

South Yorkshire Passenger Transport Executive

A61 Wakefield Road, Barnsley - Phase 2

Transport Statement

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This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

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Executive Summary

Ove Arup and Partners Ltd (Arup) has been appointed by South Yorkshire Passenger Transport Executive (SYLTE) to prepare a Transport Statement to accompany a planning application for the proposed improvement scheme on the A61 Wakefield Road. The A61 is a strategic route linking Barnsley to Wakefield and the M1 motorway.

The proposal is to widen the Wakefield Road carriageway between the Carlton Road and Smithies Lane junctions to accommodate four traffic lanes and ghosted right-turn lanes. In addition to this, the pedestrian crossing will be removed at the Carlton Road junction on the Wakefield Road northern arm, and the straight across pedestrian crossing at the Smithies Lane junction will be replaced with a staggered crossing. The Carlton Road bus stop will be relocated closer to the junction on the southbound carriageway.

The aim of the scheme is to help reduce congestion and delay experienced along the A61 corridor, and as a result improve vehicle journey times and reduce journey time variability.

A review of the scheme location on Wakefield Road, in the context of the local highway network, highlights the importance of the road in supporting connectivity between Barnsley town centre, and local and regional conurbations. There are adequate pedestrian crossing facilities at adjoining junctions. The road forms part of the 'core bus network', with bus stops in each direction serving a total of 12 services per hour during the weekday daytime.

The National Planning Policy Framework (NPPF) sets out the government's aims for achieving sustainable development and acknowledges that the transport system needs rebalancing in favour of sustainable transport modes. The proposed highway improvement is consistent with the sustainability focus within the NPPF, considering one of the main objectives of the scheme is to make public transport more attractive to potential users, through reducing congestion and reducing bus journey time variability.

A review of the scheme in relation to the Local Plan and Transport Strategy objectives shows the proposed scheme is well-positioned to help achieve the Local Plan's transport objectives.

The impact of the proposed highway improvements has been assessed for the PM peak and Saturday peak hours for the 2023 and 2040 future year scenarios using a microsimulation model. The proposed scheme improves journey times by creating additional capacity resulting in significant journey time savings in the Saturday peak.

1 Introduction

Ove Arup and Partners Ltd (Arup) has been appointed by South Yorkshire Passenger Transport Executive (SYLTE) to prepare a Transport Statement to accompany a planning application for the proposed highway improvements on A61 Wakefield Road, Barnsley.

The proposals are to widen the carriageway on Wakefield Road to introduce additional running lanes and remove pedestrian crossings to simplify junction operations.

Wakefield Road forms part of the A61, a strategic route linking Barnsley to Wakefield, and the M1 motorway. A61 Wakefield Road also facilitates frequent bus movements between Barnsley and Wakefield. The location of the proposed highway improvement scheme is shown in Figure 1 contained within Appendix A.

1.1 Background

The A61 corridor currently suffers from congestion, significant delay and journey time variation for buses and general traffic.

Arup undertook a feasibility study in 2017 to assess the impacts of a range of potential interventions along the A61 corridor in Barnsley, using an Aimsun microsimulation model. This included capacity enhancement and adjustments to signal operation at several junctions. Schemes were assessed both in isolation and in combination, to present the options which showed the biggest benefit in terms of improving journey times and flow for buses and general traffic.

A microsimulation model was favoured over static models, due to the ability to capture the dynamics of time-dependent traffic phenomena. It was important to understand this, given the objective to reduce vehicle journey times and journey time variability.

1.2 Scope

A Transport Statement is considered to be the appropriate level of study to support the planning application. The main points and issues addressed in this report can be summarised as follows:

- A review of the section of Wakefield Road in the context of its surroundings.
- A review of the local pedestrian, cycle and public transport network, and connectivity facilitated by the Wakefield Road.
- A consideration of the proposals to include how travel by non-car modes will be maintained.
- A review of highway safety using the latest available personal injury accident data considering the scheme area and 150m on the approach arms.
- A review of local and national transport policy.

- An assessment of the impact on the local highway network using the existing 2023 and 2040 future year Wakefield Road Aimsun Model (WRAM.)
- A summary of the scheme impacts/benefits.

2 Existing Conditions

This section of the report describes the existing conditions on site, focussing on how Wakefield Road provides connectivity, and how it facilitates travel for car and non-car modes.

2.1 Wakefield Road and the Local Highway Network

The extent of the highway improvement scheme includes the section of Wakefield Road (A61) through Smithies, between its junction with Whitbourne Close to the north and the HSS Hire site to the south. The extent of the works also includes approximately 100m of Smithies Lane to the west, the junction with Carlton Road, and four commercial accesses on the east side of the carriageway. The location of the site in the context of the surrounding road network is shown on Figure 2 in Appendix A.

Wakefield Road is a key link serving Barnsley town centre and provides access to the residential areas of Old Town and Athersley South via Smithies Lane and Carlton Road. Additionally, the scheme interfaces with four accesses into commercial properties along Wakefield Road.

Wakefield Road is a single carriageway with ghosted right-turn lanes to facilitate turning movements into the commercial sites and adjoining roads. The road currently carries a single carriageway of varying widths and footways with a minimum width of 2m either side. The road is subject to 30mph speed restrictions.

North of the site, the A61 remains a 30mph speed restricted single carriageway through New Lodge, with a northbound bus lane terminating just after Laithes Lane. Beyond New Lodge, the A61 continues as a single carriageway with a 40mph speed restriction as it heads north towards Wakefield.

South of the site Wakefield Road becomes Old Mill Lane at the junction with Burton Road before crossing Old Mill Lane bridge. South of the bridge, the southbound carriageway becomes three lanes on the approach to the A61 gyratory comprising a bus lane and two lanes for general traffic. It should be noted that at the time of writing this report, a planning application has been submitted for the widening of the Old Mill Lane bridge (Phase 1) and, therefore, has also been considered as a committed scheme in the assessments for Phase 2 (the subject of this study).

Regionally, the A61 forms a major transport link between Barnsley town centre and conurbations to the north including Athersley, New Lodge, Staincross, Mapplewell and Royston and Wakefield.

2.2 Local Pedestrian and Cycle Network

A review of the existing pedestrian and cycle facilities on Wakefield Road and the adjoining junctions shows adequate pedestrian crossing provision. Currently there are no cycle facilities within the scheme area.

A footway of varying widths (minimum 2m wide) is provided on both sides of Wakefield Road within the extents of the improvement scheme. There are three signalised crossings located within the scheme area, two are located on Wakefield Road, the other on Smithies Lane just before its junction with Wakefield Road.

There are no dedicated cycle lanes on Wakefield Road, or at the tie-in junctions, however the bus lanes to the south of the site on the approach to the Old Mill Lane/Old Tannery Road junction and north through New Lodge can be used by cyclists. It should be noted that whilst existing bus lanes facilitate cycling, they do not connect to dedicated cycle facilities/ routes.

The National Cycle Network 67 (traffic free route) runs approximately 1.7km to the east of the site, and an on-road cycle route is provided on Pontefract Road, approximately 3km to the south of the site. Both these routes are shown on the Sustran's website (<http://www.sustrans.org>), an extract of which is contained in Appendix B (accessed on 3 November 2021).

2.3 Local Bus Network

Wakefield Road forms a key part of the public transport network. There are two existing bus stops on Wakefield Road within the scheme area including a northbound and a southbound stop around 45m north of the junction with Smithies Lane, both with shelters, timetable information, and raised kerbs.

There are other bus stops located just beyond the scheme boundary:

- Smithies Lane (south of the bridge) – comprising flag and pole for both directions; and
- Carlton Road (200m east of its junction with Wakefield Road) – comprising a flag and pole stop.

Within the scheme boundary there are no bus priority lanes or signals. However there are bus lanes provided south of the scheme (on the Wakefield Road approach to the old Mill Lane/Old Tannery Road junction), and to the north through New Lodge.

Figure 3, contained in Appendix A, shows the bus routes and the location of bus stops near the scheme area. A summary of the local bus services (accessed 1 November 2021) is contained within Appendix C.

A total of 12 buses per hour travel in each direction on Wakefield Road stopping at the Wakefield Road/Smithies Lane bus stops. Six different bus services travel along the A61 Wakefield Road corridor in each direction during the weekday daytime. Wakefield Road therefore fulfils the criteria to be identified as part of the 'Core Bus Network' by the local authority. Routes served by buses operating through the scheme include:

- Barnsley Interchange – Staincross – Barnsley Interchange
- Barnsley Interchange - Athersley North Circular - Barnsley Interchange
- Barnsley Interchange – Athersley South Circular - Barnsley Interchange

- Wakefield Road / Smithies Lane – Kingstone (School Service)
- Kingstone – Wakefield Road / Smithies Lane
- Barnsley - Kexborough
- Kexborough - Barnsley

2.4 Highway Safety

Personal injury accident data has been reviewed for the latest available five-year period (2016 to 2020) for the highway network considering the area covering the scheme area and 150m approaches (i.e. Carlton Road, Smithies Lane and A61 Wakefield Road). A summary of the accidents is provided in Table 1 and shown on a location plan contained in Appendix D.

Table 1: Summary of Accident Data

Severity	2016	2017	2018	2019	2020	Total
Fatal	0	0	0	0	0	0
Serious	0	0	0	2	1	3
Slight	2	3	3	2	1	11
Total	2	3	3	4	2	14

Results of the analysis show that a total of 14 accidents have occurred within the search area with 8 accidents occurring within the scheme boundary and the remaining 6 on the approach arms (considering vehicles travelling in both directions).

2.4.1 Scheme Area

Of the 8 incidents that occurred in the scheme area:

- Four incidents occurred at or near the Wakefield Road/ Smithies Lane junction, all occurring between 2017 and 2019 and resulting in slight injuries. Two of the incidents (ref.: 17154051 and ref.: 19807387) involved a moving vehicle colliding with the rear of a stationary vehicle. The other two incidents at this location recorded alcohol impairment as causation factors. One of these incidents (ref.: 17154051) involved a single car collision with a set of traffic lights, the other incident (ref.: 17154051) involved a side-on collision between vehicle 1 turning right onto Smithies Lane, having overtaken another vehicle waiting to turn right and vehicle 2 travelling straight ahead along Wakefield Road.
- Two incidents occurred at or near the Wakefield Road/ Carlton Road junction – one incident occurred in 2016 and the other in 2020, both resulting in slight injuries. The 2016 incident (ref.: 16112482) involved a driver pulling out of the Carlton Road onto Wakefield Road as the traffic lights were switching from amber to red. The vehicle hit a motorcycle rider travelling along Wakefield Road, clipping his rear wheel and knocking him off. The 2020

incident at this location (ref.: 20985976) involved a vehicle colliding with the front of a second vehicle when changing lanes to turn right.

- Two other incidents occurred within the scheme area outside the previous two clusters. One incident (ref.:20931109) near Polar Ford (to the southern boundary of the scheme) involved a pedestrian being nudged onto the carriageway by a horse he was leading. After stepping onto the carriageway, the pedestrian was hit by a van's wingmirror, resulting in serious injuries for the pedestrian. The other incident (ref.: 18303138) occurred at the Smithies Lane bus stop near Quarry Street. The incident involved a bus passenger falling inside of a bus after failing to sit down properly before the bus rolled forward.

2.4.2 Smithies Lane approach

Five accidents were recorded on the Smithies Lane approach within 150m of the junction with Wakefield Road. All five incidents occurred around the tight bend in the road as it passes under Smithies bridge. One incident resulted in serious injuries, the other four have been described as slight.

The incident that was described as serious (ref.: 19889498) resulted in a head-on collision with a vehicle losing control on the bend due to slippery road conditions before skidding and colliding with a second vehicle.

Of the four slight incidents at this location, one incident (ref.: 16146620) listed road conditions as a causation factor, namely mud deposits, causing a vehicle to lose control and collide head-on with a second vehicle.

One incident (ref.:18338710) involved a pedestrian being knocked down by a vehicle, resulting in slight injuries. Failure to judge other persons path or speed was listed as the causation factor.

The other two slight incidents recorded at this location (ref.: 17219270 and ref.:17179997) involved head-on collisions, with failure to judge other persons path, aggressive driving, and swerved listed as causation factors.

2.4.3 A61 Wakefield Road north of the scheme boundary

One incident (ref.: 19834293) occurred on the A61 Wakefield Road in the search area, outside of the scheme boundary. This incident involved a collision between a motorcycle travelling straight ahead and a car pulling out of Raesbeck Terrace. This incident resulted in serious injuries for a 22-year-old motorcyclist.

2.4.4 Summary of Accident Data Analysis

Considering the scheme proposals against these findings have not identified any highway safety issues that requires any further investigation. The number of incidents are not considered to be significant for a five-year period and for such a key route serving the town centre. As such, it is not considered that there are any road safety concerns on the local highway network that are likely to be exacerbated by the proposed scheme.

Furthermore, a Road Safety Audit will be undertaken as part of the design process to consider any potential safety implications as a result of the scheme. Any issues raised will be considered as part of the design process.

2.5 Summary

A review of the scheme's location, in the context of the local highway network, highlights the importance of the route in supporting connectivity between the town centre and local and regional conurbations.

Currently the road carries a single carriageway of varying widths with ghosted right-turn lanes and is subject to a 30mph speed limit.

Footways are provided to both side of the carriageway, and there is adequate pedestrian crossing provision at the adjoining junctions. Currently there are no cycle facilities within the scheme, and although existing bus lanes nearby facilitate cycling, they do not connect to dedicated cycling facilities/routes.

Wakefield Road forms a key part of the core bus network, bus stops are provided to serve in both directions on Wakefield Road, serving a total of 12 services per hour in each direction during the weekday daytime.

Personal injury accident data for the latest five-year period has been reviewed for the extent of the highway scheme and approach arms. The review does not identify any highway concerns or issues on the local highway network that are likely to be exacerbated by the scheme proposals.

3 Policy Review

3.1 National Policy

The National Planning Policy Framework (NPPF) was revised by Secretary of State for Housing, Communities and Local Government on 20th July 2021 and sets out the government's planning policies for England and how these are expected to be applied. The Framework seeks to contribute to achieving sustainable development, and therefore has three key objectives:

- *“An economic objective – to help build a strong, responsive and competitive economy.*
- *A social objective – to support strong, vibrant and healthy communities.*
- *An environmental objective – to protect and enhance our natural, built and historic environment”.*

The guidance advises that sustainable transport should be promoted through identifying and pursuing opportunities to promote active and non-car modes. To support this objective, measures should be put in place so that the planning system actively manages patterns of growth. To help reduce congestion and improve air quality and public health, the guidance recommends:

- focussing on key routes which could be critical in broadening transport choices; and,
- providing for high quality walking and cycling infrastructure.

3.2 Local Policy

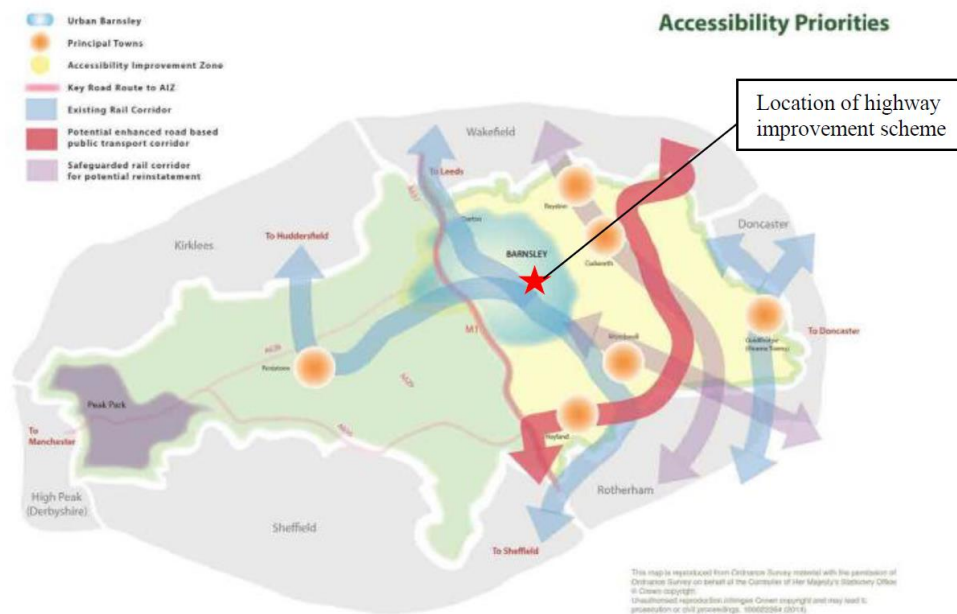
The current Development Plan for Barnsley is the Local Plan adopted in January 2019, which replaces the Core Strategy and the Unitary Development Plan.

One of the core aims set out in the Local Plan is *“to make it easy for people to move between work, health, community and leisure facilities by walking, cycling, or where necessary using public transport”*, and to *“ensure that everybody has a real alternative option, other than car”*.

Transport and particularly policies to promote sustainable transport therefore form a fundamental pillar of the Local Plan and its transport policy portfolio (T1 to T5). The main policy proposals in the Local Plan are outlined in Policy T1 (Accessibility Priorities), where there is a particular focus on:

- Improving sustainable transport and circulation in the Accessibility Improvement Zone (AIZ) area. The location of the scheme within the AIZ is shown on the map shown overleaf.
- Facilitating sustainable transport links to and from areas of employment, interchange, and community and leisure and tourism facilities;

- Promoting high quality public transport linking the AIZ to significant places of business, employment and national/international interchanges across the Leeds – Sheffield City region corridor;
- Improving national/international public transport and freight links.



Map showing the approximate location of the highway improvement scheme within the AIZ (source: BMBC Local Plan)

The emphasis on sustainable transport and promoting active travel and public transport over car use, had influenced Local Plan policies (T1 and T3) and site selection methodologies, to favour locations of housing allocation in proximity to the ‘core bus network’ (identified by SYPTE based on bus stops having a frequency of more than 6 buses per hour¹). The Local Plan highlights three sites allocated for new housing on the A61 north of Smithies, which could deliver around an estimated 690 dwellings.

Also of relevance is the Council's Transport Strategy 2014-2033 which sets out four key transport priorities, with the aim of promoting economic growth and improving the quality of life of Barnsley's residents. The priorities are as follows:

1. *“Promote economic growth and strategic connections;*
2. *Promote inclusion, accessibility and better quality of life;*
3. *Promote high quality natural environment, local air quality, climate change; and,*
4. *Promote safety, security and health”.*

In line with the Sheffield City Region Spatial Transport Strategy, “the vision for Barnsley is that by 2033, Barnsley will have a transport network which is High Speed rail ready and which provides connectivity to drive economic growth and reduce carbon emissions, and more active travel”. Following the government’s

recent announcement of the removal of the eastern leg of HS2, the proposed highway improvement helps contribute towards the latter part of this vision by improving regional and local connectivity with Barnsley's town centre. The scheme aims to make travel by bus more attractive through reducing congestion and journey times. If successful, this will bring economic and environmental benefits.

3.3 Summary

The National Planning Policy Framework (NPPF) sets out the government's aims for achieving sustainable development. The NPPF acknowledges that the transport system needs rebalancing in favour of sustainable transport modes. In order to manage patterns of growth and reduce congestion, the guidance recommends focussing on key routes with high potential of broadening transport choices.

The proposed highway improvement is consistent with the sustainability focus within the NPPF, considering one of the main objectives of the scheme is to make public transport more attractive to potential users, through reducing congestion and improving bus journey time variability.

A review of the scheme in relation to the Local Plan and Transport Strategy objectives has been undertaken. The scheme on Wakefield Road helps to achieve the Local Plan's transport objectives, given that it is located within the Accessibility Improvement Zone (AIZ) area, and is also part of the core bus network.

The Transport Strategy and Local Plan share common policy proposals. The scheme on Wakefield Road considers aspects of each of the key transport priorities but relates mainly to proposals seeking to improve local-regional connectivity and public transport links, as set out in Transport Priority 1 and Local Plan Policy T1.

4 Proposed Highway Improvements

This section describes the proposed highway improvements and the applicable standards.

4.1 Proposed Improvements

The A61 corridor in Barnsley currently suffers from severe congestion and variable bus journey times and is likely to get worse with forecast traffic growth if no interventions are applied. One of the core aims set out in the Local Plan is *“to make it easy for people to move between work, health, community and leisure facilities by walking, cycling, or where necessary using public transport”, and to “ensure that everybody has a real alternative option, other than car”*.

The scheme addresses this core aim through reducing congestion, improving flow and journey times in all directions for buses and general traffic, and reducing bus journey time variability. This is achieved by increasing highway capacity and improving the signal operation at the Smithies Lane and Carlton Road junctions.

The proposal is to:

- Widen the Wakefield Road carriageway between the Carlton Road and Smithies Lane junctions to accommodate four traffic lanes and ghosted right-turn lanes. On the southbound carriageway, the bus stop is relocated to be closer to the Carlton Road junction.
- Widen the Wakefield Road northbound approach to the Smithies Lane junction to accommodate two traffic lanes and ghosted right-turn lanes.
- At the Carlton Road junction, remove the pedestrian crossing on the Wakefield Road northern arm.
- At the Smithies Lane junction, remove the pedestrian crossing on the Wakefield Road northern arm, and introduce staggered crossings (to replace existing straight across crossings) on the Wakefield Road southern arm and Smithies Lane arm.

A drawing showing the proposed highway improvement scheme is contained in Appendix E.

4.2 Design Standards and Proposed Relaxation

The proposed scheme has been developed generally in accordance with Design Manual for Roads and Bridges (DMRB) and in liaison with Barnsley Metropolitan Borough Council’s highways team.

5 Scheme Impact Assessment

This section sets out the assessment of the local highway network using the Wakefield Road Aimsun Model (WRAM).

5.1 2017 Base Wakefield Road Aimsun Model

The WRAM is a microsimulation traffic model developed using Aimsun software. The extent of the model covers Old Mill Lane and A61 Wakefield Road to the south, Bar Lane and A61 Wakefield Road to the north, Smithies Lane to the west, and Laithes Lane and B6132 Carlton Road to the east. The model extent is shown below.

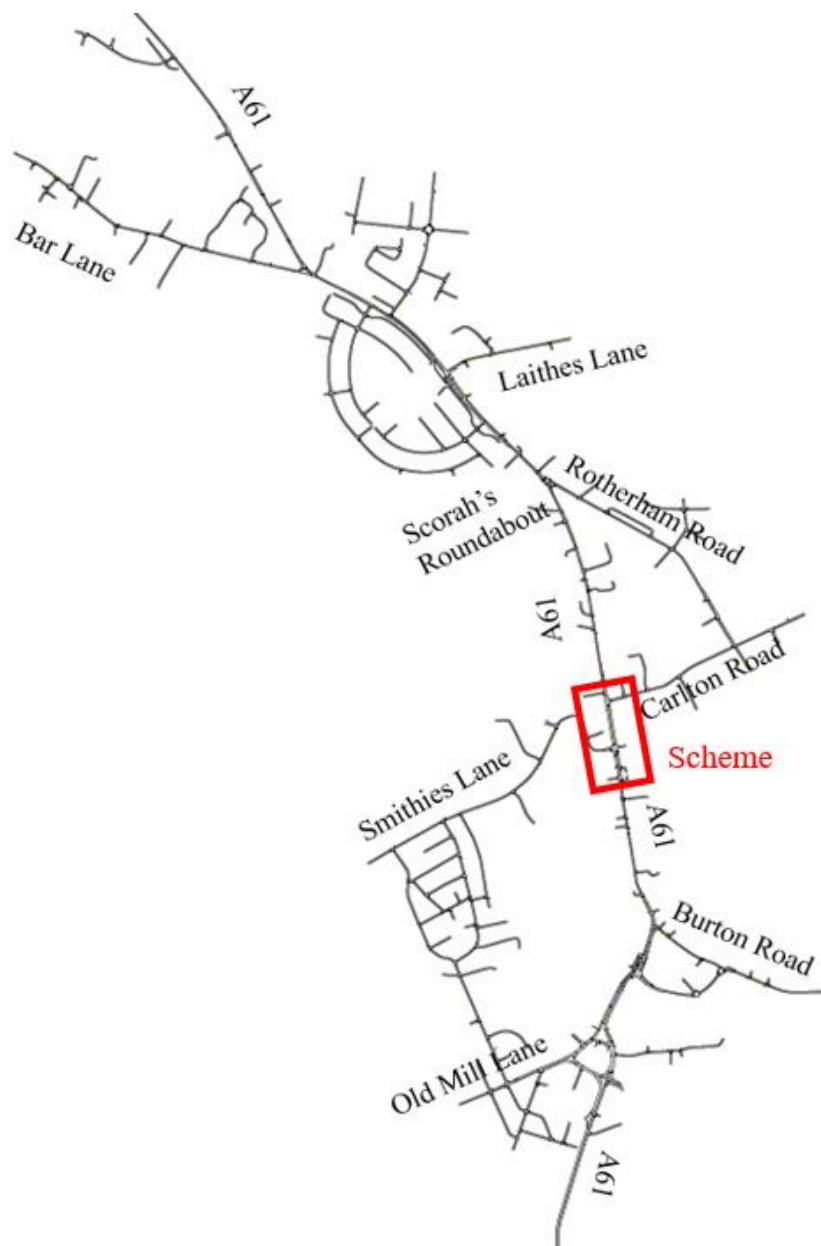


Image showing the location of highway improvement scheme within the extent of the modelled network

The 2017 Base WRAM was calibrated and validated for the following time periods:

- PM peak: 16:30-17:30 hrs; and
- Saturday peak: 12:15-13:15 hrs.

Based on 2017 survey data, these time periods reflect the two 'worst case' periods for the highest outbound and inbound traffic flows respectively.

The model includes the 2017 bus services and 2017 on-street traffic signal controls for the peak hours. The model was calibrated against manual classified count (MCC) data collected in February and March 2017, and validated against Google journey times and 2016 bus real-time data.

A Local Model Validation Report (LMVR) has been issued for the 2017 Base WRAM. With both peak periods meeting the requirements set out by TAG, the model is considered a suitable tool for the testing of future year schemes.

5.2 Assessment Scenarios

For the future year assessments of the local highway network, the following scenarios have been modelled:

- **2023 Do Nothing:** including network changes associated with committed developments.
- **2023 Do Minimum:** including network changes associated with committed developments, on-crossing detection, and the Old Mill Lane bridge widening scheme.
- **2023 Do Something:** including Do Minimum changes described above, and the proposed highway improvement scheme at the A61 / Smithies Lane and A61 / Carlton Road junctions.
- **2040 Do Nothing:** including network changes associated with committed developments.
- **2040 Do Minimum:** including network changes associated with committed developments, on-crossing detection, and the Old Mill Lane bridge widening scheme.
- **2040 Do Something:** including Do Minimum changes described above, and the proposed highway improvement scheme at the A61 / Smithies Lane and A61 / Carlton Road junctions.

5.3 2023 Forecast Traffic Growth

Background traffic growth has not been applied to the future year scenarios as the significant increase in committed development traffic exceeds the potential growth calculated in TEMPro and therefore could result in double counting.

The committed developments included in the 2023 traffic demand are outlined below. The majority of these developments are residential.

- The Peel Centre - Dryden Road, S71 1JE
- Former North Gawber Colliery - Carr Green Lane/Spark Lane, S75 6DY
- Land to the west of Wakefield Road, S75 6DL
- Aldi - Land to the east of Old Mill Lane, S71 1LL
- Former William Freeman Works
- Land to the west of Wakefield Road, S71
- 30 Cross Street, Monk Bretton, Barnsley, S71
- Land to the west of Wilthorpe Road, S75
- Better Barnsley Town Centre development (The Glassworks), S70 1GW

Table 2 below summarises the resulting traffic growth from the 2017 Base for all 2023 model scenarios / time periods.

Table 2: 2017 to 2023 assumed fixed traffic growth

Peak Period	Additional Trips		
	Cars	LGVs	HGVs
PM peak	731 (11.60%)	-	-
Saturday peak	526 (8.42%)	-	-

5.4 2040 Forecast Traffic Growth

To produce more realistic 2040 forecast traffic demands, traffic growth was calculated from the Sheffield City Region Transport Model 1 (SCRTM1). This approach allows the effects of traffic re-assignment and changes in demand to be captured, resulting from the Old Mill Lane bridge widening scheme that features in both the Do Minimum and Do Something scenarios. Whilst the WRAM is not capable of capturing such changes that would occur outside of the modelled area, applying growth factors derived from TEMPro to fixed traffic demand matrices would be likely to significantly overestimate the level of traffic in the model.

Growth was applied by layering flow difference matrices (2040 minus 2023) obtained from the SCRTM1 for each vehicle type, onto the 2023 traffic demand described in the previous section (5.3). To obtain the matrices, the SCRTM1 was cordoned down to the area of the WRAM model. To ‘translate’ these to the Aimsun origin-destination (OD) traffic demand, a zone system was applied that is consistent with the zone system in the WRAM. Throughout the translation process, flow changes were logic checked to investigate any significant changes in traffic flow.

Table 3 summarises the resulting traffic growth from the 2017 Base.

Table 3: 2017 to 2040 assumed traffic growth by model scenario

Peak period	Scenario	Additional Trips		
		Cars	LGVs	HGVs
PM peak	Do Nothing	1,053 (16.70%)	41 (4.81%)	42 (20.69%)
	Do Minimum & Do Something	1,080 (17.14%)	30 (3.52%)	40 (19.70%)
Saturday peak	Do Nothing	1,051 (16.83%)	40 (5.02%)	0
	Do Minimum & Do Something	1,293 (20.71%)	54 (6.78%)	0

5.5 Aimsun Model Outputs

Aimsun was selected at the outset as the most appropriate tool to test the scheme. Microsimulation models are well-suited to modelling schemes that involve sophisticated traffic operation such as bus priority and advanced signal control. They also provide a clear understanding of the traffic impacts that arise from complex time-dependent traffic phenomena, particularly in congested conditions.

To assess the impact of the scheme (Do Something), the outputs listed below have been produced and compared against the Do Minimum, for the PM peak hour (16:30-17:30 hrs) and Saturday peak hour (12:15-13:15 hrs). Though not analysed, the Do Nothing results are also presented to highlight the difference from the Do Minimum.

- Journey times along defined routes (“subpaths”) passing through the scheme.
- System statistics output for the entire network shown by the image in section 5.1.
- Traffic flow plots for the scheme area, which can be found in Appendix F.

The journey time subpaths are shown in Figure 4, contained in Appendix A. This includes the following:

- Subpath 1: Wakefield Rd / Old Tannery Rd → Wakefield Rd / Smithies Ln
- Subpath 2: Wakefield Rd / Smithies Ln → Wakefield Rd / Carlton Rd
- Subpath 3: Wakefield Rd / Carlton Rd → Wakefield Rd / Scora's Rbt
- Subpath 4: Wakefield Rd / Scora's Rbt → Wakefield Rd / Carlton Rd
- Subpath 5: Wakefield Rd / Carlton Rd → Wakefield Rd / Smithies Ln
- Subpath 6: Wakefield Rd / Smithies Ln → Wakefield Rd / Burton Rd
- Subpath 7: Smithies Ln / Honeywell Gr → Smithies Ln / Wakefield Rd
- Subpath 8: Carlton Rd / Wakefield Rd → Carlton Rd / Rotherham Rd
- Subpath 9: Carlton Rd / Rotherham Rd → Carlton Rd / Wakefield Rd
- Subpath 10: Smithies Ln / Wakefield Rd → Smithies Ln / Honeywell Gr

Due to the stochastic nature of microsimulation modelling, whereby each run is different, representing day-to-day variability, it is necessary to run several

replications of each scenario. The larger or more congested the model, the more replications are required to produce a reliable set of results for analysis. For the assessment, 10 replications for each scenario in each modelling peak have been analysed. The data has been reviewed to ensure that anomalies were not included in the analysis. For ease of interpretation, the average of these 10 replications over the entire modelled hour has been presented in this analysis.

5.6 Subpath Journey Time Results

The results of the Aimsun modelling for each of the subpaths are summarised in Table 4 - Table 7. The tables show the average journey time (in minutes and seconds) and average sample size results for general traffic (i.e., all vehicles, including buses) in the future year scenarios. Sample size is provided to give an indication of the scale and relative importance of journey time changes.

PM Peak

In the PM peak, the most significant changes in journey time predicted by the model are for vehicles travelling in an outbound direction along Wakefield Road, and an eastbound direction along Smithies Lane. The changes in journey times along inbound routes along Wakefield Road are negligible.

Travelling outbound along Wakefield Road in the PM peak, the results reveal a journey time improvement between the Old Tannery Road and Smithies Lane junctions (subpath 1). In the 2023 future year, the average saving is 2 minutes 23 seconds, whilst in the 2040 future year the average saving is 56 seconds. The average journey time increases along the subsequent sections of route between Smithies Lane and Carlton Road (subpath 2), and Carlton Road and Scolah's roundabout (subpath 3), but these do not completely offset the decreases discussed. This is caused by the increased flow through the junctions due the capacity enhancements, which shifts the outbound queue north towards Scolah's roundabout - a bottleneck during the PM peak. Along subpath 2, the average increase is by 8 seconds in the 2023 future year, and by 22 seconds in the 2040 future year. The average increase along subpath 3 is by 1 minute 15 seconds in the 2023 future year, and by 30 seconds in the 2040 future year.

The improved flow through the proposed scheme area also leads to considerable journey time savings travelling eastbound along Smithies Lane (subpath 7) in the PM peak. The average journey time improves by 1 minute 39 seconds in the 2023 future year, and by 2 minutes 56 seconds in the 2040 future year.

Saturday Peak

In the Saturday peak, the most significant changes in journey time predicted by the model are in the 2023 future year for vehicles travelling eastbound along Smithies Lane and westbound along Carlton Road.

Travelling eastbound along Smithies Lane between the Honeywell Grove and Wakefield Road junctions (subpath 7), the average journey time in the 2023 future year improves by 6 minutes 48 seconds. Travelling westbound along Carlton Road between Rotherham Road and Wakefield Road (subpath 9), the average journey time in the 2023 future year improves by 2 minutes 52 seconds. The savings are less along these routes in the 2040 future year, due to the increased levels of traffic. The average journey time reduces by 2 minutes 2 seconds along subpath 7, and increases slightly along subpath 9 by 26 seconds. Travelling eastbound along Carlton Road between Wakefield Road and Rotherham Road (subpath 8), the journey time increases by 1 minute 3 seconds on average.

For outbound routes along Wakefield Road, the results show improvements to journey times. In the 2023 future year, this mainly concerns the route between the Smithies Lane and Carlton Road junctions (subpath 2), where there is a slight reduction by 25 seconds on average. In the 2040 future year, this mainly concerns the route between the Old Tannery Road and Smithies Lane junctions (subpath 1). Along this route, the average journey time improves by 1 minute 9 seconds.

The results mainly reveal improvements to inbound journey times along Wakefield Road. Along the route between Scorch's roundabout and the Carlton Road junctions (subpath 4), there is an average journey time reduction of 1 minute 42 seconds in the 2023 future year, and 1 minute 49 seconds in the 2040 future year. There are slight increases and reductions (all within 30 seconds) along the subsequent sections of route towards the Smithies Lane junction (subpath 5) and Burton Road junction (subpath 6) in both future years.

Table 4: 2023 PM peak average general traffic subpath results

Sub-path	Direction	2023 PM Peak (16:30-17:30) General Traffic Journey Time (mm:ss)				2023 PM Peak (16:30-17:30) General Traffic Sample Size (Vehicles)			
		Do Nothing	Do Minimum	Do Something	Difference (DS – DM)	Do Nothing	Do Minimum	Do Something	Difference (DS – DM)
1	Outbound/ Northbound	04:42	04:24	02:02	-02:23	744	784	939	154
2		00:41	00:35	00:43	00:08	1071	1135	1260	125
3		07:14	03:37	04:52	01:15	374	437	466	29
4	Inbound/ Southbound	01:43	01:39	01:33	-00:06	451	452	457	5
5		00:40	00:40	00:31	-00:09	757	752	764	12
6		01:04	01:04	01:02	-00:01	484	494	499	5
7	Eastbound	07:18	05:02	03:24	-01:39	221	237	233	-4
8		01:27	01:20	01:34	00:14	399	387	426	38
9	Westbound	01:27	01:11	01:15	00:03	258	255	259	3
10		01:00	01:00	00:57	-00:03	203	198	213	15

Table 5: 2023 Saturday peak average general traffic subpath results

Sub-path	Direction	2023 Saturday Peak (12:15-13:15) General Traffic Journey Time (mm:ss)				2023 Saturday Peak (12:15-13:15) General Traffic Sample Size (Vehicles)			
		Do Nothing	Do Minimum	Do Something	Difference (DS – DM)	Do Nothing	Do Minimum	Do Something	Difference (DS – DM)
1	Outbound/ Northbound	01:58	01:57	01:33	-00:25	723	699	708	9
2		00:53	00:52	00:37	-00:15	906	902	991	89
3		01:29	01:30	01:36	00:06	518	520	548	28
4	Inbound/ Southbound	07:24	03:54	02:12	-01:42	482	543	552	8
5		01:01	00:44	01:05	00:21	842	972	1014	42
6		06:01	04:17	04:03	-00:15	581	693	698	5
7	Eastbound	13:24	11:01	04:14	-06:48	69	77	111	34
8		01:47	01:47	01:40	-00:06	310	319	370	50
9	Westbound	12:41	07:22	04:30	-02:52	241	310	317	7
10		00:58	00:59	00:59	00:01	233	244	251	6

Table 6: 2040 PM peak average general traffic subpath results

Sub-path	Direction	2040 PM Peak (16:30-17:30) General Traffic Journey Time (mm:ss)				2040 PM Peak (16:30-17:30) General Traffic Sample Size (Vehicles)			
		Do Nothing	Do Minimum	Do Something	Difference (DS – DM)	Do Nothing	Do Minimum	Do Something	Difference (DS – DM)
1	Outbound/ Northbound	05:57	05:09	04:13	-00:56	659	721	793	72
2		00:55	00:49	01:11	00:22	950	1033	1101	68
3		09:47	08:14	08:43	00:30	356	387	396	9
4	Inbound/ Southbound	01:39	02:02	01:40	-00:22	462	499	497	-1
5		00:35	00:37	00:32	-00:06	759	809	801	-8
6		01:12	01:07	01:22	00:15	505	546	533	-13
7	Eastbound	11:14	09:15	06:19	-02:56	192	208	222	14
8		01:43	01:38	02:09	00:31	360	388	418	30
9	Westbound	01:40	01:29	01:37	00:08	259	276	266	-10
10		01:00	00:59	00:59	-00:01	199	199	204	5

Table 7: 2040 Saturday peak average general traffic subpath results

Sub-path	Direction	2040 Saturday Peak (12:15-13:15) General Traffic Journey Time (mm:ss)				2040 Saturday Peak (12:15-13:15) General Traffic Sample Size (Vehicles)			
		Do Nothing	Do Minimum	Do Something	Difference (DS – DM)	Do Nothing	Do Minimum	Do Something	Difference (DS – DM)
1	Outbound/ Northbound	02:29	02:44	01:36	-01:09	755	745	766	21
2		01:02	00:57	00:39	-00:18	872	913	1016	103
3		01:48	01:28	01:36	00:08	525	539	572	33
4	Inbound/ Southbound	09:34	06:07	04:18	-01:49	450	577	610	33
5		01:09	00:46	01:12	00:26	781	1025	1059	34
6		06:40	03:57	04:11	00:14	565	744	747	3
7	Eastbound	14:04	14:48	12:46	-02:02	60	91	144	53
8		02:14	02:20	03:23	01:03	290	328	369	41
9	Westbound	14:05	09:40	10:06	00:26	228	332	330	-2
10		00:58	00:59	00:58	-00:01	235	283	330	47

5.7 Vehicle Throughput

The system statistics presented below in Table 8 - Table 11 include summary statistics for the entire model network shown by the image in section 5.1. It is therefore important to note that some of the benefits reported in the previous section can become dampened by other “noise” in the model network. The analysis below compares the results of the Do Something against the Do Minimum.

The statistics reveal that the proposed scheme results in higher flows through the network in each peak period assessed. In the PM peak, the flow increases by 217 vehicles in the 2023 future year, and by 188 vehicles in the 2040 future year. In the Saturday peak, the flow increases by 175 vehicles in the 2023 year, and 110 vehicles in the 2040 future year. The mean travel time in the network decreases in all scenarios with the exception of the 2040 Saturday peak, where there is a marginal increase.

Table 8: 2023 PM Peak average system statistics

Metric	Do Nothing	Do Minimum	Do Something	Diff (DS-DM)
Mean flow (veh/h)	7,430	7,595	7,811	217
Vehicles inside network	1,208	1,024	843	-181
Vehicles waiting outside	274	142	95	-47
Mean travel time (sec/km)	276	242	221	-21

Table 9: 2023 Saturday peak average system statistics

Metric	Do Nothing	Do Minimum	Do Something	Diff (DS-DM)
Mean flow (veh/h)	7,164	7,496	7,671	175
Vehicles inside network	1,261	1,105	964	-141
Vehicles waiting outside	513	240	170	-70
Mean travel time (sec/km)	338	301	287	-14

Table 10: 2040 PM peak average system statistics

Metric	Do Nothing	Do Minimum	Do Something	Diff (DS-DM)
Mean flow (veh/h)	7,049	7,444	7,632	188
Vehicles inside network	1,642	1,439	1,406	-33
Vehicles waiting outside	675	491	323	-169
Mean travel time (sec/km)	355	319	313	-6

Table 11: 2040 Saturday peak average system statistics

Metric	Do Nothing	Do Minimum	Do Something	Diff (DS-DM)
Mean flow (veh/h)	7,085	7,606	7,716	110
Vehicles inside network	1,685	1,466	1,378	-88
Vehicles waiting outside	920	928	878	-50
Mean travel time (sec/km)	385	358	366	9

5.8 Pedestrians and Cyclists

The microsimulation model has not assessed for pedestrians and cyclists (save for signal settings at controlled crossings points). The modified pedestrian crossing configurations as part of the scheme may (in some instances) lead to longer a small increase in walking distances (around 40m) and crossing times. However, it is still possible to make all necessary movements at each junction. A benefit of introducing staggered crossings on the Smithies Lane and Wakefield Road southern arms of the Smithies Lane junction, is that resting points are provided for pedestrians.

5.9 Summary

The proposal is to widen the carriageway on Wakefield Road between Carlton Road and Smithies Lane junctions to accommodate four traffic lanes, and on the Wakefield Road northbound approach to the Smithies Lane junction to accommodate two traffic lanes. Capacity is also created through changes to the pedestrian crossing configuration at each junction, and associated improvements to traffic signal operation.

The impact of the proposed highway improvements has been assessed for the PM peak and Saturday peak hours for the 2023 and 2040 future year scenarios using a microsimulation model. The 2017 Base model was calibrated using manual classified count data collected in February and March 2017.

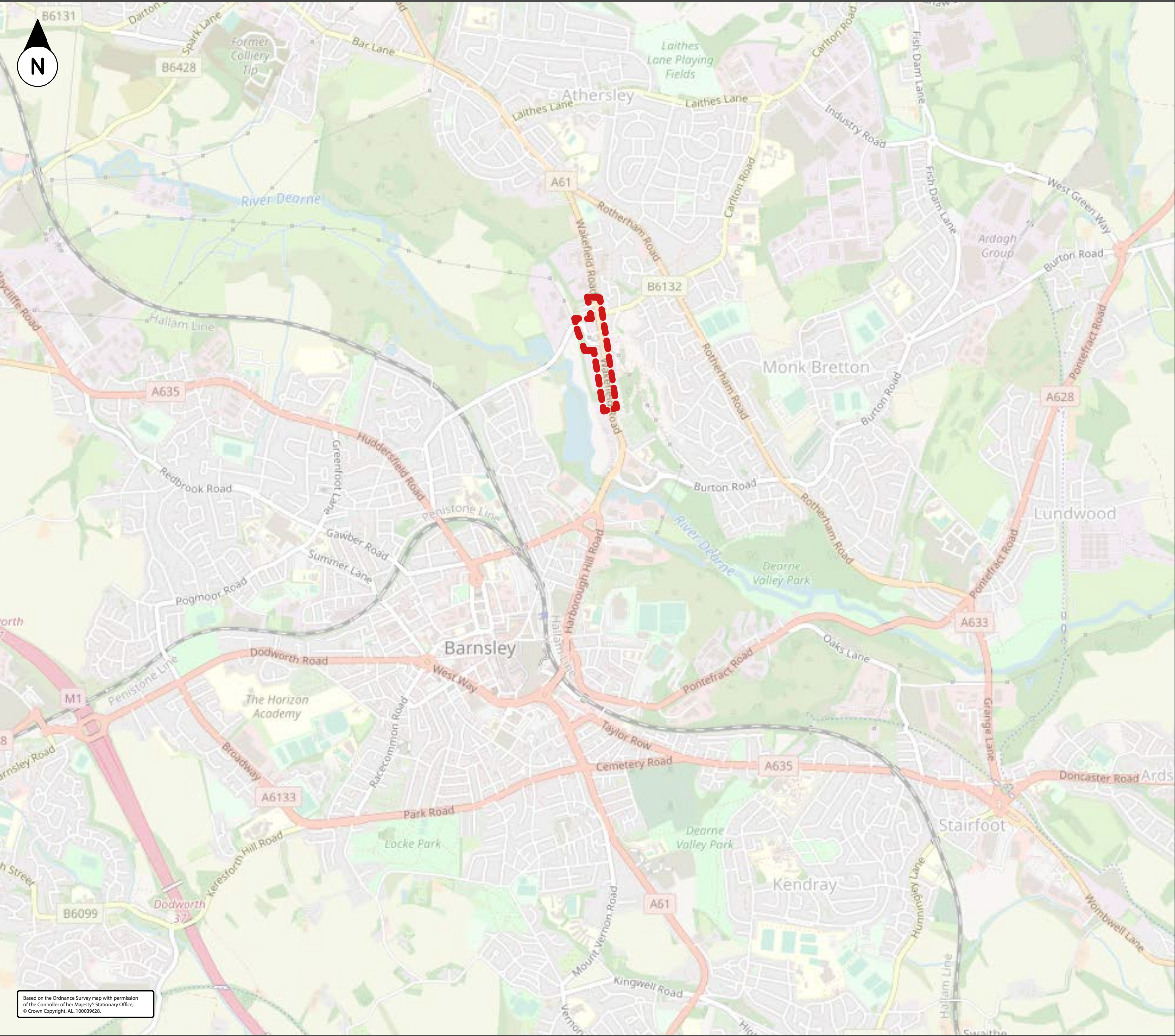
In the 2023 future year scenarios, traffic growth from committed developments has been applied, resulting in an 11.6% increase in car trips in the PM Peak, and an 8.4% increase in car trips in the Saturday peak. In the 2040 future year scenarios, traffic growth was calculated from the SCRTM1 model, and applied at an OD level. Considering the growth in car trips from the 2017 Base, there is an increase of 17.1% in the PM peak, and an increase of 20.7% in the Saturday peak.

The results of the modelling show that the proposed scheme mainly leads to improvements to journey times along the assessed routes in both future year scenarios. The most significant journey time savings are seen in the 2023 Saturday peak, along Smithies Lane in an eastbound direction, and along Carlton Road in a westbound direction. Although the modelling shows there to be some increases in journey times, these are outweighed by journey time savings. The main outbound improvements are along the route between Burton Road and Smithies Lane. The

main inbound improvements are along the route between Scolah's roundabout and Carlton Road.

Appendix A

Figures 1 - 5



ARUP

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www.arup.com

Key:
Site location



Issue:	Date:	Originator:	Checked:	Approved:
D1	06.12.21	SM	JH	AG

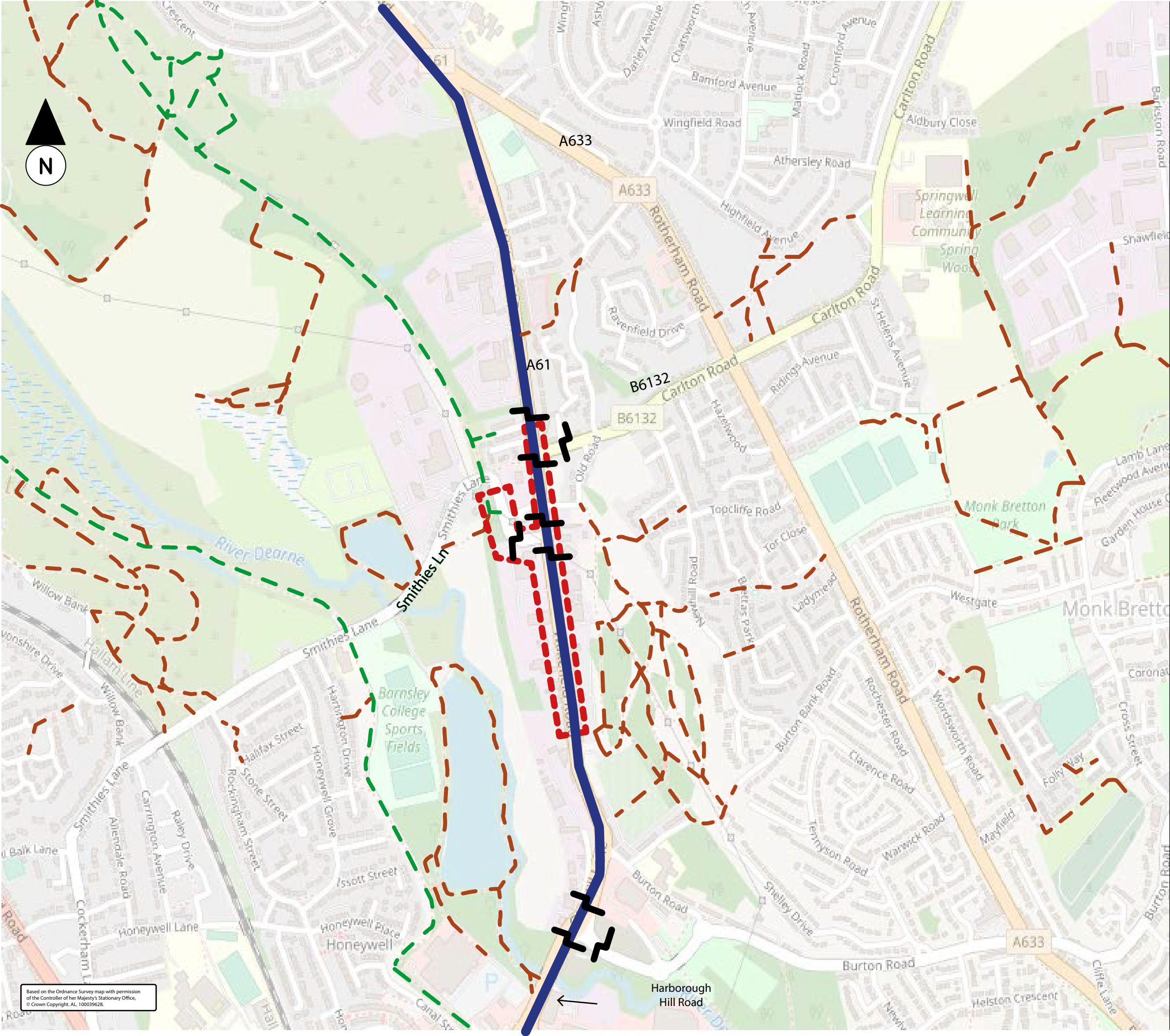
South Yorkshire Passenger Transport Executive
Wakefield Road improvement scheme
Site Location

Scale @ A3:
Not to Scale

Drawing Status:
Issue

Job Number:
253511-00

Drawing Number:
Figure 1



Based on the Ordnance Survey map with permission of the Controller of her Majesty's Stationary Office, © Crown Copyright. AL 100039628.

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- Key:
- Extent of highway improvement scheme
 - Controlled Pedestrian Crossing
 - Bus Route
 - Cycleway
 - Footway

Issue:	Date:	Originator:	Checked:	Approved:
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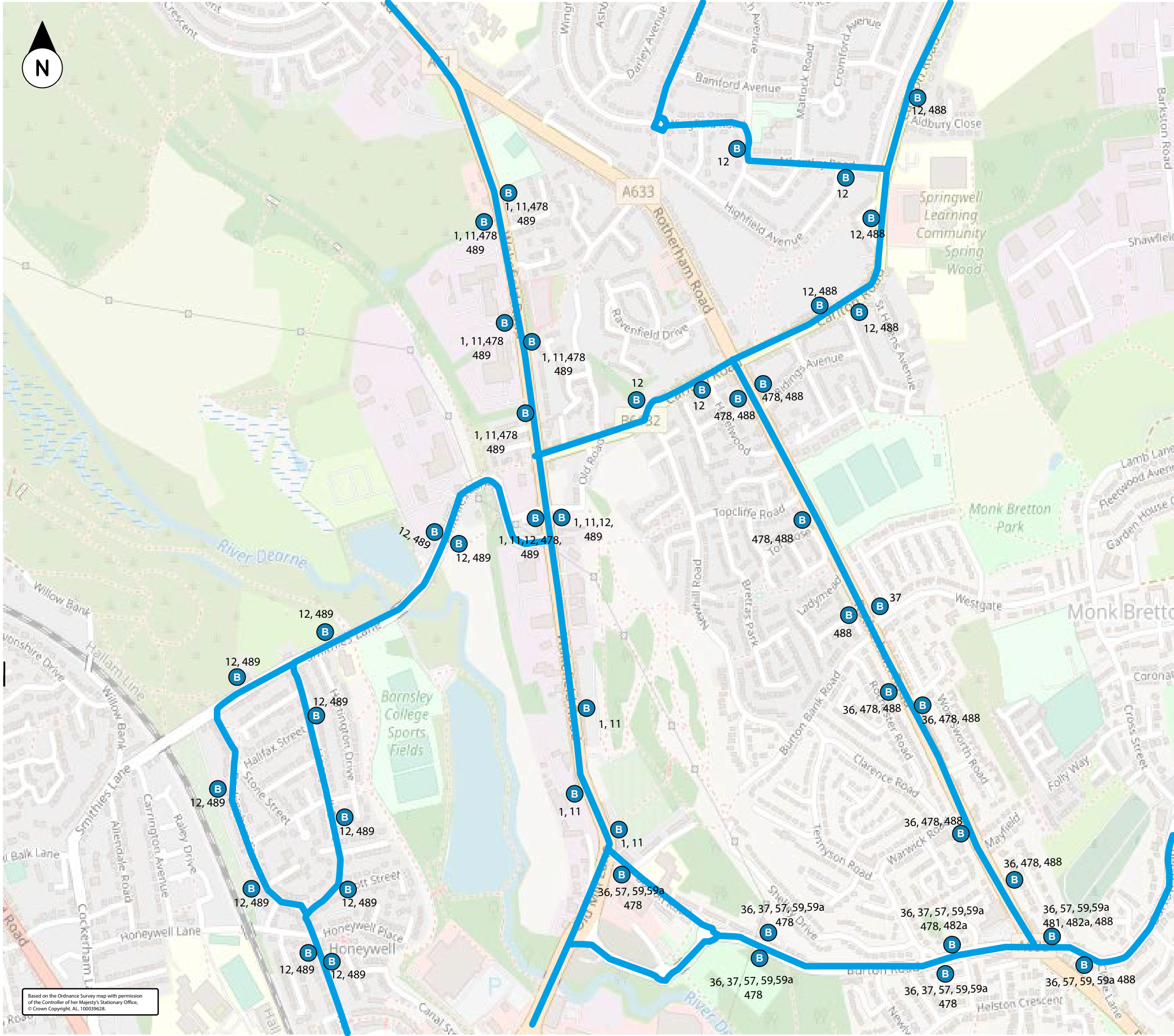
South Yorkshire Passenger Transport Executive
Wakefield Road improvement scheme
Local Highway Network

Scale @ A3:
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Drawing Status:
Issue

Job Number:
253511-00

Drawing Number:
Figure 2



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Key:

Bus routes

Bus stops

Barnsley Interchange



Issue:	Date:	Originator:	Checked:	Approved:
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D1	06.12.21	SM	JH	AG
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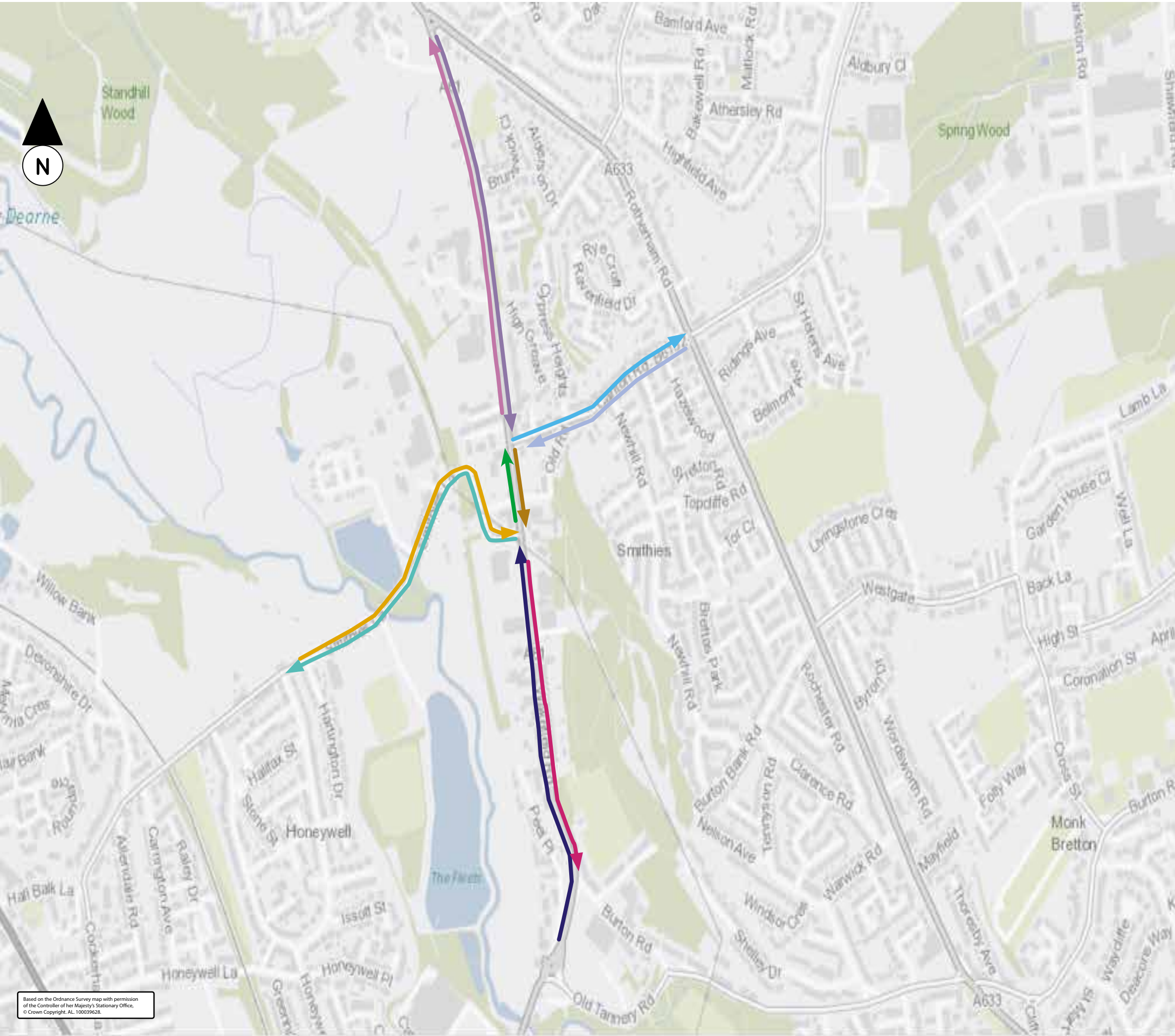
South Yorkshire Passenger Transport Executive
Wakefield Road improvement scheme
Local Bus Network

Scale @ A3:
Not to Scale

Drawing Status:
Issue

Job Number:
253511-00

Drawing Number:
Figure 3



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- Key:
- Subpath 1
 - Subpath 2
 - Subpath 3
 - Subpath 4
 - Subpath 5
 - Subpath 6
 - Subpath 7
 - Subpath 8
 - Subpath 9
 - Subpath 10

Issue:	Date:	Originator:	Checked:	Approved:
D1	03.12.21	SM	JH	AG

South Yorkshire Passenger Transport Executive
Wakefield Road improvement scheme
Local Highway Network

Scale @ A3:
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Drawing Status:
Issue

Job Number:
253511-00

Drawing Number:
Figure 4

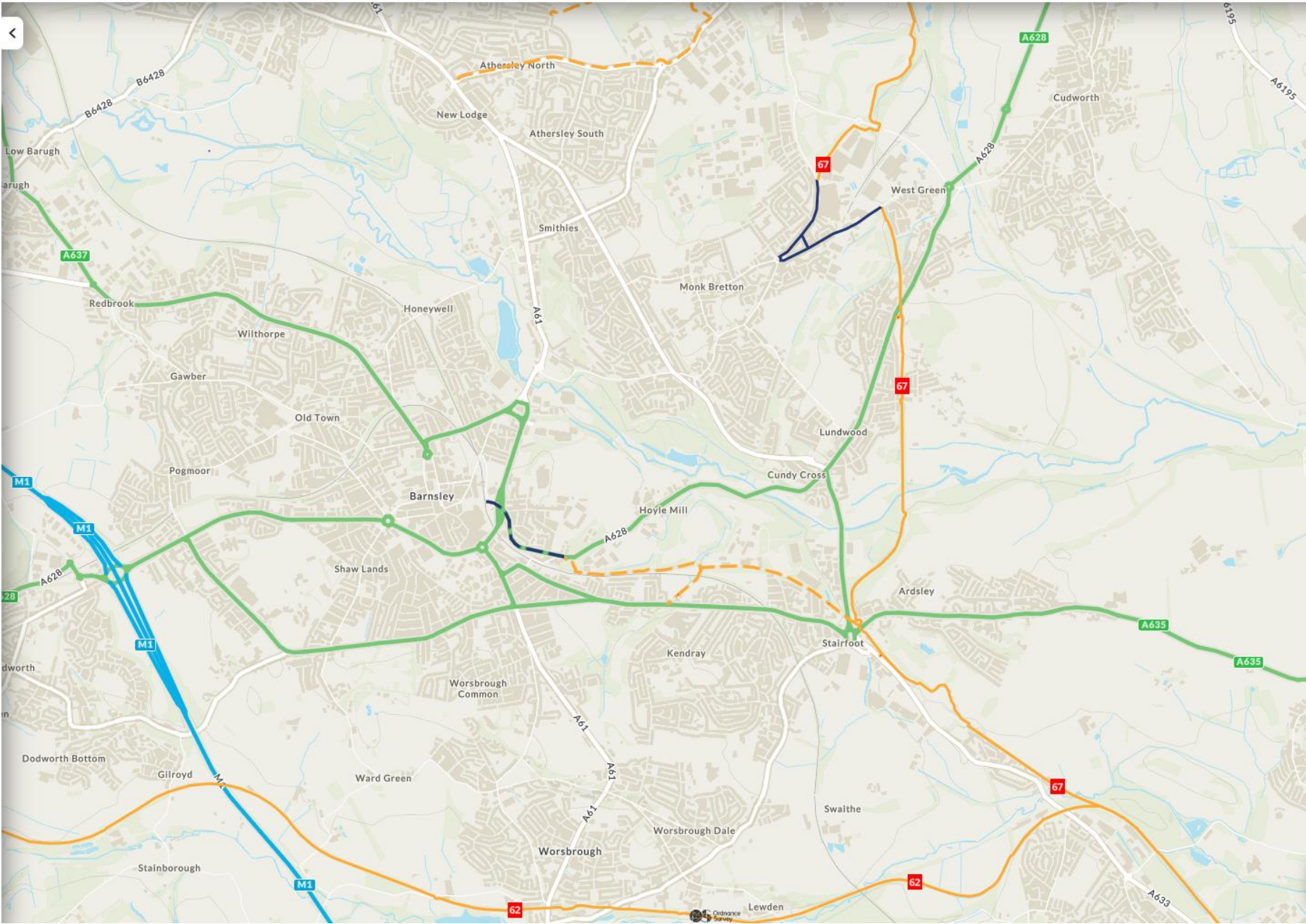
Appendix B

Cycle Map

Great Britain: National Cycle Network

National Cycle Network legend

- Traffic-free route on the National Cycle Network
- Traffic-free route (not on the National Cycle Network)
- On-road route on the National Cycle Network
- On-road route not on the National Cycle Network
- National Cycle Network route number



Appendix C

Local Bus Services

Route Number	Route	Weekday daytime services per hour (Mon- Fri)	Saturday daytime services per hour	Sunday daytime services per hour
1	Barnsley Interchange -Staincross- Barnsley Interchange	3	3	1
11	Barnsley Interchange -Athersley North Circular- Barnsley Interchange	3	3	1
12	Barnsley Interchange -Athersley South Circular- Barnsley Interchange-	3	3	1
36	Barnsley Interchange – South Elmsall	1 (8 services in the day)	1 (5 services in the day)	No Services
36	South Elmsall - Barnsley Interchange	1 (8 services in the day)	1 (5 services in the day)	No Services
37	Barnsley Interchange - Grimethorpe	1 (7 services in the day – Mon & Thurs only)	No Services	No Services
37	Grimethorpe – Barnsley Interchange	1 (7 services in the day – Mon & Thurs only)	No Services	No Services
57	Barnsley Interchange – Wakefield Bus Station	2	2	No Services
59/59a	Barnsley Interchange – Wakefield Bus Station	2	2	2
59/59a	Wakefield Bus Station – Barnsley Interchange	1	1	1
478	Wakefield Road / Smithies Lane – Kingstone (School Service)	2 (4 services in the day)	No Service	No Service

478	Kingstone – Wakefield Road / Smithies Lane	2 (4 services in the day)	No Service	No Service
488	Monk Bretton – Kexborough	1 service in the day	No Service	No Service
488	Kexborough - Monk Bretton	1 service in the day	No Service	No Service
489	Barnsley - Kexborough	1 service in the day	No Service	No Service
489	Kexborough - Barnsley	1 service in the day	No Service	No Service

Appendix D

Accident Data Location Plan

Colour-coding by SEVERITY

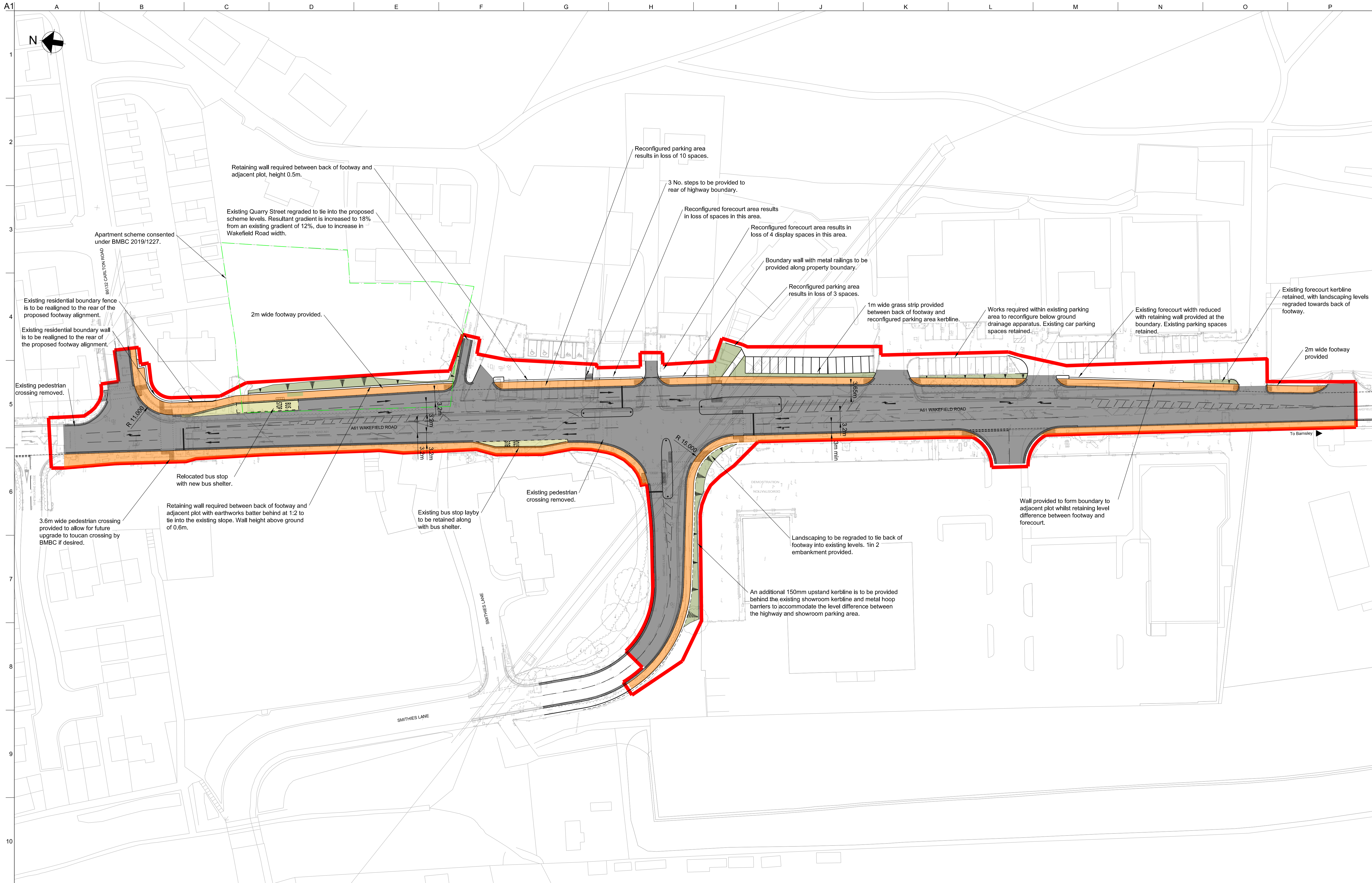
Total accidents (14)

- ✚ Fatal (0)
- Serious (3)
- ▲ Slight (11)



Appendix E

Proposed Highway Scheme Drawing



Key:

	Proposed carriageway		Apartment scheme consented under BMBC 2019/1227.
	Proposed bus stop		
	Proposed footway		
	Proposed landscaping		
	Planning boundary		

P04	01/12/21	OM	HJ	CW
Issued for Planning				

P03	23/08/21	SM	HJ	CW
For Information				
P02	06/07/21	SM	HJ	CW
For Information				
P01	07/05/21	SM	HJ	CW
For Information				
Issue	Date	By	Chkd	Appd

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Client
South Yorkshire Passenger
Transport Executive

Project Title
A61 Corridor

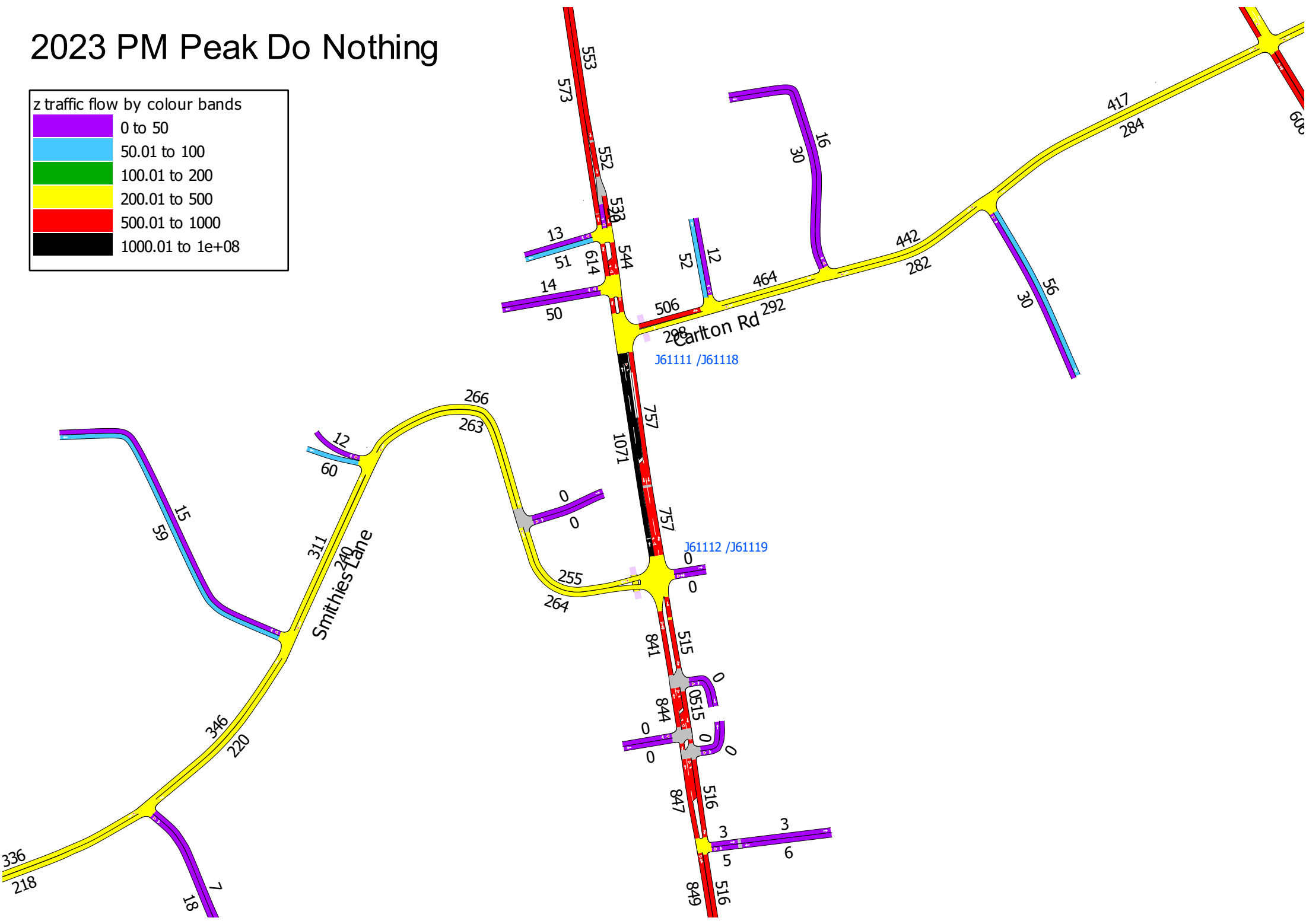
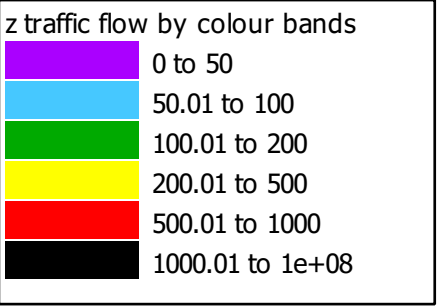
Drawing Title
Proposed Junction Improvements
Smithes Lane & Carlton Lane

Scale at A1	1:500
Role	Highways
Suitability	- S2 - Fit for information
Arup Job No	253511-00
Name	A61-ARUP-GY-XX-SK-CH-00021
Rev	P03

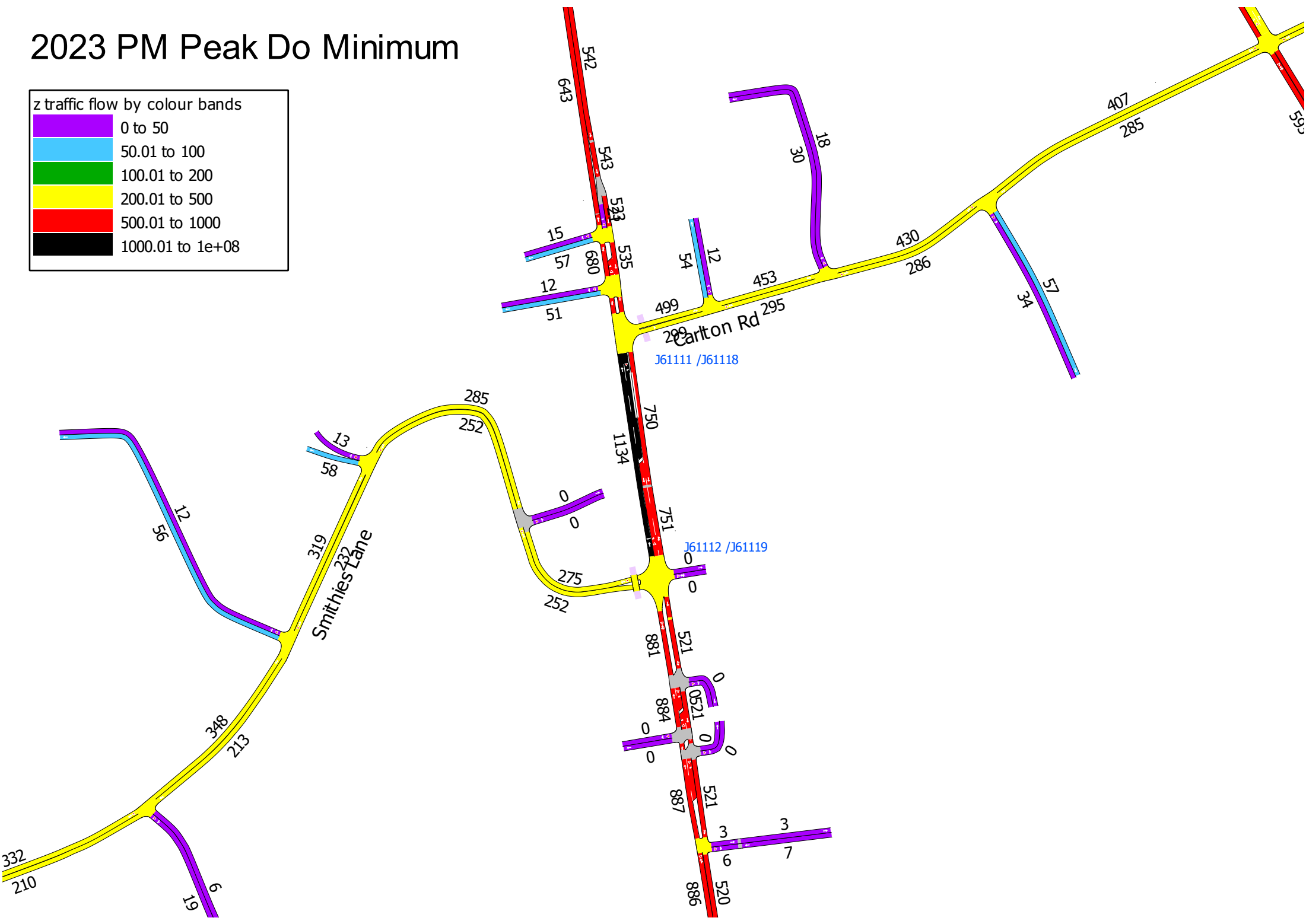
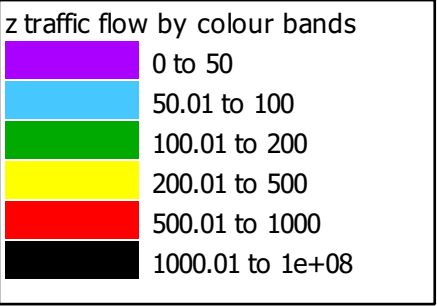
Appendix F

Model Traffic Flow Plots

2023 PM Peak Do Nothing



2023 PM Peak Do Minimum

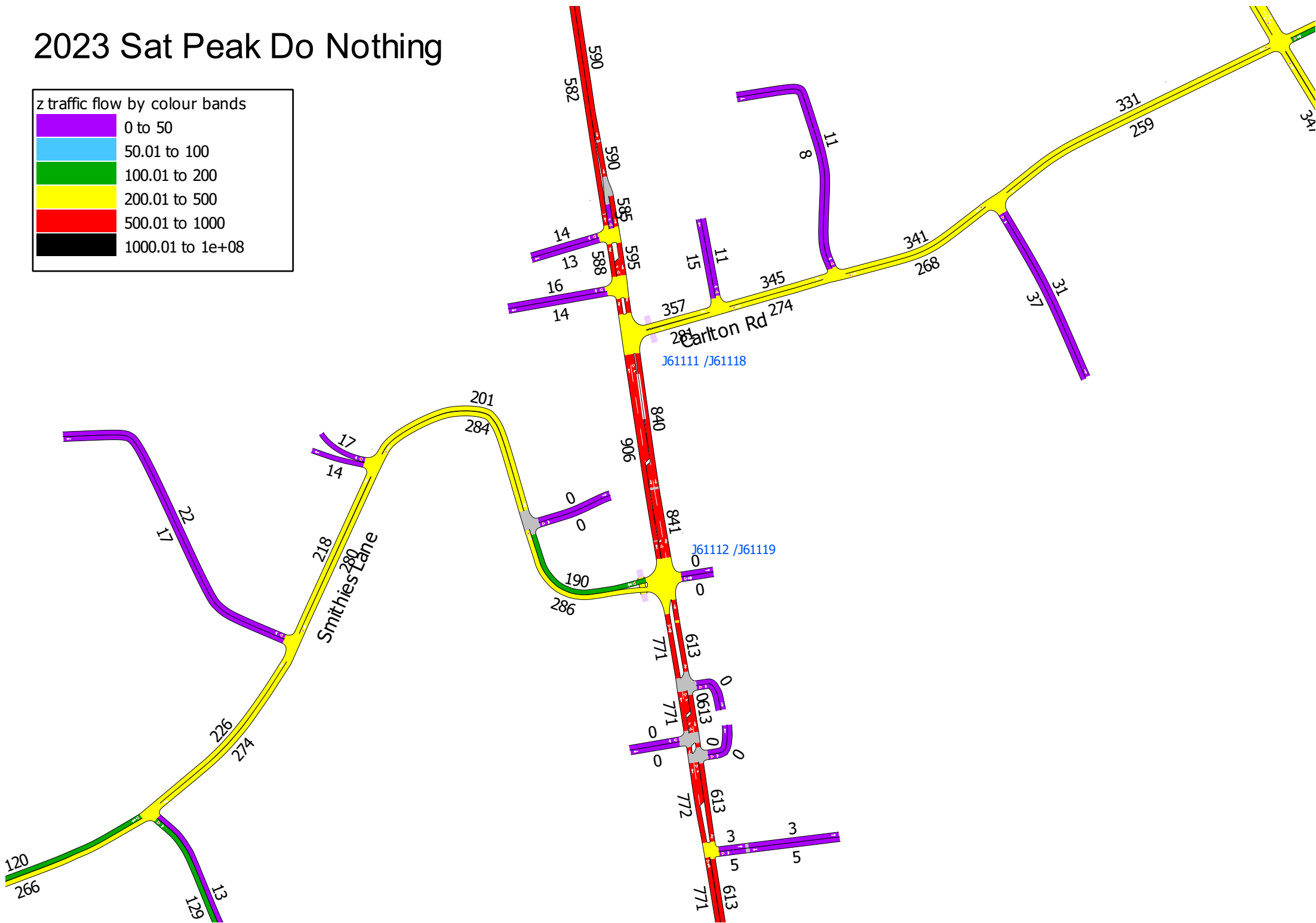
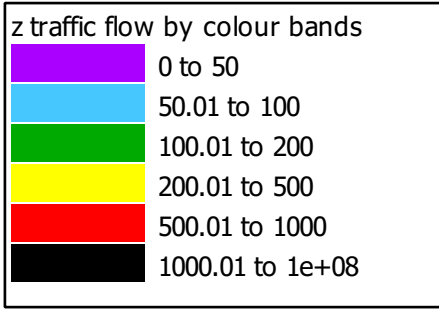


z traffic flow by colour bands

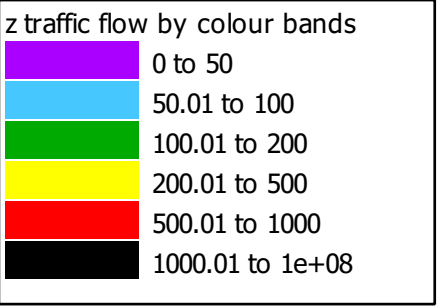
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	500.01 to 1000
	1000.01 to 1e+08



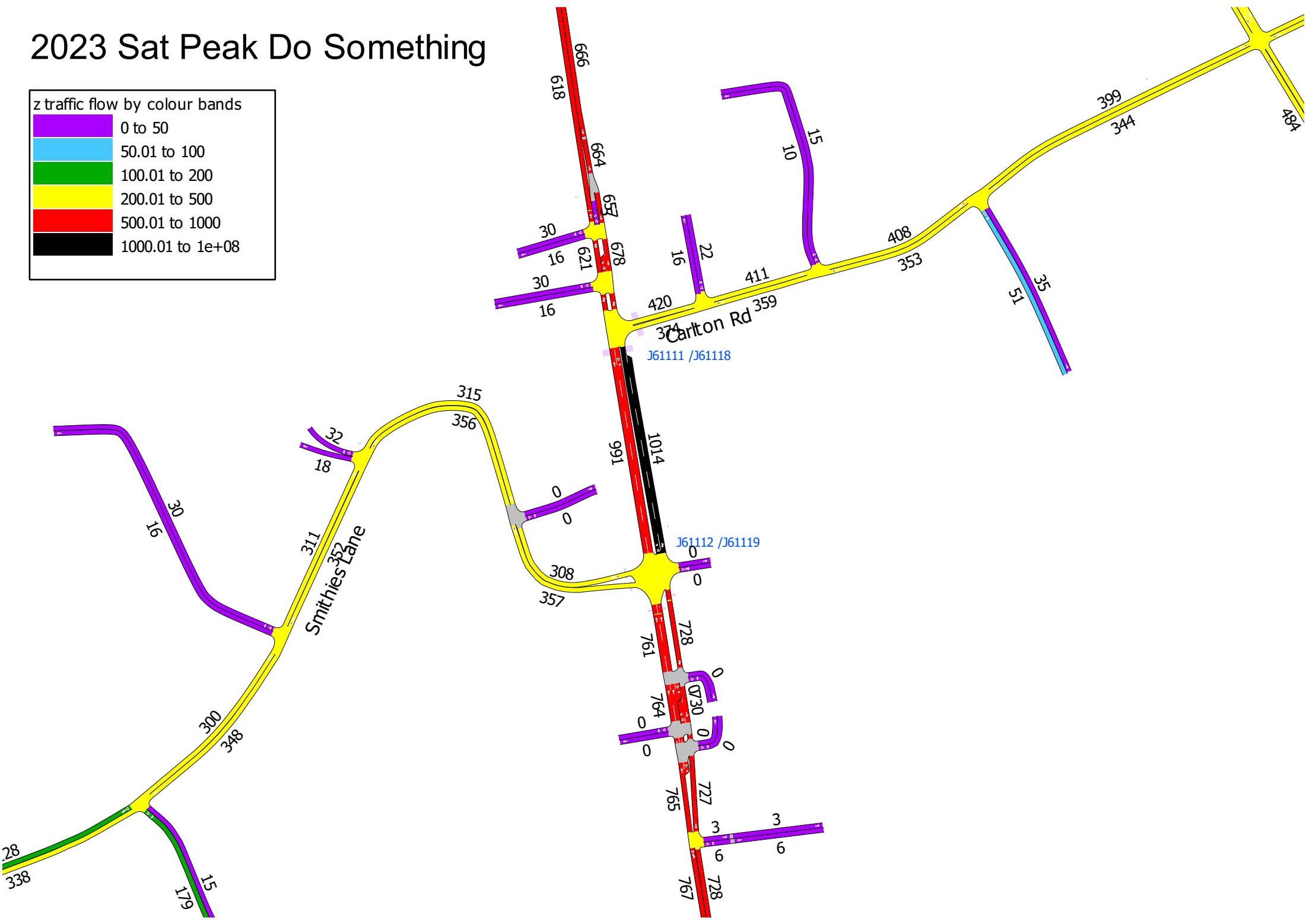
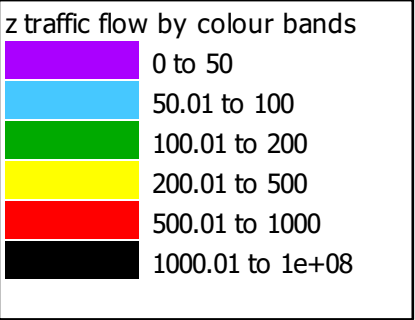
2023 Sat Peak Do Nothing



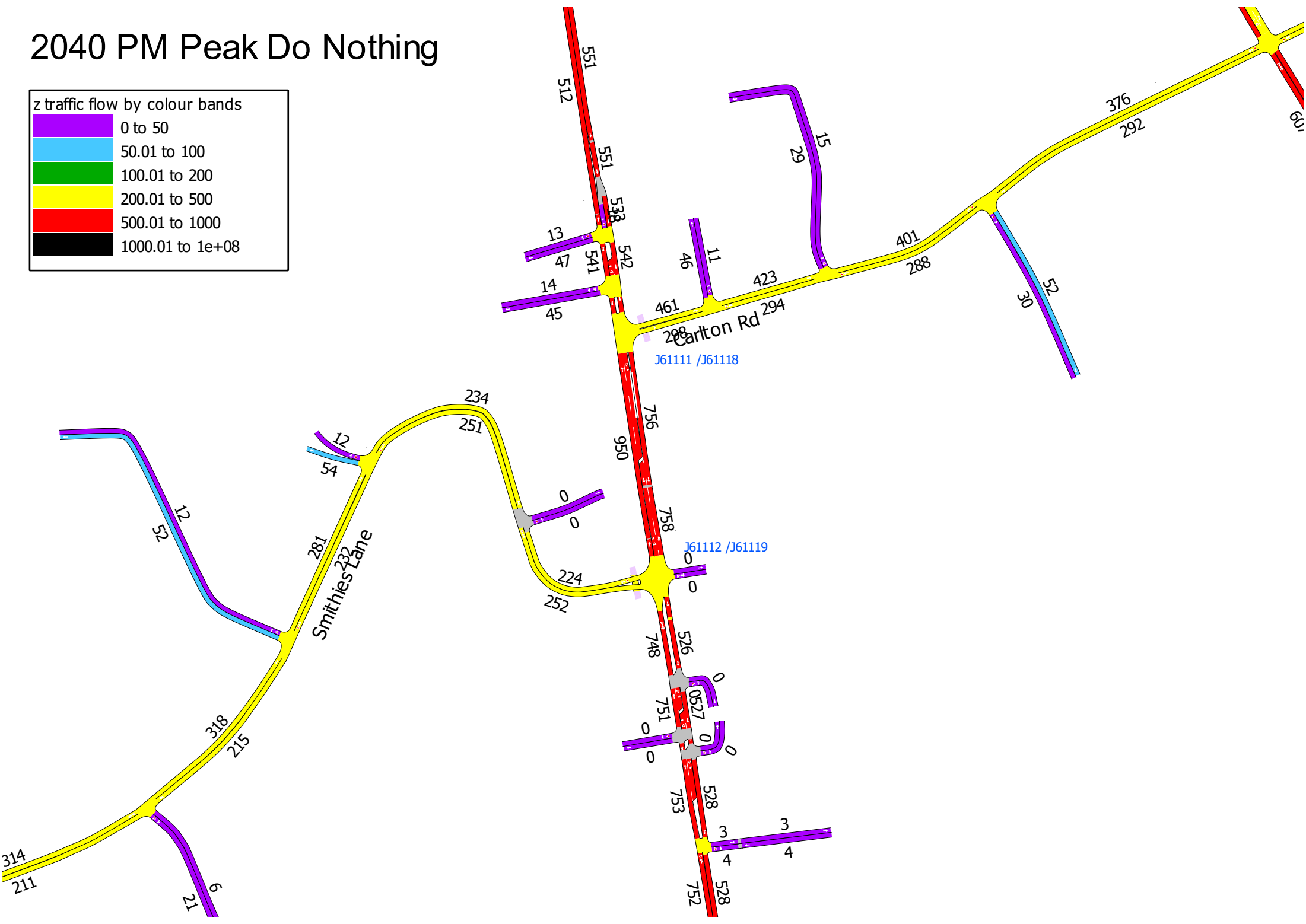
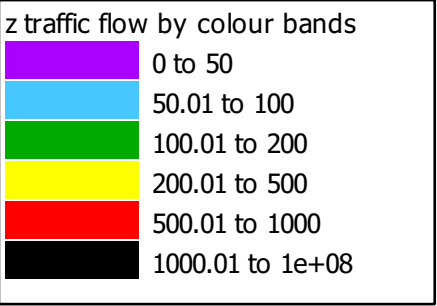
2023 Sat Peak Do Minimum



2023 Sat Peak Do Something

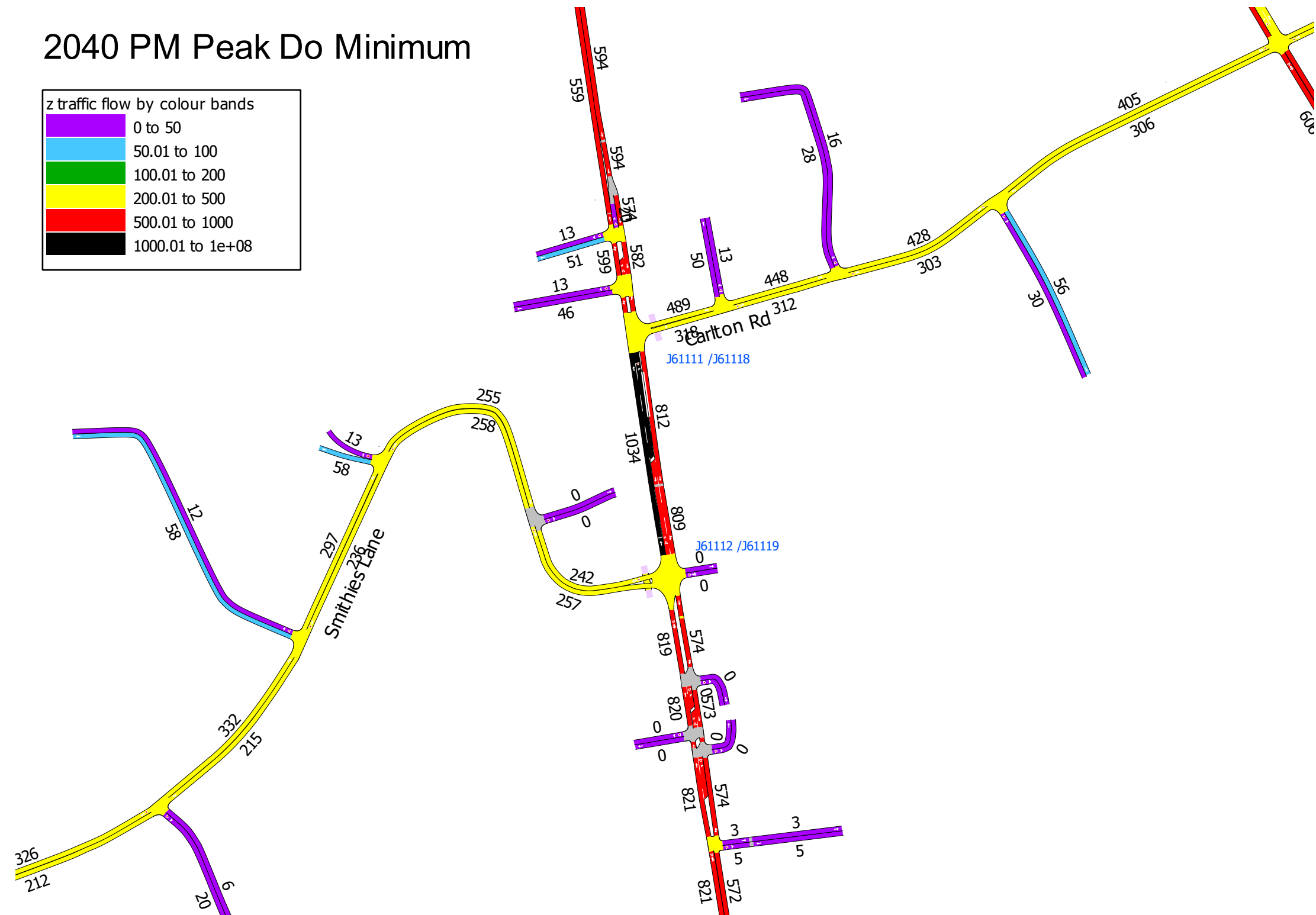


2040 PM Peak Do Nothing

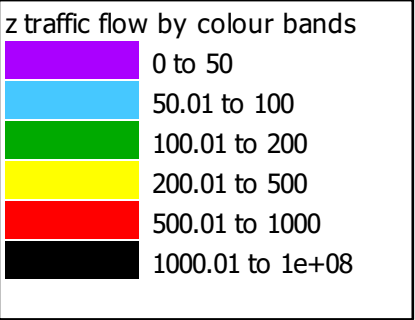


z traffic flow by colour bands

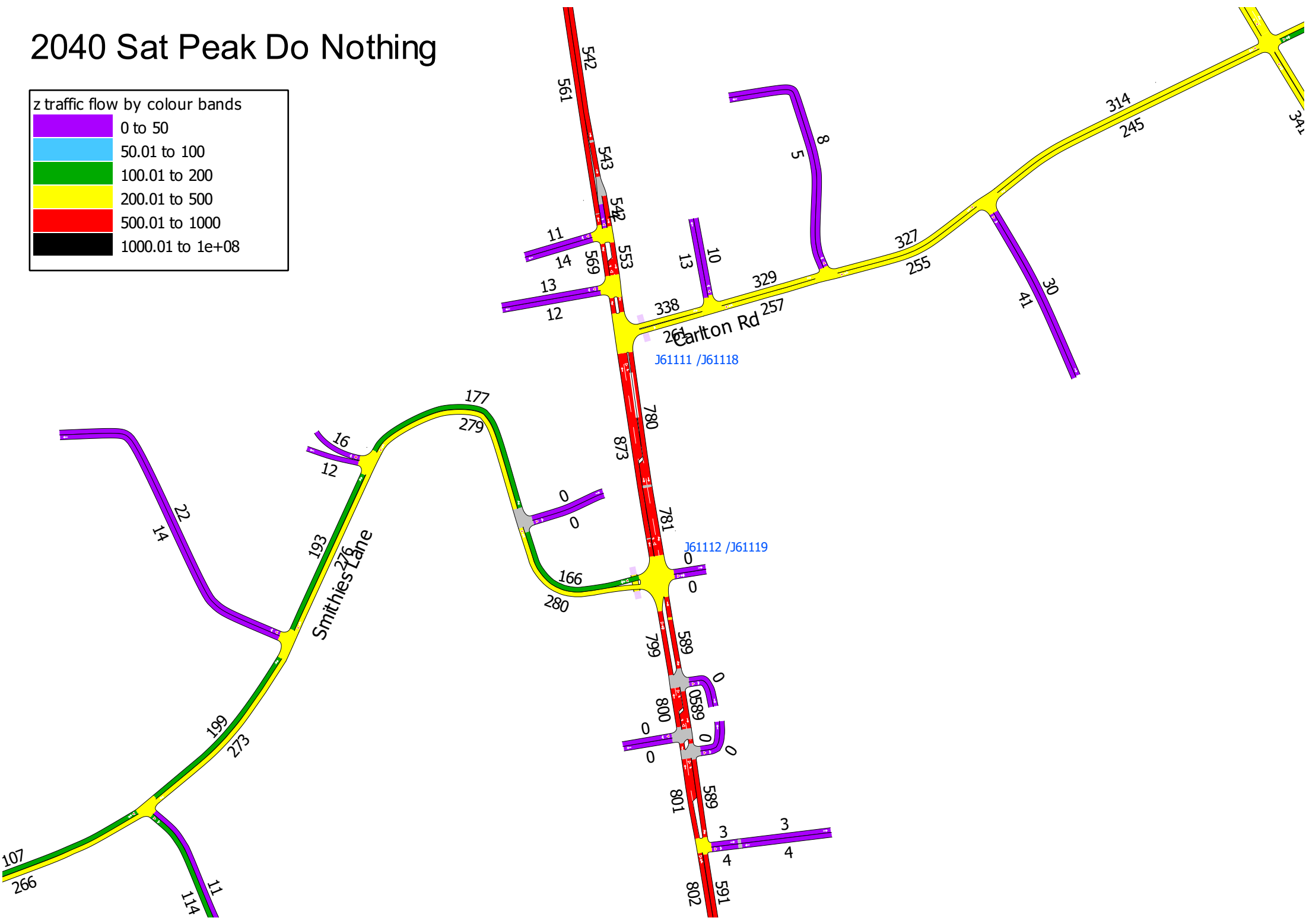
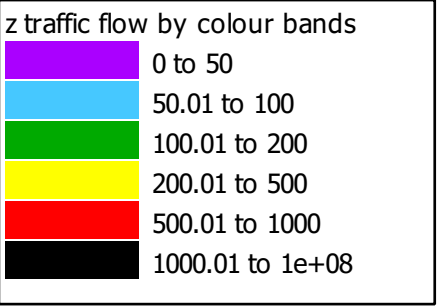
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2040 PM Peak Do Something

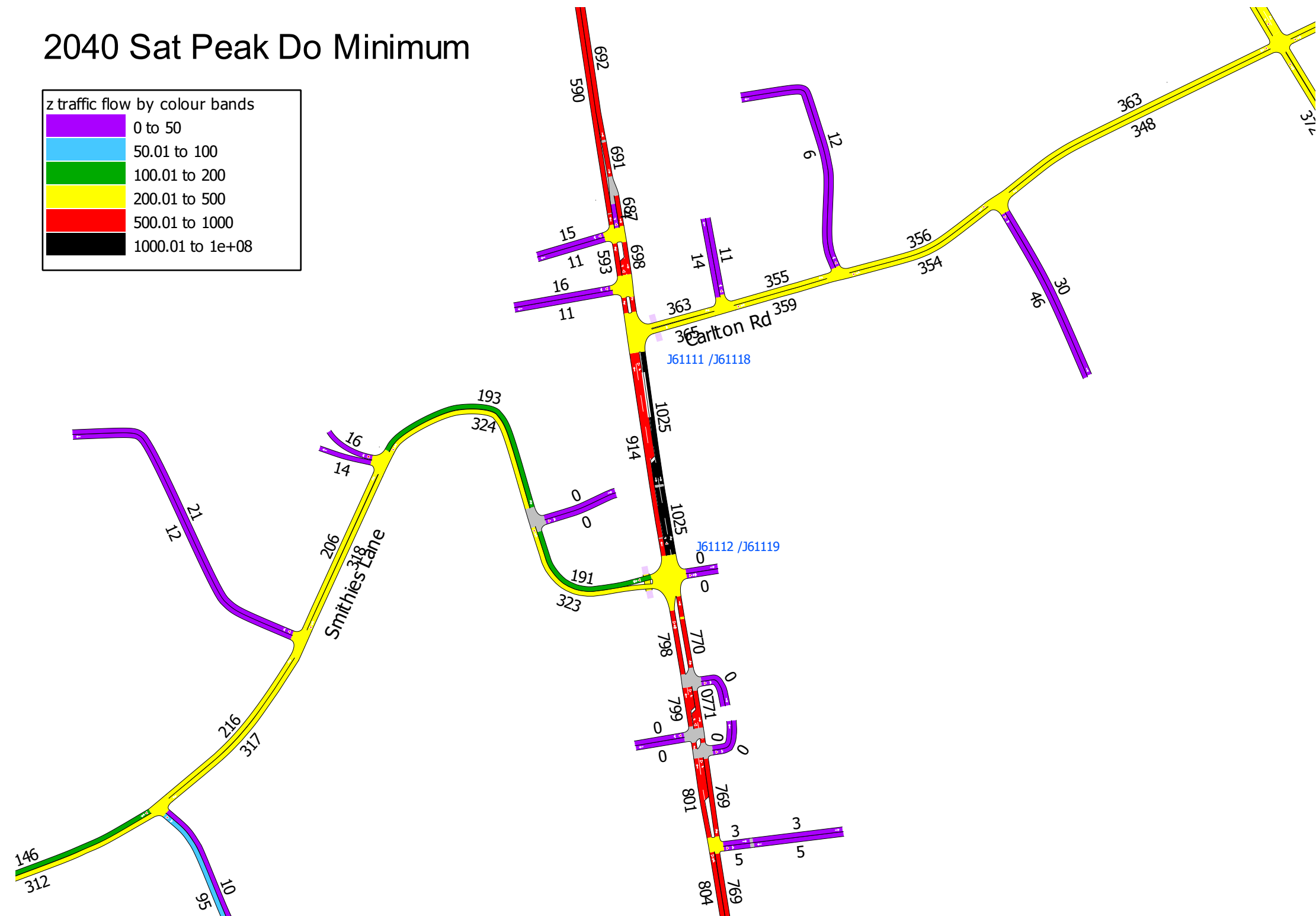


2040 Sat Peak Do Nothing



z traffic flow by colour bands

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	100.01 to 200
	200.01 to 500
	500.01 to 1000
	1000.01 to 1e+08



2040 Sat Peak Do Something

