AtkinsRéalis

Concept Design and Feasibility Study

Ayrshire Roads Alliance

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KILMAURS VILLAGE CENTRE

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Contents

1. Introduction

The historic village of Kilmaurs, located approximately one mile northwest of Kilmarnock in East Ayrshire, is currently facing traffic challenges due to its strategic position at the confluence of several key routes. These routes connect Kilmaurs to; Irvine, Kilmarnock, Crosshouse (including University Hospital Crosshouse), Stewarton, and the M77 motorway. The A735, which dissects the village from north to south, along with the C20 Irvine Road, B751 Sunnyside, and B751 Fenwick Road, form three main junctions that are constrained by the historic layout of the built environment and road network. This has resulted in accessibility challenges for pedestrians and difficult turning manoeuvres for large vehicles within the village centre.

In response to these challenges, the Ayrshire Roads Alliance (ARA) has commissioned AtkinsRéalis to conduct a comprehensive feasibility study and concept design. The primary objectives of this study are to enhance access, movement, traffic flow, and road safety within the village, with a particular focus on improving facilities for pedestrians and mitigating the negative impacts of the existing road infrastructure.

1.1 Aims and Objectives

The study aims to address the following key areas:

1. **Pedestrian Facilities**: Enhancing pedestrian infrastructure to ensure safe and convenient movement throughout the village.
2. **Access and Movement**: Evaluating current access points and movement patterns to identify opportunities for improvement.
3. **Road Safety**: Identifying high-risk areas and proposing measures to reduce collisions and improve overall safety for all road users.
4. **Traffic Management**: Analysing traffic flow and congestion to develop strategies that enhance efficiency and safety.

By addressing these areas, the study seeks to reduce the severance caused by the roads and improve the overall quality of life for Kilmaurs residents. The findings and recommendations from this study will provide a roadmap for future infrastructure improvements, ensuring that Kilmaurs remains a safe, accessible, and vibrant community.

1.2 Methodology

The methodology, summarised below, outlines the approach employed to deliver the aims and objectives of this study.

- Analysis of primary and secondary data, including desk-based research and on-site observational work to determine inhibitors to pedestrians, public transport and general traffic;
- Review key policies and guidance to ensure proposals meet the stated objectives of ARA, East Ayrshire Council (EAC) and the community of Kilmaurs; and
- Collaborate with ARA and EAC to evaluate emerging solutions and determine preferred options.

1.3 Geographic Context

The location of Kilmaurs in relation to its surrounding settlements is presented in Figure 1-1.

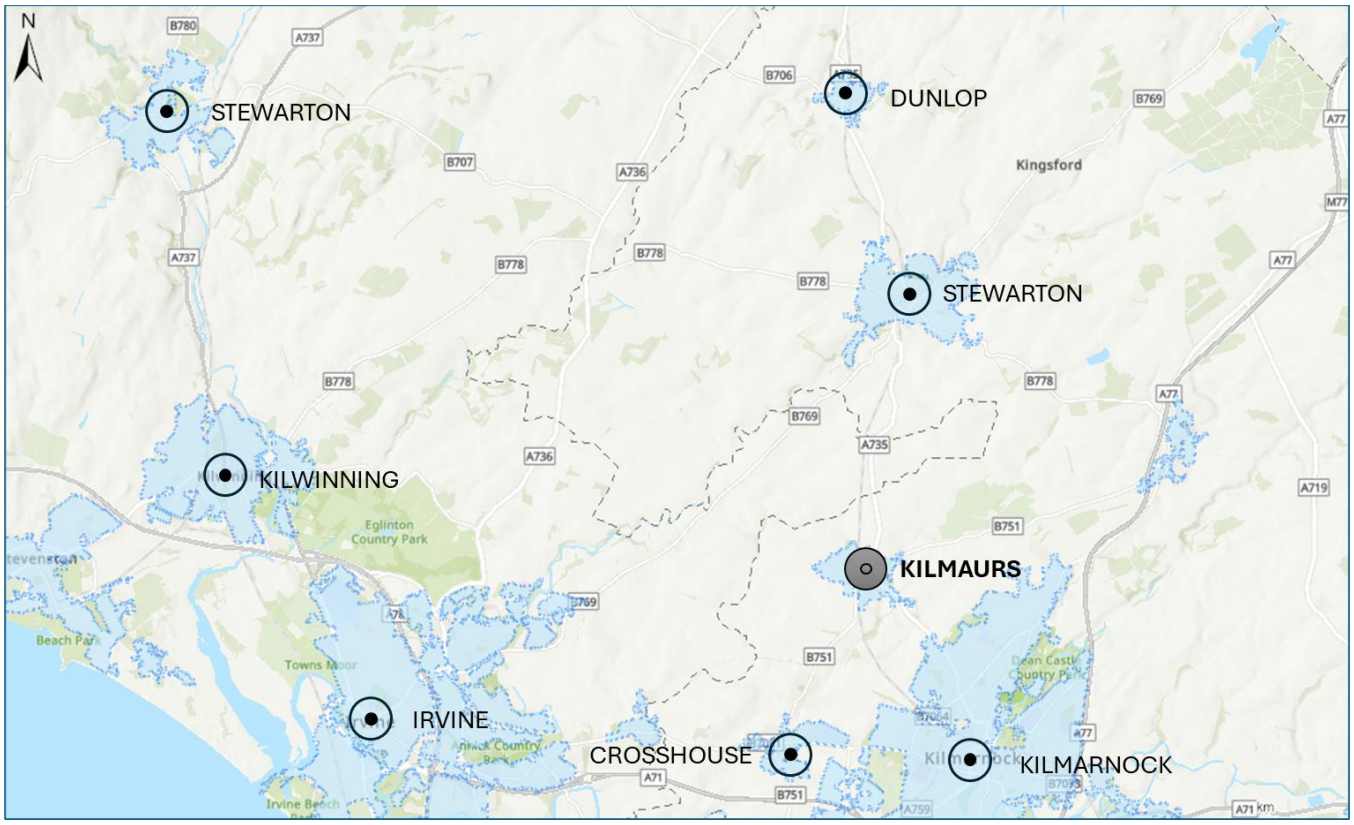


Figure 1-1 - Site location in relation to wider study area

Located northwest of Kilmarnock, Kilmaurs lies just outside of the largest settlement in East Ayrshire, situated on the banks of the Carmel Water, approximately 34 kilometres southwest of Glasgow. Kilmaurs is well-connected, as mentioned above, it is located at the convergence of the A735 and B751 routes, making it easily accessible to nearby towns such as Stewarton and Irvine. The surrounding area is predominately rural, with a mix of agricultural and small land settlements.

Kilmaurs is conveniently located near key roads, making it easily accessible from the M77 motorway. The village is connected by the B751, linking directly to the A77 at the Fenwick interchange (Junction 7, M77), providing routes to Glasgow and Kilmarnock. The B778 road also connects Kilmaurs to Stewarton and Fenwick, enhancing regional connectivity and facilitating easy travel.

Kilmaurs offers several interesting attractions and activities including:

- The Jougs,
- Kilmaurs Glencairn Bowling Club
- Kilmaurs Tennis Club
- Kilmaurs War Memorial, and
- Weston Tavern.

Additionally, the village has a marketplace, Kilmaurs Primary School, and several local amenities, including a post office and a cycling retailer.

This concept and feasibility study forms part of a number of work packages currently being undertaken to enhance pedestrian accessibility within Kilmaurs. The other two sites, site 2 and site 3, will look at enhancing pedestrian links

at the rail bridge on Irvine Road and pedestrian crossings on the A735 towards Kilmarnock Road, respectively. Sites 2 and 3 will be subject to separate concept and feasibility studies.

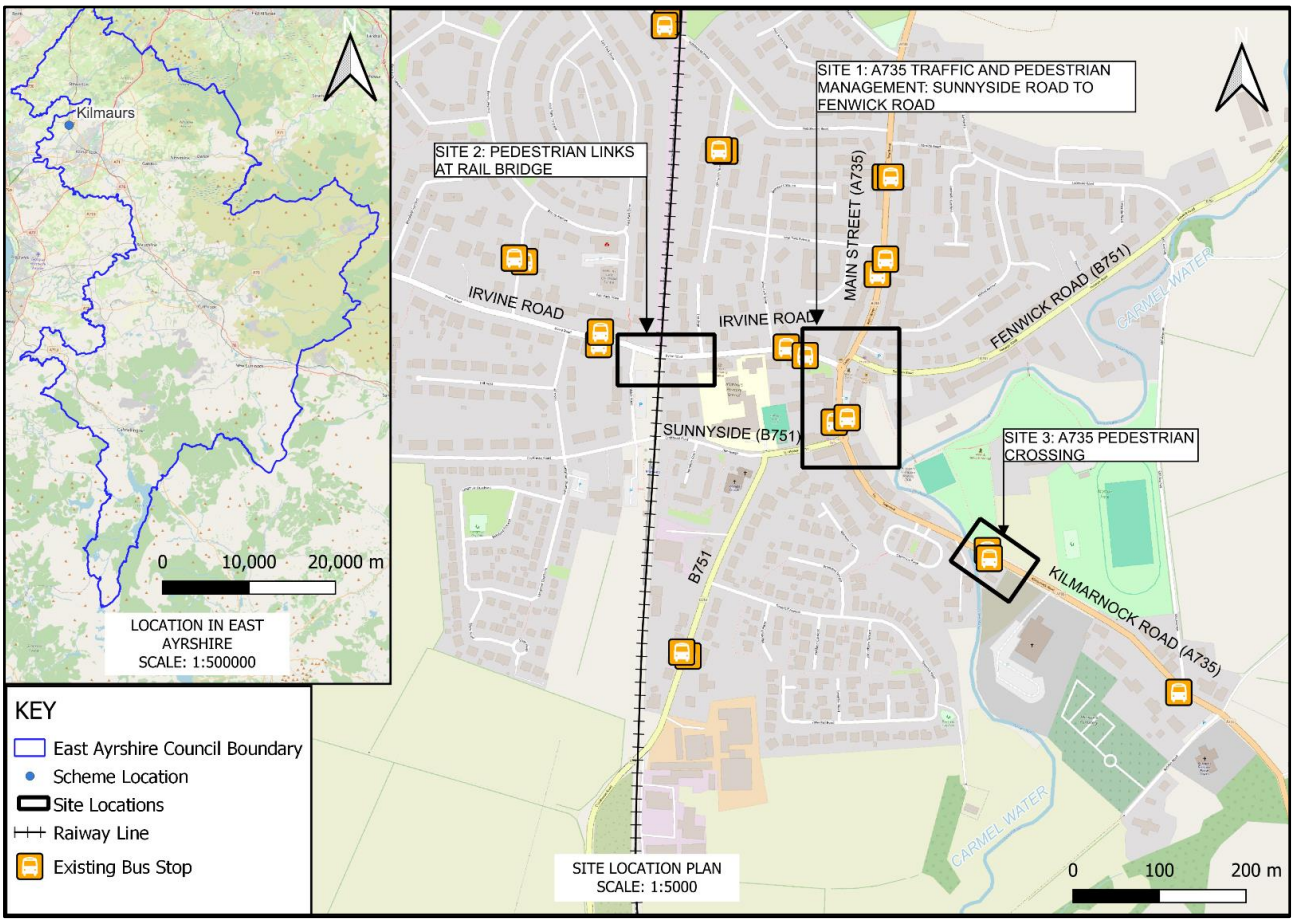


Figure 1-2 - Location of the scheme sites in relation to main features and roads of Kilmaurs

As shown in Figure 1-2 above, Kilmaurs benefits from a railway station linking the village to Kilmarnock and the national rail network via Glasgow Central Station. Local bus routes, such as the Shuttle Buses Service 113, connect Kilmaurs with nearby towns like Irvine and Stewarton. Additionally, regional bus services operated by companies like Stagecoach offer routes that link Kilmaurs to larger hubs, including Kilmarnock and Glasgow. This extensive network ensures that the village remains accessible.

2. Site Observations

A site visit was undertaken on Friday 2nd August between the hours of 13:30 and 14:50 by AtkinsRéalis to obtain data on the existing conditions and identify opportunities and constraints. During the visit, the weather was fine, and the carriageway was dry. Traffic levels were free flowing with no congestion observed. Several pedestrians but no cyclists were observed during the site visit.

A summary if the site visit observations are outlined in the sections below.

2.1 Pedestrians Infrastructure

No.	Photograph	Observation / Comment
1		No crossing facilities, which would meet local / national standard are currently provided at the junctions with Sunnyside, Irvine Road and Fenwick Road. The absence of controlled or uncontrolled crossing facilities at these locations and anticipated desire lines presents potential road safety and accessibility issues. Without dropped kerbs, individuals using wheelchairs, prams, or those with mobility impairments may face difficulty in navigating the road network. The absence of tactile paving further exacerbates the problem for visually impaired pedestrians, as they rely on these tactile cues to safely identify crossing points.
2		Visibility at the crossing over Sunnyside is also constrained by the combination existing building lines and footway widths. Poor visibility can make it challenging for both pedestrians and drivers to see each other, increasing the risk of collisions. The risks could be exacerbated by the wide junction radii at the mini roundabout potentially enabling higher vehicle speeds through the junction, making the crossing more dangerous for pedestrians. Similar visibility issues were observed at Fenwick Road.
3		Street furniture and cobbled surfacing outside Premier Kilmaurs Store may present difficulties to those with mobility issues. This type of surfacing can be challenging neurodivergent pedestrians. The issues are likely to be exacerbated during periods of wet weather.

No.	Photograph	Observation / Comment
4	 	No formal crossing facilities are provided across Fenwick Road. Where pedestrians would expect to cross there is a lack of tactile paving, which presents significant road safety and accessibility issues. The absence of tactile paving further exacerbates the problem for visually impaired pedestrians, as they rely on these tactile cues to safely identify crossing points.
		Visibility at the crossing over Fenwick Road is also constrained by building line of Premier Kilmaurs Store and the absence of the footway alongside the store on Fenwick Road. Poor visibility can make it challenging for both pedestrians and drivers to see each other, increasing the risk of collisions.
5		No formal crossing provided across Irvine Road. Where pedestrians would expect to cross there is a lack of tactile paving, which presents significant road safety and accessibility issues. The absence of tactile paving further exacerbates the problem for visually impaired pedestrians, as they rely on these tactile cues to safely identify crossing points. Note, the footway and entrance to the “Oriental Cottage”, appear to be set at a lower level than the adjacent carriageway which could present challenges for engineering improvements in this area.

No.	Photograph	Observation / Comment
6		Narrow footway width at Sunnyside could impact perceived and actual pedestrian accessibility and safety. When footways are too narrow, it becomes difficult for pedestrians to pass each other, particularly for those with wheeling devices such as wheelchairs or prams. This can force pedestrians to step onto the carriageway, leading to an increased risk of collisions between pedestrians and road users.
7		Building line and beer garden forms pinch-point on footway for pedestrians. Cobbled surfacing may present difficulties / barrier to those with mobility issues. Drainage channel positioned centre of the footway presents a tripping hazard, particularly those that are visually impaired.
8		Currently the footway terminates at The Jougs, this presents restrictions to pedestrian movements north and south of the carriageway along this section of Main Street/Townend.
9		Footway parking observed in proximity to Sunnyside on the the A735 may obstruct pedestrians. This may result in pedestrians stepping onto the carriageway to pass around the parked vehicles on the footway. This is likely to be exacerbated for those with wheeling devices, such as wheelchair users and pram, who may have difficulty egress and access the footway via the full height kerbs.
10		Footway parking occuring throughout village centre creates obtrsuctions for pedestrians. This may result in pedestrians stepping onto the carriageway to pass around the parked vehicles on the footway. This is likely to be exacerbated for those with wheeling devices, such as wheelchair users and pram, who may have difficulty egress and access the footway via the full height kerbs. This may result in pedestrians being stuck on the carriageway.

No.	Photograph	Observation / Comment
11		The footway terminates on the east side of Main Street, and there is poor visibility for crossing the road at this point. There is a lack of dropped kerbs and tactile paving where pedestrians may intend to cross, significant road safety and accessibility issues. Without dropped kerbs, individuals using wheelchairs, prams, or those with mobility impairments face considerable difficulty navigating the crossing. The absence of tactile paving further exacerbates the problem for visually impaired pedestrians, as they rely on these tactile cues to safely identify crossing points.

Key Observations

The following observations may reduce pedestrians' accessibility and safety:

- Lack of formalised crossing facilities, this includes at observed desire lines between amenities and services in the village centre.
- Uneven cobbled surfacing located at the Premier Kilmaur Store, The Western Tavern and The Jougs.
- Termination in footway provision between the northern footway and The Jougs located on the southern side of Main Street.
- Footway parking.
- Narrow footways, particularly near and at the junction of the A753 Main Street at Sunnyside.

2.2 Road Infrastructure

No.	Photograph	Observation / Comment
1	 	The junction geometry can result in tight turning manoeuvres at Sunnyside and Fenwick Road, presenting a challenge for heavy goods vehicle (HGV) movements.

No.	Photograph	Observation / Comment
2		The mini roundabout at Irvine Road does facilitate movements of large vehicles, however, it was observed that some HGV's could only achieve this by occupying the whole junction. Opposing vehicles were observed to give-way when these situations occurred. At such times, large vehicles caused momentary delay within Kilmaurs, however this quickly dissipated.
3		
4		On-street parking is provided within the centre of the village. This limits space for pedestrian infrastructure, increases street clutter, creates severance and defines the village centre as a car orientated environment. Off-street and quiet road parking is available close by.
5		Bus stops are conveniently located in the centre of the village, providing easy access to public transportation for residents and visitors alike.

2.3 Character, Heritage and Public Realm

No.	Photograph	Observation / Comment
1		Bollards positioned on cobbled footway outside of Premier store are absent of reflectors. Risk of road users being unable to see the bollards, particularly during hours of darkness and potentially strike the bollards.
2		Whilst cobbled surfacing may present difficulties / barriers to those with mobility issues, they do contribute to the heritage of the village and can improve visual amenity.
3		Opportunity for public realm or place making at existing car park adjacent to The Jougs.
4		Both approaches to the centre of the village feature relatively straight horizontal alignments, transitioning into curved horizontal alignments within the village itself. These approaches also have slight gradients, which, when combined with the straight alignments, may lead to higher vehicle speeds.
5		The Jougs is a key aesthetic and cultural asset to Kilmaurs; however it is surrounded by street clutter and a small car park, therefore, its visual impact is reduced. Some seating is provided in the villages but there is little in the way of public realm / streetscape or socialising space.

3. Collision Review

3.1 Introduction

A review of the collision data for Main Street was conducted for the most recent 5-year period (2019 – 2023). Data was supplied by ARA which comprises reported personal injury collisions. It should be noted that the Covid-19 pandemic and subsequent reduction on traffic volumes recorded during this time may have impacted collision statistics.

3.2 Collision Data Summary

Collision data consists of one collision location along Main Street as shown in Figure 3-1 below:

Figure 3-1 – Collision locations

A summary of the collision that occurred within the five-year period is provided below.

- Location: Just north of the northeastern arm of the Main Street (A735) roundabout with Irvine Road
- Collision Details: Vehicle collision with a pedestrian
- Casualty: One pedestrian (aged 19) with slight injuries

3.3 Analysis

As one collision has occurred within the scope of this review, the analysis which can be undertaken is limited by the small sample size. The observations made below are therefore caveated based on the small sample size and are

made based on the available information of the collision provided, observations from the site visit undertaken, and information obtained on traffic speeds and volumes.

- **Collision severity:** Given the limited number of collisions, there is not a trend within the severity of collisions.
- **Weather conditions:** Given the number and lack of information, there is not a trend relating to the weather being a significant factor affecting the collisions along Main Street (A735).
- **Time of day:** Given the number and lack of information, there is not a trend relating to the time of day is a significant factor affecting the collisions along Main Street (A735)
- **Vulnerable Users:** Given the limited number of collisions, there is not a trend of collisions involving vulnerable users.

During discussions with ARA, it was noted that while there is not a significant history of Personal Injury Collisions (PIC), there have been numerous damage-only collisions. Damage-only collisions, while not resulting in personal injuries. Frequent damage-only collisions can indicate underlying safety issues, such as poor road conditions or problematic driving behaviours, which may require attention and corrective measures.

4. SWOT Analysis

To gain a comprehensive understanding of the current situation and long-term potential for transportation and accessibility within Kilmaurs, a SWOT analysis has been conducted. This analysis identifies the strengths, weaknesses, opportunities, and threats, providing valuable insights for future planning and improvements.

4.1 Strengths

Residential Proximity: Most properties in Kilmaurs are connected to its centre by footways, enabling people to walk and wheel, rather than use the private car. The maximum walking distance is approximately 1km, however, most are considerably closer to the centre than that. The railway does create some form of severance however, this is limited due to the distances involved.

High building occupancy: It appeared that occupancy rates in Kilmaurs for retail and local services high, with few vacant units. A vibrant village centre can stimulate local activity which can be complimented by enhanced access and public realm facilities.

Potential for improved pedestrian infrastructure: Despite some localised constraints, the A753 Main Street corridor is wide with potential to widen pedestrian footways and provide uncontrolled and / or controlled crossing points.

Transport network: Kilmaurs is connected to neighbouring communities by bus and rail, which provides opportunities to discourage private car journeys.

Local amenities: Proximity to essential services like grocery stores, schools, and healthcare facilities makes daily life easier and more efficient. Amenities like parks and public transport options can reduce the community's carbon footprint and promote sustainable living.

Decriminalised parking enforcement: May enable EAC to take a targeted approach to enforcement and tackle any observed issues associated with prohibited waiting, loading or parking. This can help with;

- Reducing illegal parking and increases compliance with parking regulations;
- Reducing obstructions and congestion, leading to smoother traffic movement; and
- Helps reduce collisions and ensures safer access for pedestrians and cyclists.

4.2 Weaknesses

Narrow Footways: Due to the historic nature of Kilmaurs and its built environment, certain sections of footway along Main Street and Sunnyside are notably narrow. This issue is further exacerbated by vehicles parking on the footways, limiting pedestrian space and accessibility.

Footway Geometry and Surfacing: The presence of numerous vertical elements and street furniture along Main Street and Sunnyside can obstruct pedestrians, particularly those with mobility issues. In addition, in number of places the footway surface is uneven which may present tripping hazards and difficulties to those using wheeling devices. The cobbled setts in places, albeit a heritage feature, can also present tripping hazards and issues to those with mobility impairments and neurological divergance.

Poor Visibility: The junctions at Sunnyside and Fenwick Road have been observed to suffer from poor visibility. The existing junction radii may encourage higher vehicle speeds, making it more challenging for pedestrians to cross safely.

Crossing Facilities: Throughout Main Street, there is a noticeable lack of dropped kerbs and tactile paving at expected pedestrian crossing points. This presents significant road safety and accessibility issues. Without dropped kerbs, individuals using wheelchairs, prams, or those with mobility impairments face considerable difficulty in navigating the crossings. The absence of tactile paving further exacerbates the problem for visually impaired pedestrians, who rely on these tactile cues to safely identify crossing points.

Built Environment Causes Severance: Between Fenwick Road and Sunnyside crossing Main Road is challenging due to the severance caused by the Jougs, Weston Tavern Beer Garden, vertical elements, Main Street Car Park, parking layby and bus stops. This is exhasarbated by surfacing level difference and lack of footway around The Jougs.

Tight Radii: The current radii provisions at the junctions with Sunnyside and Fenwick Road make it difficult for vehicles, particularly large ones such as HGVs, to maneuver appropriately at the existing mini roundabouts.

4.3 Opportunities

Promotion of Sunnyside: Sunnyside directly links the village centre with Morrisions, Kilmaurs Primary School, Kilmaurs Tennis Club and Kilmaurs Rail Station, as well as multiple residential areas. This could be promoted as key walking route in the village.

Removal of Street Clutter: The removal of street clutter, street furniture and refurbishment of worn infrastructure throughout the village centre could improve visual and public amenity. In addition, it may improve the usability of the village centre by those residents with visual impairments and those with neurodivergant characteristics. Overall, a coherant approach to managing accessibility, parking and traffic could allow a significant enhancement to the culturalc

Removal of Main Street Car Park: The removal of the car park could facilitate the creation of a public space which would help reduce severance, improve visual amenity and the visual setting of the Jougs. Such a space could enable local events to be held.

Widen footways: The widening of footways where appropriate creates a more pedestrian-friendly environment, improving the effective width.

Introduction of Traffic Control: The management of traffic by signal control could present opportunities to enhance pedestrian crossing facilities. Subject to geometric perameters signal controlled solutions could also improve turning manoeubvreability for vehilces, particularly larger / longer vehicles such as HGVs.

4.4 Threats

Budget: Concerns around the cost of implementing and maintaining measures to improving the general area of the village centre of Kilmaurs.

Parking: Local concerns that improved infrastructure / opportunity for public realm may come in place of local parking provision.

Heritage: Concerns around losing the village centre's heritage and identity with the proposal of providing smooth pathways throughout by either resurfacing or removal of cobbled footways.

Carriageway operation: Concerns over the change in the operation on the A735 within the village centre with the removal of both mini roundabouts at the junctions with Sunnyside and Fenwick Road. Additionally, the proposed one-way system at Sunnyside may raise concerns with the public, particularly those that live along Sunnyside.

5. Traffic Analysis

5.1 Traffic Surveys

Streetwise were commissioned to complete junction turning counts (JTCs) for the village centre. The JTCs were undertaken on Thursday 22nd and Saturday 24th of August for a 12-hour period from 07:00 to 19:00. These include classified turning counts and queue lengths.

The locations of each of the JTCs are presented in Figure 5-1.

Figure 5-1 - Traffic Survey Locations

The following peak hours were identified from the traffic surveys:

- 08:00 – 09:00 *(Weekday AM)*
- 16:45 – 17:45 *(Weekday PM)*
- 11:15 – 12:15 *(Saturday)*

The peak hour turning movements and queues, measured in PCUs (Passenger Car Units), as well as the percentage of heavy vehicles, have been summarised for each junction and are summarised in Sections 5.2, 5.3 and 5.4.

5.2 Junction 1 – Fenwick Road Priority Junction

The most northern junction in the village centre, Junction 1, is formed by the B751 Fenwick Road and the A735 Main Street. Junction 1 is currently a priority junction as indicated in Figure 5-2 where:

- Arm A is Main Street (North)
- Arm B is Fenwick Road (East)

- Arm C is Main Street (South)

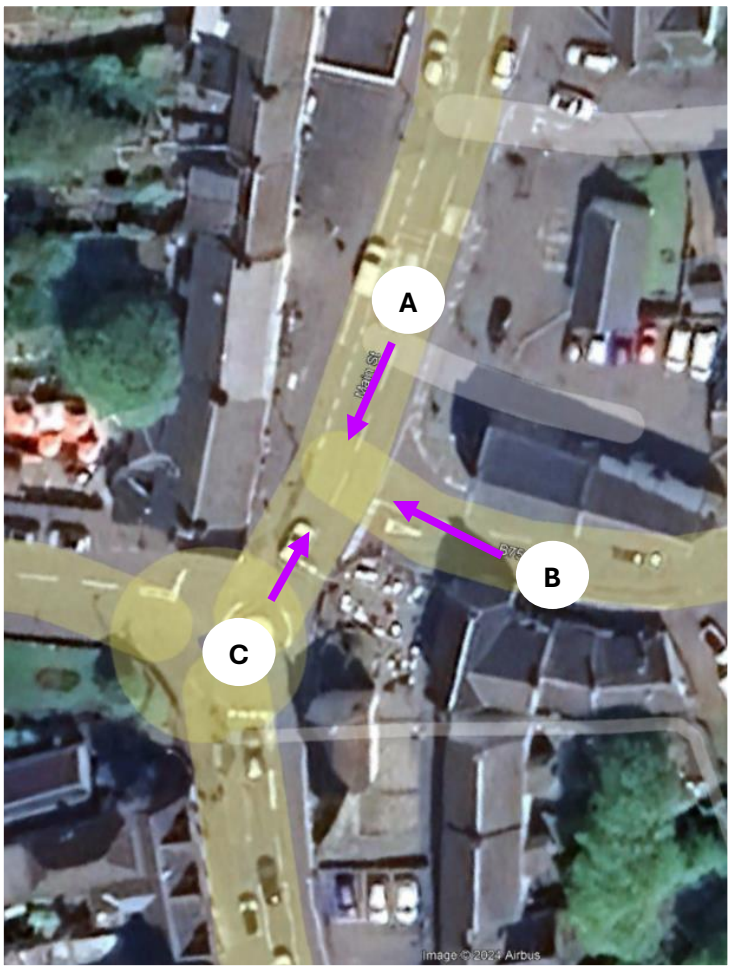


Figure 5-2 - Junction 1 layout (Image from Google Earth Pro - Satellite View)

5.2.1 Turning Counts

Traffic flows and the percentage of heavy goods vehicles (HGVs) for Junction 1 across all three peak hours are summarised in Table 5-1.

Overall, across all three arms of the junction and across all peak hours, flows are between 105 and 380 PCUs on individual arms. The highest flows were observed during the PM peak, with 889 PCUs, and are lowest during the AM peak at 653 PCUs. The flows tend to be highest both to and from Arm C, ranging between 271 to 453 PCUs. The only exception to this is in the AM peak, where there are slightly more vehicles from Arm A (276 PCUs) than Arm C (271 PCUs). From Arm C there are a high proportion of vehicles turning right, between 95 and 115 PCUs, across all peaks.

Arm A and C generally have more traffic than Arm B, showing that most traffic is moving along Main Street. Most traffic from Arm B is turning left into Arm C across all three peaks, feeding into Junction 2.

Overall, for any given turning movement, observed HGV movements were 2% or lower during the Saturday peak, and 4% or lower during the PM peak. The AM peak had the highest percentage of HGVs, with 6% from Arm A to Arm C, and 7% from Arm C to Arm A.

A total of 70 HGVs were observed during the full 12hr survey on Thursday 22nd August, with the largest class of vehicles turning identified as OGV2 (Other Goods Vehicle 2). OGV2 represent either rigid vehicles with four or more

axles, or articulated vehicles of any length. As such large vehicles are turning across the junction a signalised junction is recommended as an upgrade to allow for easier manoeuvres for these vehicles.

Table 5-1 - Junction 1 Peak Hour Flows

Date: Thurs 22 Aug 2024

Peak: AM - 8:00 to 9:00

PCU	A	B	C	Tot
A	0	21	256	**276**
B	13	0	93	**106**
C	156	115	0	**271**
Tot	**169**	**136**	**348**	**653**

	A	B	C
A	0%	5%	6%
B	0%	0%	1%
C	7%	0%	0%

Peak: PM - 16:45 to 17:45

PCU	A	B	C	Tot
A	0	24	230	**254**
B	32	0	223	**255**
C	271	109	0	**380**
Tot	**303**	**133**	**453**	**889**

PCU	A	B	C
A	0%	4%	2%
B	0%	0%	1%
C	2%	2%	0%

Date: Sat 24 Aug 2024

Peak: Sat - 11:15 to 12:15

PCU	A	B	C	Tot
A	0	29	213	**242**
B	21	0	87	**108**
C	216	95	0	**311**
Tot	**237**	**124**	**299**	**660**

	A	B	C
A	0%	0%	1%
B	0%	0%	1%
C	2%	0%	0%

5.2.2 Queues

Table 5-2, Table 5-3, and Table 5-4 detail the observed queues for the weekday AM, weekday PM and Saturday peaks respectively.

During the AM peak queues were observed on all arms of the junction. These queues varied across the hour but were generally higher at the start and end of the hour with no queues recorded between 8:30 and 8:35 on any arm. The queues were highest on Arm B, reaching a maximum of 4 PCUs at three points across the hour.

Table 5-2 – Junction 1 Observed Queue Lengths - AM (PCUs)

			Arm A	Arm B	Arm C
08:00	to	08:05	2	4	2
08:05	to	08:10	0	3	2
08:10	to	08:15	3	3	1
08:15	to	08:20	3	4	0
08:20	to	08:25	0	0	2
08:25	to	08:30	0	1	0
08:30	to	08:35	0	0	0
08:35	to	08:40	0	3	0
08:40	to	08:45	2	1	0
08:45	to	08:50	0	2	1
08:50	to	08:55	0	2	1
08:55	to	09:00	1	4	2

During the PM peak, the queues were similar lengths on Arm A and C as those observed during the AM peak. Arm B, however, was notably longer, remaining above 3 PCUs across the hour and reaching 7 PCUs at the start of the hour and 6 PCUs at three other points. This corresponds with the higher traffic flows noted during the PM peak.

Table 5-3 – Junction 1 Observed Queue Lengths - PM (PCUs)

			Arm A	Arm B	Arm C
16:45	to	16:50	0	7	0
16:50	to	16:55	2	3	0

			Arm A	Arm B	Arm C
16:55	to	17:00	0	3	1
17:00	to	17:05	3	5	2
17:05	to	17:10	0	6	2
17:10	to	17:15	1	5	2
17:15	to	17:20	2	6	1
17:20	to	17:25	0	4	1
17:25	to	17:30	0	4	1
17:30	to	17:35	0	4	2
17:35	to	17:40	1	3	1
17:40	to	17:45	0	6	2

During the Saturday peak, Arm A reached a maximum queue of 3 PCUs, much like the other queues, however, was noted to be 0 PCUs for most of the hour. Observed queues on Arm C were similar to the other peaks, and Arm B again had the highest observed queues. The Arm B queues occurred at the start of the hour, where queues reached 5 and 4 PCUs before reducing to queues of between 1 and 2 PCUs.

Table 5-4 – Junction 1 Observed Queue Lengths - Saturday (PCUs)

			Arm A	Arm B	Arm C
11:45	to	11:50	0	5	2
11:50	to	11:55	1	4	2
11:55	to	12:00	0	1	0
12:00	to	12:05	0	2	1
12:05	to	12:10	0	1	3
12:10	to	12:15	0	1	1
12:15	to	12:20	3	2	1
12:20	to	12:25	0	2	2
12:25	to	12:30	0	2	0
12:30	to	12:35	0	1	3
12:35	to	12:40	0	1	1
12:40	to	12:45	1	2	0

This junction is in close proximity to Junction 2, leading to the queues of each one interacting. There is about 5m (approximately 1 PCU length) between the two junctions, so any queue longer than a single vehicle on Arm C will extend into Junction 2. Similarly, when Junction 2 has queues to the north it will block Junction 1. This leads to queuing on Arm B of Junction 1 as these vehicles cannot turn left onto Main Street. By combining Junction 1 and 2 into one staggered signalised junction the interactions between the two would be mitigated, allowing for vehicles to more easily navigate from one junction to the next.

5.2.3 Survey Footage Observations

Survey footage clearly indicates the impact that Junctions 1 and 2 have on each other. Congestion was observed at both junctions when vehicles attempted to turn right both into and out of Fenwick Road. This issue is illustrated in Figure 5-3, which is a snapshot from survey footage of Junction 1. The snapshot is taken from opposite Fenwick Road and shows traffic queuing on all three approaches to Junction 1 as they wait for right turners from Main Street. These right-turners have just exited Junction 2 before attempting to turn right across Junction 1.

This issue was observed to be exacerbated when heavy vehicles attempt to navigate the junction. This reinforces the observations discussed previously, combining these two junctions into one staggered signalised junction would eliminate tailback issues between Fenwick Road and Irvine Road by managing traffic movements.

Figure 5-3 - Survey Footage of Junction 1 indicating congestion caused by right turners

5.3 Junction 2 – Irvine Road Mini-Roundabout

Junction 2 is located immediately south of Junction 1 and is formed by Irvine Road, the A735 Main Street and the A735 Townend. Junction 2 is currently a mini-roundabout as indicated in Figure 5-4 where:

- Arm A is Main Street (South)
- Arm B is Irvine Road (West)
- Arm C is Townend (North)

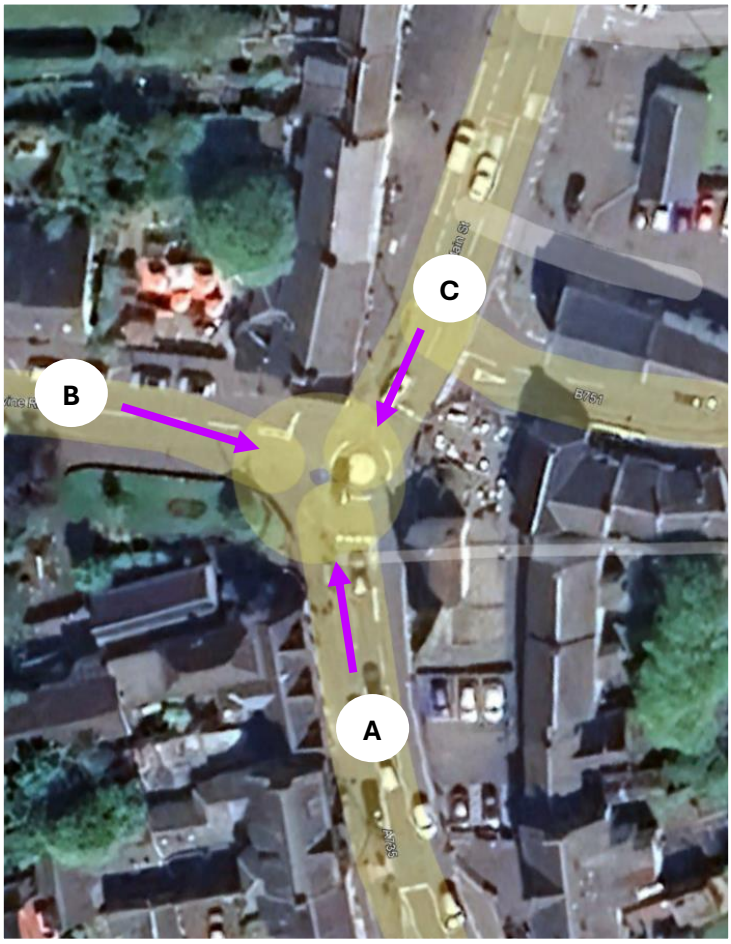


Figure 5-4 - Junction 2 layout (Image from Google Earth Pro - Satellite View)

5.3.1 Traffic Counts

Traffic flows and the percentage of heavy goods vehicles (HGVs) for Junction 2 across all three peak hours are summarised in

Table 5-5.

Overall, across all three arms of the junction and across all peak hours, flows are between 173 and 453 PCUs on individual arms. The highest overall flows were observed during the PM peak, with 1057 PCUs, and the lowest during the Saturday peak at 755 PCUs. Flows tend to be highest from Arm C, ranging between 299 to 345 PCUs. The PM peak had the most observed traffic and with 46% of those PCUs coming from Arm C turning right into Irvine Road.

Overall, for any given turning movement, observed HGV movements were 4% or lower during the Saturday peak and 3% and lower during the PM peak. The AM peak had the highest percentage of HGVs, with 5% from Arm A to Arm C (and vice versa) and 7% from Arm A to Arm B.

A total of 49 HGVs were observed during the course of the full 12hr survey on Thursday 22nd August, with the largest class of vehicles turning identified as OGV2.

Table 5-5 - Junction 2 Peak Hour Flows

Date: Thurs 22 Aug 2024					*Date: Thurs 22 Aug 2024*					*Date: Sat 24 Aug 2024*				
Peak: AM - 8:00 to 9:00					***Peak: PM - 16:45 to 17:45***					***Peak: Sat - 11:15 to 12:15***				
PCU	A	B	C	**Tot**	PCU	A	B	C	**Tot**	PCU	A	B	C	**Tot**
A	0	57	168	**225**	A	0	44	266	**310**	A	0	35	195	**230**
B	55	0	64	**118**	B	56	0	123	**178**	B	32	0	74	**106**
C	255	121	0	**377**	C	255	92	2	**350**	C	222	67	2	**291**
Tot	**310**	**178**	**232**	**720**	**Tot**	**311**	**136**	**391**	**838**	**Tot**	**254**	**102**	**271**	**627**
PCU	A	B	C		PCU	A	B	C		PCU	A	B	C	
A	0%	4%	5%		A	0%	0%	1%		A	0%	0%	0%	
B	6%	0%	7%		B	2%	0%	1%		B	0%	0%	0%	
C	4%	5%	0%		C	2%	1%	0%		C	2%	3%	0%	

5.3.2 Queues

Table 5-6, Table 5-7, and Table 5-8 detail the observed queues for the weekday AM, weekday PM and Saturday peaks respectively.

During the AM peak, queues were observed on all arms of the junction. These queues varied across the hour but remained generally low on Arm A and C, although both arms did reach 3 PCUs across one 5-minute period during the AM peak. The queues were highest on Arm B, reaching a maximum of 4 PCUs twice across the hour.

Table 5-6 – Junction 2 Observed Queue Lengths - AM (PCUs)

			Arm A	Arm B	Arm C
08:00	to	08:05	0	1	1
08:05	to	08:10	2	2	1
08:10	to	08:15	0	2	2
08:15	to	08:20	1	3	3
08:20	to	08:25	0	4	0
08:25	to	08:30	3	2	2
08:30	to	08:35	0	1	1
08:35	to	08:40	1	0	0
08:40	to	08:45	0	3	1
08:45	to	08:50	1	4	2
08:50	to	08:55	0	3	2
08:55	to	09:00	0	2	0

During the PM peak, queues were observed to be significantly longer on Arm A and Arm B than those in the AM, while Arm C remained relatively similar. Arm B reached queues of 9 PCUs at the end of the hour as well as 7 PCUs at 17:15. On Arm A, queues remained above 3 PCUs for most of the hour. and reached 11 PCUs at the end of the hour as well as 6 PCUs at 17:15.

Table 5-7 – Junction Observed Queue Lengths - PM (PCUs)

			Arm A	Arm B	Arm C
16:45	to	16:50	3	3	2
16:50	to	16:55	2	3	2
16:55	to	17:00	5	2	1
17:00	to	17:05	3	4	1
17:05	to	17:10	3	1	0
17:10	to	17:15	3	4	2
17:15	to	17:20	6	7	2
17:20	to	17:25	4	2	0
17:25	to	17:30	5	2	2
17:30	to	17:35	4	5	1
17:35	to	17:40	3	2	1
17:40	to	17:45	11	9	3

The observed queues during the Saturday peak were similar levels to those observed in the AM. Arm C was observed to have the lowest queues while Arm A also had generally low queues, although reached at least 3-4 PCUs at three points. Arm B had the longest queues, remaining above 2 PCUs for most of the hour and reaching 4 PCUs three times.

Table 5-8 – Junction 2 Observed Queue Lengths - Saturday (PCUs)

			Arm A	Arm B	Arm C
11:15	to	11:20	1	2	1
11:20	to	11:25	0	2	2
11:25	to	11:30	4	4	2
11:30	to	11:35	0	1	2
11:35	to	11:40	3	2	2
11:40	to	11:45	1	4	2
11:45	to	11:50	1	3	1
11:50	to	11:55	3	2	1
11:55	to	12:00	1	1	1
12:00	to	12:05	2	4	0
12:05	to	12:10	1	2	0
12:10	to	12:15	1	2	1

As noted previously Junction 1 and 2s queues interact with each other due to their proximity. Any vehicles which turned right into Fenwick Road were observed to block vehicles back into Junction 2. This prevents other vehicles from entering the roundabout to turn north and is an influencing factor behind the queues on Arm A.

5.4 Junction 3 – Sunnyside Mini-Roundabout

The most southern junction in Site 1, Junction 3, is formed by the B751 Sunnyside and the A735 Townend. Junction 3 is currently a mini roundabout as indicated in Figure 5-5 where:

- Arm A is Townend (South)
- Arm B is Sunnyside (West)
- Arm C is Townend (North)

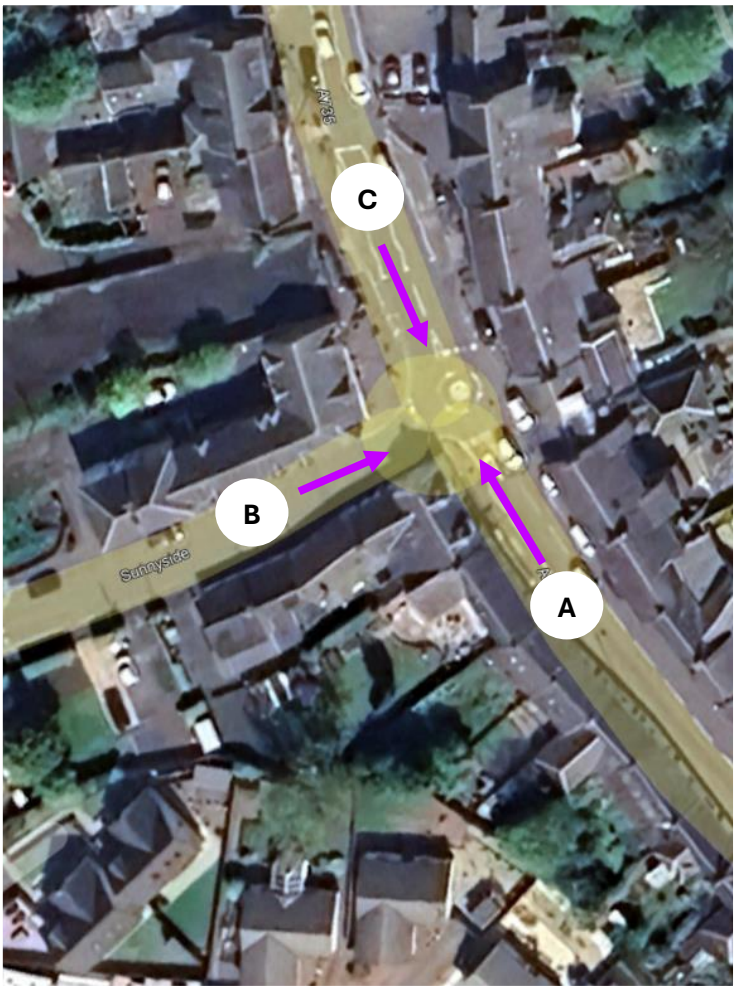


Figure 5-5 - Junction 3 layout (Image from Google Earth Pro - Satellite View)

5.4.1 Traffic Counts

Traffic flows and the percentage of heavy goods vehicles (HGVs) for Junction 3 across all three peak hours are summarised in Table 5-9.

Overall, across all three arms of the junction and across all peak hours, flows are between 106 and 377 PCUs on individual arms. The highest flows were observed during the PM peak, with 838 PCUs, and are lowest during the Saturday peak, with 627 PCUs. The flows tended to be highest to Arm C ranging between around 291 to 377 PCUs. For Arm C the highest levels of traffic were observed in the AM peak with 32% of PCUs turning right into Sunnyside.

Arm A and C have more traffic than Arm B, showing that most traffic is moving along the A735. Most traffic from Arm B was turning left into Arm C across all three peaks. Notably most of this traffic will feed into Junction 2 with the only exception being those parking on the street to visit any establishments on Townend.

Overall, for any given movements, observed HGVs movements were 3% and less during the PM and Saturday peaks. The AM peak had the highest percentage of HGVs, with 6% from Arm B to Arm A and 7% from Arm B to Arm C.

A total of 88 HGVs were observed during the course of the full 12hr survey on Thursday 22nd August with the largest class of vehicles turning identified as OGV2. As such large vehicles are turning across the junction a signalised junction is recommended as an upgrade to allow for easier manoeuvres for these vehicles.

Table 5-9 - Junction 3 Peak Hour Flows

Date: Thurs 22 Aug 2024										*Date: Sat 24 Aug 2024*				
Peak: AM - 8:00 to 9:00					*Peak: PM - 16:45 to 17:45*					*Peak: Sat - 11:15 to 12:15*				
PCU	A	B	C	**Tot**	PCU	A	B	C	**Tot**	PCU	A	B	C	**Tot**
A	0	57	168	**225**	A	0	44	266	**310**	A	0	35	195	**230**
B	55	0	64	**118**	B	56	0	123	**178**	B	32	0	74	**106**
C	255	121	0	**377**	C	255	92	2	**350**	C	222	67	2	**291**
Tot	**310**	**178**	**232**	**720**	**Tot**	**311**	**136**	**391**	**838**	**Tot**	**254**	**102**	**271**	**627**
PCU	A	B	C		PCU	A	B	C		PCU	A	B	C	
A	0%	4%	5%		A	0%	0%	1%		A	0%	0%	0%	
B	6%	0%	7%		B	2%	0%	1%		B	0%	0%	0%	
C	4%	5%	0%		C	2%	1%	0%		C	2%	3%	0%	

5.4.2 Queues

Table 5-10, Table 5-11 and Table 5-12 detail the observed queues for the weekday AM, weekday PM and Saturday peaks respectively.

During the AM peak, queues were observed on all arms of the junction. These queues varied across the hour but were low on Arm B, 1 PCU, for most of the hour however queues did reach up to 3 and 4 PCUs at three points. Arm A and Arm C, on the other hand, both had no queues at the start of the hour but increased significantly across the hour both observed to reach up to 6 PCUs at 08:40.

Table 5-10 – Junction 3 Observed Queue Lengths - AM (PCUs)

			Arm A	Arm B	Arm C
08:00	to	08:05	0	1	0
08:05	to	08:10	0	1	0
08:10	to	08:15	4	1	0
08:15	to	08:20	5	1	2
08:20	to	08:25	1	3	3
08:25	to	08:30	0	1	0
08:30	to	08:35	1	1	3
08:35	to	08:40	3	4	3
08:40	to	08:45	6	3	6
08:45	to	08:50	0	1	3
08:50	to	08:55	2	1	3
08:55	to	09:00	1	2	2

The queues observed during the PM peak hour were higher than those for the other two peaks. Arm A and Arm B were observed to have longer queues than the AM peak, however, Arm C was observed to have shorter queues. The longest queues were observed on Arm A, reaching 8 PCUs at 17:05 and 6 PCUs at the end of the hour.

Table 5-11 – Junction 3 Observed Queue Lengths - PM (PCUs)

			Arm A	Arm B	Arm C
16:45	to	16:50	1	1	0
16:50	to	16:55	4	5	1

			Arm A	Arm B	Arm C
16:55	to	17:00	0	2	2
17:00	to	17:05	2	2	4
17:05	to	17:10	8	1	1
17:10	to	17:15	2	5	0
17:15	to	17:20	0	1	2
17:20	to	17:25	2	4	2
17:25	to	17:30	3	2	2
17:30	to	17:35	5	2	1
17:35	to	17:40	3	2	4
17:40	to	17:45	6	4	1

During the Saturday Peak, Arm C had the longest observed queues during the Saturday peak, 6 PCUs, at 11:50 but was otherwise generally low, remaining between 0 and 1 PCUs across most of the hour. On Arm A, queues reached 4 PCUs at the start of the hour but otherwise remained between 1 and 3 PCUs for most of the hour. Arm B similarly remained between 1 and 3 across the hour.

Table 5-12 – Junction 3 Observed Queue Lengths - Saturday (PCUs)

			Arm A	Arm B	Arm C
11:45	to	11:50	4	1	1
11:50	to	11:55	1	2	6
11:55	to	12:00	2	1	2
12:00	to	12:05	2	1	0
12:05	to	12:10	1	2	1
12:10	to	12:15	2	3	1
12:15	to	12:20	1	2	1
12:20	to	12:25	2	1	0
12:25	to	12:30	1	1	1
12:30	to	12:35	3	2	1
12:35	to	12:40	0	1	1
12:40	to	12:45	3	1	0

5.4.3 Survey Footage Observations

Survey footage indicates there are two issues with the layout which cause additional congestion. The left turn from Townend to Sunnyside was observed to be too narrow for large HGVs to turn safely in one movement, forcing them to reverse back into the junction to make the turn, causing traffic to back up in all directions, as shown in Figure 5-6. Additionally, the Sunnyside bus stop is located approximately 15m north of the junction, where buses stop on-road to collect and drop off passengers; stationary buses block vehicles upstream at the junction, as shown in Figure 5-7.

Located between Junction 3 and Junction 2, approximately 30m north of Junction 3, is a signalised pedestrian crossing. This was not included in the traffic counts but was visible from cameras located at both Junction 1 and 2. Footage of the pedestrian crossing was reviewed during the peak hours to identify how regularly it was used, the impact this has on vehicle traffic, and any consequent queues which may interact with adjacent junctions. The crossing was observed to be used only a small number of times during peak periods, with pedestrians generally choosing to cross during gaps in traffic rather than to activate and wait for the signalised crossing. When the crossing was used, it was rarely observed to have an impact on oncoming traffic and never resulted in queues longer that 2 vehicles and therefore did not impact the adjacent junctions.

Figure 5-6 - Survey Footage of Junction 3 indicating congestion caused by heavy vehicles turning into Sunnyside

Figure 5-7 - Survey Footage of Junction 3 indicating congestion caused by Sunnyside Bus Stop

Measures were discounted as it was considered other options would have a more meaningful impact on the issues identified during the site audit and public engagement exercises.

6. Options Development

Based on the above analysis, beyond a do minimum option, two concept design options have been developed aimed at improving pedestrian connectivity and accessibility and road safety at Main Street (A735), Kilmaurs. The options have been developed taking cognisance of collision data, traffic survey data, site visit observations, opportunities and constraints. The options have been prepared in accordance with the following design guidance:

- National Roads Development Guide
- Designing Streets: A Policy Statement for Scotland
- Transport Scotland Roads for All: Good Practice Guide for Roads
- DfT Guidance on the Use of Tactile Paving
- CIHT Buses in Urban Developments
- LTN 1/07 – Traffic Calming

The concept design options have been developed to provide an understanding of what can be achieved within the study area.

Drawings for the proposed concept design options and swept path analysis are attached within Appendix A and Appendix B, respectively.

6.1 Option One

Option 1 comprises the following measures to be implemented to improve road safety along Main Street:

- **Tightened corner radii:** Reduces vehicle speeds at corners.
- **Uncontrolled crossing points:** Alerts drivers of potential pedestrians crossing whilst providing improved crossing points for pedestrians, directly addressing a key concern raised in the brief.
- **Signal-Controlled crossing points:** Slows down vehicles and providing pedestrian priority at crossing points, directly addressing a key concern raised in the brief and aligning with LTN 1/07's recommendations for pedestrian-friendly road design.
- **Uncontrolled crossing point with a raised table:** Reduces vehicle speeds along a section of Main Street with a straight horizontal alignment.
- **Signalised junction:** Provides pedestrians priority at crossing points, directly addressing a key concern raised in the brief and aligning with LTN 1/07's recommendations for pedestrian-friendly road design.
- **Bus stop relocation:** Relocating the bus stop accommodates the new signal-controlled crossing location and improvers the effective width of both the northern and southern footways.
- **Parking removal:** Removal of the existing on-street parking bays will create wider footways, improve access for those with mobility issues or wheeling devices. It will also provide smoother traffic flow due to the elimination of vehicles manoeuvring in and out of parking spaces, as well as reducing congestion, particularly during peak hours.

The aim of Option 1 is to improve road safety by implementing simple upgrades junctions and the provision of uncontrolled and signal-controlled crossing facilities. The removal of the mini roundabouts. Given there is a minimal number of crossing facilities provided on Main Street at present, Option 1 will provide uncontrolled and signalled controlled crossing facilities for improved crossing points for pedestrians where there is an apparent desire line whilst alerting drivers of potential pedestrians crossing at these locations. It is envisaged that tighten junction radii will encourage drivers to slow down and travel within the posted speed limit.

6.2 Option Two

Option 2 comprises the following measures be implemented to improve road safety along Main Street, in addition to the measures proposed in Option 1:

- **Parking bays:** Provides dedicated parking spaces for road users, addressing a key concern with vehicles parking on footways. This has been proposed in lieu of southern footway proposal in Option 1.

The purpose of Option 2 is to improve road safety by implementing a combination of physical measures and speed control strategies. Option 2 includes parking bay provisions on the northern side of the carriageway of Main Street between its junctions with Sunnyside and Irvine Road. Controlled crossing facilities will slow down vehicles and provide priority to pedestrians at these crossing locations.

7. Traffic Modelling

7.1 Methodology

The traffic modelling has been undertaken using the industry standard package LinSig 3 used to model two signal-controlled options for Site 1. In addition, the geometric parameters for the existing layouts were measured using Ordnance Survey mapping and DS designs in AutoCAD and the intergreens were identified using Quickgreen. Quickgreen is a software package that processes the distances between movements to calculate the minimum intergreen times needed.

For all LinSig based models the layouts were assessed using the following criteria:

- Mean Max Queue (MMQ) – represents the maximum queue per lane within a typical cycle, averaged across all cycles within the modelled time period. Measured in PCUs.
- Delay - The average delay for each PCU in a lane, averaged over the modelled time period, measured in seconds per PCU (s/PCU).
- Degree of Saturation (DoS) - This is a percentage defined as the ratio of flow to capacity for the lane. A DoS of over 90% indicates that approach is operating above capacity.
- Practical Reserve Capacity (PRC) - indicating how much additional traffic can be accommodated across the junction before a DoS of 90% is reached on a single approach.

7.2 Traffic Data

Each Layout was assessed for an AM, PM and Saturday peak hours within the following scenarios:

- 2024 observed
- 2029 factored (2024 + 5 years)
- 2034 factored (2024 +10 years)

As agreed with ARA, NRTF low growth factors were applied to the observed turning movements to simulate background traffic growth for the future year scenarios. The identified growth factors are noted as follows:

- 2024 to 2029 – factor of 1.026
- 2024 to 2034 – factor of 1.052

7.2.1 Proposed Redistribution

Both Option 1 and Option 2, propose converting Sunnyside from a two-way to a one-way road, preventing any traffic entering the A735 from Sunnyside. Alongside this, Junction 1 and Junction 2 have been combined into one staggered junction. To account for both these changes traffic counts were manually redistributed onto the proposed layouts, altering the traffic flow diagram from that shown in Figure 7-1. The junctions are now referred to as Junction A comprising Junction 1 and Junction 2, and Junction B comprising Junction 3.

Traffic was rerouted as follows:

- All traffic from Arm B Junction 3 was rerouted to Arm C Junction A

- Left turning traffic from Arm B Junction 2 and ahead movement traffic from Arm A Junction 2 was distributed into northbound and eastbound movements proportional to the northbound and eastbound movements previously noted at Arm C Junction 1. The redistribution is noted in Arm C and Arm D in Junction A respectively.
- Similarly ahead movements from Arm A Junction 1 and the right turn movements from Arm B Junction 1 were redistributed into westbound and southbound movements proportional to those previously noted on Arm C Junction 2. The redistribution is noted in Arm A and Arm B in Junction A respectively.
- Junction 3 Arm C was increased to include additional traffic and is now referred to as Arm E in Junction B.
- Arm A in Junction 3 remained unchanged and is now referred to as Arm G in Junction B.
- All U-turns were removed from the model.

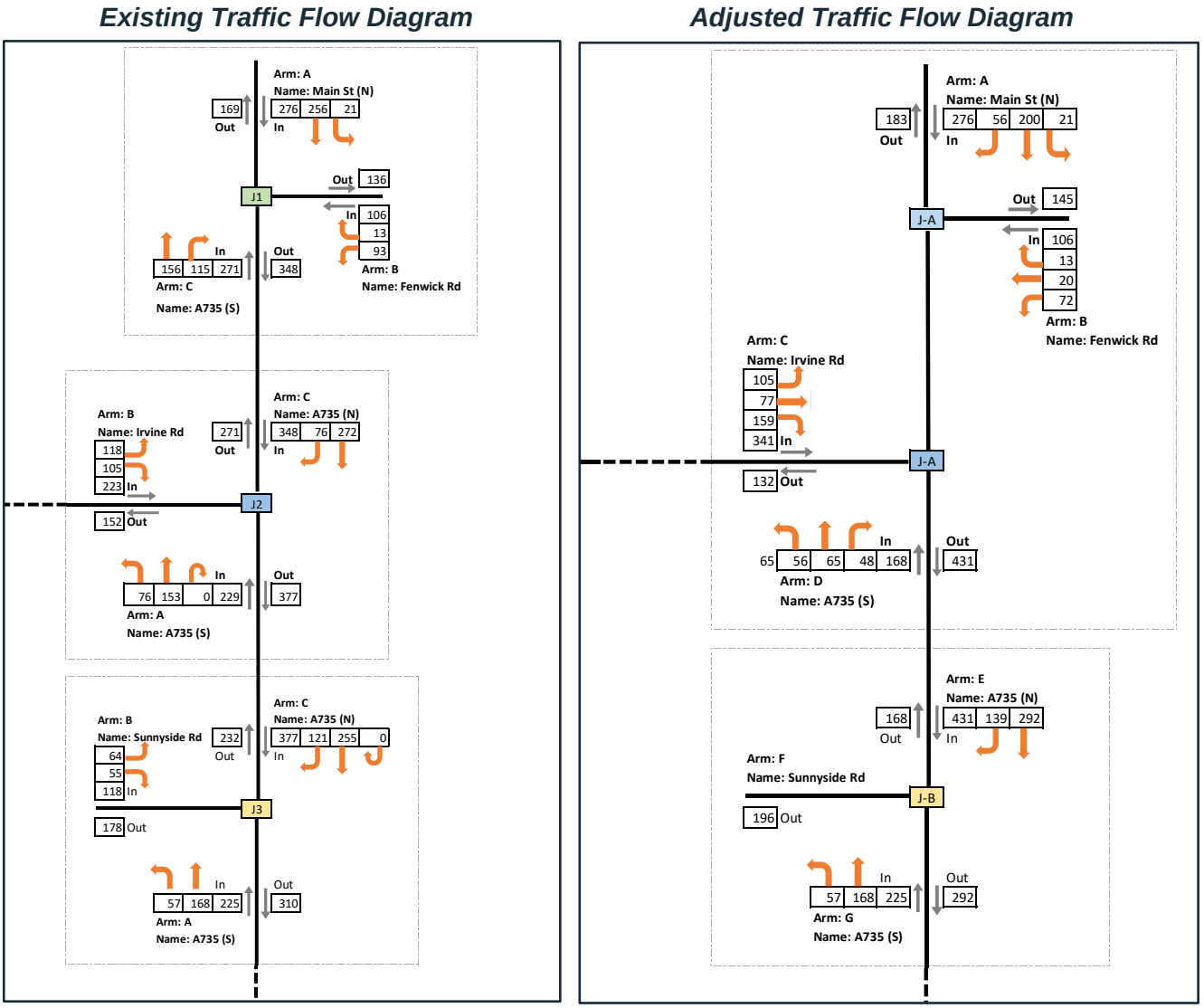


Figure 7-1 - Traffic Flow Diagram before and after traffic redistribution (AM Peak hour shown)

7.3 Modelling Results

7.3.1 Summary Results

Table 7-1 provides an overview of the PRC for both layout options across all peak hours and all scenarios. The overall capacity remains positive across both junctions across all scenarios, however the PM peak has significantly lower

available capacity than in the AM and Saturday peak hours. Additionally, the increased traffic expected in the future scenarios further reduces the residual capacity of the junctions.

Both layout Options have broadly similar results, although Option 2 has slightly less capacity in the AM and PM peaks but does have slightly greater capacity in the Saturday peaks.

Table 7-1 - PRC Results Summary

Layout	AM Peak	PM Peak	Sat Peak
	2024		
Option 1	68%	17%	79%
Option 2	64%	13%	80%
	2029		
Option 1	63%	10%	73%
Option 2	60%	9%	76%
	2034		
Option 1	60%	8%	70%
Option 2	55%	4%	70%

The LinSig outputs are presented in Appendix C. The detailed results for the worst-performing scenario year, 2034, are summarised in the following sections.

7.3.2 Option 1

Option 1 will include the following changes:

- Junction 1 and Junction 2 will be combined into a staggered signalised junction with pedestrian crossings at each arm (referred to as Junction A).
- Junction 3 mini roundabout has been removed and Sunnyside has been converted into a one-way.
- Signalised pedestrian crossing on the A735 will be shifted approximately 15m south.

This model will include two sets of signals, one for Junction A and one for the pedestrian crossing. The LinSig model included one staging plan with two stage streams, one for each set of lights, both of which are presented in Figure 7-2 where Stream 1 applies to Junction A and Stream 2 applies to the pedestrian crossing.

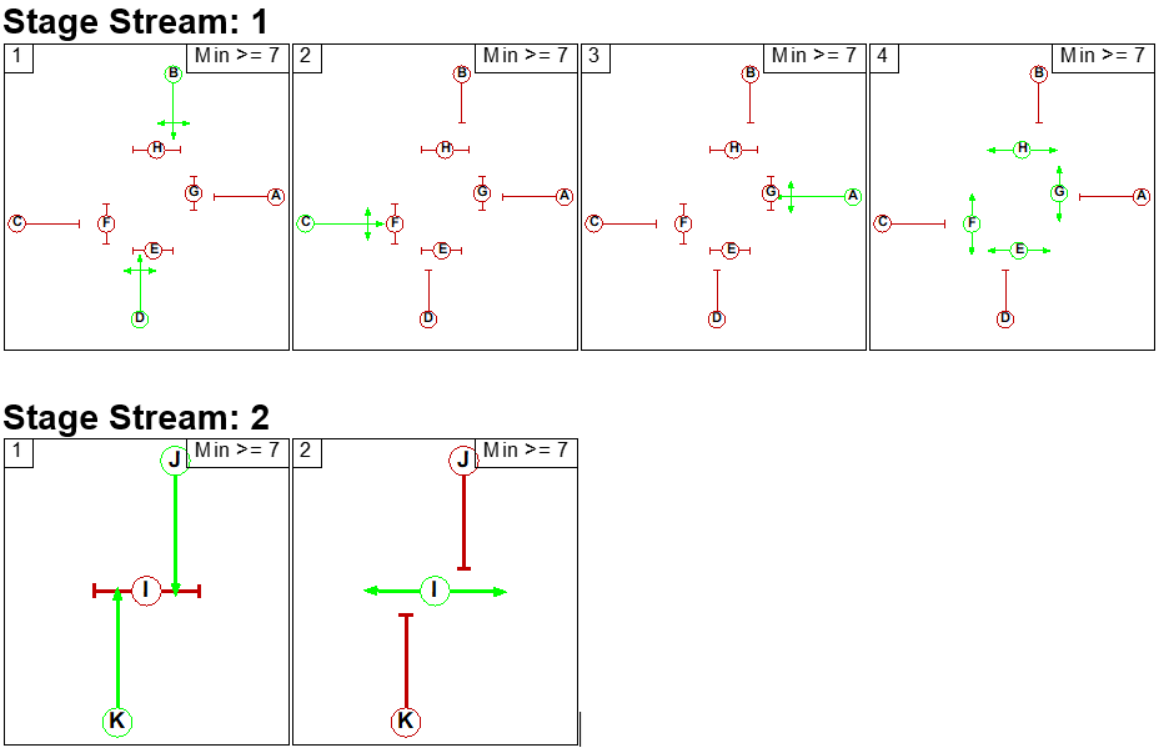


Figure 7-2 - Option 1 Stage Diagram (LinSig)

Option 1, Stream 1 – Staggered Crossroads (Junction A)

The model results for Option 1 relating to Junction A are presented in Table 7-2. The approach queue storage lengths are as undernoted; approaches where the available storage is exceeded have their queue lengths highlighted in red.

- A735 South: 8.5 PCU, between junction and Sunnyside
- Fenwick Road: No notable junctions within vicinity that would cause storage issues
- A735 North: 5 PCU, between junction and Millhill Avenue
- Irvine Road: 13 PCU, between junction and Vince Park Road

Table 7-2 - Option 1 Junction A Model Results

Approach	2034 AM			2034 PM			2034 Sat		
	DoS (%)	Delay (s/pcu)	MMQ (pcu)	DoS (%)	Delay (s/pcu)	MMQ (pcu)	DoS (%)	Delay (s/pcu)	MMQ (pcu)
A735 South	54%	40	5.1	56%	45	7.1	42%	41	4.9
Fenwick Road	54%	70	3.9	81%	74	10.0	53%	68	3.9
A735 North	56%	47	8.5	78%	67	9.7	52%	45	7.6
Irvine Road	56%	38	9.7	84%	63	14.4	52%	40	8.2

All arms are shown to be operating within capacity, with DoS values of less than 90% throughout all peak hours. Overall the PM peak is the closest to reaching capacity, with Irvine Road reaching a DoS of 84%.

The queues on the A735 North approach are predicted to extend beyond Millhill Avenue in each peak hour, therefore it is recommended considering the provision of yellow box markings to ensure the junction is still accessible during busier periods.

The queues on the Irvine Road approach are also predicted to block the nearest upstream junction, Vine Park Road. Similar to the A735 North approach, it is recommended considering the provision of yellow box markings.

Despite the predicted blocking issues, it should be noted that as the model is predicted to operate within capacity it is expected that all queues will clear within a single cycle.

Option 1, Stream 2 – Pedestrian Crossing / Sunnyside (Junction B)

The model results for Option 1 relating to the pedestrian crossing are presented in Table 7-1. The approaches and their queue storages are as undernoted. Queues exceeding the available storage are highlighted in red.

- A735 North SB: Southbound approach to the proposed signal-controlled crossing. There is storage for approximately 8.5 PCU to queue between the crossing and Junction A to the north.
- A375 South NB: Northbound approach to the proposed signal-controlled crossing. There is storage for approximately 1.5 PCU to queue between the crossing and Sunnyside.
- A735 South SB: Southbound approach to the proposed one-way Sunnyside junction, where right-turning vehicles into Sunnyside give-way to the opposing northbound A735 traffic stream. There is storage for approximately 1.5 PCU to queue when giving way, so any queuing vehicles beyond the first will instead queue north of the proposed crossing.

Table 7-3 - Option 1 Junction B Model Results

Approach	2034 AM			2034 PM			2034 Sat		
	DoS (%)	Delay (s/pcu)	MMQ (pcu)	DoS (%)	Delay (s/pcu)	MMQ (pcu)	DoS (%)	Delay (s/pcu)	MMQ (pcu)
A735 North SB	25%	2	0.4	23%	2	1.3	19%	1	0.4
A735 South NB	10%	3	1.0	17%	3	1.6	12%	3	1.2
A735 South SB	26%	2	0.2	24%	2	0.7	19%	1	0.1

The proposed pedestrian crossing is predicted to operate well within capacity, with minimal queues and delays predicted at the crossing or for right-turners into Sunnyside.

Traffic on the northbound approach to the crossing is predicted to reach a maximum of 1.6 PCU, meaning that when the pedestrian crossing is called vehicles may be blocked from turning into Sunnyside. Given the short length of the predicted queue and delay however this is unlikely to result in any major issues.

No queueing issues are predicted for right-turning vehicles into Sunnyside, and no storage issues are predicted for southbound traffic between the crossing and Junction A.

7.3.3 Option 2

Option 2 includes all of the changes proposed for Option 1, with the key difference being it does not provide a crossing on the south approach to the staggered crossroads (Junction A).

The staging plan is the same as Option 1, with a stage stream for each set of lights. Stage stream 1 differs Option 1's as it lacks the south crossing, and the stage sequence is 1, 3, 2, 4, i.e. Stage 3 (Fenwick Road) occurs before Stage 2 (Irvine Road). This is because the intergreen between Stage 3 to 2 is 1s shorter than from Stage 1 to 2 for Option 2 due to tighter geometry, therefore switching the staging sequence improves timing efficiency.

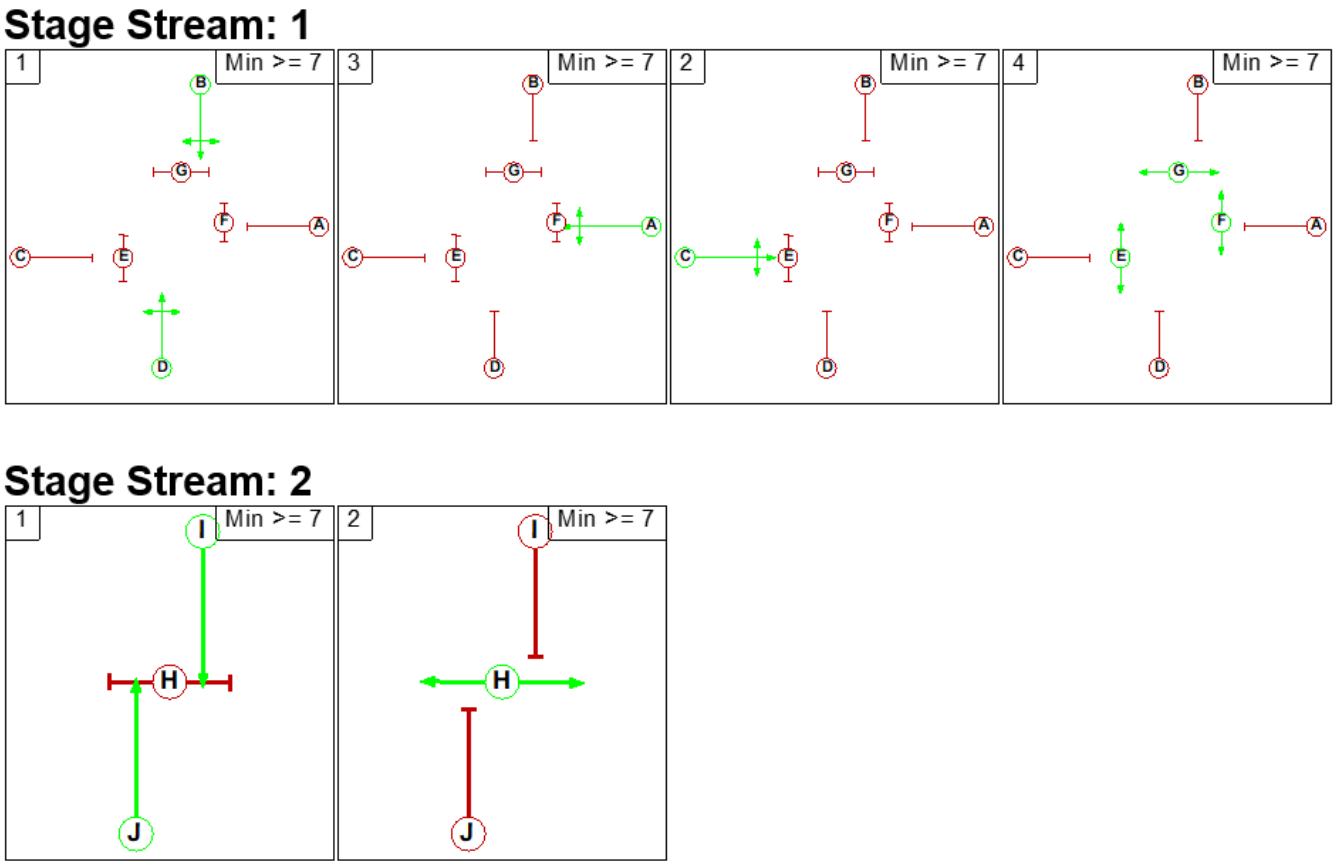


Figure 7-3 - Option 2 Stage Diagram (LinSig)

Option 2, Stream 1 – Staggered Crossroads (Junction A)

The model results for option 2 relating to the Junction A are presented in Table 7-4. The approach storage lengths are same as those for Option 1. Those approaches where the predicted queue exceeds the available storage have their queue lengths highlighted in red.

Table 7-4 - Option 2 Junction A Model Results

Approach	2034 AM			2034 PM			2034 Sat		
	DoS (%)	Delay (s/pcu)	MMQ (pcu)	DoS (%)	Delay (s/pcu)	MMQ (pcu)	DoS (%)	Delay (s/pcu)	MMQ (pcu)
A735 South	50%	47	4.2	54%	42	8.1	41%	41	5.1
Fenwick Road	57%	72	3.9	84%	81	10.6	52%	66	3.9
A735 North	57%	45	8.4	84%	77	10.7	53%	45	7.4
Irvine Road	58%	39	9.8	87%	70	15.3	53%	40	8.2

All arms are shown to be operating within capacity, with DoS values of less than 90% throughout all peak hours. Overall, the PM peak is the closest to reaching capacity, with all but the A735 South approach predicted to have a DoS of at least 84%.

Similar to Option 1, the A735 North approach queues are predicted to extend beyond Millhill Avenue in each peak hour, therefore it is recommended considering the provision of yellow box markings to maintain access to the junction during busier times.

Irvine Road is also predicted to experience similar queue issues to Option 1, with queues expected to extend beyond Vine Park Road. The same recommendation regarding the consideration of the provision of yellow box markings applies.

As with Option 1, the queues on each approach to this layout are expected to clear within a single cycle as the junction is predicted to operate within capacity.

Option 2, Stream 2 – Pedestrian Crossing / Sunnyside (Junction B)

The model results for Option 2 relating to the pedestrian crossing are presented in Table 7-5. The approach labels and queuing storage are the same as for Option 1. Queues exceeding the available storage are highlighted in red

Table 7-5 - Option 2 Junction B Model Results

Approach	2034 AM			2034 PM			2034 Sat		
	DoS (%)	Delay (s/pcu)	MMQ (pcu)	DoS (%)	Delay (s/pcu)	MMQ (pcu)	DoS (%)	Delay (s/pcu)	MMQ (pcu)
A735 North SB	25%	2	0.2	23%	2	0.4	19%	2	0.4
A735 South NB	11%	3	1.0	17%	3	1.8	12%	3	1.2
A735 South SB	26%	12	0.2	24%	2	0.2	19%	1	0.1

As with Option 1, the proposed pedestrian crossing and revised Sunnyside junction layout are predicted to operate well within capacity.

The queues predicted for the Option 2 layout are broadly similar to Option 1. Traffic on the northbound approach to the crossing is predicted to reach a maximum of 1.8 PCU, meaning that when the pedestrian crossing is called vehicles may be blocked from turning into Sunnyside. Similar to Option 1, the short length of the predicted queue and delay is unlikely to result in any major issues.

No queueing issues are predicted for right-turning vehicles into Sunnyside, and no storage issues are predicted for southbound traffic between the crossing and Junction A.

7.4 Modelling Summary

The results for both Options 1 and 2 are broadly similar. Both are predicted to operate within capacity, and both predict queues extending beyond upstream junctions at the proposed staggered crossroads to be formed by Fenwick Road and Irvine Road.

It should however be noted that the existing junctions at Fenwick Road and Irvine Road currently experience queuing issues, particularly when larger vehicles attempt to turn at either junction. This is exacerbated when HGVs attempt to travel between Fenwick Road and Irvine Road, which requires a right-turn manoeuvre within the tight constraints of

the existing layout. Upgrading to the staggered crossroads merges the two junctions into one, ensuring that traffic is held back and vehicles from each approach can move through the junction more easily.

Both proposed layouts also offer the benefit of improved crossing provision for pedestrians, particularly for Option 1 which provides a crossing on the south approach to the crossroads. Both options also better meet the observed desire line of pedestrians, many of them school pupils, crossing the A735 near Sunnyside.

8. Summary

8.1 Option Cost Estimate

The following high level construction cost estimates for each option have been prepared. The total cost of each option is summarised in the Table 8-1 below with caveats and assumptions listed in section 8.1.1.

Table 8-1– Options Cost Estimate

Series	Option One (£)	Option Two (£)
Series 100: Preliminaries	£64,919.29	£60,845.71
Series 200: Site Clearance	£8,834.77	£8,834.77
Series 700: Pavement	£188,245.87	£188,934.17
Series 1100: Kerbs, Footways and Paved Areas	£121,263.68	£115,834.41
Series 1200: Traffic Signs and Road Markings	£114,450.93	£92,034.70
Provisional Traffic Management Sum	£15,000	£15,000
Total	**£512,714.54**	**£481,483.74**

8.1.1 Caveats and Assumptions

- Cost estimates have been developed based on SPON's Civil Engineering and Highway Works Price Book 2024 rates. Where no appropriate rates are available, rates have been taken from similar projects or estimated.
- A Provisional Traffic Management Sum of £15,000 has been applied to the cost estimates.
- 15% allowance has been made to construction costs for Preliminaries.
- Cost does not include for removal and renewal of any infrastructure in relation to drainage and street lighting, as well as earthwork cut and fill volumes or material disposal costs.
- Cost does not include design costs, utility diversions, land acquisition, contract documentation, statutory orders, legal fees, project management or VAT.

8.2 Recommendation

Based on the review and options appraisal of Main Street (A735) within the village centre of Kilmaurs, **Option A** is highly recommended. This option prioritizes a comprehensive set of measures to enhance road safety for all users, with a particular emphasis on improving pedestrian and general road safety.

The measures proposed in Option A, selected for their effectiveness, feasibility, and impact on traffic flow, align perfectly with the project brief's objectives to address large vehicle manoeuvres and create a more pedestrian-friendly environment along Main Street. These measures include tightened corner radii, uncontrolled and signalised crossing points, junction buildouts, and the introduction of a signalised junction.

Implementing these measures is anticipated to significantly improve the safety and usability of Main Street for pedestrians, cyclists, and motorists alike. By addressing the identified road safety concerns and implementing these comprehensive measures, Option A can contribute to a more vibrant, connected, and pedestrian-friendly community.

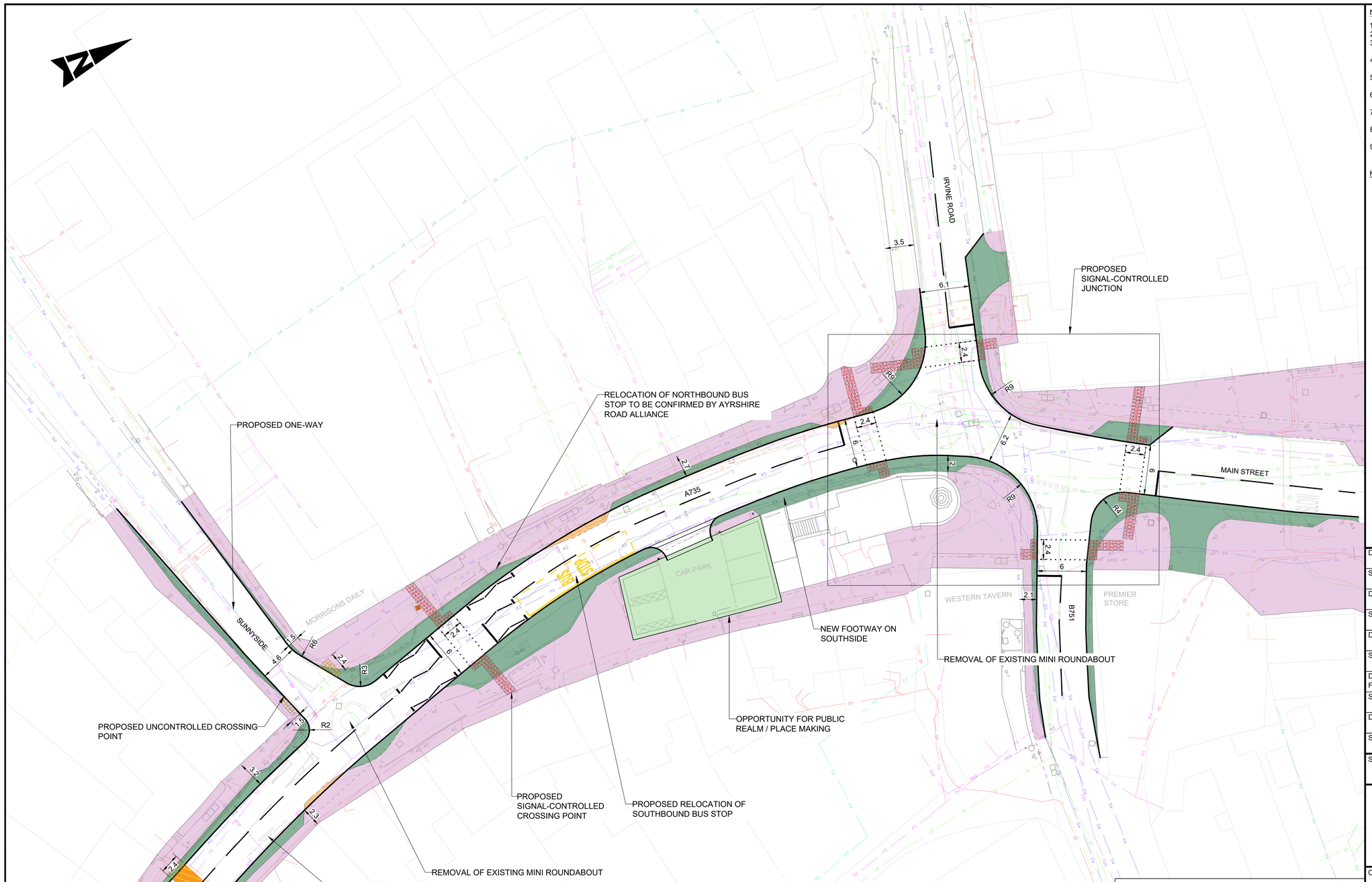
APPENDICES

Appendix A. Proposed Concept Designs

CLASSIFICATION - Base Line (Low Risk)

DO NOT SCALE

Millimetres 0 10 100



NOTES:

1. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
2. DO NOT SCALE FROM THIS DRAWING.
3. THIS DRAWING IS TO BE READ IN CONJUNCTURE WITH 5230671-ATK-HGN-XX-RP-CH-000001 TECHNICAL NOTE.
4. THIS DRAWING IS FOR INFORMATION PURPOSES ONLY AND SUBJECT TO AGREEMENT WITH AYRSHIRE ROADS ALLIANCE.
5. THIS OPTIONS APPRAISAL IS BASED ORDNANCE SURVEY MAPPING PROVIDED BY AYRSHIRE ROADS ALLIANCE.
6. DESIGN IS BASED ON TOPOGRAPHICAL SURVEY DATA PROVIDED BY ASPECT SURVEYORS LIMITED IN AUGUST 2024.
7. C2 UTILITIES WERE REQUESTED AND RECEIVED IN AUGUST 2024. UTILITIES HAVE BEEN SHOWN INDICATIVELY AND MAY DIFFER ON SITE.
8. AS THIS DRAWING IS FOR DESIGN OPTIONEERING AND NOT FOR CONSTRUCTION, NO CDM H&S RISKS HAVE BEEN SHOWN.
9. ALL STREET FURNITURE, UTILITIES APPARATUS AND DRAINAGE HAS BEEN SHOWN INDICATIVELY. LOCATION TO BE CONFIRMED ON SITE.

KEY

- EXISTING ROAD MARKING
- PROPOSED ROAD MARKING
- PROPOSED PEDESTRIAN CROSSING STUDS
- PROPOSED CONTROLLED TACTILE PAVING
- PROPOSED UNCONTROLLED TACTILE PAVING
- PROPOSED KERBLINE
- EXISTING CAR PARK
- PROPOSED GATEWAY FEATURE
- EXISTING FOOTWAY AREA TO BE RETAINED
- EXISTING FOOTWAY AREA TO BE REMOVED
- PROPOSED ADDITIONAL FOOTWAY AREA

UTILITIES

- SPEN LOW VOLTAGE
- SPEN LOW VOLTAGE ABANDONED
- SPEN HIGH VOLTAGE
- SPEN HIGH VOLTAGE ABANDONED
- SPEN SUBSTATION
- GTC LOW PRESSURE GAS
- GTC LOW PRESSURE GAS PROPOSED
- SGN LOW PRESSURE GAS
- SGN MEDIUM PRESSURE GAS
- NETWORK RAIL ASSET
- SCOTTISH WATER COMBINED SEWER
- SCOTTISH WATER FOUL SEWER
- SCOTTISH WATER SURFACE SEWER
- SCOTTISH WATER NATURAL WATER
- SCOTTISH WATER DISTRIBUTION MAIN
- SCOTTISH WATER ABANDONED
- BRITISH TELECOMMUNICATIONS PROPOSED
- BRITISH TELECOMMUNICATIONS
- BRITISH TELECOMMUNICATIONS OVERHEAD
- VODAFONE

Scale 1:250

5m 0m 5m 10m 15m

Description

Status	Revision	Drawn	Checked	Reviewed	Authorised	Issue Date

Description

Status	Revision	Drawn	Checked	Reviewed	Authorised	Issue Date

Description

Status	Revision	Drawn	Checked	Reviewed	Authorised	Issue Date

Description

Status	Revision	Drawn	Checked	Reviewed	Authorised	Issue Date

Description
FIRST ISSUE

Status	Revision	Drawn	Checked	Reviewed	Authorised	Issue Date
	P01	KB	CK	RH	---	28/02/25

Description

Status	Revision	Drawn	Checked	Reviewed	Authorised	Issue Date
S0	P02.1	---	---	---	---	---

Status	Drawing Suitability
S0	WORK IN PROGRESS

AtkinsRéalis

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Client

Ayrshire Roads Alliance

Project Title
ARA KILMAURS VILLAGE CENTRE FEASIBILITY STUDY AND CONCEPT DESIGN

Drawing Title
PEDESTRIAN LINKS AT RAIL BRIDGE IRVINE RD, KILMAURS, EAST AYRSHIRE GENERAL ARRANGEMENT OPTION 1

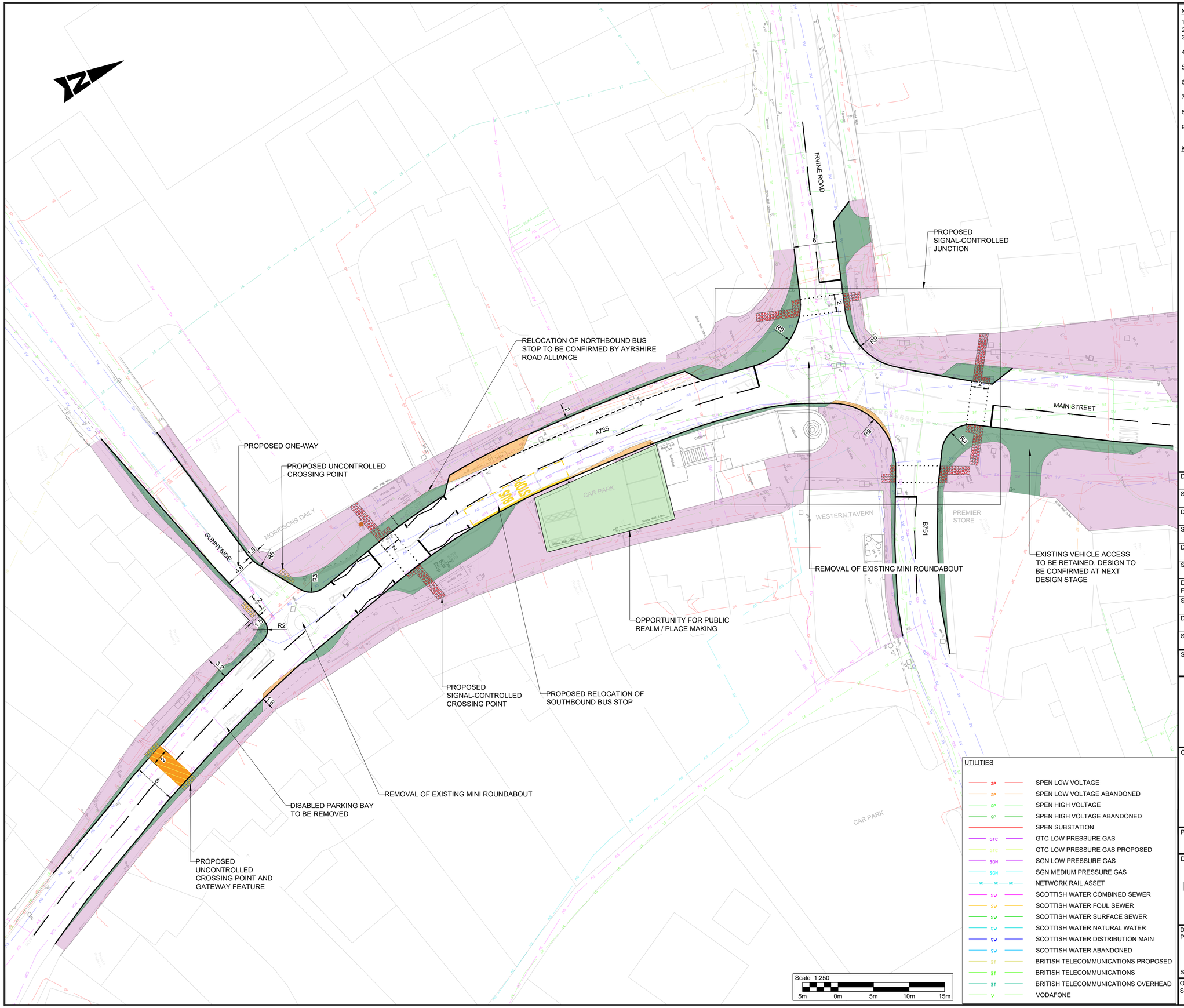
Drawing Number Project	Originator	Functional Breakdown
5230671 S1	- ATK - DR	- HGN - CH - 000100
Spatial Breakdown	Form	Discipline Number

Original Size:	Scale:	Project Ref. No:	Sheet:	Rev:
A1	1:200	5230671	1 of 1	P02.1

CLASSIFICATION - Base Line (Low Risk)

DO NOT SCALE

Millimetres 0 10 100



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KEY

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- PROPOSED ROAD MARKING
- PROPOSED PEDESTRIAN CROSSING STUDS
- PROPOSED SIGNAL CONTROLLED TACTILE PAVING
- PROPOSED UNCONTROLLED TACTILE PAVING
- PROPOSED KERBLINE
- EXISTING CAR PARK
- PROPOSED GATEWAY FEATURE
- EXISTING FOOTWAY AREA TO BE RETAINED
- EXISTING FOOTWAY AREA TO BE REMOVED
- PROPOSED ADDITIONAL FOOTWAY AREA

UTILITIES

- SPEN LOW VOLTAGE
- SPEN LOW VOLTAGE ABANDONED
- SPEN HIGH VOLTAGE
- SPEN HIGH VOLTAGE ABANDONED
- SPEN SUBSTATION
- GTC LOW PRESSURE GAS
- GTC LOW PRESSURE GAS PROPOSED
- SGN LOW PRESSURE GAS
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- SCOTTISH WATER NATURAL WATER
- SCOTTISH WATER DISTRIBUTION MAIN
- SCOTTISH WATER ABANDONED
- BRITISH TELECOMMUNICATIONS PROPOSED
- BRITISH TELECOMMUNICATIONS
- BRITISH TELECOMMUNICATIONS OVERHEAD
- VODAFONE

Scale 1:250
5m 0m 5m 10m 15m

Description

Status	Revision	Drawn	Checked	Reviewed	Authorised	Issue Date

Description

Status	Revision	Drawn	Checked	Reviewed	Authorised	Issue Date

Description

Status	Revision	Drawn	Checked	Reviewed	Authorised	Issue Date

Description
FIRST ISSUE

Status	Revision	Drawn	Checked	Reviewed	Authorised	Issue Date
	P01	KB	CK	RH	---	28/02/25

Description

Status	Revision	Drawn	Checked	Reviewed	Authorised	Issue Date
S0	P02.1	---	---	---	---	---

Status	Drawing Suitability
S0	WORK IN PROGRESS

AtkinsRéalis
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Client: Ayrshire Roads Alliance

Project Title: ARA KILMAURS VILLAGE CENTRE FEASIBILITY STUDY AND CONCEPT DESIGN

Drawing Title: PEDESTRIAN LINKS AT RAIL BRIDGE IRVINE RD, KILMAURS, EAST AYRSHIRE GENERAL ARRANGEMENT OPTION 2

Drawing Number Project	Originator	Functional Breakdown
5230671 S1	- ATK	- HGN -
Spatial Breakdown	Form	Discipline / Number
	- DR	- CH - 000101

Original Size:	Scale:	Project Ref. No:	Sheet:	Rev:
A1	1:200	5230671	1 of 1	P02.1

Appendix B. Swept Path Analysis

CLASSIFICATION - Base Line (Low Risk)

DO NOT SCALE

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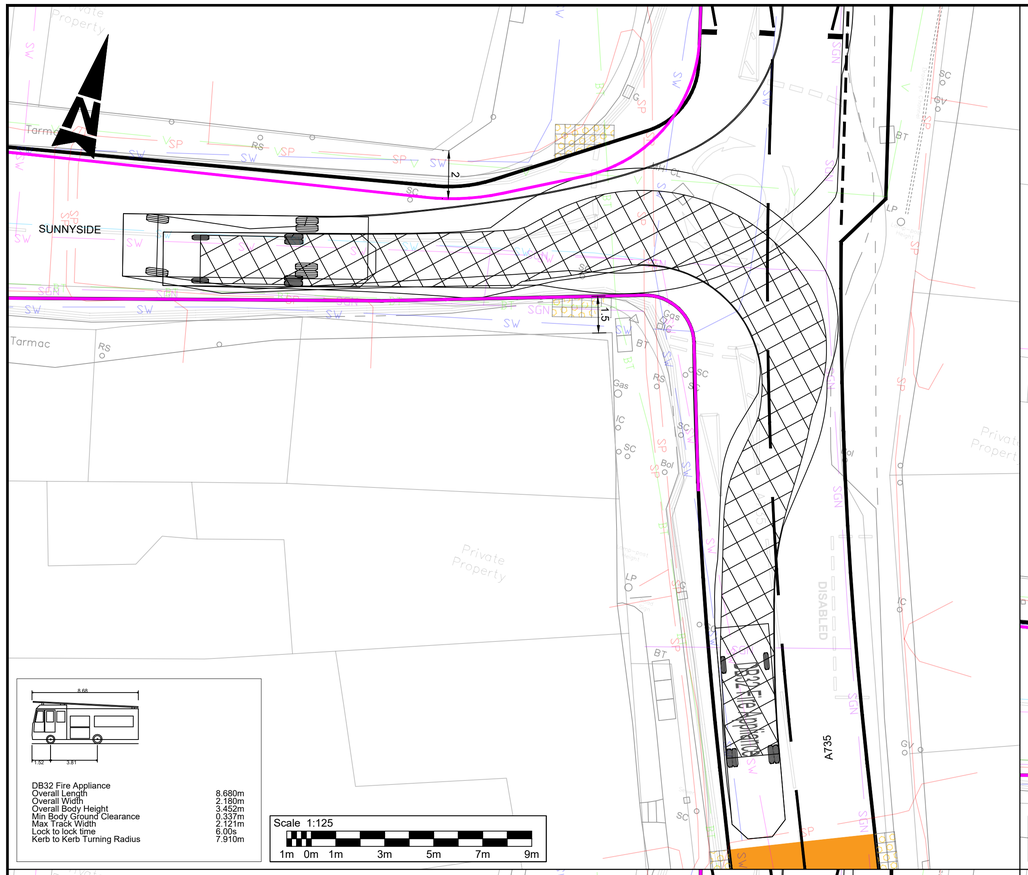

DB32 Fire Appliance
Overall Length 8.680m
Overall Width 2.180m
Overall Body Height 3.452m
Min Body Ground Clearance 0.337m
Max Track Width 2.121m
Lock to lock time 6.00s
Kerb to Kerb Turning Radius 7.910m

Scale 1:125
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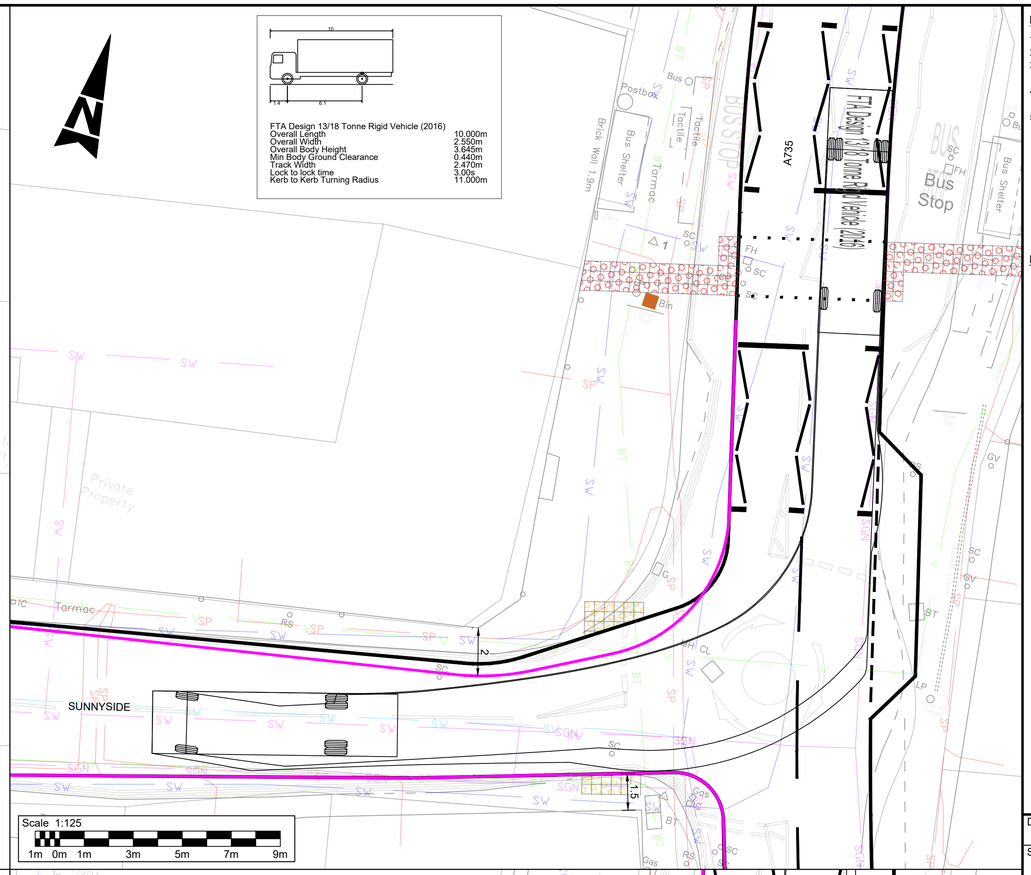

FTA Design 13/18 Tonne Rigid Vehicle (2016)
Overall Length 10.000m
Overall Width 2.550m
Overall Body Height 3.645m
Min Body Ground Clearance 0.440m
Track Width 2.470m
Lock to lock time 3.00s
Kerb to Kerb Turning Radius 11.000m

Scale 1:125
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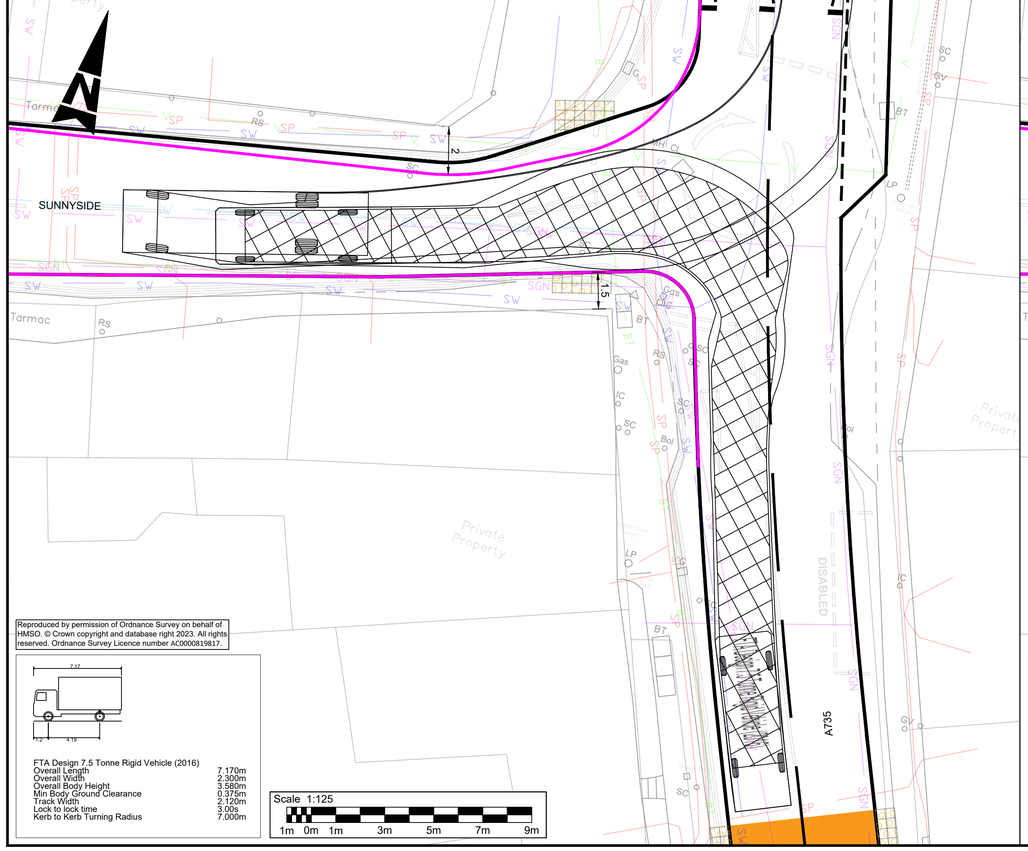

FTA Design 7.5 Tonne Rigid Vehicle (2016)
Overall Length 7.170m
Overall Width 2.300m
Overall Body Height 3.580m
Min Body Ground Clearance 0.375m
Track Width 2.120m
Lock to lock time 3.00s
Kerb to Kerb Turning Radius 7.000m

Scale 1:125
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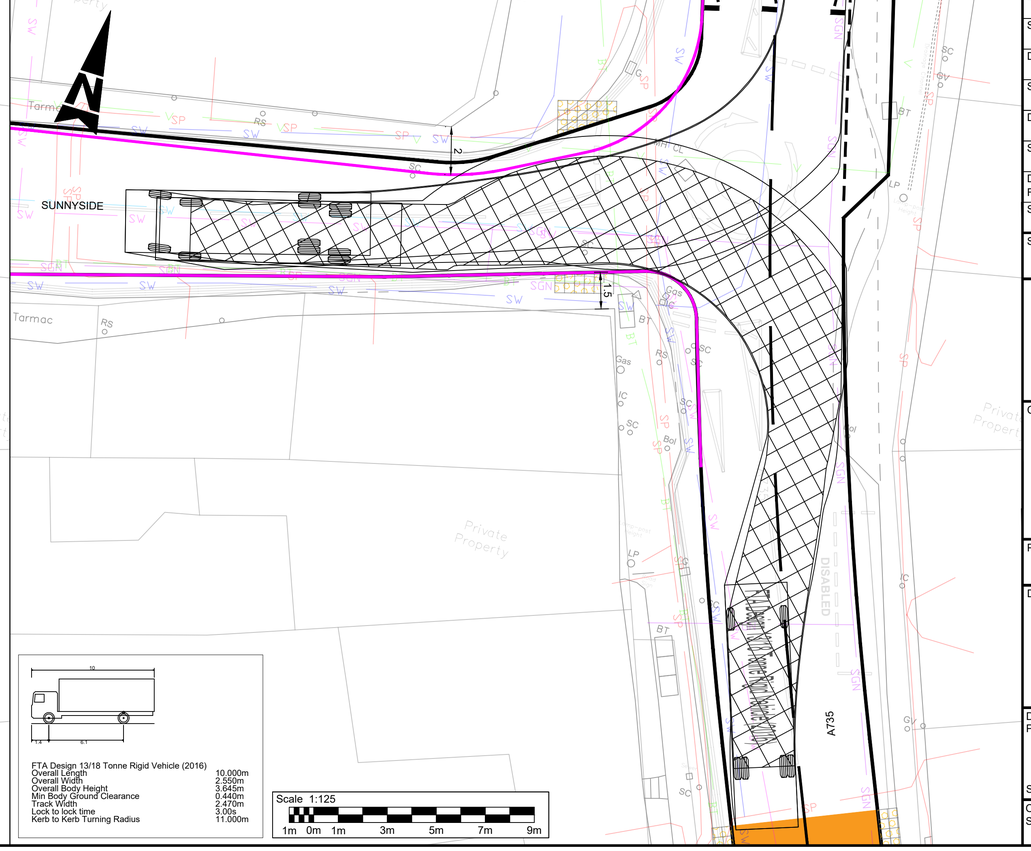

FTA Design 13/18 Tonne Rigid Vehicle (2016)
Overall Length 10.000m
Overall Width 2.550m
Overall Body Height 3.645m
Min Body Ground Clearance 0.440m
Track Width 2.470m
Lock to lock time 3.00s
Kerb to Kerb Turning Radius 11.000m

Scale 1:125
1m 0m 1m 3m 5m 7m 9m

NOTES:

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4. THIS DRAWING IS FOR INFORMATION PURPOSES ONLY AND SUBJECT TO AGREEMENT WITH AYRSHIRE ROADS ALLIANCE.
5. VEHICLE SWEPT PATHS HAVE BEEN SHOWN AT A SPEED OF 1KM/HR.

KEY

PROPOSED KERBLINE

VEHICLE SWEPT PATH

Description						
Status	Revision	Drawn	Checked	Reviewed	Authorised	Issue Date
Description						
Status	Revision	Drawn	Checked	Reviewed	Authorised	Issue Date
Description						
Status	Revision	Drawn	Checked	Reviewed	Authorised	Issue Date
Description						
Status	Revision	Drawn	Checked	Reviewed	Authorised	Issue Date
Description FOR INFORMATION						
Status	Revision P01	Drawn KB	Checked CK	Reviewed RH	Authorised ---	Issue Date 28/02/25

Status

Drawing Suitability

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Client

Ayrshire Roads Alliance

Project Title
ARA KILMAURS VILLAGE CENTRE FEASIBILITY STUDY AND CONCEPT DESIGN

Drawing Title
KILMAURS VILLAGE CENTRE SWEPT PATHS

Drawing Number Project	Originator	Functional Breakdown
5230671 S1	- ATK	- HGN -
Spatial Breakdown	Form - DR	Discipline - CH - Number 000102

Original Size:	Scale:	Project Ref. No:	Sheet:	Rev:
A1	1:125	5230671	1 of 1	P01

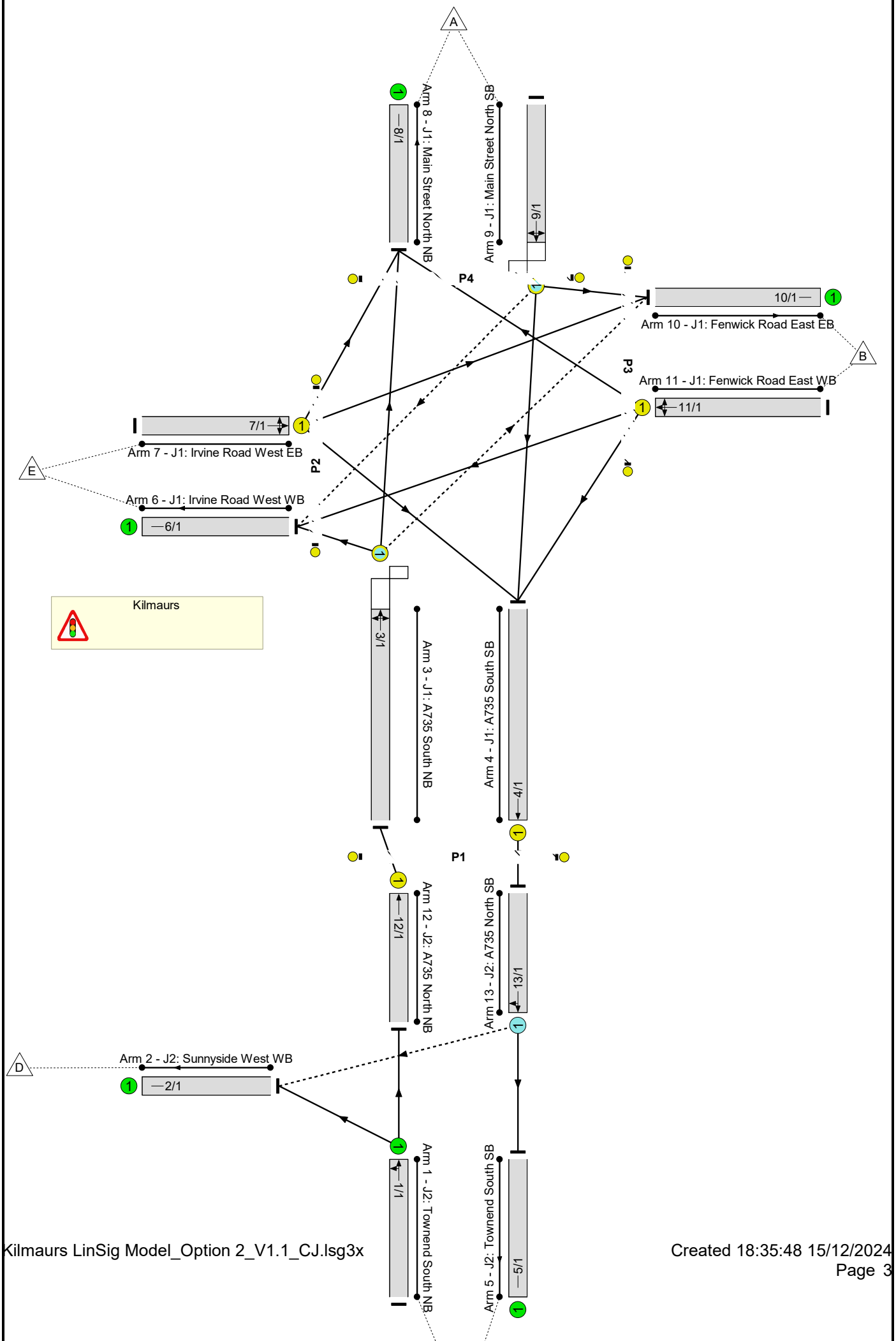
Appendix C. LinSig Modelling Outputs

Full Results Summary-routes

User and Project Details

Project:	**Kilmaurs Village Centre**
Title:	**Base signal model**
Location:	
Client:	ARA and EAC
Additional detail:	
File name:	Kilmaurs LinSig Model_Option 2_V1.1_CJ.lsg3x
Author:	
Company:	
Address:	

Network Layout Diagram


A
B
D
E
Arm 8 - J1: Main Street North NB
8/1
Arm 9 - J1: Main Street North SB
9/1
P4
10/1
Arm 10 - J1: Fenwick Road East EB
P3
Arm 11 - J1: Fenwick Road East WB
11/1
7/1
Arm 7 - J1: Irvine Road West EB
P2
Arm 6 - J1: Irvine Road West WB
6/1
Kilmaurs
3/1
Arm 3 - J1: A735 South NB
Arm 4 - J1: A735 South SB
4/1
P1
12/1
Arm 12 - J2: A735 North NB
Arm 13 - J2: A735 North SB
13/1
Arm 2 - J2: Sunnyside West WB
2/1
1/1
Arm 1 - J2: Townend South NB
Arm 5 - J2: Townend South SB
5/1

Scenarios

Number	Scenario Name	Flow Group	Network Control Plan	Time	Cycle Time (s)	PRC (%)	Delay (pcuHr)
1	2024 AM	2024 AM	Network Control Plan 1	08:00 - 09:00	120	63.5	11.43
2	2024 PM	2024 PM	Network Control Plan 1	16:45 - 17:45	120	12.9	19.03
3	2024 SAT	2024 Sat	Network Control Plan 1	11:15 - 12:15	120	80.0	10.49
4	2029 AM	2029 AM	Network Control Plan 1	08:00 - 09:00	120	59.5	11.90
5	2029 PM	2029 PM	Network Control Plan 1	16:45 - 17:45	120	9.3	21.08
6	2029 SAT	2029 SAT	Network Control Plan 1	11:15 - 12:15	120	75.5	10.88
7	2034 AM	2034 AM	Network Control Plan 1	08:00 - 09:00	120	55.3	12.27
8	2034 PM	2034 PM	Network Control Plan 1	16:45 - 17:45	120	3.5	22.91
9	2034 SAT	2034 SAT	Network Control Plan 1	11:15 - 12:15	120	70.1	11.22

Network Results

Scenario 1: '2024 AM' (FG1: '2024 AM', Plan 1: 'Network Control Plan 1')

Item	Lane Description	Deg Sat (%)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network: Base signal model	-	**55.1%**	-	-
Kilmaurs	-	**55.1%**	-	-
1/1	J2: Townend South NB Left Ahead	11.9%	1.1	0.1
2/1	J2: Sunnyside West WB	8.9%	1.0	0.0
3/1	J1: A735 South NB Left Ahead Right	46.1%	44.9	4.4
4/1	J1: A735 South SB Ahead	23.8%	1.7	0.3
5/1	J2: Townend South SB	13.3%	1.1	0.1
6/1	J1: Irvine Road West WB	6.9%	1.0	0.0
7/1	J1: Irvine Road West EB Right Left Ahead	55.1%	38.2	9.2
8/1	J1: Main Street North NB	9.6%	1.0	0.1
9/1	J1: Main Street North SB Ahead Right Left	53.8%	44.5	7.9
10/1	J1: Fenwick Road East EB	7.6%	1.0	0.0
11/1	J1: Fenwick Road East WB Left Ahead Right	53.9%	70.8	3.7
12/1	J2: A735 North NB Ahead	10.1%	2.9	1.0
13/1	J2: A735 North SB Right Ahead	24.8%	1.5	0.2
Ped Link: P1	Unnamed Ped Link	0.0%	-	-
Ped Link: P2	Unnamed Ped Link	0.0%	-	-
Ped Link: P3	Unnamed Ped Link	0.0%	-	-
Ped Link: P4	Unnamed Ped Link	0.0%	-	-

C1	Stream: 1 PRC for Signalled Lanes (%):	63.5	Total Delay for Signalled Lanes (pcuHr):	10.63	Cycle Time (s): 120
C1	Stream: 2 PRC for Signalled Lanes (%):	277.8	Total Delay for Signalled Lanes (pcuHr):	0.31	Cycle Time (s): 120
	PRC Over All Lanes (%):	63.5	Total Delay Over All Lanes(pcuHr):	11.43	

Scenario 2: '2024 PM' (FG2: '2024 PM', Plan 1: 'Network Control Plan 1')

Item	Lane Description	Deg Sat (%)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network: Base signal model	-	**79.7%**	-	-
Kilmaurs	-	**79.7%**	-	-
1/1	J2: Townend South NB Left Ahead	16.0%	1.2	0.1
2/1	J2: Sunnyside West WB	6.7%	1.0	0.0
3/1	J1: A735 South NB Left Ahead Right	54.3%	44.4	6.6
4/1	J1: A735 South SB Ahead	21.8%	1.5	0.7
5/1	J2: Townend South SB	13.3%	1.1	0.1
6/1	J1: Irvine Road West WB	15.1%	1.1	0.1
7/1	J1: Irvine Road West EB Right Left Ahead	77.8%	56.2	12.9
8/1	J1: Main Street North NB	17.2%	1.1	0.1
9/1	J1: Main Street North SB Ahead Right Left	72.9%	62.3	8.9
10/1	J1: Fenwick Road East EB	7.2%	1.0	0.0
11/1	J1: Fenwick Road East WB Left Ahead Right	79.7%	73.8	9.6
12/1	J2: A735 North NB Ahead	15.9%	3.1	1.6
13/1	J2: A735 North SB Right Ahead	22.7%	1.5	0.1
Ped Link: P1	Unnamed Ped Link	0.0%	-	-
Ped Link: P2	Unnamed Ped Link	0.0%	-	-
Ped Link: P3	Unnamed Ped Link	0.0%	-	-
Ped Link: P4	Unnamed Ped Link	0.0%	-	-

C1	Stream: 1 PRC for Signalled Lanes (%):	12.9	Total Delay for Signalled Lanes (pcuHr):	18.08	Cycle Time (s): 120
C1	Stream: 2 PRC for Signalled Lanes (%):	312.1	Total Delay for Signalled Lanes (pcuHr):	0.36	Cycle Time (s): 120
	PRC Over All Lanes (%):	12.9	Total Delay Over All Lanes(pcuHr):	19.03	

Scenario 3: '2024 SAT' (FG3: '2024 Sat', Plan 1: 'Network Control Plan 1')

Item	Lane Description	Deg Sat (%)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network: Base signal model	-	**50.0%**	-	-
Kilmaurs	-	**50.0%**	-	-
1/1	J2: Townend South NB Left Ahead	12.2%	1.1	0.1
2/1	J2: Sunnyside West WB	5.1%	0.9	0.0
3/1	J1: A735 South NB Left Ahead Right	39.8%	40.1	4.6
4/1	J1: A735 South SB Ahead	18.1%	1.4	0.2
5/1	J2: Townend South SB	11.6%	1.1	0.1
6/1	J1: Irvine Road West WB	6.8%	1.0	0.0
7/1	J1: Irvine Road West EB Right Left Ahead	50.0%	39.3	7.7
8/1	J1: Main Street North NB	13.1%	1.1	0.1
9/1	J1: Main Street North SB Ahead Right Left	49.5%	43.5	7.0
10/1	J1: Fenwick Road East EB	6.7%	1.0	0.0
11/1	J1: Fenwick Road East WB Left Ahead Right	49.5%	65.1	3.7
12/1	J2: A735 North NB Ahead	11.9%	2.9	1.2
13/1	J2: A735 North SB Right Ahead	18.0%	1.3	0.1
Ped Link: P1	Unnamed Ped Link	0.0%	-	-
Ped Link: P2	Unnamed Ped Link	0.0%	-	-
Ped Link: P3	Unnamed Ped Link	0.0%	-	-
Ped Link: P4	Unnamed Ped Link	0.0%	-	-

C1	Stream: 1 PRC for Signalled Lanes (%):	80.0	Total Delay for Signalled Lanes (pcuHr):	9.80	Cycle Time (s): 120
C1	Stream: 2 PRC for Signalled Lanes (%):	396.8	Total Delay for Signalled Lanes (pcuHr):	0.27	Cycle Time (s): 120
	PRC Over All Lanes (%):	80.0	Total Delay Over All Lanes(pcuHr):	10.49	

Scenario 4: '2029 AM' (FG4: '2029 AM', Plan 1: 'Network Control Plan 1')

Item	Lane Description	Deg Sat (%)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network: Base signal model	-	**56.4%**	-	-
Kilmaurs	-	**56.4%**	-	-
1/1	J2: Townend South NB Left Ahead	12.1%	1.2	0.1
2/1	J2: Sunnyside West WB	9.1%	1.0	0.1
3/1	J1: A735 South NB Left Ahead Right	49.4%	46.5	4.1
4/1	J1: A735 South SB Ahead	24.4%	1.5	0.2
5/1	J2: Townend South SB	13.6%	1.1	0.1
6/1	J1: Irvine Road West WB	7.1%	1.0	0.0
7/1	J1: Irvine Road West EB Right Left Ahead	56.4%	38.6	9.5
8/1	J1: Main Street North NB	9.8%	1.0	0.1
9/1	J1: Main Street North SB Ahead Right Left	55.5%	45.0	8.2
10/1	J1: Fenwick Road East EB	7.8%	1.0	0.0
11/1	J1: Fenwick Road East WB Left Ahead Right	55.5%	71.6	3.8
12/1	J2: A735 North NB Ahead	10.3%	2.9	1.0
13/1	J2: A735 North SB Right Ahead	25.5%	1.6	0.2
Ped Link: P1	Unnamed Ped Link	0.0%	-	-
Ped Link: P2	Unnamed Ped Link	0.0%	-	-
Ped Link: P3	Unnamed Ped Link	0.0%	-	-
Ped Link: P4	Unnamed Ped Link	0.0%	-	-

C1	Stream: 1 PRC for Signalled Lanes (%):	59.5	Total Delay for Signalled Lanes (pcuHr):	11.10	Cycle Time (s): 120
C1	Stream: 2 PRC for Signalled Lanes (%):	268.2	Total Delay for Signalled Lanes (pcuHr):	0.30	Cycle Time (s): 120
	PRC Over All Lanes (%):	59.5	Total Delay Over All Lanes(pcuHr):	11.90	

Scenario 5: '2029 PM' (FG5: '2029 PM', Plan 1: 'Network Control Plan 1')

Item	Lane Description	Deg Sat (%)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network: Base signal model	-	**82.4%**	-	-
Kilmaurs	-	**82.4%**	-	-
1/1	J2: Townend South NB Left Ahead	16.4%	1.2	0.1
2/1	J2: Sunnyside West WB	6.9%	1.0	0.0
3/1	J1: A735 South NB Left Ahead Right	53.4%	42.6	7.9
4/1	J1: A735 South SB Ahead	22.5%	1.7	0.3
5/1	J2: Townend South SB	13.7%	1.1	0.1
6/1	J1: Irvine Road West WB	15.5%	1.1	0.1
7/1	J1: Irvine Road West EB Right Left Ahead	82.4%	61.9	14.0
8/1	J1: Main Street North NB	17.6%	1.1	0.1
9/1	J1: Main Street North SB Ahead Right Left	82.1%	73.9	10.1
10/1	J1: Fenwick Road East EB	7.4%	1.0	0.0
11/1	J1: Fenwick Road East WB Left Ahead Right	82.1%	77.1	10.1
12/1	J2: A735 North NB Ahead	16.3%	3.1	1.7
13/1	J2: A735 North SB Right Ahead	23.4%	1.5	0.2
Ped Link: P1	Unnamed Ped Link	0.0%	-	-
Ped Link: P2	Unnamed Ped Link	0.0%	-	-
Ped Link: P3	Unnamed Ped Link	0.0%	-	-
Ped Link: P4	Unnamed Ped Link	0.0%	-	-

C1	Stream: 1 PRC for Signalled Lanes (%):	9.3	Total Delay for Signalled Lanes (pcuHr):	20.08	Cycle Time (s): 120
C1	Stream: 2 PRC for Signalled Lanes (%):	300.7	Total Delay for Signalled Lanes (pcuHr):	0.39	Cycle Time (s): 120
	PRC Over All Lanes (%):	9.3	Total Delay Over All Lanes(pcuHr):	21.08	

Scenario 6: '2029 SAT' (FG6: '2029 SAT', Plan 1: 'Network Control Plan 1')

Item	Lane Description	Deg Sat (%)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network: Base signal model	-	**51.3%**	-	-
Kilmaurs	-	**51.3%**	-	-
1/1	J2: Townend South NB Left Ahead	12.5%	1.1	0.1
2/1	J2: Sunnyside West WB	5.2%	0.9	0.0
3/1	J1: A735 South NB Left Ahead Right	41.2%	40.5	4.8
4/1	J1: A735 South SB Ahead	18.6%	1.4	0.4
5/1	J2: Townend South SB	11.9%	1.1	0.1
6/1	J1: Irvine Road West WB	7.0%	1.0	0.0
7/1	J1: Irvine Road West EB Right Left Ahead	51.3%	39.6	8.0
8/1	J1: Main Street North NB	13.4%	1.1	0.1
9/1	J1: Main Street North SB Ahead Right Left	51.0%	43.9	7.2
10/1	J1: Fenwick Road East EB	6.9%	1.0	0.0
11/1	J1: Fenwick Road East WB Left Ahead Right	51.0%	65.7	3.8
12/1	J2: A735 North NB Ahead	12.2%	3.0	1.2
13/1	J2: A735 North SB Right Ahead	18.5%	1.4	0.1
Ped Link: P1	Unnamed Ped Link	0.0%	-	-
Ped Link: P2	Unnamed Ped Link	0.0%	-	-
Ped Link: P3	Unnamed Ped Link	0.0%	-	-
Ped Link: P4	Unnamed Ped Link	0.0%	-	-

C1	Stream: 1 PRC for Signalled Lanes (%):	75.5	Total Delay for Signalled Lanes (pcuHr):	10.17	Cycle Time (s): 120
C1	Stream: 2 PRC for Signalled Lanes (%):	383.5	Total Delay for Signalled Lanes (pcuHr):	0.28	Cycle Time (s): 120
	PRC Over All Lanes (%):	75.5	Total Delay Over All Lanes(pcuHr):	10.88	

Scenario 7: '2034 AM' (FG7: '2034 AM', Plan 1: 'Network Control Plan 1')

Item	Lane Description	Deg Sat (%)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network: Base signal model	-	**58.0%**	-	-
Kilmaurs	-	**58.0%**	-	-
1/1	J2: Townend South NB Left Ahead	12.5%	1.2	0.1
2/1	J2: Sunnyside West WB	9.3%	1.0	0.1
3/1	J1: A735 South NB Left Ahead Right	50.1%	46.6	4.2
4/1	J1: A735 South SB Ahead	25.0%	1.5	0.2
5/1	J2: Townend South SB	14.0%	1.1	0.1
6/1	J1: Irvine Road West WB	7.2%	1.0	0.0
7/1	J1: Irvine Road West EB Right Left Ahead	58.0%	39.1	9.8
8/1	J1: Main Street North NB	10.1%	1.0	0.1
9/1	J1: Main Street North SB Ahead Right Left	56.5%	45.3	8.4
10/1	J1: Fenwick Road East EB	8.0%	1.0	0.0
11/1	J1: Fenwick Road East WB Left Ahead Right	56.7%	72.2	3.9
12/1	J2: A735 North NB Ahead	10.5%	2.9	1.0
13/1	J2: A735 North SB Right Ahead	26.2%	1.6	0.2
Ped Link: P1	Unnamed Ped Link	0.0%	-	-
Ped Link: P2	Unnamed Ped Link	0.0%	-	-
Ped Link: P3	Unnamed Ped Link	0.0%	-	-
Ped Link: P4	Unnamed Ped Link	0.0%	-	-

C1	Stream: 1 PRC for Signalled Lanes (%):	55.3	Total Delay for Signalled Lanes (pcuHr):	11.44	Cycle Time (s): 120
C1	Stream: 2 PRC for Signalled Lanes (%):	260.0	Total Delay for Signalled Lanes (pcuHr):	0.31	Cycle Time (s): 120
	PRC Over All Lanes (%):	55.3	Total Delay Over All Lanes(pcuHr):	12.27	

Scenario 8: '2034 PM' (FG8: '2034 PM', Plan 1: 'Network Control Plan 1')

Item	Lane Description	Deg Sat (%)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network: Base signal model	-	**87.0%**	-	-
Kilmaurs	-	**87.0%**	-	-
1/1	J2: Townend South NB Left Ahead	16.9%	1.2	0.1
2/1	J2: Sunnyside West WB	7.1%	1.0	0.0
3/1	J1: A735 South NB Left Ahead Right	54.0%	41.9	8.1
4/1	J1: A735 South SB Ahead	23.0%	1.8	0.4
5/1	J2: Townend South SB	14.0%	1.1	0.1
6/1	J1: Irvine Road West WB	15.9%	1.1	0.1
7/1	J1: Irvine Road West EB Right Left Ahead	87.0%	70.1	15.3
8/1	J1: Main Street North NB	18.1%	1.1	0.1
9/1	J1: Main Street North SB Ahead Right Left	84.1%	76.9	10.7
10/1	J1: Fenwick Road East EB	7.6%	1.0	0.0
11/1	J1: Fenwick Road East WB Left Ahead Right	84.1%	80.5	10.6
12/1	J2: A735 North NB Ahead	16.8%	3.1	1.8
13/1	J2: A735 North SB Right Ahead	24.1%	1.5	0.2
Ped Link: P1	Unnamed Ped Link	0.0%	-	-
Ped Link: P2	Unnamed Ped Link	0.0%	-	-
Ped Link: P3	Unnamed Ped Link	0.0%	-	-
Ped Link: P4	Unnamed Ped Link	0.0%	-	-

C1	Stream: 1 PRC for Signalled Lanes (%):	3.5	Total Delay for Signalled Lanes (pcuHr):	21.87	Cycle Time (s): 120
C1	Stream: 2 PRC for Signalled Lanes (%):	291.0	Total Delay for Signalled Lanes (pcuHr):	0.42	Cycle Time (s): 120
	PRC Over All Lanes (%):	3.5	Total Delay Over All Lanes(pcuHr):	22.91	

Scenario 9: '2034 SAT' (FG9: '2034 SAT', Plan 1: 'Network Control Plan 1')

Item	Lane Description	Deg Sat (%)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network: Base signal model	-	**52.9%**	-	-
Kilmaurs	-	**52.9%**	-	-
1/1	J2: Townend South NB Left Ahead	12.8%	1.1	0.1
2/1	J2: Sunnyside West WB	5.4%	0.9	0.0
3/1	J1: A735 South NB Left Ahead Right	41.8%	40.7	5.0
4/1	J1: A735 South SB Ahead	19.1%	1.5	0.9
5/1	J2: Townend South SB	12.2%	1.1	0.1
6/1	J1: Irvine Road West WB	7.1%	1.0	0.0
7/1	J1: Irvine Road West EB Right Left Ahead	52.6%	39.9	8.2
8/1	J1: Main Street North NB	13.7%	1.1	0.1
9/1	J1: Main Street North SB Ahead Right Left	52.9%	44.5	7.4
10/1	J1: Fenwick Road East EB	7.1%	1.0	0.0
11/1	J1: Fenwick Road East WB Left Ahead Right	51.9%	66.1	3.9
12/1	J2: A735 North NB Ahead	12.4%	3.0	1.2
13/1	J2: A735 North SB Right Ahead	19.0%	1.4	0.1
Ped Link: P1	Unnamed Ped Link	0.0%	-	-
Ped Link: P2	Unnamed Ped Link	0.0%	-	-
Ped Link: P3	Unnamed Ped Link	0.0%	-	-
Ped Link: P4	Unnamed Ped Link	0.0%	-	-

C1	Stream: 1 PRC for Signalled Lanes (%):	70.1	Total Delay for Signalled Lanes (pcuHr):	10.49	Cycle Time (s): 120
C1	Stream: 2 PRC for Signalled Lanes (%):	371.0	Total Delay for Signalled Lanes (pcuHr):	0.29	Cycle Time (s): 120
	PRC Over All Lanes (%):	70.1	Total Delay Over All Lanes(pcuHr):	11.22	

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