Sustainable Transport	-	-	-	✓✓	✓✓
COP2 - Localised Road Junction and Safety Improvements	×	✓	-	-	-
COP3 - Road Junction Upgrade: Signalised Junction	×	✓	×	-	✓
COP4 – Strategic Road Improvement: Linking from Cadham Road to Tullis Russell Roundabout	×	✓✓	-	-	✓
COP5 – Strategic Road Improvement: Realigned A92 carriageway	×××	✓✓	✓	-	✓

6.5.11 Environment

It is anticipated that the absence of any substantial improvement measures as part of the Do-Minimum scenario would result in a negligible impact from an environmental perspective.

It is expected that the installation of improved crossing facilities and footways as part of the Sustainable Transport Package (COP1) would likely result in a neutral impact from an environmental perspective. A minor benefit would

be expected given the enhanced connectivity and the potential to encourage modal shift, however, this would likely be offset by a detrimental impact on vehicular emissions given that strategic A92 traffic would be brought to a stop by traffic signals. A similar detrimental impact on vehicular emissions is anticipated with COP3. The Localised Road Junction and Safety Improvements Package (COP2) would be expected to result in a slight negative impact from an environmental perspective considering the additional land take caused by residual widening of the carriageway.

The formation of new carriageway as part of COP4 and COP5 would likely result in a negative environmental impact. COP5, in particular, is anticipated to result in a major negative impact given the environmental constraints mapping contained within Section 3.7 suggests it would likely be required to traverse mature ancient woodland and designated landscape and gardens.

6.5.12 Safety

In the absence of any major interventions, as assumed under the Do-Minimum scenario, it is anticipated there would be no changes in safety at the Cadham Road junction.

The Sustainable Transport Package (COP1) would also be anticipated to have a negligible impact upon safety considering that there is limited evidence to suggest that there is an existing problem relating to pedestrian and cyclist movements conflicting with traffic at the junction. Localised Road Junction and Safety Improvements (COP2) are expected to result in a minor benefit given enforcement camera installation may reduce conflict associated with prohibited right turning traffic that currently takes place. The car wash diverge lane proposed under this package may also reduce conflict with vehicles breaking sharply on the main A92 carriageway.

The installation of a Signalised Junction (COP3) has the potential to improve safety at the Cadham Road junction given that this option would introduce greater control of traffic movements, eliminating the potential for conflicts to and from the minor arms of the junction. While benefits would be expected at the junction itself, concerns have been raised that signal implementation could introduce conflicts and the potential for rear shunt accidents on the A92, potentially therefore partially offsetting the safety benefits of traffic signals.

Strategic improvements involving linking Cadham Road to Tullis Russell Roundabout (COP4) or a new A92 alignment (COP5) would be considered to have a moderately positive impact on safety considering both options would remove the existing conflict between the traffic travelling to/from Cadham Road junction and the A92.

6.5.13 Economy

Considering the relatively minor scale improvements included within the Do-Minimum scenario as well as the Localised Road Junction and Safety Improvements Package (COP2), it is anticipated there would be no changes from an economic perspective at the Cadham Road junction.

The Sustainable Transport Package (COP1) is anticipated to have a negligible economic impact considering it would likely only have a very minor impact on strategic journey times on the A92 given the likely low frequency the pedestrian stage would be called. In contrast, the installation of a signalised junction (COP3) is expected to have a minor negative impact from an economic perspective given the frequency it would likely be called and the additional journey times and delay on the main carriageway introduced for A92 strategic traffic.

It is anticipated that the strategic improvement package involving linking Cadham Road to the Tullis Russell Roundabout (COP4) is unlikely to have any major economic impact given strategic journey times would remain largely unaffected on the A92. There may be a minor positive economic impact from realigning the carriageway as part of COP5 given that the A92 road length would be marginally shorter than it is at present and it could offer the potential for speed limit changes.

6.5.14 Integration

It is considered that the Sustainable Transport Package (COP1) would align well with existing governmental policy objectives to encourage increased active travel and increased use of public transport and therefore has been assigned as having a positive impact on Integration.

The remaining packages incorporating the Do-Minimum, Localised Road Junction and Safety Improvements (COP2), the Road Junction Upgrade Packages (COP3) and the Strategic Road Improvement Packages (COP4 and COP5) are anticipated to have a negligible impact on the Integration criteria.

6.5.15 Accessibility and Social Inclusion

Considering the relatively minor scale of improvements included within the Do-Minimum scenario and the Localised Road Junction and Safety Improvements Package (COP2), it is anticipated there would be a negligible impact on access and social inclusion in the vicinity of the Cadham junction under these options.

It is considered that the Sustainable Transport Package (COP1) would likely result in a reduction in pedestrian and cyclist severance currently caused by the A92 which could lead to accessibility improvements for the surrounding Cadham community. Introduction of a controlled toucan crossing, in particular, could potentially assist those with mobility impairments to traverse the A92 more easily than at present. Residential areas within Cadham are ranked as amongst Scotland's most deprived according the SIMD rankings and therefore development of measures that increase the accessibility of the local community to services would be expected to have a positive impact against this objective.

The installation of traffic signals (COP3) is anticipated to have a minor positive impact with regards to enhancing connectivity for pedestrians and cyclists across the A92. In addition, this option would likely improve the ease in which local vehicular traffic can emerge on to the A92 and therefore access local services and amenities.

The Strategic Road Improvement Packages (COP4 and COP5) are both expected to result in a minor positive impact against this objective. It is anticipated that the removal of the Cadham Road junction within CPO4 is likely to improve conditions for active travel modes trying to traverse the Cadham Road whilst CPO5 would likely result in the removal of significant traffic volumes from the existing A92 alignment; thus potentially reducing the severance effects of the A92 on Cadham residents.

6.5.16 Established Policy Directives

A Policy Assessment Framework has been completed to assess the performance of the proposed option packages against established national policy with the results presented in **Appendix D.**

6.5.17 Summary

This section has presented the results from the initial appraisal of option improvement packages for Cadham. A summary of the appraisal outcome is presented in Table 6.15 alongside proposed recommendations as to whether the option packages should be taken forward for further, more detailed consideration at the Detailed Appraisal stage, or sifted from further consideration at this stage.

Table 6.15: Cadham Appraisal Summary

Option Package	TPOs				Implementability			STAG Criteria					Recommendation
	TPO1	TPO2	TPO3	TPO4	Feasibility	Affordability	Acceptability	Environment	Safety	Economy	Integration	Accessibility & Social Inclusion	
Do-Minimum	-	-	-	-	✓✓✓	Low	×	-	-	-	-	-	**Retain:** Take forward for purposes of comparison.
COP1 - Sustainable Transport	-	✓✓	×	-	✓✓	Low	✓	-	-	-	✓✓	✓✓	**Retain:** Option generally performs positively against the TPOs and is considered feasible in terms of deliverability. It is recommended that this option is taken forward for further consideration.
COP2 - Localised Road Junction and Safety Improvements	✓	-	-	-	✓	Low	×	×	✓	-	-	-	**Retain:** Specific measures proposed as part of this package could directly address identified conflict issues at this junction and therefore merit further consideration.
COP3 - Road Junction Upgrade: Signalised Junction	✓	✓✓	××	✓✓	-	Low	✓	×	✓	×	-	✓	**Retain:** While there are a number of question marks over the deliverability of this option, including its impacts on strategic traffic, the option does have the potential to address a number of the TPOs. Accordingly, it is recommended that this option package is taken forward for more detailed assessment.
COP4 – Strategic Road Improvement: Linking from Cadham Road to Tullis Russell Roundabout	✓✓	✓	✓	✓✓	✓	High	✓✓	×	✓✓	-	-	✓	**Retain:** This option has the potential to support delivery across the suite of TPOs and is recommended for further consideration as part of the detailed appraisal stage.
COP5 – Strategic Road Improvement: Realigned A92 carriageway	✓✓	✓	✓✓	✓✓	××	Very High	×	×××	✓✓	✓	-	✓	**Reject:** While this option performs positively against the study TPOs, the option would be anticipated to have a major negative environmental impact which could present significant deliverability and technical risks. Acceptability for this option may also be lower than other alternatives as a result of these potential planning issues. In addition, it is unlikely to be justifiable from an affordability perspective and as an intervention to address specific issues at Cadham Road. Accordingly, it is recommended that this option is sifted from further consideration at this stage, though may merit further consideration to address wider strategic objective for the development of the A92 trunk road network over the longer term.

Summary and Next Steps

07

7. Summary and Next Steps

7.1 Introduction

This Pre-Appraisal and Initial Appraisal Case for Change study has sought to:

- Consolidate and validate the findings from previous studies and update the evidence base of problems and opportunities in the study areas through analysis of the latest transport and socio-economic data;
- Refine Transport Planning Objectives against the updated evidence base and other policy updates since the time of previous study on the corridor;
- Generate and sift a long list of transport interventions, including options brought forward from previous studies as well as through discussions with Transport Scotland and BEAR Scotland, to address the identified problems and opportunities at the respective junctions in the study area, and undertake a process of sifting and packaging; and
- Undertake an initial assessment of the performance of the option packages through appraisal of the short-listed packages against the TPOs, Implementability criteria and STAG criteria.

STAG does not recommend, nor does it identify a preferred option. It presents information on the performance of options within a multi-criteria assessment framework. Decision-makers should use this information in their deliberations on the future development and implementation of interventions.

7.2 Summary

7.2.1 Freuchie

At Freuchie, five option packages have been appraised against a Do-Minimum scenario, the TPOs, the five STAG criteria and aspects of implementability. **Table 7.1** summarises the outcomes of the appraisal.

Table 7.1: Freuchie Options Recommended for Further Assessment

Option Package	Rationale for Selection
Do-Minimum	Take forward for purposes of comparison.
FOP1 - Sustainable Transport	Option generally performs positively against the TPOs and is considered feasible in terms of deliverability. It is recommended that this option is taken forward for further consideration.
FOP2 – Localised Road Junction and Safety Improvements	Option generally performs positively against the TPOs, albeit to a lesser extent than other option packages. It is recommended that this option is retained for further consideration. Specific options within this package may merit consideration as part of a shorter term approach.
FOP3 - Road Junction Upgrade: Signalise Both Kettlebridge and Cross Keys Junctions	Option has the potential to deliver a number of the TPOs, particularly enhancing access to the strategic road network for the Freuchie community and reducing the potential for vehicular and pedestrian conflicts. It is recommended this option is taken forward for more detailed design and assessment work to understand the quantitative impacts of this intervention on A92 strategic traffic.
FOP4 - Road Junction Upgrade: Staggered Junction at Kettlebridge	While the benefits of this package in terms of performance against TPOs is not considered to be as positive as FOP3 and FOP5, it is recommended that there is merit in taking this option forward for further consideration.
FOP5 - Road Junction Upgrade: Roundabout at Kettlebridge	Option has the potential to deliver positive impacts against the TPOs albeit may introduce some adverse impacts for strategic traffic. It is recommended this option be taken forward for more detailed design and assessment work to understand the quantitative impacts of this intervention on A92 strategic traffic.

7.2.2 Balfarg

At Balfarg, give option packages have been appraised against a Do-Minimum scenario, the TPOs, the five STAG criteria and aspects of implementability. Table 7.2 summarises the outcomes of the appraisal.

Table 7.2: Balfarg Options Recommended for Further Assessment

Option Package	Rationale for Selection
Do-Minimum	Take forward for purposes of comparison.
BOP1 - Sustainable Transport	Option performs positively against the TPOs, deliverability and STAG criteria and it is recommended that this option is taken forward for further consideration.
BOP3 - Road Junction Upgrade: Signalised Junction	This option has the potential to deliver positive impacts against a number of the TPOs, particularly enhancing access to the strategic road network. It is recommended this option is taken forward for more detailed design and assessment work to understand the quantitative impacts of this intervention on A92 strategic traffic.
BOP4 - Road Junction Upgrade: Roundabout	This option has the potential to deliver positive impacts against the TPOs and would likely perform positively in terms of public acceptability. It is recommended this option be taken forward for more detailed design and assessment work to understand the quantitative impacts of this intervention on A92 strategic traffic.

As noted in Chapter 6, it is recommended that BOP2 (Localised Road Junction and Safety Improvements) and BOP5 (Grade Separated Junction) are rejected and not taken forward for further consideration at detailed appraisal stage.

It is considered that BOP2 generally has a negligible impact against the TPOs and STAG criteria, and is unlikely to be public acceptable given the historic concerns relating to the need for intervention to address local road safety and conflict concerns at junctions in Balfarg. Although specific options within this package may merit further consideration as part of a shorter term approach, as a longer term approach it is recommended this option is sifted at this stage.

With regards to BOP5, while this option does have the potential to address a number of the TPOs, particularly around safety, due to the significant uncertainties around option deliverability and given that alternative options have the potential to deliver similar benefits at lower costs, it is recommended that this option is also sifted from further consideration at this stage.

7.2.3 Cadham

At Cadham, five options have been appraised against a Do-Minimum scenario, the TPOs, the five STAG criteria and aspects of implementability. Table 7.3 summarises the outcomes of the appraisal.

Table 7.3: Cadham Options Recommended for Further Assessment

Option Package	**Rationale for Selection**
Do-Minimum	Take forward for purposes of comparison.
COP1 - Sustainable Transport	Option generally performs positively against the TPOs and is considered feasible in terms of deliverability. It is recommended that this option is taken forward for further consideration.
COP2 - Localised Road Junction and Safety Improvements	Specific measures proposed as part of this package could directly address identified conflict issues at this junction and therefore merit further consideration.
COP3 - Road Junction Upgrade: Signalised Junction	While there are a number of question marks over the deliverability of this option, including its impacts on strategic traffic, the option does have the potential to address a number of the TPOs. Accordingly, it is recommended that this option package is taken forward for more detailed assessment.

As stated in Chapter 6, it is recommended that COP5 (Realigned A92 carriageway) is rejected and not taken forward for further consideration at detailed appraisal stage. While this option performs positively against the

study TPOs, it is considered that it would be unlikely to be justified on economic grounds given the scale of works required. The option would also be anticipated to have a major negative environmental impact and as an intervention to address specific issues at Cadham Road, it is considered to be unjustifiable. Accordingly, it is recommended that this option is sifted from further consideration at this stage, though may merit further consideration as part of a wider package of measures to address wider strategic objective for the development of the A92 trunk road network.

7.3 Next Steps

7.3.1 Overview

This study has outlined the findings from the Pre-Appraisal and Initial Appraisal phases of a STAG study into the case for interventions at junctions in the study areas of Freuchie, Balfarg and Cadham.

As detailed at the policy context to this study, the Scottish Government is soon to embark on the process for preparing its second Strategic Transport Projects Review (STPR2) to inform the Scottish Government's investment plan for major transport interventions over the next twenty years. There is an expectation that strategic interventions identified from this A92 STAG study will be fed into the STPR2 appraisal process for consideration alongside other strategic transport improvements across the country.

The findings from the study suggest that there are a range of strategic options that merit further assessment, and the section below outlines some additional work and data collection activities that should be considered to inform the more detailed assessment of these options as they are fed into the STPR2 process.

7.3.2 Quick Wins

While the best performing options emerging from the initial appraisal are centred on large scale, strategic infrastructure improvements, despite not performing as favourably in the assessment, to address immediate concerns there may be merit in Transport Scotland and its partners to consider the implementation of some of the more localised options as 'quick wins'. It is to be noted however that some of these measures could be abortive if strategic measures are subsequently implemented.

Revisiting the long option generation set out in **Section 5.3**, the following table presents a series of short term measures which performed positively in the appraisal and may merit further consideration as immediate quick wins. The order of priority of these schemes will be subject to review by Transport Scotland and with continued community consultation. Additional technical feasibility assessments will be required to confirm outline design concepts are achievable within existing engineering and land constraints. A locational masterplan or junction improvement plan for quick wins could be developed with a phased approach relative to priorities, whilst the longer term strategic review is underway.

Table 7.4: Quick Win Considerations

Study Area	Potential Quick Wins
Freuchie Study Area	• **ST1:** Toucan Crossing across A92 at Crosskeys Junction (Subject to outcome of **ST5**)
	• **ST2:** New Shared Use Path on east side of A92
	• **ST4:** New Footway on north side of Kettlebridge Road
	• **ST5:** Toucan Crossing across A92 at Kettlebridge Junction (Subject to outcome of **ST1** and **ST7**)
	• **ST6:** Widening of existing footway on west side of A92
	• **ST7:** Dropped kerb crossing over A92 at Kettlebridge Junction (Subject to outcome of **ST5**)
	• **ST8:** Simple Dropped kerb crossing facility over East End (B936) at Crosskeys Junction
	• **ST9:** New bus stop facilities on the A92 to the north of Kettlebridge Junction
	• **R1:** Improve radii and widen at Kettlebridge Junction
	• **R6:** Improve approach grade of local roads at Kettlebridge Junction
	• **R10:** A92 30mph speed limit reduction
	• **O1:** Vehicular Activated Signage north of Kettlebridge Junction
	• **O2:** Education Programme

Study Area	Potential Quick Wins
Balfarg Study Area	• **ST1** - Installing Footways / Cycleways in verge to west of A92
	• **ST2 –** Installing Footways / Cycleways in verge to east of A92 north of Star Junction
	• **ST3 –** Completion of footway on east side of A92 south of Star Junction.
	• **ST4** - Upgrade Uncontrolled Crossing Point to north of Western Avenue Junction
	• **ST5 –** Providing Dropped Kerb Crossing Facility Across Western Avenue
	• **R1** – Signing and Lining Improvements at both Western Avenue and Star Road Junctions
	• **R2 -** Improve Radii of A92 Northbound Merge Taper at Western Avenue Junction
	• **R3 –** Install kerbed splitter islands at Star Road Junction
	• **R4 -** Increase Length of A92 Offside Northbound Deceleration Lane at Star Road Junction
	• **R5 –** Improve vertical alignment of A92 carriageway
	• **R13 -** A92 30mph speed limit reduction
Cadham Study Area	• **ST1 -** Provide toucan crossing facility across A92
	• **ST2 –** Upgrade of existing footway on east side of A92
	• **ST3 –** Provide dropped kerb crossing facility across Cadham Road
	• **R2** - Signing and Lining Improvements
	• **R3 –** Improve drainage and grip in the vicinity of A92 West Lodge
	• **O1 –** Right Turn Ban Camera Enforcement

7.3.3 Next Steps

To support the future assessment of options at the detailed appraisal stage, the following next steps are recommended for further consideration and action to inform future appraisal activities:

- Data Collection: It is recommended that an independent data collection exercise is undertaken to understand the full extent of queueing and delays, by all modes including active travel, at each of the junctions assessed as part of this study. While a number of previous studies have sought to quantify the full extent of problems experienced at junctions both from a vehicular and active travel perspective, a review of data undertaken as part of this study has highlighted a number of issues associated with the collection and processing of data, including variance in the periods during which data has been collected. Accordingly, it is recommended that prior to moving to the detailed appraisal stage, further quantification of issues at each junction is undertaken based on an independent data collection exercise; such an exercise would also be required for the traffic modelling of options required to quantify impacts of proposed interventions at detailed appraisal stage.
- Option Development: Further work should be commenced to develop interventions to an appropriate level of design detail to allow for a further assessment of their deliverability, including technical and operational feasibility. A more detailed understanding of proposed junction layout, and, for example, the principles around pedestrian provision, would also assist traffic modelling work which, as noted above, will form an important element of the detailed appraisal stage.
- Consultation: As set out in this report, there is a considerable level of community and stakeholder interest in junction improvements across the three study areas, with a long history of discussions between community groups and community councils with transport authorities including Transport Scotland, BEAR Scotland and Fife Council. To ensure stakeholders are fully informed of developments, it is recommended that the further community engagement is undertaken as the study moves forward; this ongoing engagement and dialogue will assist in terms of assessing the public acceptability of potential interventions at detailed appraisal stage.
- Wider Work: Finally, Transport Scotland should continue to keep informed about wider interventions and work taking place in the study area which have the potential to influence interventions proposed across the study areas. This includes, for example, the potential for revised routing of the national cycle network in central Fife, which could influence the performance of interventions at future appraisal stages.

Appendix A - Problems vs TPO Matrix

Problems vs. Objectives Matrix – Freuchie

Problem	TPO 1	TPO 2	TPO 3	TPO 4
Severance: No dedicated crossings or footways at Kettlebridge;		✓		✓
Limited Public Transport Provision: Absence of bus stop facilities at Kettlebridge junction;		✓		✓
Conflict: Radii result in turning HGVs encroaching on to opposite carriageway, drivers overtaking through junctions;	✓		✓	
Community Safety Concerns: One fatal and one serious accident at the junctions within last 5 years;	✓		✓	✓
Delay and Conflict: Right turning A92 traffic causes delay and creates conflict;	✓		✓	
Constrained Visibility: Vertical visibility issue to the south at the Cross Keys junction;	✓			

Problems vs. Objectives Matrix – Balfarg

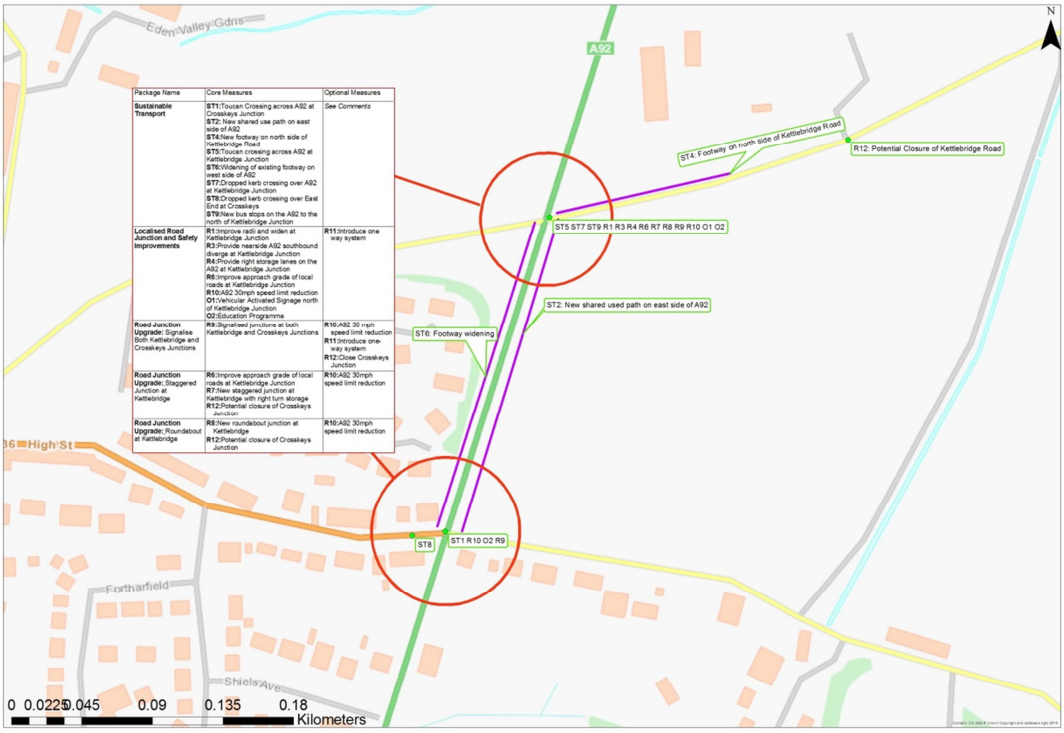
Problem	TPO 1	TPO 2	TPO 3	TPO 4
Conflict: Right turners from minor arms can block central reservation, queue abreast and HGVs can overhang;	✓		✓	✓
Driver Confusion: Drivers unclear on assumed priority at the Western Avenue junction;	✓		✓	
Delay: There is notable delay for right turning vehicles in both directions at the Western Avenue junction;			✓	✓
Community Safety Concerns: There is a cluster of historical collisions at the junction; and	✓		✓	✓
Severance: Pedestrian provision across A92 to access bus stops north of junction poor.		✓		✓

Problems vs. Objectives Matrix – Cadham

Problem	TPO 1	TPO 2	TPO 3	TPO 4
Conflict: Drivers (42 per week) not adhering to the right turn ban, vehicles travelling westbound in the eastbound lane on Cadham Road, vehicles accessing the car wash result in following vehicles breaking sharply;		✓		✓
Delay and Conflict: Visibility is severely constrained for right turning traffic from Cadham Road;		✓		✓
Poor Active Travel Connectivity: High vehicular flow and lack of facilities creates difficulty crossing, particularly for cyclists.	✓		✓	

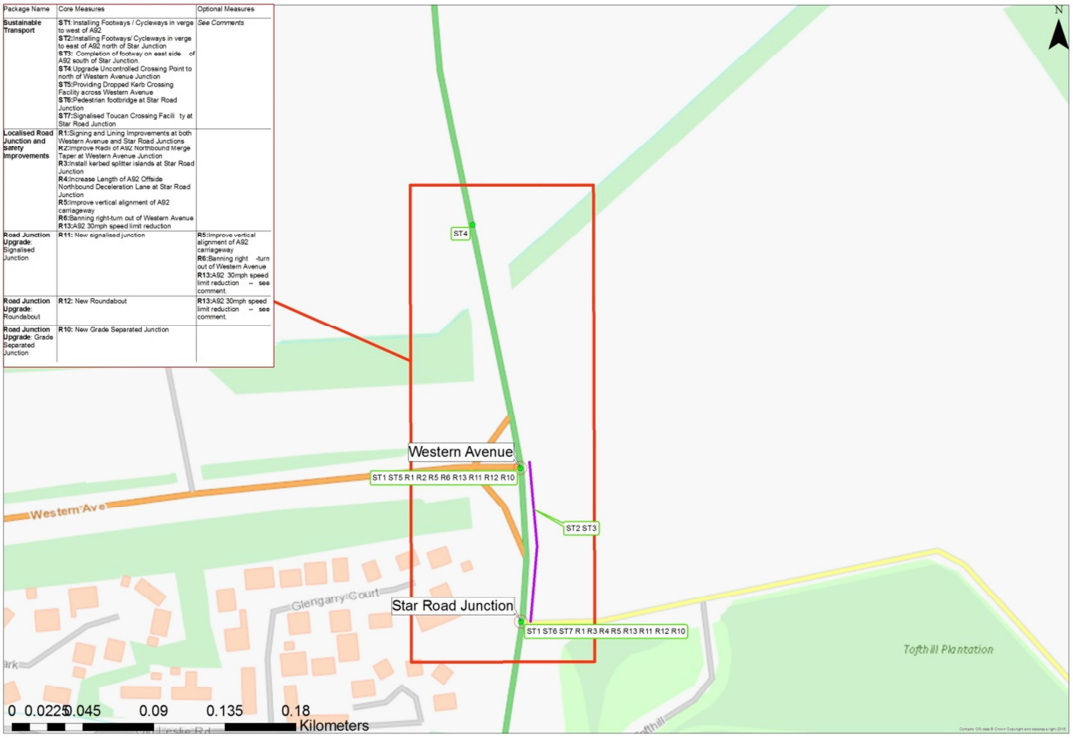
Appendix B - Location Diagrams

Freuchie



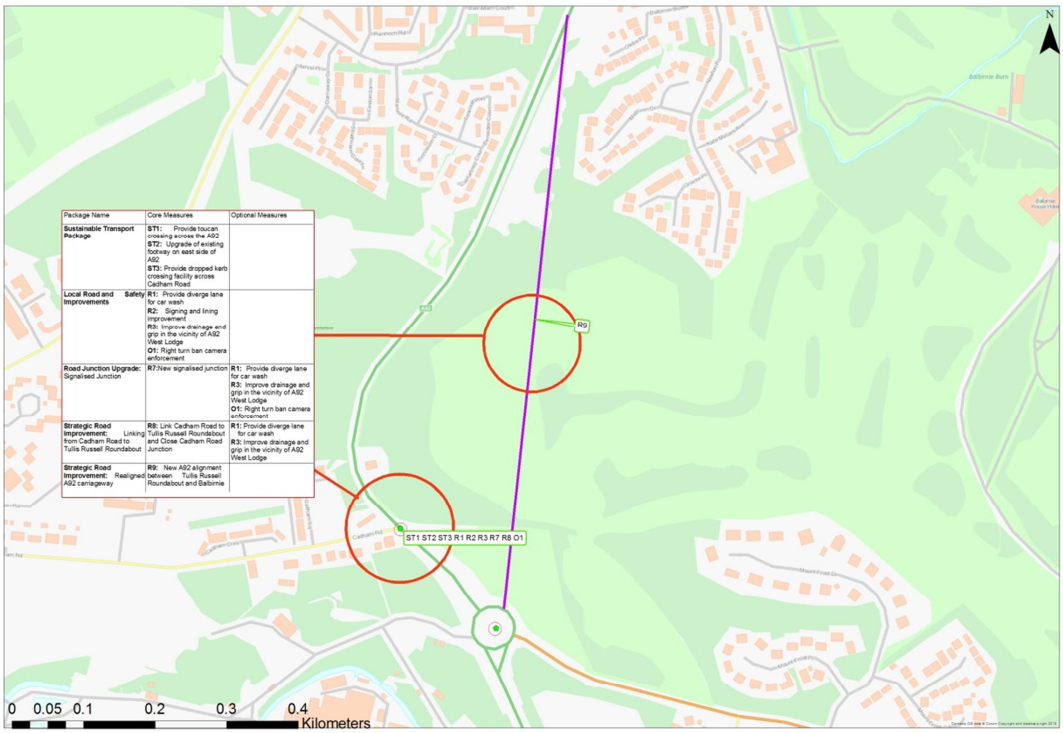
Package Name	Core Measures	Optional Measures
Sustainable Transport	**ST1**:Toucan Crossing across A92 at Crosskeys Junction **ST2**: New shared use path on east side of A92 **ST4**:New footway on north side of Kettlebridge Road **ST5**:Toucan crossing across A92 at Kettlebridge Junction **ST6**:Widening of existing footway on west side of A92 **ST7**:Dropped kerb crossing over A92 at Kettlebridge Junction **ST8**:Dropped kerb crossing over East End at Crosskeys **ST9**:New bus stops on the A92 to the north of Kettlebridge Junction	*See Comments*
Localised Road Junction and Safety Improvements	**R1**:Improve radii and widen at Kettlebridge Junction **R3**:Provide nearside A92 southbound diverge at Kettlebridge Junction **R4**:Provide right storage lanes on the A92 at Kettlebridge Junction **R6**:Improve approach grade of local roads at Kettlebridge Junction **R10**:A92 30mph speed limit reduction **O1**:Vehicular Activated Signage north of Kettlebridge Junction **O2**:Education Programme	**R11**:Introduce one way system
Road Junction Upgrade: Signalise Both Kettlebridge and Crosskeys Junctions	**R3**:Signalised junctions at both Kettlebridge and Crosskeys Junctions	**R10**:A92 30 mph speed limit reduction **R11**:Introduce one-way system **R12**:Close Crosskeys Junction
Road Junction Upgrade: Staggered Junction at Kettlebridge	**R6**:Improve approach grade of local roads at Kettlebridge Junction **R7**:New staggered junction at Kettlebridge with right turn storage **R12**:Potential closure of Crosskeys Junction	**R10**:A92 30mph speed limit reduction
Road Junction Upgrade: Roundabout at Kettlebridge	**R8**:New roundabout junction at Kettlebridge **R12**:Potential closure of Crosskeys Junction	**R10**:A92 30mph speed limit reduction

Balfarg



Package Name	Core Measures	Optional Measures
Sustainable Transport	**ST1**:Installing Footways / Cycleways in verge to west of A92 **ST2**:Installing Footways/ Cycleways in verge to east of A92 north of Star Junction **ST3**: Completion of footway on east side of A92 south of Star Junction **ST4**:Upgrade Uncontrolled Crossing Point to north of Western Avenue Junction **ST5**:Providing Dropped Kerb Crossing Facility across Western Avenue **ST6**:Pedestrian footbridge at Star Road Junction **ST7**:Signalised Toucan Crossing Facili ty at Star Road Junction	*See Comments*
Localised Road Junction and Safety Improvements	**R1**:Signing and Lining Improvements at both Western Avenue and Star Road Junctions **R2**:Improve Hatch of A92 Northbound Merge Taper at Western Avenue Junction **R3**:Install kerbed splitter islands at Star Road Junction **R4**:Increase Length of A92 Offside Northbound Deceleration Lane at Star Road Junction **R5**:Improve vertical alignment of A92 carriageway **R6**:Banning right-turn out of Western Avenue **R13**:A92 30mph speed limit reduction	
Road Junction Upgrade: Signalised Junction	**R11**: New signalised junction	**R5**:Improve vertical alignment of A92 carriageway **R6**:Banning right -turn out of Western Avenue **R13**:A92 30mph speed limit reduction – see comment.
Road Junction Upgrade: Roundabout	**R12**: New Roundabout	**R13**:A92 30mph speed limit reduction – see comment.
Road Junction Upgrade: Grade Separated Junction	**R10**: New Grade Separated Junction	

Cadham



Package Name	Core Measures	Optional Measures
Sustainable Transport Package	**ST1:** Provide toucan crossing across the A92 **ST2:** Upgrade of existing footway on east side of A92 **ST3:** Provide dropped kerb crossing facility across Cadham Road	
Local Road and Safety Improvements	**R1:** Provide diverge lane for car wash **R2:** Signing and lining improvement **R3:** Improve drainage and grip in the vicinity of A92 West Lodge **O1:** Right turn ban camera enforcement	
Road Junction Upgrade: Signalised Junction	**R7:** New signalised junction	**R1:** Provide diverge lane for car wash **R3:** Improve drainage and grip in the vicinity of A92 West Lodge **O1:** Right turn ban camera enforcement
Strategic Road Improvement: Linking from Cadham Road to Tullis Russell Roundabout	**R8:** Link Cadham Road to Tullis Russell Roundabout and Close Cadham Road Junction	**R1:** Provide diverge lane for car wash **R3:** Improve drainage and grip in the vicinity of A92 West Lodge
Strategic Road Improvement: Realigned A92 carriageway	**R9:** New A92 alignment between Tullis Russell Roundabout and Balbirnie	

Appendix C - Appraisal Summary Tables

Appendix D - Policy Assessment Framework

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