national highways

A27 Worthing and Lancing improvements scheme

Staged Overview of Assessment Report (SOAR)

February 2023

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Introduction

The A27 is the only east to west trunk road south of the M25, linking Portsmouth, Southampton and south-west England with Brighton, Eastbourne and Dover. The A27 is predominantly a dual carriageway, but there are a number of single carriageway sections, such as through Worthing and Lancing, which suffer from congestion and below average journey times.

The A27 Worthing and Lancing Improvements scheme is proposing a series of online interventions at junctions and key sections of the A27 through Worthing and Lancing, to address congestion and associated dis-benefits such as journey time, journey reliability and safety.

The scheme was originally part of Roads Investment Strategy 1 (RIS1) but was cancelled in 2018 before the Preferred Route Announcement, as its statutory consultation received 76% opposition. Proposed improvements to the A27 at Worthing and Lancing were re-announced within RIS2 (2020-25). This new iteration of the scheme features a smaller budget, revised objectives, and a simplified RIS statement:

“A package of enhancements between Worthing and Lancing to improve the capacity and flow of traffic.”

Document purpose

The Staged Overview of Assessment Report (SOAR) gives an overview of the technical and policy analysis (including traffic, economic, safety, operational, technology, maintenance and both environmental assessment and appraisal), and provides the basis for deciding which options should be included in the Options Consultation.

Need for intervention

There are many longstanding issues on the stretch of the A27 through Worthing and Lancing. This includes high levels of congestion during peak hour travel, leading to consequential impacts upon journey time reliability across the corridor. Demand exceeds capacity at a number of junctions within the single carriageway section of the A27 between Offington Corner and Sompting Road, acting as a series of bottlenecks. This results in some traffic diverting away from the A27 onto the local road network, creating ‘rat-running’ routes, with associated safety concerns and local air quality challenges. Longer-distance trips also re-route via the A29 / B2139 / A283 directly through the South Downs National Park (SDNP).

The proposed scheme will help address some specific issues of congestion and help smooth the flow of traffic along the A27, making journeys safer and more reliable. Given the reduced scope of the scheme from the original 2017 proposals, it is not intended to address all current and forecast capacity issues; rather to address specific areas of strategic road network (SRN) performance for both local and strategic movements, whilst also supporting active travel modes.

Scheme objectives

Aligned with National Highways' Strategic Business Plan, five objectives have been identified and used to guide the progression of the scheme. These are:

- Improve road safety for all on the A27 and alternative local road network in the Worthing and Lancing areas (in line with 2025 and 2040 targets)
- Reduce delays and improve journey times for the Worthing and Lancing area
- Not impede future enhancements to transport in the scheme area
- Provide for alternative travel modes along the A27 and crossing the A27 in the Worthing and Lancing areas
- Ensure that the scheme does not result in any significant adverse environmental effects, and seek opportunities for enhancements

Options identification

After passing through a Strategy, Shaping and Prioritisation stage, that identified three potential concepts, the scheme is now at the Option Identification stage. The objective of this stage is to identify all potential options that could meet the scheme objectives, and to sift out those options that are likely to perform less well compared to others. As part of the option identification process, Mott MacDonald identified a total of 51 improvement interventions across key junctions and sections of the A27 within the scheme extents. These interventions were supported by an additional 18 non-SRN improvement interventions which were considered to offer additional benefits to the local community and complement the improvements identified on the A27.

Once a long-list of interventions had been identified, a two-stage sifting process was undertaken; the first step to sift out the options that were either wholly infeasible or failed to meet the scheme objectives, and the second to select those options identified as either best performing or otherwise warranting further assessment.

Conclusion

Following the completion of the sifting process and further assessment, the best performing interventions have been compiled into three individual delivery packages, termed options, which will be presented for consultation.

Option 1 proposes major improvement works to A27 Offington Corner Roundabout and A27 Grove Lodge Roundabout, as well as a review of the existing signalised crossing provision.

Option 2 proposes major improvement works to A27 Offington Corner Roundabout, and minor improvement works to A27 Grove Lodge Roundabout and A27 Lyons Way / Sompting Road Junction. Upper Brighton Road will be changed to a one-way road in the west to east direction, and existing signalised crossing provision will be reviewed.

Option 3 proposes major improvement works to A27 Offington Corner Roundabout and minor improvement works to A27 Grove Lodge Roundabout and A27 Busticle Lane Junction. Upper Brighton Road will be changed to an eastbound only one-way street, and the existing signalised crossing provision will be reviewed.

Technological improvements and a new shared-use pedestrian and cyclist route will also be included in all three options.

Following Project Control Framework (PCF) Stage 1 (options identification stage), a non-statutory Stage 2 (options selection stage) consultation will be undertaken to select a preferred option. The precise timing for the Stage 2 options consultation is yet to be agreed.

Stage 2 involves preparing and managing the options public consultation, including a six-week period in which the options consultation will take place. The results of this consultation will then be analysed to inform the way forward. Following this, the design will be refined as appropriate, and a preferred option will be identified ahead of the preferred option announcement in 2023.

1. Introduction

1.1. Project background

The A27 is the only east to west trunk road south of the M25, linking Portsmouth, Southampton and south-west England with Brighton, Eastbourne and Dover to the east, via the A259. Although predominantly a dual carriageway, there are a number of single carriageway sections – including the section through Worthing and Lancing. As a result, this section of the A27, along with others (e.g. at Arundel) suffers from congestion and below average journey times.

There are many longstanding issues on the stretch of the A27 through Worthing and Lancing. This includes high levels of congestion during peak hour travel, leading to consequential impacts upon journey time reliability across the corridor. Demand exceeds capacity at a number of junctions within the single carriageway section of the A27 between Offington Corner and Sompting Road, acting as a series of bottlenecks. This results in some traffic diverting away from the A27 onto the local road network, creating 'rat-running' routes, with associated safety concerns and local air quality challenges. Longer-distance trips also re-route via the A29 / B2139 / A283 directly through the South Downs National Park (SDNP).

Figure 1-1: Worthing and Lancing Improvements scheme extents

Source: Mott MacDonald. Contains Ordnance Survey data Crown copyright and database right (2021)

As part of National Highways Road Investment Strategy 1 (RIS1) a 9.5km improvement scheme was proposed along the A27 through Worthing and Lancing, the extents of which are shown on Figure 1-1 above.

The scheme identified key junctions along the route which were operating above capacity during peak times, resulting in long traffic queues and impairing the efficiency of the A27.

A single online option (Option 1) was developed, which proposed improvements to six junctions along the A27 between Castle Goring (west of Worthing) and the A27/Grinstead Lane roundabout (east of Lancing). The option was taken to public consultation between July and September 2017 but was opposed by 76% of those who responded. Due to the lack of stakeholder and public support the RIS1 project was paused in November 2018 and following a period of inactivity was returned to National Highways' Project Control Framework (PCF) Stage 0 in September 2020.

The approach to the option appraisal during PCF Stage 0 focused on informal stakeholder engagement and the concept of indicative delivery packages. A longlist of 58 interventions were grouped together by theme into one of four strategies, identified at various Stage 0 workshops. Several interventions were selected from each strategy to help build potential packages of measures, based on their likely performance against pre-defined scheme objectives.

The scheme achieved a green outcome at the Stage Gate Assessment Review 0 (SGAR 0) on 25 January 2021 and an amber outcome at a Project Assessment Review (PAR) held between 12-14 January 2021. The scheme has been adopted by Mott MacDonald for progression through Phase 1 of the PCF lifecycle which includes PCF Stage 1 and PCF Stage 2.

1.2. Project scope

Mott MacDonald were commissioned to assess the A27 at Worthing and Lancing in accordance with National Highways PCF Stage 1 and the requirements of the Transport Analysis Guidance (TAG) Transport Appraisal Process.

This involved identifying and understanding the root cause of the existing problems on the A27 and developing options to address the identified issues. These options were assessed from an environmental, traffic, economic and engineering perspective in order to understand their individual viability.

The assessment undertaken for each option will ultimately inform the business case and the identification of potential future schemes to take forward into Road Investment Strategy, 2nd Period (RIS2).

1.3. PCF context

National Highways Project Control Framework sets out the methodology for delivery of a major highways scheme. The process comprises eight stages, of which this scheme is currently in combined Stage 1 and 2, defined as follows:

- **Stage 0** (Strategy, Shaping and Prioritisation) – problem definition, scheme requirements and strategic business case
- **Stage 1** (Option Identification) – option identification and sifting out of options that are likely to perform less well compared to others
- **Stage 2** (Option Selection) – detailed option assessment and selection of the preferred option, including detailed public consultation on the options
- **Stage 3** (Preliminary Design) – scheme development including design of the preferred option in sufficient detail to produce draft orders and preparation of the Environmental Assessment
- **Stage 4** (Statutory Procedures and Powers) – gaining authority to construct the scheme through the normal statutory processes as laid down in legislation
- **Stage 5** (Construction Preparation) – procurement of the construction contractor and detailed design of the scheme
- **Stage 6** (Construction) – construction of the scheme
- **Stage 7** (Handover and Close-Out) – project close out

1.4. Purpose of the Staged Overview of Assessment Report

The Staged Overview of Assessment Report (SOAR) is a document intended to give an overview of the development of a scheme through each of its earliest stages. It is intended as a summary of the underlying work that is accessible to all audiences. Its precise composition varies slightly by design stage, with the length and detail of some elements changing in some stages. In this stage the SOAR is intended to give an overview of the technical and policy analysis, summarise the development of the shortlisted options, and provide the basis for deciding the preferred option for construction.

2. Summary of the current and future conditions

2.1. Overview of area

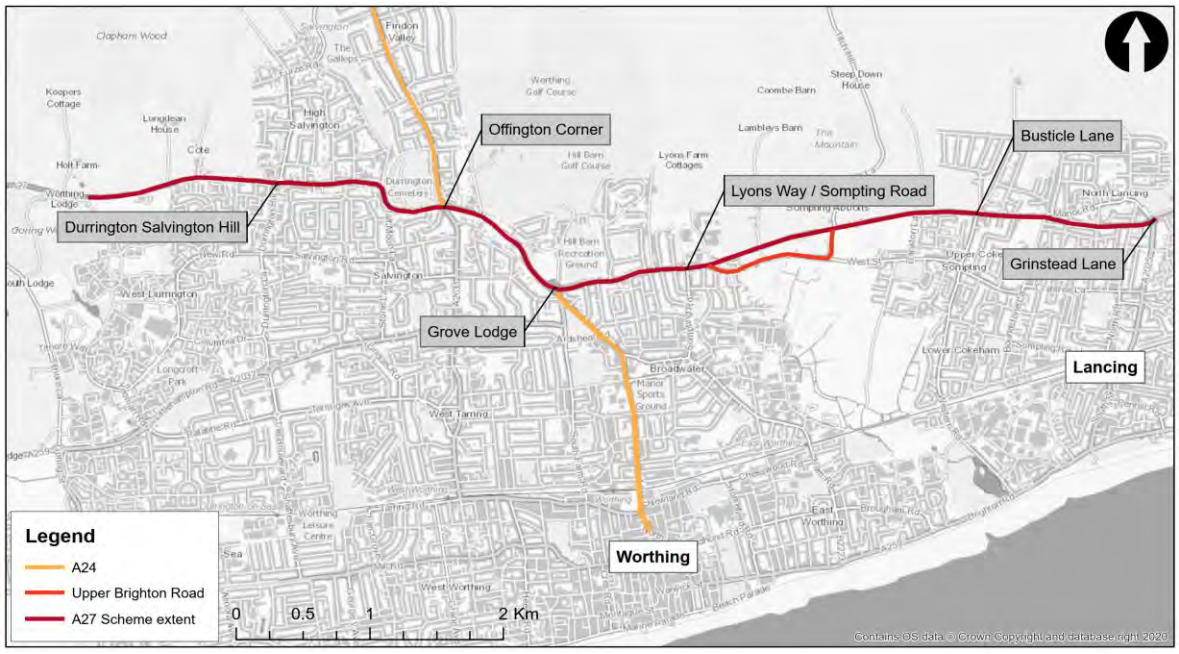
2.1.1. Description of locality

The 9.5km section of the A27 assessed by the consultant runs through the coastal districts of Arun and Adur, and the borough of Worthing, within West Sussex. The town of Worthing, and the villages of Sompting and Lancing are located on the coast immediately south of the scheme extents. There are several neighbourhoods within the Worthing borough which are located adjacent to the A27, including High Salvington and West Durrington at the western end of the scheme, which lie to the north and south of the A27 respectively.

The land immediately surrounding the A27 within the scheme extents is predominantly residential. The South Downs National Park lies to the north and borders the majority of the A27, whilst the land to the south is more urbanised and overlooks the English Channel.

The area near the scheme is shown in Figure 2-1

Figure 2-1: Detailed area project location plan

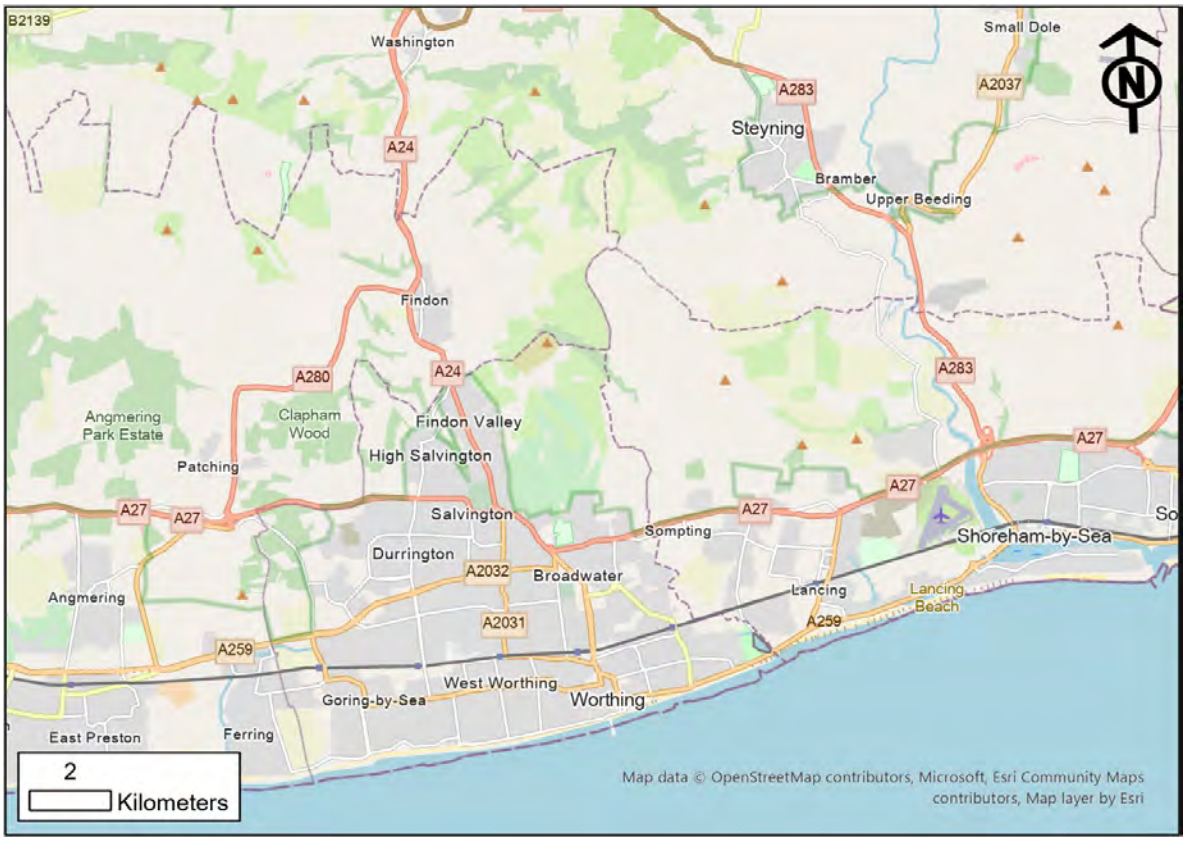


Source: Mott MacDonald. Contains Ordnance Survey data Crown copyright and database right (2021)

2.1.2. Existing highway network

The existing highway network in the vicinity of the scheme is shown in Figure 2-2.

Figure 2-2: Existing highway network



Source: Mott MacDonald. Contains OpenStreetMap data

2.1.2.1. Strategic roads

The strategic road network (SRN) in England consists of motorways and the most significant 'A' roads which link key urban centres and provide inter-regional connectivity. It represents around 2% of all roads in England by length but carries a third of all traffic by mileage. The SRN is managed, maintained, and improved by National Highways on behalf of the Secretary of State.

The A27 is the only strategic road within the scheme study area. It is the only east to west trunk road south of the M25 and runs from Pevensey near Eastbourne in the east to Portsmouth in the west, where it becomes the M27 and continues west past Southampton. As well as Eastbourne and Portsmouth it links several cities and towns along the south coast, including Havant, Chichester, Arundel, Worthing, Lancing, Brighton, and Lewes, and also provides access to the ports at Portsmouth and Newhaven.

The majority of the A27 is a two-lane dual carriageway but narrows to a single carriageway through Worthing and Lancing, where the speed limit is reduced from

70mph to 40mph. The single carriageway section experiences significant peak hour congestion which is exacerbated by the number of local access points, which include local road junctions and direct property accesses. These allow a high number of local access movements during peak times which impair the strategic performance of the route.

2.1.2.2. Local roads

There are numerous local roads which connect to the A27 within the study area, but those which are considered 'key' and have been considered in the proposed junction improvements are listed in Table 2-1.

Table 2-1: Key local roads within scheme extents

Road Name	Junction Type
Durrington Hill	At-grade priority junction
Salvington Hill	At-grade priority junction
Goodwood Road	Roundabout – Offington Corner
Findon Road (A24)	Roundabout – Offington Corner
Offington Lane	Roundabout – Offington Corner
Broadwater Street West (A24)	Roundabout – Grove Lodge
Hill Barn Lane	Roundabout – Grove Lodge
Pines Avenue	At-grade priority junction
Hadley Avenue	At-grade priority junction
Sompting Road	Signal controlled crossroads
Gainsborough Avenue	At-grade priority junction
Upper Brighton Road	Signal controlled crossroads
Lyons Way	Signal controlled crossroads
Church Lane	At-grade priority junction
Busticle Lane	Signal controlled crossroads
Halewick Lane	Signal controlled crossroads
Grinstead Lane	Roundabout – Grinstead Lane
Manor Road	Roundabout – Grinstead Lane

All junctions on the A27 within the scheme extents are at-grade and the majority are simple priority providing access to residential areas. There are three roundabouts: Offington Corner, Grove Lodge, and Grinstead Lane, all of which have been considered for improvement.

2.1.3. Topography

The land to the south of the A27 is mostly flat and falls towards the sea, whereas the land to the north is typically more undulant, especially within the South Downs National Park which features several named hills. The A27 itself falls gradually from west to east throughout the scheme extents.

To the east of the scheme, the River Adur flows from Henfield to join the Channel at Shoreham-by-Sea, and the River Arun flows from Horsham to Littlehampton to the west.

2.1.4. Land use, property and industry

The South Downs National Park borders the northern side of the A27 throughout the scheme extents. In general, it features a mixture of agricultural and forested land, but areas have been claimed for residential development around Worthing and Lancing. The land to the south of the A27 is more urbanised and typical of a UK coastal town.

The A27 is fronted by private dwellings on both sides throughout the majority of the scheme extents, with numerous direct accesses connecting them to the road. The NHS Sussex Partnership Foundation Trust's Swandean site is located adjacent to the A27/Salvington Hill junction at the western end of the scheme, which comprises several medical and training facilities. Durrington Cemetery (Worthing's main site for burials) is located to the immediate north-west of Offington Corner roundabout, and Worthing College, which includes extensive outdoor sports grounds, is located immediately north of Grove Lodge roundabout. There is a large retail complex at the A27/Lyons Way junction comprised of Lyons Farm/Red Square Retail Park and Downland Business Park which includes a supermarket and petrol station amongst other stores and businesses.

2.2. Traffic conditions

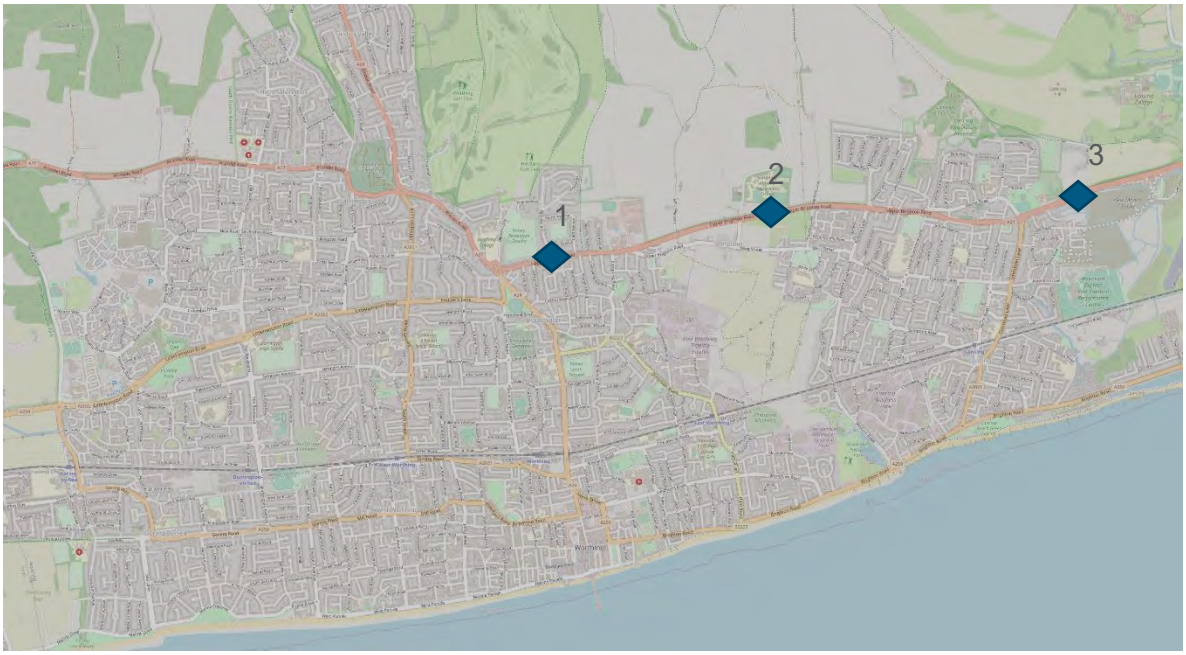
2.2.1. Existing traffic conditions

The A27 through Worthing and Lancing is identified as a section of one of the busiest trunk roads between Portsmouth and Lewes. It carries a triple function. Firstly, it serves as a strategic route for long distance traffic and is the only east to west road south of the M25.

Secondly, there are also a high number of local traffic movements to education, retail, and other amenities as well as commuting trips in and out of Worthing and Lancing from nearby areas. Thirdly, the road provides a residential access route for the surrounding urban areas located to the north and south of the A27.

Continuous traffic data was analysed from National Highways WebTris data with the locations shown in Figure 2-3 below.

Figure 2-3: Continuous count data locations

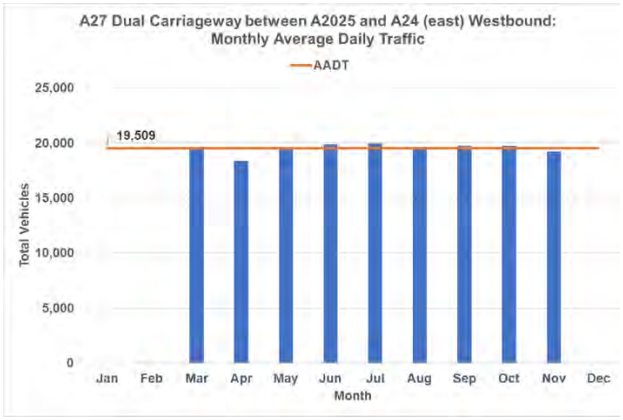


Source: Webtris

While location 1 represents a section of single carriageway locations 2 and 3 are along stretches of dual carriageway. The capacity of each impact on the volumes observed.

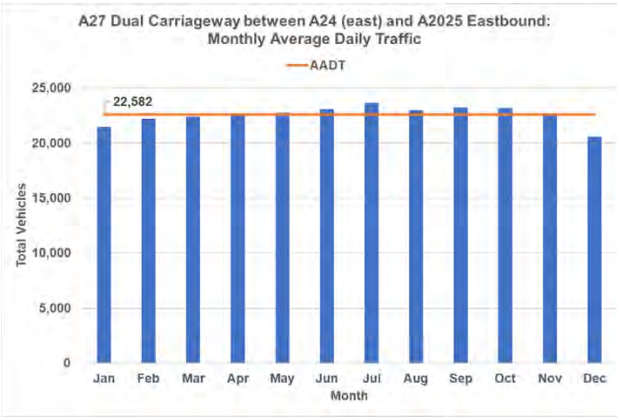
The cleaned data available for 2019 for locations 1 and 2 were analysed for annual trends, volumes by travel direction and differences between the count locations. These are shown in Figure 2-4 to Figure 2-7.

Figure 2-4: Monthly average daily traffic for westbound dual carriageway (2019)



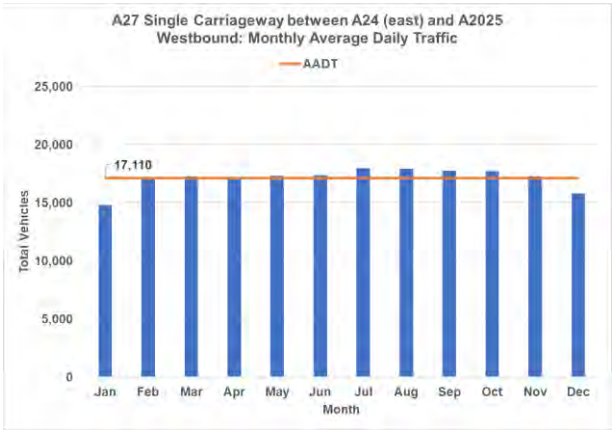
Source: WebTRIS/Mott MacDonald

Figure 2-5: Monthly average daily traffic for eastbound dual carriageway (2019)



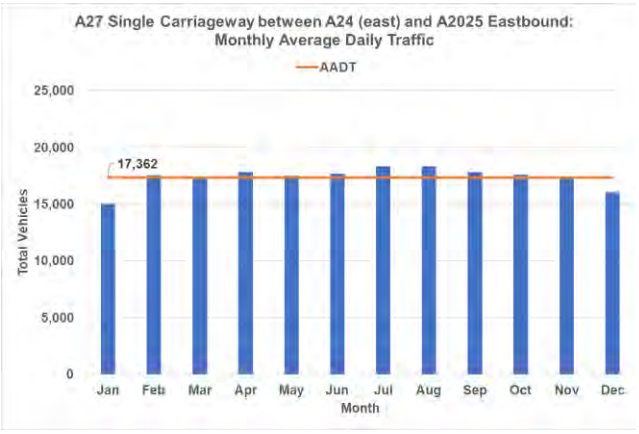
Source: WebTRIS/Mott MacDonald

Figure 2-6: Monthly average daily traffic for westbound single carriageway (2019)



Source: WebTRIS/Mott MacDonald

Figure 2-7: Monthly average daily traffic for eastbound single carriageway (2019)

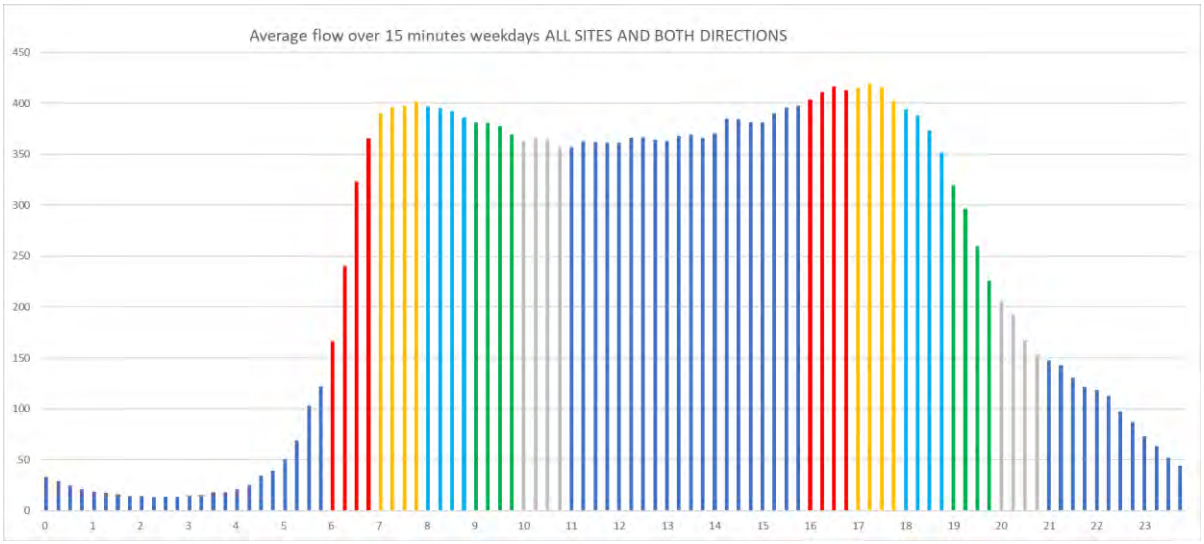


Source: WebTRIS/Mott MacDonald

The graphs show daily traffic volumes of over 22,000 for the dual carriageway section and over 17,000 for the single carriageway section. It is apparent that there is little difference comparing the traffic volumes across the year. Directional traffic levels along the single carriageway are similar eastbound and westbound, while along the dual section traffic is about 20% higher eastbound than westbound. This may be the result of westbound traffic diverting away from the trunk road to avoid delays using urban road sections as 'rat-run' routes instead.

Further the daily traffic volume pattern was assessed using all count locations combined. These are shown in Figure 2-8 for each 15-minute section across the day.

Figure 2-8: Daily traffic volumes

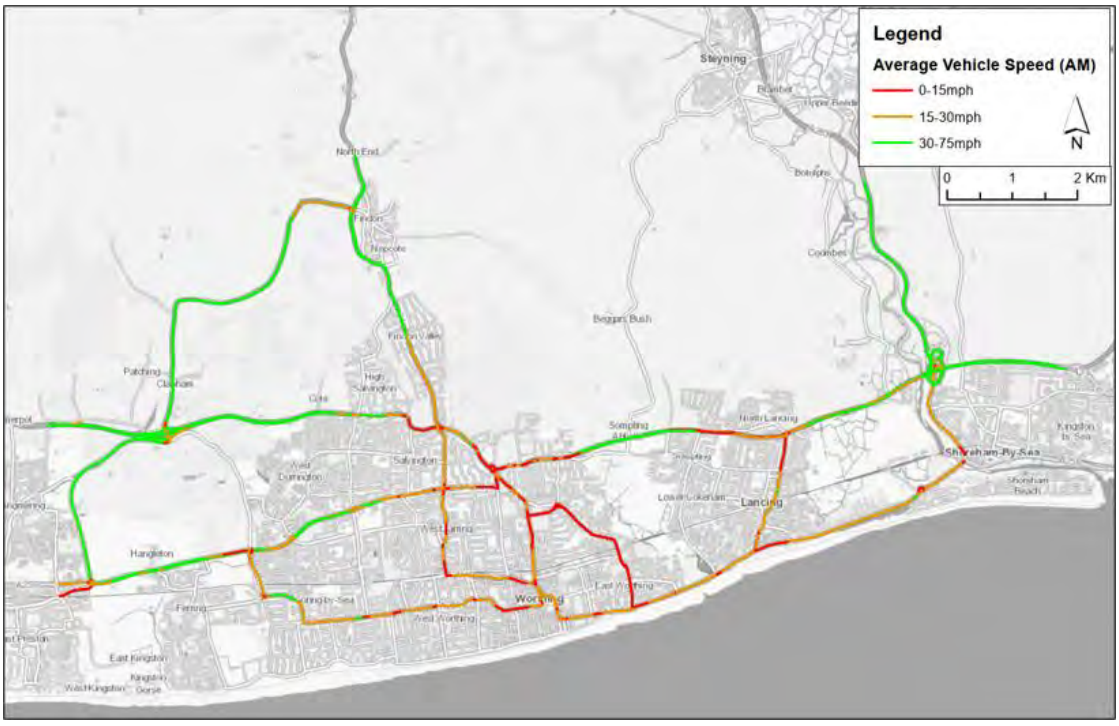


Source: Mott MacDonald

The figure shows the main peak time during the morning occurs between 7am and 9am while the evening peak occurs between 4pm and 6pm. Traffic volumes during the inter-peak only reduce by about 13% compared to the peaks indicating continuously high traffic volumes.

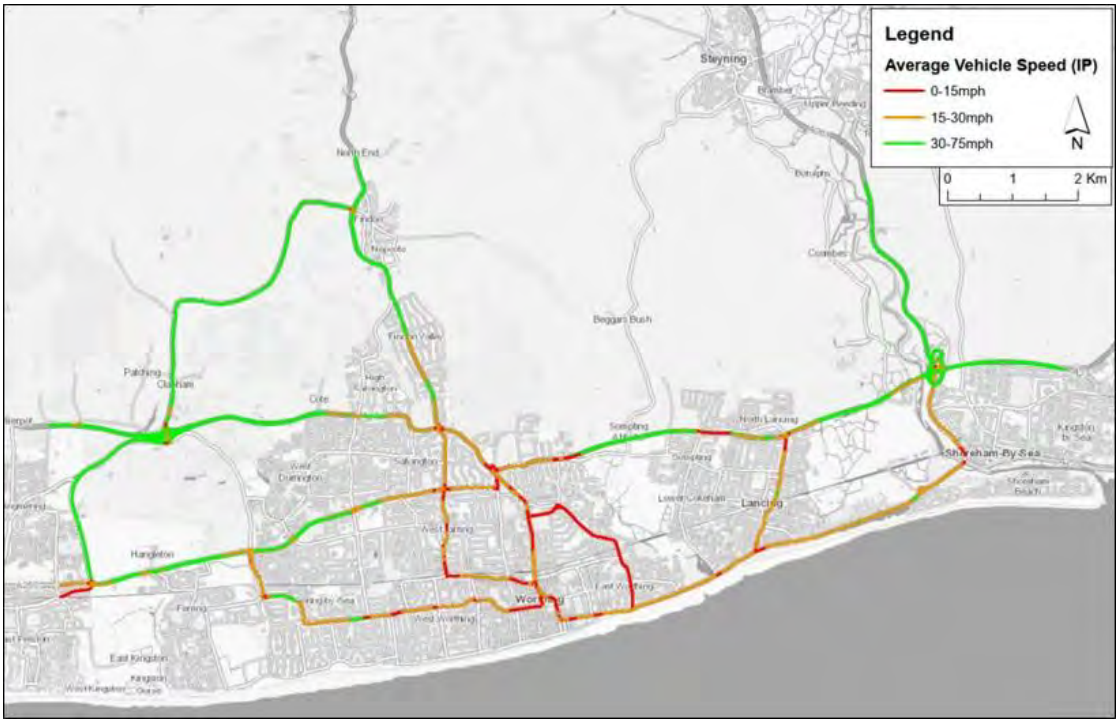
Because of the combination of dual carriageway sections and single sections along the scheme corridor traffic volumes vary and lead to pinch points. Further, there are several junctions along the A27 with other main roads such as the A24 or A2025 and signalised junctions, which ensure safe access for side roads, that have high volumes of traffic. These also create pinch points for traffic moving along the A27 in Worthing and Lancing. Delays occur at several of these locations as shown for each time period by Figure 2-9 to Figure 2-11 outlining the travel speeds across the corridor.

Figure 2-9: Average vehicle speeds in the AM period



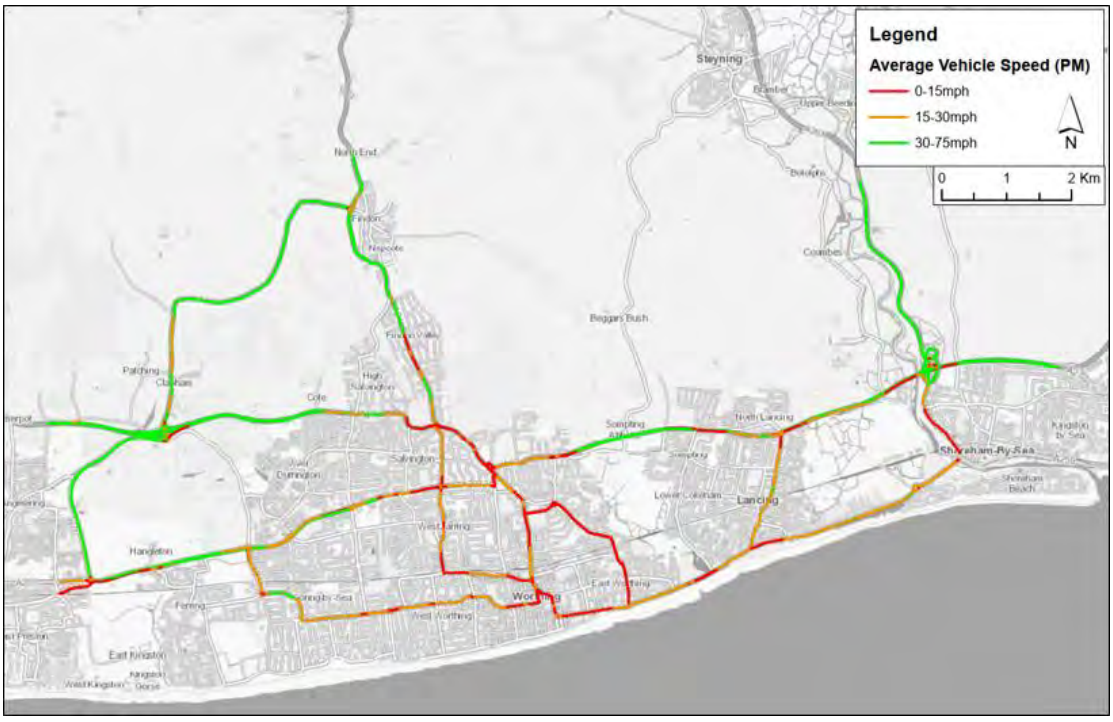
Source: Mott MacDonald

Figure 2-10: Average vehicle speeds in the inter-peak period



Source: Mott MacDonald

Figure 2-11: Average vehicle speeds in the PM period



Source: Mott MacDonald

Although vehicle speeds are expected to be lower in the urban areas it is noticeable that there are several sections along the A27 where speed reduces to less than 15mph in particular during the AM and PM peak periods. This includes the single carriageway section from west of Offington Corner roundabout to Lyons Farm and the sections around Busticle Lane junction and Grinstead roundabout.

During the inter-peak the slower speeds along the A27 are observed mainly through the two signalised junctions at Lyons Farm retail park where high volumes of traffic enter and exit the retail park during this period.

Junctions turning count data at these locations was most recently collected during 2015. The volumes entering the junctions for each time period are shown Figure 2-12 to Figure 2-14 below.

Figure 2-12: Observed junction turning flows 2015 AM period

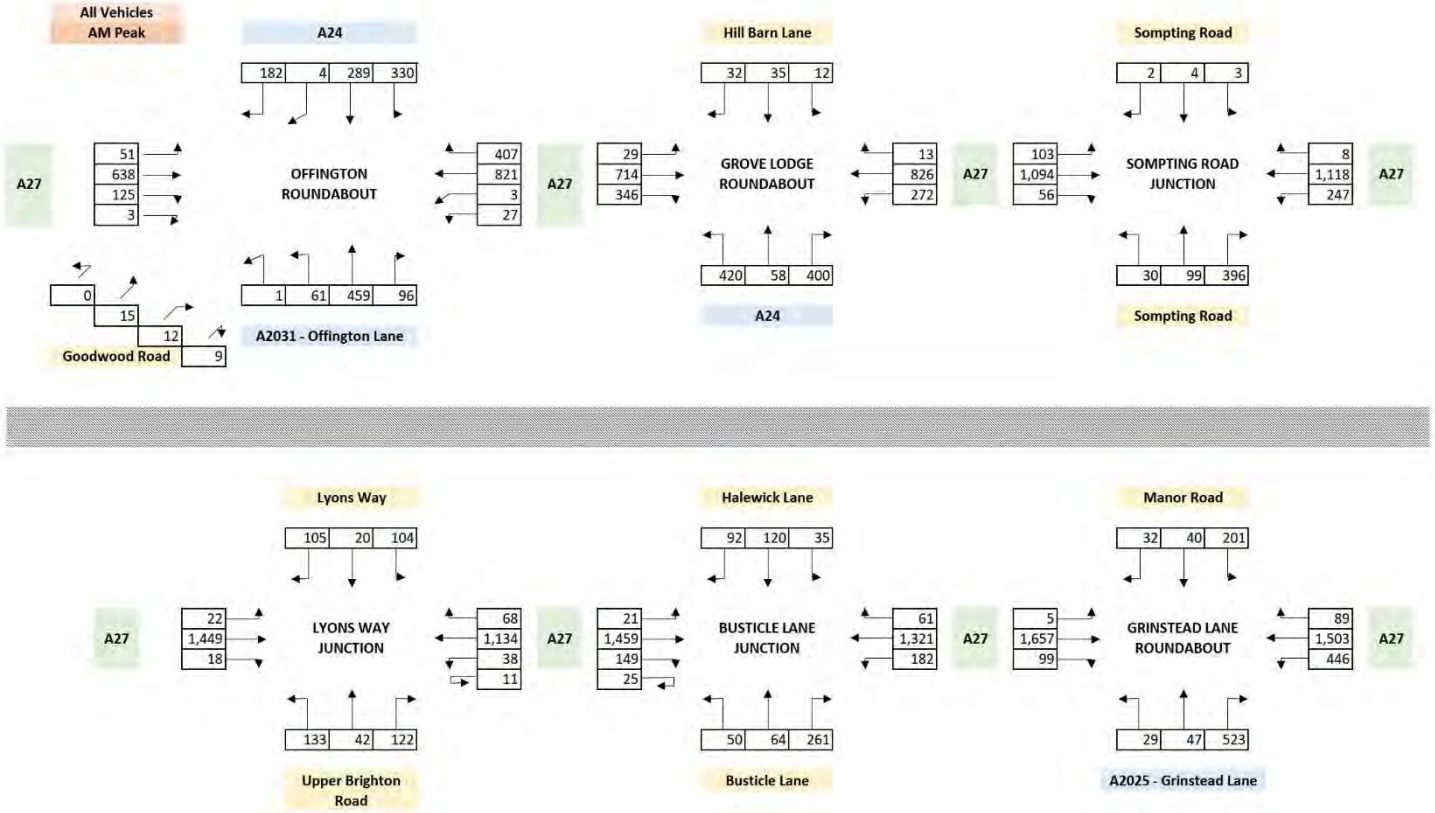


Figure 2-13: Observed junction turning flows 2015 interpeak period

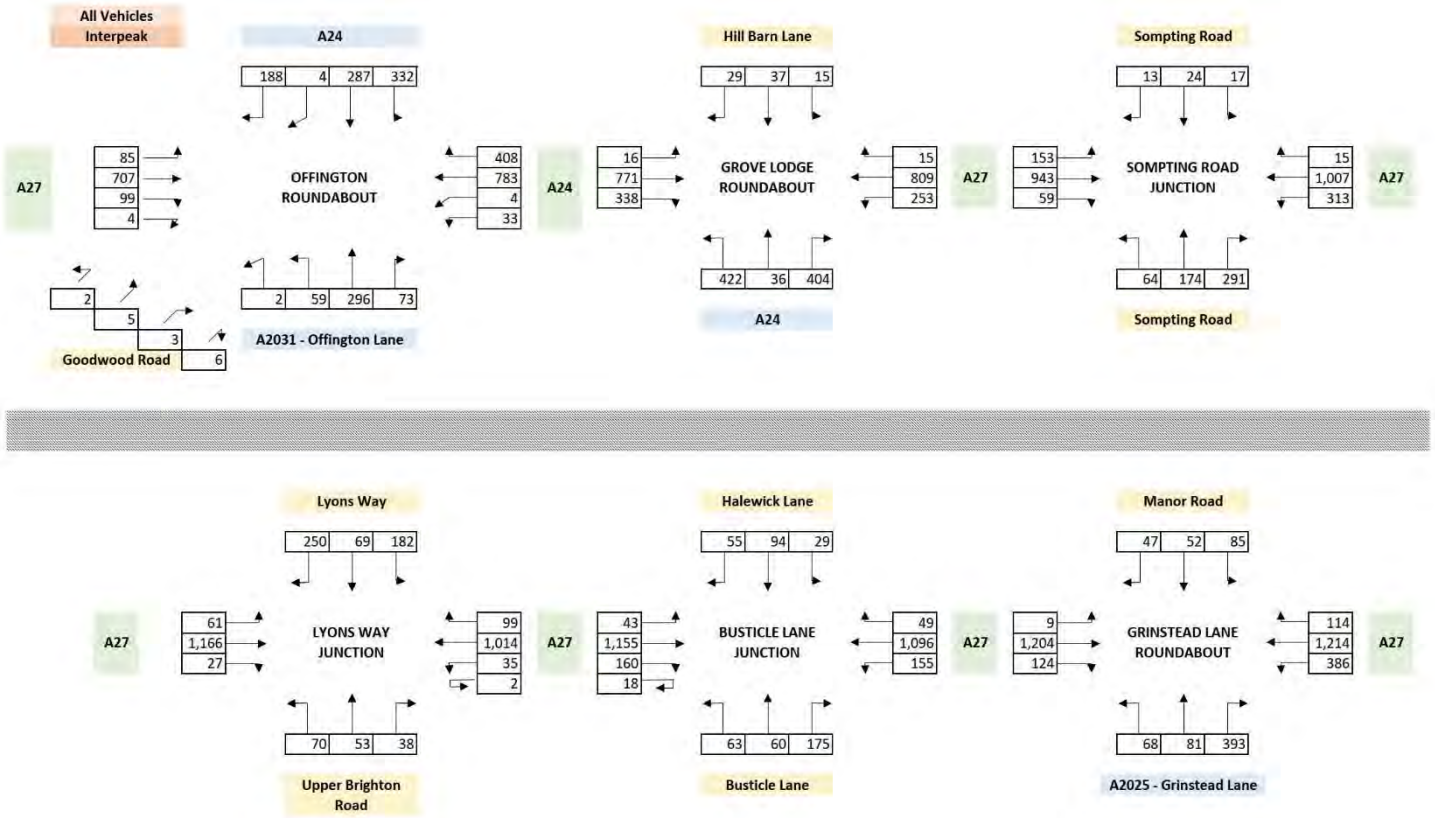
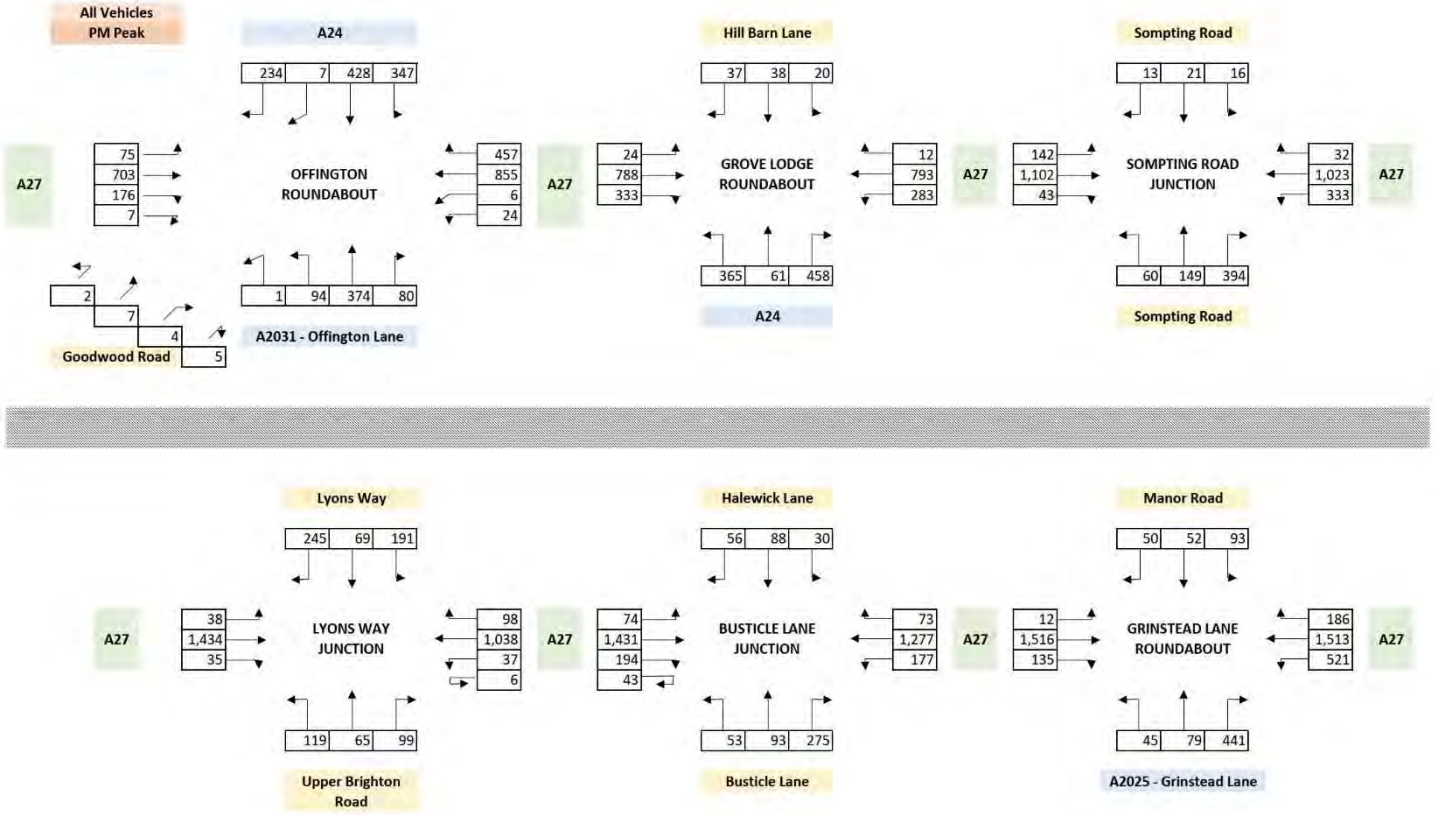


Figure 2-14: Observed junction turning flows 2015 PM period



Accident data was collected for the corridor for the five-year period between 2015 to 2019. The locations of these accidents by severity are shown in Figure 2-15: .

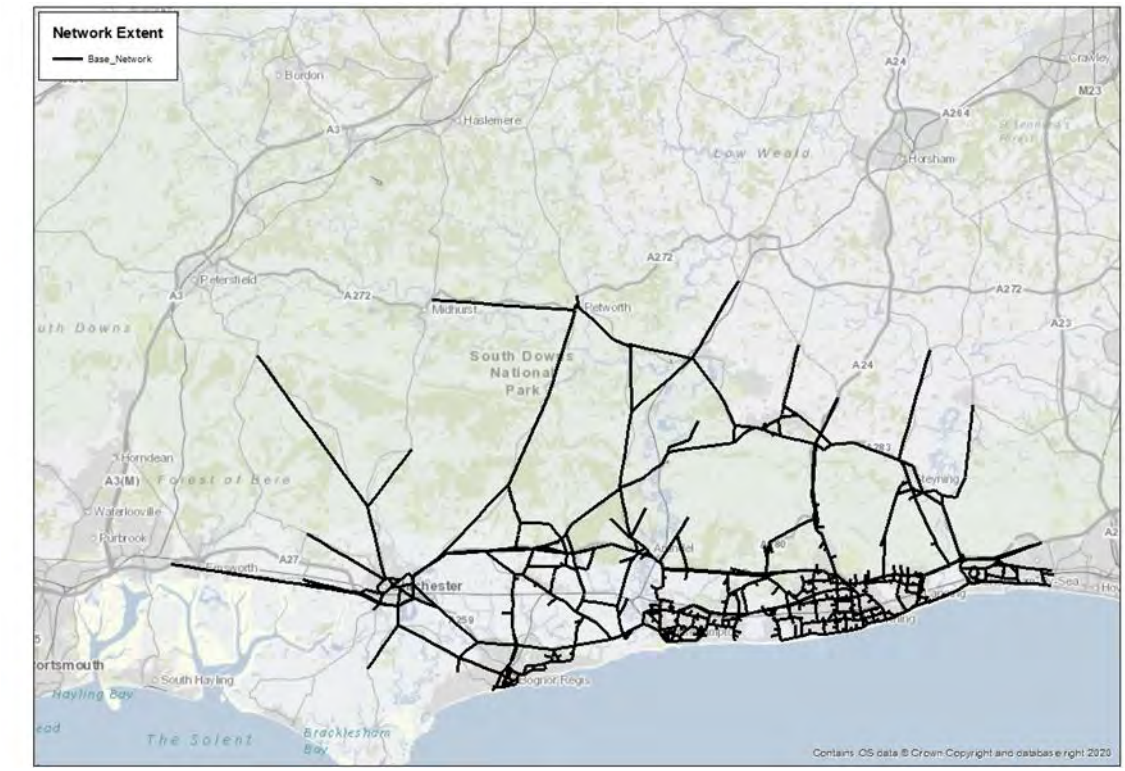
Figure 2-15: Observed accidents in assessment area by severity

The vast majority of accidents were slight with no apparent pattern of serious accidents, and only one fatal accident was observed along the A27 corridor east of the improvement scheme section.

2.2.2. Future traffic conditions

An extensive traffic modelling exercise was carried out. This included the setup of base models for AM (7am-10am), inter-peak (10am-4pm) and PM (4pm-7pm) based on the SATURN model used for the assessment of the corridor adjacent to Arundel Bypass Project Control Framework (PCF) stage 3 scheme. The extent of the model, which represents a cordon of the wider South East Regional Traffic Model (SERTM) is shown in Figure 2-16 below.

Figure 2-16: Cordon model network



Source: Mott MacDonald

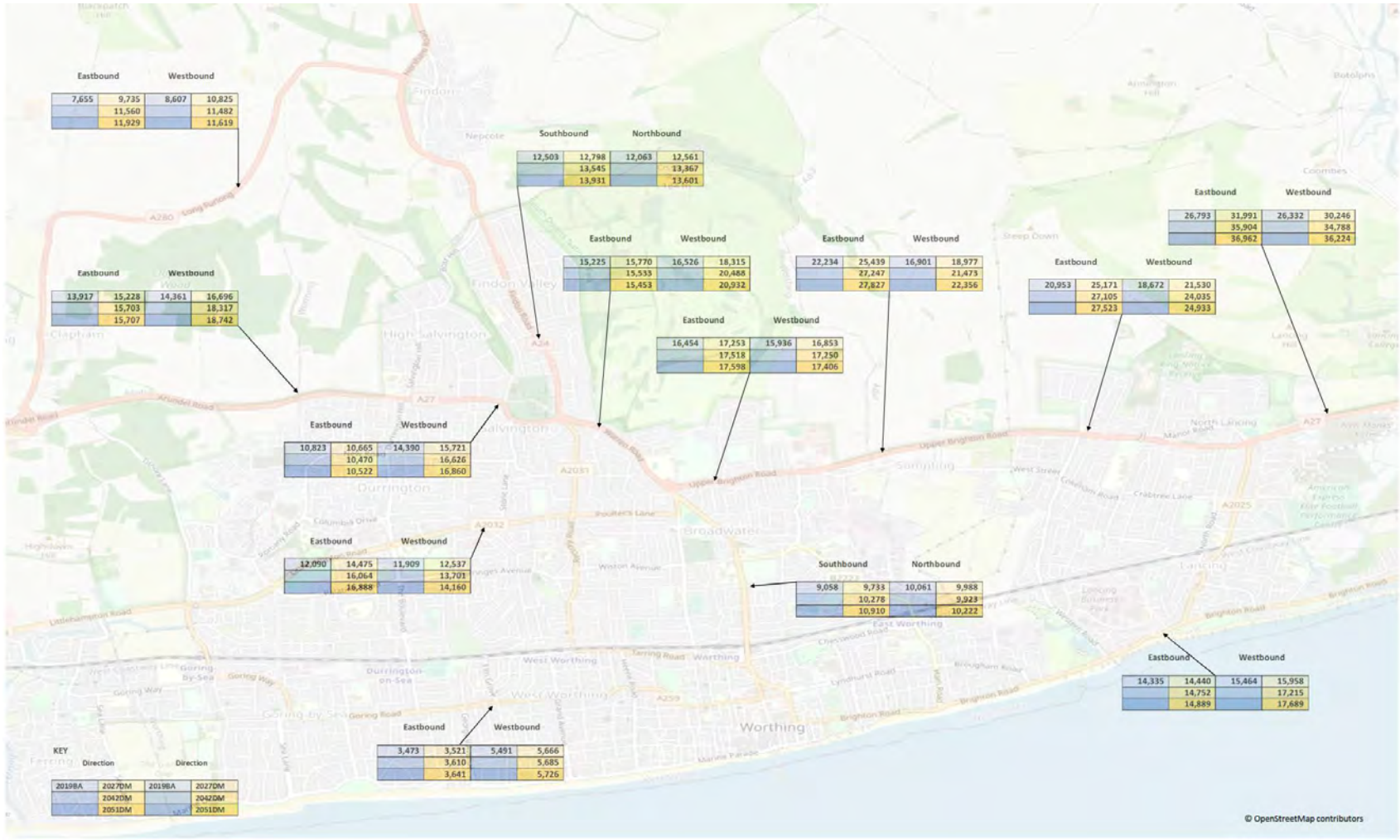
A Transport Analysis Guidance (TAG) compliant model validation was carried out for a 2019 average March base model. Further a variable demand model (VDM) was set up including the assessment of time period choice, mode choice and distribution choice and realism testing was completed to ensure a suitable demand response. More detail about this process is provided in the A27 Worthing and Lancing Traffic Model Package (HE608509-MMD-GEN-OP00-RP-TR-007).

Forecasting was prepared for the proposed opening year 2027 and interim forecast year of 2042 and a horizon year of 2051 for the AM, inter-peak and PM periods. This included the preparation of forecast networks (including local schemes such

as A284 Lyminster Bypass and Arundel Bypass) and included forecast demand (including proposed developments such as Monks Farm and Sompting development). Both, forecast network and forecast demand elements were added to the validated 2019 base model. More detail about the forecast modelling is provided in the A27 Worthing and Lancing Traffic Forecast Package (HE608509-MMD-GEN-OP00-RP-TR-010).

The forecast post-VDM models showed significant increase in traffic volumes across the Worthing and Lancing corridor. However, at key pinch points such as Offington Corner roundabout or Grove Lodge movements at capacity already (primarily eastbound) at present do not show an increase in traffic but traffic diverts to the minor roads within Worthing such as the A2032 and A259. This is shown in Figure 2-17.

Figure 2-17: Annual Average Daily Traffic Base and Do-Minimum forecast



Delays also increase further with over 5 minutes delay at some junctions. Again, this is forecast primarily eastbound at Offington Corner roundabout and the section between Grove Lodge and Lyons Farm as well as increases of delay along the minor road network routes through Worthing such as the A259 and A2032.

Accident assessments were carried out using COBALT software based on the strategic model forecasts and using local accident data where appropriate. This shows a gradual reduction in accidents over the future years in line with Department for Transports (DfT's) Databook parameters.

2.3. Engineering opportunities and constraints

2.3.1. Road layout

The existing road layout is considered sub-optimal for strategic traffic using the A27, local traffic wishing to join the strategic road network, and local traffic wishing to remain on the local road network. Important junctions on the A27 through Worthing and Lancing cannot handle existing traffic flows during peak times, which is resulting in long queues and delays. Due to the congestion on the A27, some longer distance traffic is diverting onto less suitable local routes to the north and south of the A27. These local roads are not suited to large volumes of traffic which is ultimately impairing user safety. The number of accidents on the A27 through Worthing and Lancing is also above the national average.

The most significant constraint to the road layout is land availability. The section of the A27 within the scheme extents runs through a residential urban area, fronted on both sides by private properties, and with minimal space for significant geometric alterations.

Most of the existing junction approach lanes within the scheme extents are 3m wide, although a few right-turn lanes have been identified with substandard width. There are also several existing bus lay-bys considered non-compliant with UK highways design standards.

Despite the land availability constraints, only on-line improvement options have been considered due to the proximity to the South Downs National Park in the north.

2.3.2. Road safety

Overall collision rates along this section of the A27 are higher than national averages, based upon analysis undertaken during Stage 0 on the dual carriageway section between Gainsborough Avenue and Upper Boundstone Lane.

Personal Injury Collision (PIC) data was obtained from West Sussex County Council (WSCC) covering the period 1 January 2017 to 31 December 2020.

One hundred and seventy-five (175) PICs were recorded on the A27 within the scheme extents for years 2017-2020 inclusive, resulting in 265 individual casualties. Five pedestrian casualties and 14 cyclist casualties were recorded within the scheme extents. Of these PICs only one resulted in a fatality, which involved a vehicle colliding with a pedestrian on the dual carriageway section to the east of Grinstead Lane roundabout.

In general, recorded collisions were distributed evenly along the A27, with some minor clustering observed at Sompting Road junction, Busticle Lane junction and Grinstead Lane roundabout.

Additional Non-Motorised User (NMU) cluster site analysis was undertaken throughout Worthing and Lancing, which identified a collision cluster on the Findon Road approach to Offington Corner roundabout.

All options are anticipated to deliver a neutral impact on safety on the approaches to, and at, the junctions, where the measures are focused. Improvements to geometry and additional capacity reduces the risk of collision within these areas. Additional, or enhanced, pedestrian and cycle crossing facilities at Offington Corner and Grove Lodge (within all options) improves safety for non-motorised users.

The improvements at the junctions result in changes to anticipated traffic movements across the A27 corridor and surrounding network. Traffic that currently experiences shorter journey times along local roads due to congestion on the A27 mainline, is encouraged back onto the A27 as congestion is reduced. This represents a positive road safety outcome for local roads, with reduced risk of conflicts between vehicles and non-motorised users. However, within the quantified assessment of accidents, the increased volume of traffic on the A27, and higher speeds, results in some forecast increase in accident levels along the impacted sections of the A27.

2.3.2.1. Collisions on the A27

2.3.2.1.1. Collision summary

The following collisions have been filtered to only include collisions that took place on the A27.

The collisions that were recorded on the A27 (between 01/01/2017 and 31/12/2020) are summarised below.

Table 2-2: Summary of collisions on the A27 (2017 – 2020)

Collision severity	2017	2018	2019	2020	Total
Fatal	1	0	0	0	1
Serious	7	13	14	6	40

Collision severity	2017	2018	2019	2020	Total
Slight	28	41	38	27	134
Total	36	54	52	33	175

Source: Personal Injury Collision data from West Sussex County Council

The total number of collisions occurring on the studied section of the A27 each year rose quite significantly in 2018 from the preceding year (an increase of 18 or 50%). The number of collisions stayed at a similar level in 2019, then in 2020, fell back to a similar number of collisions as was recorded in 2017. The number of collisions recorded in 2020 may have been significantly affected by the effects of the Covid-19 pandemic on the overall number of people and traffic movements.

There has been one fatality recorded on the A27 study area within the last four years of PIC data available.

2.3.2.1.2. Casualty summary

The following casualties have been filtered to only include casualties that took place on the A27.

The casualties that were recorded on the A27 (between 01/01/2017 and 31/12/2020) are summarised Error! Reference source not found.below.

Table 2-3: Summary of casualties on the A27 (2017 – 2020)

Casualties severity	2017	2018	2019	2020	Total
Fatal	1	0	0	0	1
Serious	8	14	15	6	43
Slight	58	68	55	40	221
Total	67	82	70	46	265

Source: Personal Injury Collision data from West Sussex County Council

The casualties follow a similar trend to the collisions. Although there are fewer casualties recorded in 2020, when compared to 2017, there are a similar number of collisions in these preceding years.

2.3.2.1.3. Summary of data

The summary of the latest four-year collision data is as follows:

- One hundred and seventy-five (175) collisions, resulting in 265 casualties
- An average of 43.8 PICs per year
- One collision resulted in a fatality, which was a pedestrian casualty. The details of this collision are as follows:

  - Vehicle travelling east on the A27 collided with a pedestrian on the approach to Hoe Court.
- Thursdays exhibit the highest number of recorded collisions (33 PICs), accounting for 18.9% of the total
- The largest proportion of collisions recorded (16 PICs each) occur between the hours of 07:00-08:00 and 18:00-19:00, representing 9.1% of the total
- Collisions by month are generally spread evenly across the year, with June accounting for the highest total (20 PICs, 11.4% of the total)
- Thirty-two (32) PICs (18.3%) involved vehicles that skidded
- Collisions on a wet road surface (37 PICs) accounted for 21.1% of the total
- Vehicle involvement (378 vehicles in total) in collisions was recorded as follows:
  - Cars – 275 vehicles (72.8%)
  - Motorcycles – 37 vehicles (9.8%)
  - Light Goods Vehicles – 25 vehicles (6.6%)
  - Heavy Goods Vehicles – 19 vehicles (5.0%)
  - Pedal Cycles – 14 vehicles (3.7%)
  - Buses – 1 vehicle (0.3%)
  - Other / Unknown – 7 vehicles (1.9%)
- The following Vulnerable Road User (VRU) casualties were recorded:
  - Motorcycle Riders – 35 casualties (13.2%)
  - Pedal Cyclists – 14 casualties (5.3%)
  - Pedestrians – 5 casualties (1.9%) Collisions on the local road network

2.3.2.1.4. Collisions

The following collisions have been filtered to only include collisions that took place on the local road network, within the study area.

The collisions that were recorded on the local road network (between 01/01/2017 and 31/12/2020) are summarised below.

Table 2-4: Summary of collisions on the local road network (2017 – 2020)

Collision severity	2017	2018	2019	2020	Total
Fatal	0	0	2	2	4
Serious	68	47	70	52	237
Slight	223	230	219	145	817
Total	291	277	291	199	1,058

Source: Personal Injury Collision data from West Sussex County Council

The total number of collisions occurring on the local road network each year fluctuates year by year, with the peak years being 2017 and 2019. The number of collisions recorded in 2020 was the lowest of the four-year period, but this may have been significantly affected by the Covid-19 pandemic.

There were four fatalities recorded on the local road network within the study area within the last four years of PIC data available.

2.3.2.1.5. Casualties

The following casualties have been filtered to only include casualties that took place on the local road network.

The casualties that were recorded on the local road network (between 01/01/2017 and 31/12/2020) are summarised below.

Table 2-5: Summary of casualties on the local road network (2017 – 2020)

Casualties severity	2017	2018	2019	2020	Total
Fatal	0	0	2	2	4
Serious	73	52	72	54	251
Slight	285	285	284	187	1,041
Total	358	337	358	243	1,296

Source: Personal Injury Collision data from West Sussex County Council

Following a similar trend to collisions, the totals also show a fluctuation, year on year, with 2017 and 2019 accounting for the highest numbers of casualties.

2.3.2.1.6. Summary of the PIC data

The summary of the latest four-year collision data is as follows:

- One thousand and fifty-eight (1,058) collisions, resulting in 1296 casualties
- On average 264.5 PICs per year
- Four collisions resulted in fatalities, three of which were pedestrian casualties. The details of these are:
  - Motorcycle travelling east on A280, passing a lane of traffic on the approach to the roundabout junction with Titnore Lane. The motorcyclist was travelling at speed and entered the hatch markings, then lost control and departed the motorcycle. The motorcyclist has then slid across the carriageway and struck a road sign, coming to a rest. The rider died as a result of his injuries.
  - Pedestrian attempted to cross the road other than at the pedestrian crossing and stepped out between two stationary vehicles into the path of a pedal cyclist, who collided with the pedestrian.

  - A Pedestrian was pulled into the carriageway by their dog while crossing the road. A vehicle has collided with pedestrian causing fatal injuries.
  - A vehicle was reversing out of a private driveway on to North Farm Road. A pedestrian was crossing from the offside of North Farm Road pushing a shopping trolley as she crossed. The vehicle collided with the pedestrian, knocking her to the floor.
- Wednesdays exhibit the highest number of recorded collisions (186 PICs), accounting for 17.6% of the total
- The largest proportion of collisions recorded (107 PICs each) occur between the hours of 08:00-09:00, representing 10.1% of the total
- Collisions by month are generally spread evenly across the year, with July accounting for the highest total (108 PICs, 10.2% of the total)
- 107 PICs (10.1%) involved vehicles that skidded
- Collisions on a wet road surface (241 PICs) accounted for 22.8% of the total
- Vehicle involvement (2051 vehicles in total) in collisions was recorded as follows:
  - Cars – 1409 vehicles (68.7%)
  - Pedal Cycles – 301 vehicles (14.7%)
  - Motorcycles – 142 vehicles (6.9%)
  - Light Goods Vehicles – 114 vehicles (5.6%)
  - Taxis – 28 vehicles (1.4%)
  - Heavy Goods Vehicles – 23 vehicles (1.1%)
  - Buses – 19 vehicles (0.9%)
  - Mini Buses – 2 vehicles (0.1%)
  - Other / Unknown – 13 vehicles (0.6%)
- The following Vulnerable Road User (VRU) casualties were recorded:
  - Pedal Cyclists – 291 casualties (22.5%)
  - Pedestrians – 202 casualties (15.6%)
  - Motorcycle Riders – 132 casualties (10.2%)

2.3.2.2. All collisions

2.3.2.2.1. All Collisions

The table and figures below summarise all of the data within the dataset, including collisions on the strategic road network and the local road network. This includes all collisions that took place between 01/01/2017 and 31/12/2020.

Table 2-6: Summary of all collisions (2017 – 2020)

	2017	2018	2019	2020	Total
Fatal	1	0	2	2	5
Serious	75	60	84	58	277
Slight	251	271	257	172	951
Total	327	331	343	232	1,233

Source: Personal Injury Collision data from West Sussex County Council

2.3.2.2.2. Casualties

The table below summarises all of the casualties within the dataset, including the A27 and the local road network. This includes all casualties that took place between 01/01/2017 and 31/12/2020.

Table 2-7: Summary of all casualties (2017 – 2020)

	2017	2018	2019	2020	Total
Fatal	1	0	2	2	5
Serious	81	66	87	60	294
Slight	343	353	339	227	1,262
Total	425	419	428	289	1,561

Source: Personal Injury Collision data from West Sussex County Council

2.3.2.2.3. Summary of data

The summary of the latest four-year collision data is as follows:

- 1,233 collisions, resulting in 1,561 casualties
- An average of 308.3 PICs per year
- Five collisions resulted in fatalities, four of which were pedestrian casualties. The details of these are:
  - Vehicle travelling east on the A27, which collided with a pedestrian on approach to Hoe Court
  - Motorcycle travelling east on A280, passing a lane of traffic on the approach to the roundabout junction with Titnore Lane. The motorcyclist was travelling at speed and entered the hatch markings, then lost control and departed the motorcycle. The motorcyclist then slid across the carriageway and struck a road sign, coming to a rest. The rider died as a result of his injuries.
  - Pedestrian attempted to cross the road other than at the pedestrian crossing and stepped out between two stationary vehicles into the path of a pedal cyclist, who collided with the pedestrian.
  - Pedestrian pulled into the carriageway by their dog while crossing the road. Vehicle collided with the pedestrian causing fatal injuries.

  - Vehicle reversing out of a private driveway on to North Farm Road. Pedestrian was crossing from the offside of North Farm Road pushing a shopping trolley as she crossed. The vehicle collided with the pedestrian, knocking her to the floor.
- Wednesdays exhibit the highest number of recorded collisions (214 PICs), accounting for 17.4% of the total
- The largest proportion of collisions recorded (118 PICs) occur between the hours of 08:00-09:00, representing 9.6% of the total
- Collisions by month are generally spread evenly across the year, with July accounting for the highest total (126 PICs, 10.2% of the total)
- One hundred and thirty-nine (139) PICs (11.3%) involved vehicles that skidded
- Collisions on a wet road surface (278 PICs) accounted for 22.5% of the total
- Vehicle involvement (2429 vehicles in total) in collisions was recorded as follows:
  - Cars – 1,684 vehicles (69.3%)
  - Pedal Cycles – 315 vehicles (13.0%)
  - Motorcycles – 179 vehicles (7.4%)
  - Light Goods Vehicles – 139 vehicles (5.7%)
  - Heavy Goods Vehicles – 42 vehicles (1.7%)
  - Taxis – 28 vehicles (1.2%)
  - Buses – 20 vehicles (0.8%)
  - Mini Buses – 2 vehicles (0.08%)
  - Other / Unknown – 20 vehicles (0.8%)
- The following Vulnerable Road User (VRU) casualties were recorded:
  - Pedal Cyclists – 305 casualties (19.5%)
  - Pedestrians – 207 casualties (13.2%)
  - Motorcycle Riders – 167 casualties (10.7%)

For pedestrians, cyclists and horse-riders collision data in the study area see paragraph 2.3.9.1 below.

2.3.3. Drainage

The existing surface water collection system consists of a series of kerbs and gullies. Given the likely scope of works it is anticipated that the existing highway drainage outfall points would be retained. No constraints or opportunities have been identified at this stage following a preliminary drainage assessment. More detailed drainage surveying should be undertaken at later design stages.

2.3.4. Street lighting

Street lighting is provided throughout the entire extents of the scheme. Where existing lighting is to be replaced, there will be the opportunity to improve energy efficiency. Existing luminaries can be replaced with LED lighting luminaries if they aren't already. Central Management System (CMS) control can also be introduced, where the operator chooses when to switch individual streetlights on or off and/or by how much to reduce the lamp power. The CMS also provides other benefits such as fault detection and would ultimately deliver a reduction in carbon emission through lower energy consumption.

No lighting constraints have been identified at this stage, following a preliminary lighting assessment. A more detailed formal lighting assessment should be undertaken at later design stages.

2.3.5. Maintenance access

The section of the A27 within the scheme extents runs through a residential urban area, with numerous side roads and existing lay-bys which provide safe access for maintenance purposes. There is limited space available for the provision of new maintenance lay-bys around key junctions, but there is an opportunity for provision of new maintenance lay-bys along the dual carriageway section (between Upper Brighton Road and Manor Road). Maintenance access provision should be reviewed in further detail during later design stages, once the preferred route has been announced.

2.3.6. Technology

The technology assets present on the A27 in the vicinity of the scheme extents are typical of features on All Purpose SRN routes. These range from control measures such as signalised junctions and pedestrian crossings to Vehicle Activated Signs (VAS) and spot speed and red-light enforcement cameras. For traffic monitoring there are a number of vehicle counter and classifier installations along with traffic monitoring CCTV located at traffic signal sites. Although this route has a major effect on the West Sussex County Council (WSCC) highway network in this area, WSCC lacks direct access to National Highways resources to monitor traffic flow or to respond to incidents. There is currently no dissemination of information to users via variable message signs.

The following opportunities has been identified:

- Both West Sussex County Council and National Highways currently operate 'Osprey' Urban Traffic Management and Control (UTMC) Systems which they use to control and monitor technology assets on their respective highway networks. These systems are typically used with equipment such as traffic signals, vehicle detection and CCTV to collect and disseminate data. UTMC systems are also commonly used by highway authorities to interact with a wide range of associated traffic sub-systems and technologies spanning environmental monitoring, public transport, and car park guidance. The

presence of the WSCC and National Highways Osprey systems provides an opportunity to achieve a co-operative operational management regime for this corridor, that would allow both authorities to improve the visibility of real-time network performance and to initiate appropriate responses to scenarios on both highway networks.

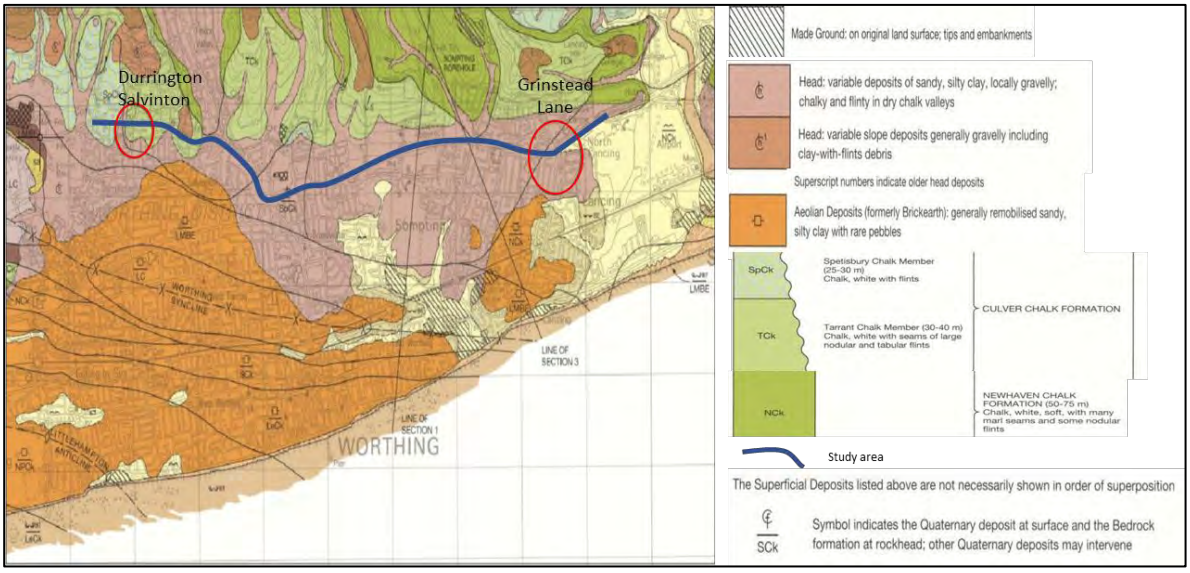
- Although there are a number of traffic monitoring CCTV installations along this route, these are not linked to the main National Highways CCTV system. To overcome the limitations of the existing cameras, it is recommended that the deployment of Enhanced Network Camera Programme (ENCP) installations is investigated for strategic sites on this route. This would then provide the National Highways Regional Control Centre (RCC) visibility of traffic flow and incidents and critically allow these images to be disseminated via the junction dashboards for WSCC use.
- Small air quality monitors can be located along the route to provide indications of pollution levels. The data from these can also feed into the junction dashboards to influence strategy plans in order to improve air quality.
- Downstream vehicle congestion monitoring at signalised junctions can be used to implement special plans within the traffic signal controller to overcome the issue of queueing vehicles blocking the exits at these junctions, resulting in them becoming 'grid locked'. Once triggered, this feature is used to 'meter' traffic flow through the junction and by relocating the traffic queue to the A27 approaches of the junction, allows the downstream congestion to dissipate. Active congestion monitoring therefore helps to keep the junction from becoming 'grid locked' allowing local traffic to still cross the A27. This could be accompanied with message signs on the local road approaches to warn of congestion on the A27. Additional 'All Red' vehicle detection within the central areas of the junctions will also help to reduce the incidence of congestion at these traffic signals by allowing time for traffic to clear the junction prior to allowing more traffic to flow. These two sets of features will provide particular benefits to local traffic movements, and will reduce how congestion affects the A27 as well.
- In order to improve safety and smooth traffic flow, the option to supplement the existing 'Spot' enforcement camera sites on this route with Average Speed Enforcement installations should be considered. Average Speed Enforcement systems have widely demonstrated their superiority over 'Spot' enforcement cameras because of their ability to regulate vehicle speeds for the entirety of road sections equipped with this type of system. On the dual carriageway sections, these systems can benefit the flow of traffic by smoothing arrival rates at the end of each dualled section to help to reduce the formation of congestion. In addition, these features can also reduce lone vehicle incidents which typically occur in off-peak periods. This type of installation has been successful in providing both operational and safety benefits across different types of highways elsewhere in the UK.

- The regulation of vehicle speeds can also be assisted by the use of Vehicle Activated Signs (VAS). Although there are a couple of these installed on this route, their increased presence on the single carriageway sections of the route would help to improve compliance with the 40mph speed limit for much of these areas.
- The provision of Variable Message Sign (VMS) at strategic locations ahead of decision points along the A27 and on the local road network could be used to provide a range of information to users. This could include message sets to warn of the occurrence of incidents on the A27 or to provide current journey time information to typical locations along the route.
- Features should be incorporated within the route for the safety and convenience of NMU. There are existing controlled and uncontrolled crossing locations along this section of the A27, however this provision should be reviewed in order to maximise NMU safety whilst taking account of the natural desire line users will wish to use when crossing. The provision should therefore look to provide good connectivity with pedestrian requirements and cycle routes both along the A27 and across the vicinity of the route. Where possible, crossing provision should be segregated from vehicular traffic, but where this is not achievable, the use of good quality signalised crossings should be considered which make use of modern operating capabilities that offer safety benefits to NMUs, such as on-crossing detection. The method of control at signalised crossings should be reviewed along with assessing the quality of the existing physical crossing provision and level of compliance with the current Design Manual for Roads and Bridges (DMRB) requirements.
- In order to encourage modal shift from private cars to public transport, facilities should be considered to make bus use more attractive to passengers. There are a number of bus routes which currently travel along this section of the A27, so there are bus stops at regular intervals for much of the route. However, many of these stops are not equipped with any facilities, most consist of only a flag-sign. Although real-time bus information is available within West Sussex, the bus stops in this area do not appear to be equipped with displays. Modern Real-Time Passenger Information (RTPI) can make use of new display technologies, such as ePaper, that are both energy efficient and robust.
- A number of modern shelters could be provided at strategic locations along the route in order to enhance users experience of public transport. Shelters are now commercially available that incorporate a range of safety and convenience features, such as lighting and CCTV coverage, along with WiFi hotspots and wireless charging for mobile devices. Ecological features, including electrical generation using Photo-Voltaic (PV) panels or vertical wind turbines can be incorporated within these structures, and costs can be offset against commercial contracts for advertising. Shelters may also include the provision of cycle racks so that the bus stop acts as a local transportation hub.

2.3.7. Geotechnics

The British Geological Survey (BGS) map shows the site to be underlain by Head deposits of clay, silts, sands, and gravels overlying chalk bedrock, an extract of the map is shown in Figure 2-18. Towards the western end of the scheme (at Durrington Salvington), chalk deposits outcrop at the ground surface. The Head deposits are generally unstratified, most commonly originating from solifluction. However, there are difficulties in accurately estimating the thickness of these deposits due to similarities with the underlying bedrock.

Figure 2-18: Superficial and bedrock geology



Source: Reproduced with permission of the British Geological Survey @NERC. All rights reserved British Geological Survey, 2006: England and Wales Sheet 318/333 Brighton and Worthing, Solid and Drift Geology

A review of the Department for Environment Food and Rural Affairs (Defra) maps suggests that majority of the study area except the Busticle Lane and Grinstead Lane junctions are within Source Protection Zone (SPZ) 1 with other sections cutting across SPZ 2 and 3. The bedrock strata underlying the study area are classified as principal aquifers. The BGS maps suggest that there is limited potential for groundwater flooding to occur in the majority of the site. However, sections of the site such as the Grove Lodge and Grinstead Lane junctions cut across regions where there is potential for groundwater flooding to occur at the surface, which indicates likely elevated groundwater levels.

The Environment Agency classifies most of the site into regions of high groundwater vulnerability, excluding the Upper Brighton Link from Lyons Way to Busticle Lane which has intermediate vulnerability. The Grinstead Lane junction to the east of the site is also classified as an area within flood zone 3.

An assessment of the unexploded ordnance (UXO) risk maps obtained from Zetica indicates that the study area falls within varying degrees of bomb risk zones, shown in Figure 2-19. Moderate bomb risk zones are identified from Durrington Hill

/ Salvington Hill junction to a section of the Upper Brighton Road and then transitions into low-risk zones for the rest of the site.

Figure 2-19: Unexploded ordnance risk

Source: Reproduced from Zetica Ltd. @ Copyright 2021

2.3.8. Stakeholder engagement

The Road Investment Strategy (RIS1) A27 Worthing and Lancing improvements scheme was paused in November 2018 due to a lack of key stakeholder support and 76% public opposition. There is a risk that the same key stakeholders and general population of Worthing and Lancing also oppose the RIS2 proposals, which is considered a significant constraint to the project.

In order to improve public perception and secure stakeholder support this time around, the project will pursue the delivery of local, 'non-SRN', interventions through National Highways' Designated Funds programme alongside the main scheme, which will offer further benefit to the local community. Additionally, regular Technical Working Groups (TWGs) will be held with the Local Authority throughout the duration of Stage 1, to ensure frequent stakeholder engagement and input during the design of interventions.

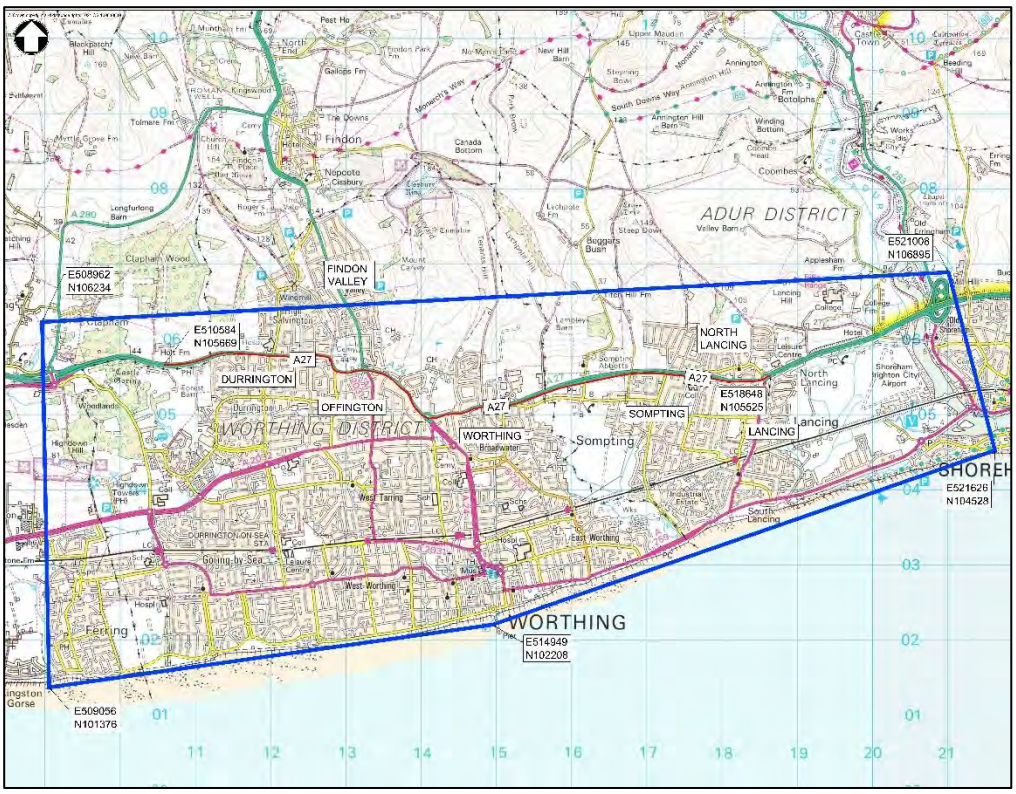
2.3.9. Walking, cycling and horse-riding

As part of Project Control Framework (PCF) Stage 1, a Walking, Cycling and Horse-riding Assessment and Review (WCHAR) was started in accordance with the requirements of DMRB GG 142 (Walking, cycling and horse-riding assessment and review).

The WCHAR serves to facilitate the inclusion of walking, cycling and horse-riding (WCH) users in the highway scheme development, and is comprised of two distinct parts: assessment and review. The assessment process is undertaken at PCF Stage 1, whilst the review phase is undertaken continuously throughout subsequent design stages.

The aim of the assessment is to gain an understanding of existing facilities for pedestrians, cyclists, and equestrians in the local area, to provide background information for reference throughout the scheme development, and to identify opportunities for improvement for WCH users. To guide the process, a WCHAR study area is defined within which the assessment is undertaken. The WCHAR study area is shown in Figure 2-20.

Figure 2-20: WCHAR study area



Source: Mott MacDonald. Contains Ordnance Survey data Crown copyright and database right (2021)

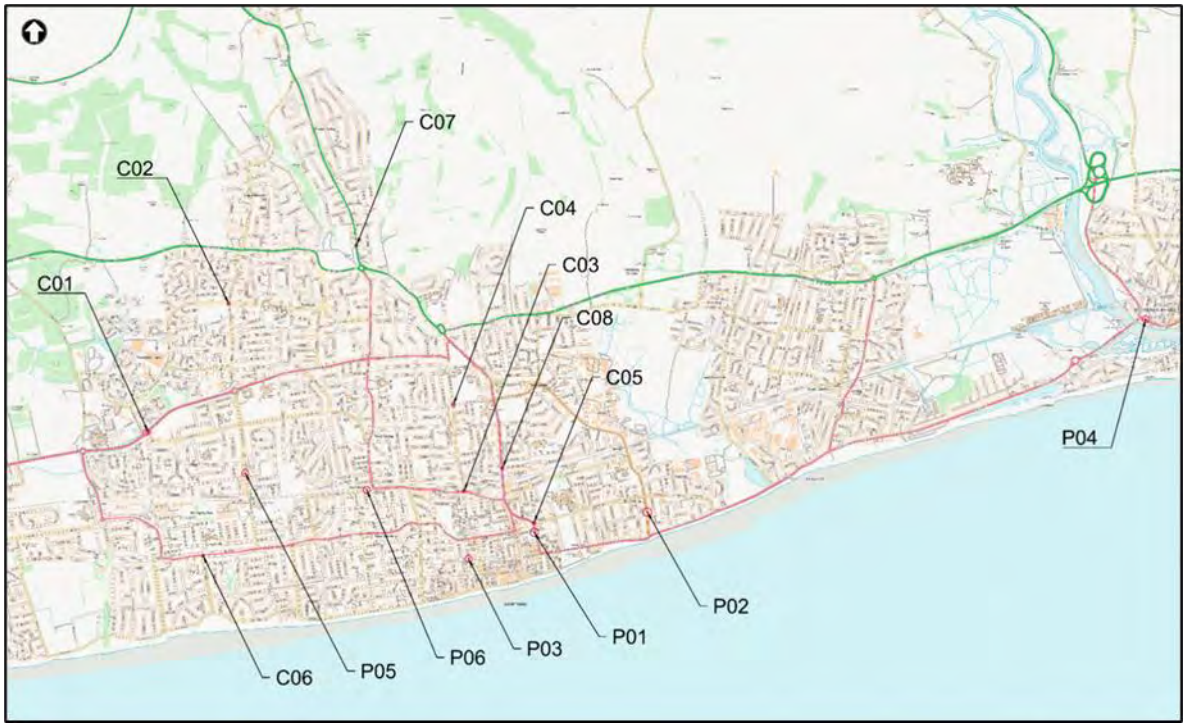
As part of the WCHAR, several opportunities for improving WCH conditions within the study area have been identified and are detailed in Section 8 of this report.

2.3.9.1. Collision data

Personal Injury Collision (PIC) data was obtained from West Sussex County Council (WSCC) covering the period 1 January 2017 to 31 December 2020.

Cluster site analysis has been undertaken to establish notable concentrations of collisions involving pedestrians, cyclists and horse-riders that occurred within the study area. These collision cluster sites are identified in Figure 2-21.

Figure 2-21 : Collision cluster sites



Source: Mott MacDonald. Contains Ordnance Survey data Crown copyright and database right (2021)

In total, 1,233 PICs were recorded in the WCHAR study area over the four years, although it should be noted that a lower number of PICs were recorded during the year 2020 due to the effect of the Covid-19 pandemic.

Of the total 1,233 collisions recorded within the study area, 198 involved pedestrians (16.1% of the total). Five of these took place on the A27 and the remaining 193 occurred on the local road network. Pedestrian collision clusters are identified in Figure 2-21 and detailed in Table 2-8.

Table 2-8: Pedestrian collision cluster sites (three or more PICs) by rank

Ref	Location	OSGR	Diameter	Collisions			
				Fatal	Serious	Slight	Total
P01	A259 High Street at Junction of Union Place	515049 / 102864	87	0	2	2	4
P02	B2223 Ham Road at Junction of Church Walk	516220 / 103073	87	0	2	2	4
P03	Shelley Road near Junction with Gratwicke Road	514369 / 102589	71	0	1	2	3
P04	A259 High Street at Junction of West Street	521380 / 105061	71	0	1	2	3

Ref	Location	OSGR	Diameter	Collisions			
P05	The Boulevard at Junction of Bolsover Road	512055 / 103476	71	0	0	3	3
P06	Tarring Road East of Valencia Road	513314 / 103302	71	0	0	3	3

Source: Mott MacDonald, analysis of Personal Injury Collision data from West Sussex County Council (between 01/01/2017 and 31/12/2019)

Of the total 1,233 collisions recorded within the study area, 308 involved cyclists (25.0% of the total). Fourteen of these took place on the A27 and the remaining 294 occurred on the local road network. Cyclist collision clusters are identified in Figure 2-21 and detailed in Table 2-9.

Table 2-9: Cyclist collision cluster sites (three or more PICs) by rank

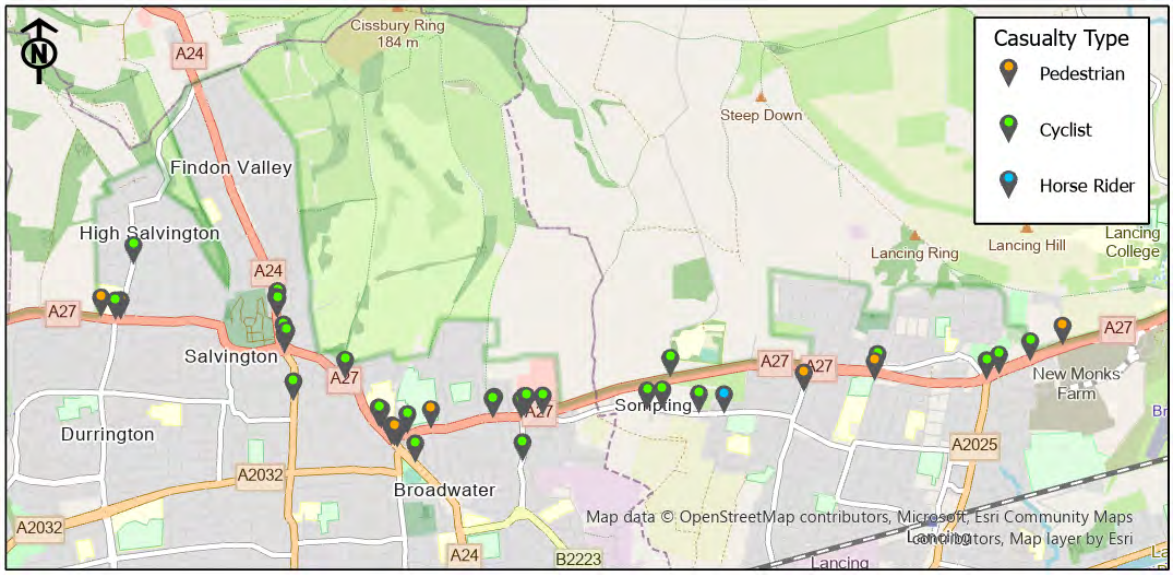
Ref	Location	OSGR	Diameter	Collisions			
				Fatal	Serious	Slight	Total
C01	A2032 Littlehampton Road at Junction of Palatine Road	511051 / 103900	53	0	0	8	8
C02	Salvington Road at Junction of Durrington Lane	511886 / 105223	35	0	2	2	4
C03	Tarring Road at Junction with Clifton Road	514322 / 103288	35	0	2	2	4
C04	South Farm at Junction with Wiston Avenue	514210 / 104180	35	0	1	3	4
C05	A259 North Street at Junction of Lyndhurst Road	515046 / 102962	35	0	1	3	4
C06	Alinora Avenue near Junction with Goring Road	511618 / 102625	28	0	1	2	3
C07	A24 Findon Road at Junction of exit from Jet Petrol Station	513207 / 105824	28	0	1	2	3
C08	A24 at Junction of King Edward Avenue	514719 / 103526	28	0	1	2	3

Source: Mott MacDonald, analysis of Personal Injury Collision data from West Sussex County Council (between 01/01/2017 and 31/12/2019)

Only one equestrian collision occurred within the study area. This collision took place on West Street, near the junction with Loose Lane. The collision involved a car passing a horse-rider and clipping the horse with the nearside door mirror of the car. This collision resulted in a slight injury to the horse-rider.

The locations of PICs involving WCH users on the A27 and its immediate approaches within the scheme extents are shown in Figure 2-22.

Figure 2-22: Walking, Cycling, and Horse-riding PICs



Source: Mott MacDonald. Contains OpenStreetMap data.

2.3.9.2. Multi-modal transport services

The rail network runs east to west, south of the A27. The service has six stops within the WCHAR study area including Goring-by-Sea, Durrington-on-Sea, West Worthing, Worthing, East Worthing and Lancing.

Several bus services are also located within the scheme extents and make use of the key junctions/road sections previously identified:

- Route 1 – Travelling between Findon Road and Offington Lane, using the Durrington Roundabout
- Route 7 – Travelling between High Salvington, Upper Brighton Road, Grinstead Roundabout, and Lancing
- Route 9 – Travelling between Lancing Manor roundabout along Old Shoreham Road
- Route 16 – Travelling between Worthing and Lancing using Upper Brighton Road
- Route 23 – Travelling between Durrington roundabout and Grove Lodge roundabout
- Routes 5 and 10 are also located within the WCHAR study area but make use of the local road network.

2.3.9.3. Trip generators

Some of the key main attractors within the WCHAR study area are considered to be:

- Worthing town centre
- NHS Swandean
- Worthing College
- Durrington Cemetery
- Lyons Farm retail park and Downland business park
- Lancing Manor Leisure Centre

In addition to the above, there are a number of other potential local amenity and key trip generation sites (accommodation, restaurants, public houses, places of worship, supermarkets, retail areas, medical / hospital facilities, education facilities, sports / recreation areas, a recycling centre, parks, public transport stops, equestrian services, fuel, car parking and public toilets).

2.3.9.4. Existing pedestrian, cyclist and equestrian facilities

Walking, cycling and equestrian facilities within the WCHAR study area are mostly limited to existing highways, streets, and footways. At this stage information on the level and frequency of use and user type of each route is not known.

Several Public Rights of Way (PRoWs) have also been identified, a number of which are considered significant due to their proximity to the scheme:

- WSCC 2060: Footpath to the north of the scheme between Old Shoreham Road and Hoe Court
- WSCC 2066: Footpath which intersects the scheme between The Street and Manor Road
- WSCC 2067: Footpath to the north of the scheme between Manor Road and Upper Brighton Road
- WSCC 2071: Footpath which intersects the scheme at Sompting Bypass between Dankton Lane and Thornbury House
- WSCC 2072: Footpath to the north of the scheme between Church Lane and Sompting Bypass
- WSCC 2073: Footpath which intersects the scheme at Sompting Bypass between West Street and bridleway 2076
- WSCC 2074: Footpath to the north of the scheme between Church Lane and Lambleys Lane
- WSCC 2075: Bridleway to the north of the scheme along Dankton Lane

- WSCC 2081: Bridleway to the north of the scheme which intersects at Warren Road
- WSCC 2097: Bridleway to the north of the scheme between Foxley Lane and Long Furlong
- WSCC 3134: Footpath to the north of the scheme which intersects the scheme at Upper Brighton Road
- WSCC 3135: Footpath to the south of the scheme between Upper Brighton Road and Bramper Road
- WSCC 3767: Footpath which intersects Arundel Road from the south from Cheviot Road

There are several at-grade crossings for pedestrians and cyclists along the A27 within the scheme extents, comprising a mixture of signal-controlled and uncontrolled facilities. There is also a single pedestrian and cyclist footbridge across the A27 adjacent to the A27/Manor Road junction.

2.4. Environmental opportunities and constraints

2.4.1. Environment

There are several environmental opportunities and constraints associated with the scheme options. These are presented below and illustrated within the environmental constraints plans within Appendix F.

2.4.1.1. Air quality

All scheme options pass through the Worthing Air Quality Management Area (AQMA) and two additional AQMAs, the Shoreham AQMA and Southwick AQMA, are located within 10km of the scheme options. All scheme options pass through multiple residential areas and one school (Worthing College) within 200m of all scheme options. There are no ecological designated sites within 200m of the scheme options. The nearest ecological designation is the Lancing Ring Local Nature Reserve (LNR), which is located approximately 560m north-east of Option 3.

2.4.1.2. Cultural heritage

There are no world heritage sites, scheduled monuments, registered battlefields or registered parks and gardens within 250m of the scheme options. However, there are other designated heritage assets recorded within 250m of the scheme options. These comprise 8 listed buildings, none of which would be physically impacted by the scheme options. Additionally, there are two conservation areas within 250m of the scheme options, including Sompting and Broadwater Conservation Areas. Sompting Conservation Area is also situated within the scheme boundary for Options 2 and 3 at Upper Brighton Road. Land outside the highway boundary has the potential for unknown archaeological remains to be present. These designated heritage assets are displayed on the constraints plan in Appendix F.

2.4.1.3. Landscape and visual

Although the scheme is not located within an Area of Outstanding Beauty or National Park, the South Downs National Park (SDNP) lies directly to the north of the scheme options and directly adjacent to Busticle Lane Junction, identified as an improvement location for Options 2 and 3. The scheme options straddle the boundary between National Character Area (NCA) 125 South Downs (NE432) to the north, and NCA 126 South Coast Plain (NE525) to the south. There is a range of potential visual receptors for the scheme options. Considering the scheme options, receptors include the users of the A27 itself, users of the nearby local road and footway network, occupants of residential properties, users of community facilities and workplaces, and users of publicly accessible land and paths including the Public Rights of Way (PRoW) network.

2.4.1.4. Biodiversity

There are no internationally designated sites within 2km of the scheme options. However, three Special Areas of Conservation (SAC) designated for bat populations, including The Mens, Ebernoe Common and Singleton and Cocking Tunnels, are located within 30km of the scheme options. There are two Sites of Special Scientific Interest (SSSI) located within 2km of all scheme options at their closest point, including Adur Estuary and Cissbury Ring SSSI. Adur Estuary SSSI represents the only significant area of saltmarsh within the local area, whilst Cissbury Ring SSSI consists of unimproved chalk grassland areas. Lancing Ring LNR and Local Wildlife Site (LWS) is approximately 560m north-east of the scheme options at its closest point. There are five additional LWS within 1km of the scheme options. Furthermore, there are three Ancient Semi-Natural Woodland (ASNW) areas located within 1km of the scheme options.

The habitat in the vicinity of the scheme includes grassland, scrub, natural woodland and plantation woodland. Improvements to habitats is an opportunity to work towards Biodiversity Net Gain (BNG) for the scheme.

2.4.1.5. Geology and soils

The Agricultural Land Classification (ALC) of soils in the vicinity of the scheme options is predominantly Grade 2, with some areas of Grade 3a. There are no other geological designations in the vicinity. Additional to the ALC soils, receptors include superficial geology, urban classified soils, surface water, groundwater, and humans.

2.4.1.6. Materials and waste

There is one historic landfill site, Hillbarn Recreation Ground, located approximately 495m north-east of the Grove Lodge Roundabout, associated with all scheme options. There are no authorised landfill sites within 500m of any scheme option. Receptors relevant to material assets and waste include natural material resources and waste management facilities in the region.

2.4.1.7. Noise

There are numerous residential receptors which lie within the residential areas of Worthing and Lancing. In addition, four Noise Important Areas (NIA) lie within 600m of the scheme options, including: ID 215; ID 176; ID 224; and ID 13815. There are various other NIAs on adjoining roads that are within a 1km buffer from the physical extents of the scheme.

While it will not be possible to mitigate or enhance in all locations due to scheme constraints and the urban context, acoustic mitigation or enhancement measures such as the horizontal and vertical alignment of roads, low noise surfacing, provision of acoustic bunds or barriers will be considered to minimise potential adverse noise impacts.

2.4.1.8. Water environment

Receptors with the potential to be affected by the scheme include the Water Framework Directive (WFD) waterbodies Teville Stream, located approximately 210m to the south of Upper Brighton Road (Options 2 and 3). The scheme does not lie within any flood zones.

2.4.1.9. Population and human health

There are 6,771 residential properties within the Land Use and Accessibility Impact Area[1] (LUAIA), the closest of which are less than 15m from the scheme options. The majority of the residential properties within the LUAIA are located in the settlements of High Salvington, Offington, Broadwater, and North Lancing. There are a total of 80 community resources located within the LUAIA, including children's' nurseries, churches and religious meeting places, hospitals, primary schools, playgrounds, and several other resources. There are approximately 223 businesses within the LUAIA. The majority of businesses are concentrated around the Offington Corner Junction, Grove Lodge Junction, and Upper Brighton Road. Businesses include golf clubs, car repair shops, cafes and restaurants. The proportion of the population in the LUAIA of working age is in line with the Human Health Impact Area[2] (HHIA) proportion and slightly lower than the South East and England proportions. The proportion of employed working age population within the HHIA (82%) is higher than the South East (78%) and England proportions (75%). There are several agricultural land holdings within the LUAIA. Much of the land appears to be used for arable production, predominantly to the north of the scheme. Within the LUAIA, there are 13 PRoWs and three cycling routes identified

[1] Land use and accessibility impact area (LUAIA) refers to population and human health conditions outlined with DMRB LA112, including topic areas which focus on impacts associated with the requirement for land and impacts on accessibility. Topic areas include private property and housing, community land and assets, development land and businesses, agricultural land holdings and walking, cycling and horse-riding.

[2] Human health impact area (HHIA) refers to the geographical extent of impacts on human health which are considered dependent upon the nature and characteristics of a project and sensitivity of receptors, in accordance with DMRB LA112. The assessment considered effects on health determinants, which are the personal, social, economic and environmental factors that influence health status.

from the West Sussex County Council's Cycle Facility Map. The population within the LUAIA are also considered as human health receptors.

2.4.1.10. Climate

The receptors associated with the climate assessment include climate itself and scheme assets, which includes pavement, structures, drainage, geotechnics and the soft estate.

3. Need for intervention and scheme objectives

3.1. Need for an intervention

As the A27 is the only strategic route along the south-east coast of England, the congestion between Worthing and Lancing acts as a constraint for travel between Portsmouth, Southampton (and their ports), as well as other locations to the west, and locations to the east such as Brighton, Hastings and Eastbourne.

The strong reliance on this east to west strategic route results in a significant daily flow of vehicles including heavy good vehicles. This significant volume of traffic is further impeded at Worthing and Lancing by the conflict with local traffic, worsening congestion at the key junctions. The already high flows, congestion, and conflict between local and strategic traffic at this location, also contribute to this section of the A27 having accident numbers higher than the national average.

Traffic volumes will only continue to increase in the future, leading to worsening future congestion. This increase in congestion will likely lead to deterioration in Air Quality at the existing Air Quality Management Area (AQMAs), with the potential to create new areas, and worsening of noise levels at the priority areas and key junctions along the A27 between Worthing and Lancing. With an increase in traffic, the already poor accident record for this stretch of road is also likely to fall further.

A key opportunity for capacity improvements is to ensure they are delivered in line with local strategic development plans. This ensures that any proposed housing developments are not delayed by capacity issues on the A27, and/or that such developments do not cause additional congestion.

Future road improvement projects further east along the A27, such as Arundel may also have the effect of increasing traffic draw along the A27 from outside the region, which could further worsen the current situation around Worthing and Lancing.

The key operational challenge for Worthing and Lancing is the rising level of traffic on an already congested section of road, leading to queues during the AM and PM peaks on a number of links and/or approaches to junctions. While further studies such as those undertaken by Transport for South East (TFSE) continue to explore larger scale, longer-term improvements to the Worthing and Lancing areas, the proposed scheme provides strong benefits to improve congestion and address some of the key challenges facing Worthing and Lacing in the short-term.

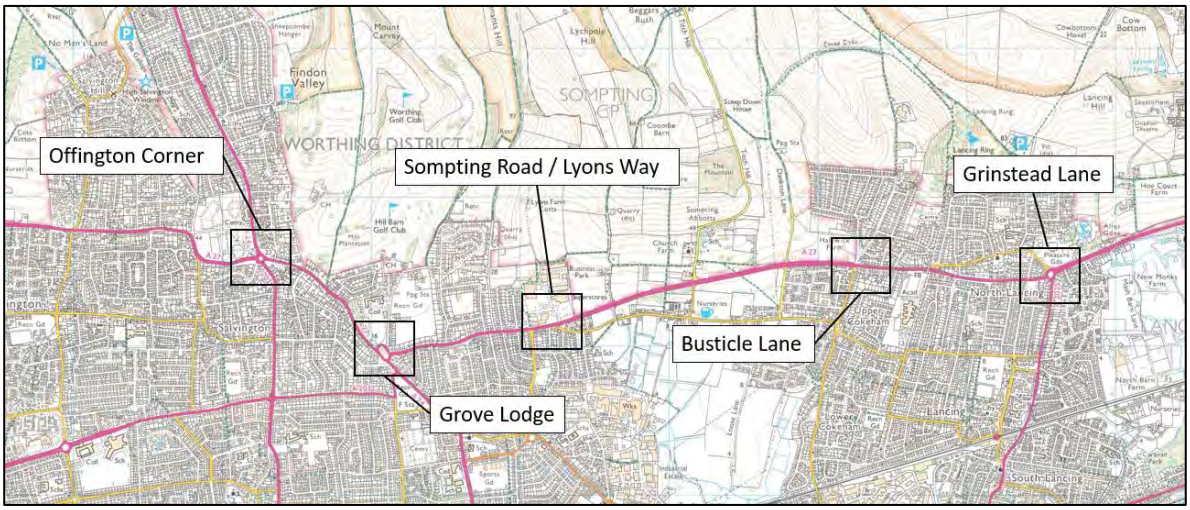
There are several longstanding issues on the stretch of the A27 through Worthing and Lancing, which includes congestion during peak hour travel leading to delays and impacts upon journey time reliability. The series of junctions on the A27 are unable to handle existing traffic flows, compromising the safety of road users.

Demand exceeds capacity at a number of links and junctions on the A27 through Worthing and Lancing, and the key bottlenecks are identified as:

- The single carriageway section between Offington Corner and Sompting Road
- Offington Corner Junction – a priority-controlled roundabout that exceeds capacity on both the A24 and A27 approaches, and has high circulating traffic flows resulting in reduced gaps to enter the circulatory carriageway
- Grove Lodge junction – a signal-controlled roundabout that operates over capacity
- Sompting Road / Lyons Way junctions – two signal-controlled crossroads that operate over capacity. A short westbound merge between the two junctions results in conflict
- Busticle Lane junction – a signal-controlled crossroads that has high flows on the A27 mainline and high turning flows when it exceeds capacity
- Grinstead Lane junction – a priority-controlled roundabout that experiences considerable queues in both directions during the peak hours when capacity is exceeded, predominantly due to high approach flows and circulatory traffic, resulting in reduced gaps to enter the circulatory carriageway.

The locations of these key bottlenecks are identified in Figure 3-1.

Figure 3-1: Locations of key bottlenecks through Worthing and Lancing



Source: Mott MacDonald. Contains Ordnance Survey data Crown copyright and database right (2021)

Without any intervention, the congestion along the A27 is forecast to grow by approximately 25% by 2041, which will mean the route will under-deliver. Interventions to improve capacity and the flow of traffic along the A27 corridor, would reduce pressure on the local road network, and help the local authority meet National Highways' Strategic Vision for the Road Investment Strategy (RIS).

The interventions are expected to provide safe, reliable, predictable and rapid journeys for both people and goods between the main centres of population, major ports, airports, and rail terminals, as well as other regions within England.

3.2. Policy driving the scheme

3.2.1. Road Investment Strategy

The Department for Transport (DfT) developed the Road Investment Strategy (RIS), which set out a long-term programme of improvements to the strategic road network (SRN) and allocated funding accordingly. The RIS comprises of:

- a long-term vision for the SRN, outlining how the DfT and National Highways will create smooth, smart and sustainable roads
- a multi-year investment plan that will be used to improve the network and create better roads for users, directed by five overall objectives:
  - A network that supports the economy
  - A greener network
  - A safer and more reliable network
  - A more integrated network
  - A smarter network

The RIS also describes nine user priorities, guided by Transport Focus's '*Road users' priorities for the Road Investment Strategy, 2020-2025 research*', which identified aspects that SRN users want to see funded:

- Enhanced safety
- Improving journey times
- Improved surface quality, signage and lighting
- Better information
- Improve roadside facilities
- Better integration with other roads
- Meeting the needs of bus and coach passengers
- Improved provision for non-motorised users
- Future proofing new investment

The A27 Worthing and Lancing Improvements scheme was originally announced in 2015 as a part of the government's Road Investment Strategy 1 (RIS1) but was paused in November 2018 before the Preferred Route Announcement (PRA) could be made. In March 2020, the scheme was re-announced as a part of RIS2, with an amended, shorter RIS statement which reads: "A27 Worthing and Lancing

improvements – package of enhancements between Worthing and Lancing to improve the capacity and flow of traffic."

3.2.2. Strategic Business Plan

In order to meet the requirements of the RIS Highways England (now National Highways) produced the Strategic Business Plan, which describes how the investment plan will be delivered and achieve the Performance Specification. The plan identifies six performance outcomes which accord with the goals and priorities of the RIS:

- Improving safety for all
- Providing fast and reliable journeys
- A well-maintained and resilient network
- Delivering better environmental outcomes
- Meeting the needs of all users
- Achieving efficient delivery

The A27 Worthing and Lancing Improvements scheme is directly referenced in the 2020-25 Strategic Business Plan, which states "a package of enhancements on the A27 between Worthing and Lancing will be developed in consultation with local stakeholders".

3.3. Scheme objectives

The scheme objectives were defined during the Project Control Framework (PCF) Stage 1 Value Management Workshop, and have been defined as objectives, and supporting objectives, aligned with the Highways England (now National Highways) Business Plan's performance goals. The Value Management Workshop was held in April 2021 where objectives were developed and agreed, using the PCF stage 0 Client Scheme Requirements as the basis of discussion. The agreed objectives are shown in Table 3-1.

Table 3-1: Scheme objectives

Category	Objective	Supporting objectives
Improving safety for all (health, safety, security & wellbeing)	Improve road safety for all on the A27 and alternative local road network in the Worthing and Lancing areas.	Reduction in the number of accidents. (in line with 2025 and 2040 targets)
Providing fast and reliable journeys (customers)	Reduce delays and improve journey times for the Worthing and Lancing area.	Decrease journey times.
		Reduction of congestion, queuing and delays on A27.
		Reduction of rat-running through local roads.
	Not impede future enhancements to transport in the scheme area.	

Category	Objective	Supporting objectives
Meeting the needs of all users (people & communities)	Provide for alternative travel modes along the A27 and crossing the A27 in the Worthing and Lancing areas.	Incorporating local cycling and walking infrastructure plan (LCWIP).
		Improve bus stop provision.
		Provision of walking and cycling crossing facilities where needed.
Being environmentally responsible (environment)	Ensure that the scheme does not result in any significant adverse environmental effects, and seek opportunities for enhancements.	Minimise adverse impacts on air quality.
		Minimise adverse impacts on noise.
		Minimise adverse impacts on heritage assets.
		Minimise adverse impacts on designated sites.
		Minimise adverse impacts on water environment.
		Minimise carbon emission.
		Opportunity for biodiversity net gain.

3.4. Scheme programme

The scheme programme covers key stages in relation to the Project Control Framework. This scheme is part of the RIS2. Dates for all stages are outlined in Table 3-2 below:

Table 3-2: PCF stage timings

PCF Stage	Stage Start	Stage End
Stage 0 (Strategy, Shaping and Prioritisation	January 2018	January 2021
Stage 1 (Option Identification)	April 2021	January 2023
Stage 2 (Option Selection)	February 2023	July 2023
Preferred Route Announcement	April 2023	May 2023
Stage 3 (Preliminary Design)	August 2023	March 2024
Stage 4 (Statutory Procedures and Powers)	April 2024	July 2024
Stage 5 (Construction Preparation)	August 2024	December 2024
Stage 6 (Construction)	December 2024	June 2026
Stage 7 (Handover and Close-out)	July 2026	June 2027

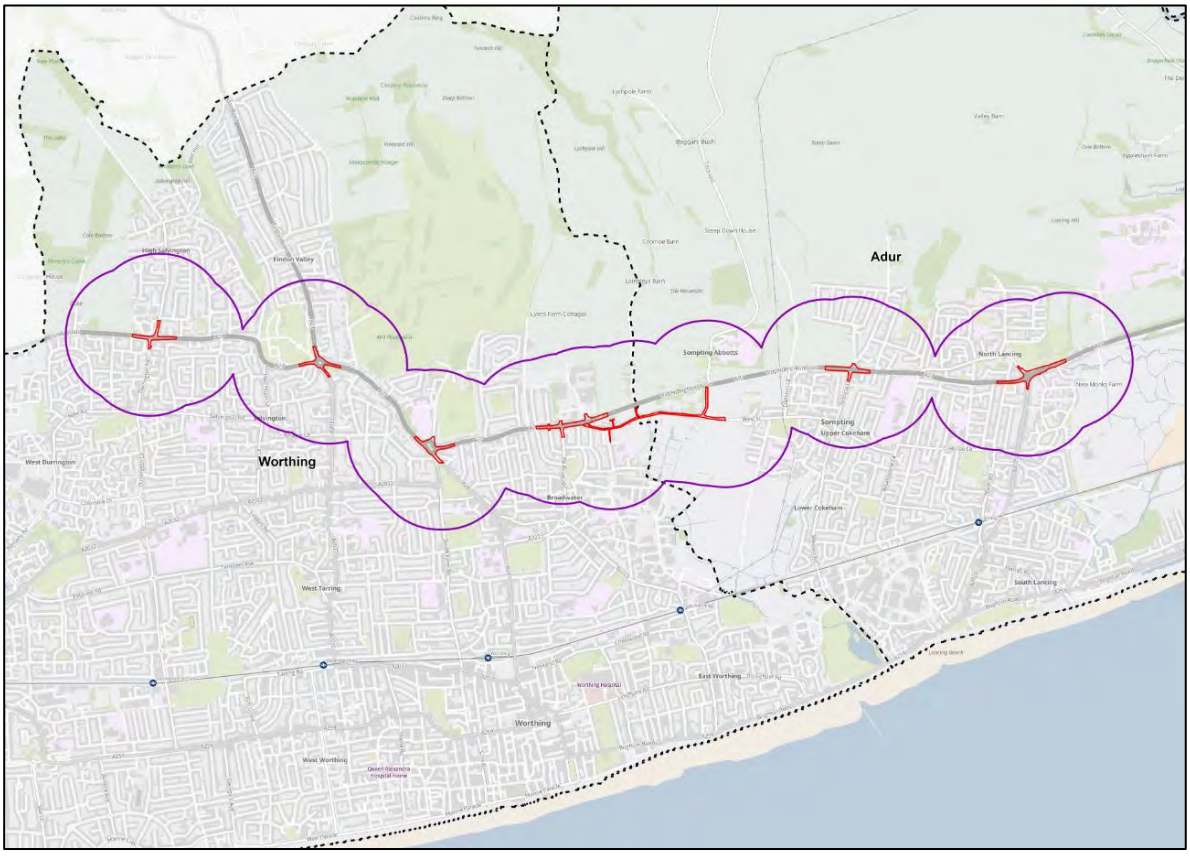
Source: A27 Worthing and Lancing Improvements programme

4. Geographic, demographic, planning and policy contexts

4.1. Geographic context

Under the requirements for Stage 1 of the Project Control Framework (PCF), an environmental study was produced to understand the potential impact of the scheme on the local population. The report defines a Local Impact Area (LIA), which encompasses 500m either side of the A27 throughout the extents of the scheme and represents the immediate geographical area of impact. The extents of the LIA are shown in Figure 4-1.

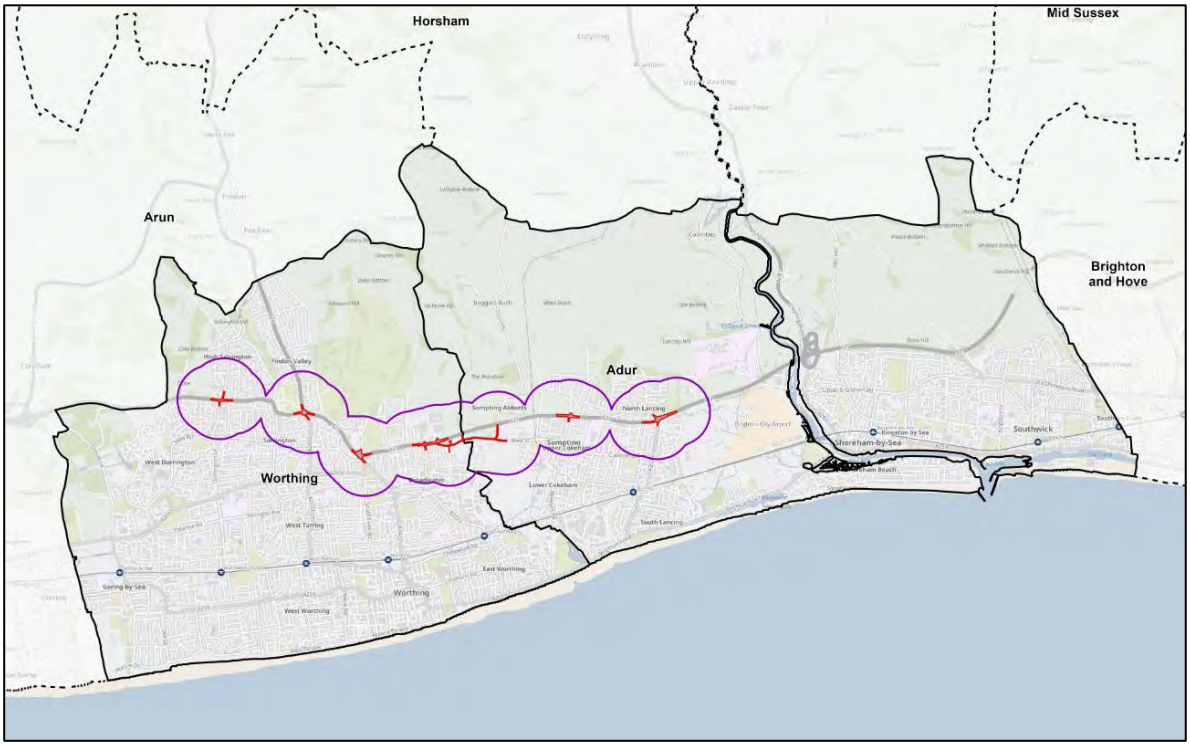
Figure 4-1: Extents of the Local Impact Area



Source: Mott MacDonald. Contains Ordnance Survey data Crown copyright and database right (2022)

The study also defined a Wider Impact Area (WIA), comprised of the area covered by West Sussex County Council and Adur and Worthing Council. The WIA has also been considered when investigating the baseline demographic conditions and provides a 'wider area' context when assessing the human impact of the scheme. The extents of the WIA are shown in Figure 4-2.

Figure 4-2: Extents of the Wider Impact Area



Source: Mott MacDonald. Contains Ordnance Survey data Crown copyright and database right (2022)

There are 10,648 residential properties within the LIA, with the majority distributed between High Salvington, Offington, Broadwater, and North Lancing. There are 115 'community resources', including eight children's nurseries, 11 churches and religious meeting places, four hospitals, three primary schools, and 10 playgrounds, amongst others. There are approximately 280 businesses, with the concentrations around Offington Corner roundabout, Grove Lodge roundabout, and Upper Brighton Road.

4.2. Demographic context

4.2.1. Population

As of 2019 the Office for National Statistics (ONS) estimates that there are 25,103 people living within the LIA.

Table 4-1 details the population and age structure of the LIA, WIA, South East region and England.

Table 4-1: Population and age structure

Area	Total population	Children (Under 16)	Young people (16-24)	Older people (65+)
LIA	25,103	18%	8%	24%
WIA	174,871	18%	8%	23%

Area	Total population	Children (Under 16)	Young people (16-24)	Older people (65+)
South East	9,180,135	19%	10%	20%
England	56,286,961	19%	11%	18%

Source: ONS mid-year population estimates, 2019

The proportion of children within both the LIA and WIA are considered in-line with the wider South East area and national average. The proportion of young people is slightly lower than the regional and national averages, and the proportion of older people is considerably higher.

4.2.2. Deprivation

The English Indices of Multiple Deprivation (IMD) use a collection of indicators to provide a relative estimate of deprivation levels (poverty) within England. Table 4-2 below shows the deprivation quintiles across the LIA, WIA, South East and England.

Table 4-2: Deprivation

Location	Most deprived	Second most deprived	Third most deprived	Fourth most deprived	Least deprived
LIA	0%	21%	17%	33%	28%
WIA	6%	21%	30%	25%	18%
South East	8%	15%	20%	24%	33%
England	20%	20%	20%	20%	20%

Source: 2019 mid-year population estimates, ONS and 2019 English Indices of Deprivation, MHCLG

The proportion of the LIA population living in the most deprived areas is lower than the WIA, South East and England proportions. The majority of the population within the LIA live in areas that fall within either the least deprived or fourth most deprived quintile, indicating lower overall levels of deprivation in the LIA compared to other areas.

4.2.3. Health

Table 4-3 presents key health indicators within the LIA, WIA, South East and England. At LIA level, data is only available for ‘bad or very bad health’ and ‘long-term health problem or disability’ (LTHD).

Table 4-3: Public health baseline data

Measure	LIA	WIA	South East	England
Bad or very bad health (2011)	5%	5%	4%	5%
Long-term health problem or disability (2011)	19%	20%	16%	18%
Life expectancy at birth (male 2016-18) (years)	n/a	80.1	80.7	79.6

Measure	LIA	WIA	South East	England
Life expectancy at birth (female 2016-18) (years)	n/a	83.4	84.1	83.2
Percentage of physically inactive adults	n/a	18%	20%	23%
Under-75 mortality rate, cardiovascular diseases (per 100,000, 2019)	n/a	63	57.1	70.4
Under-75 mortality rate, all respiratory diseases (per 100,000, 2019)	n/a	27.3	28.1	34.2

Source: Public Health England 2018/2019, ONS Census 2011, ONS Life expectancy, UK, 2016 to 2018, Public Health England Mortality Profile 2017-2019

The proportion of the population within the LIA with bad or very bad health is broadly in line with the WIA, South East and England proportions. In comparison, the proportion of population with a long-term health problem or disability within the LIA (19%) is slightly higher than the South East (16%), but in line with the WIA (20%) and England (18%) proportions. In addition, the proportion of physically inactive people within the WIA is considerably lower than the South East and England, suggesting that the people living in the WIA are generally more physically active compared to other areas.

4.3. Planning and policy context

4.3.1. National policy

4.3.1.1. National Planning Policy Framework (2021)

The National Planning Policy Framework (NPPF) sets out the UK Governments planning policies for England. The document sets out requirements of the planning system and how policy should be adhered to and delivered in local plan development and planning decisions.

The NPPF promotes sustainable development and sets out three roles that planned development should fulfil:

- An economic role – contributing to building a strong, responsive and competitive economy, by ensuring that sufficient land of the right type is available in the right places and at the right time to support growth and innovation; and by identifying and co-ordinating development requirements, including the provision of infrastructure.
- A social role – supporting strong, vibrant and healthy communities, by providing the supply of housing required to meet the needs of present and future generations; and by creating a high-quality built environment, with accessible local services that reflect the community's needs and support its health, social and cultural well-being.
- An environmental role – contributing to protecting and enhancing our natural, built, and historic environment; and, as part of this, helping to improve

biodiversity, use natural resources prudently, minimise waste and pollution, and mitigate and adapt to climate change including moving to a low carbon economy.

The A27 Worthing and Lancing scheme aligns with the NPPF by ensuring that the highway network supports current and future housing and development sites to make contribution towards a strong competitive economy.

This scheme is also designed to ensure that residents enjoy a good quality of life reducing carbon emissions and environmental impacts around the A27 supporting healthy communities and enhancing the natural and built environment.

4.3.1.2. Transport Investment Strategy (2017)

The strategy sets out how high performing infrastructure helps deliver balanced growth across the country, as providing an integrated network of maintained and upgraded transport infrastructure connects communities and businesses which help support country-wide growth.

This strategy identifies four objectives to support the investment which include ‘a more reliable, less congested, and better-connected transport network’ which builds a strong economy.

Economic growth priorities are also articulated within The Road to Growth (Highways England, 2017), which explains the economic contribution of Highways England regarding investment to maintain and enhance the network to support business productivity and competitiveness.

This scheme will aim to make significant improvements to a key strategic route along the south coast providing connectivity between important areas of economic activity. Improvements will make the route more attractive for more sustainable modes therefore reducing the number of vehicles on the network, therefore contributing to the key objectives of this strategy in creating ‘a more reliable, less congested, and better-connected transport network’.

4.3.1.3. The Road to Growth: our Strategic Economic Growth Plan (July 2017)

The document sets out the relationship between the strategic road network (SRN) and the economy. It describes National Highways’ role in supporting growth and development across the country and provides a long-term framework to 2050 that will inform future road investment strategies. National Highways’ four key strategic roles are as follows:

- Supporting business productivity and competitiveness, and enabling the performance of SRN-reliant sectors
- Providing efficient routes to global markets through international gateways
- Stimulating and supporting the sustainable development of homes and employment spaces

- Providing employment, skills and business opportunities

The project will align with National Highways' key strategic roles by:

- Improving journey time reliability which will reduce delays and associated costs to business users, freight and tourist/holiday traffic
- Support the sustainable development of homes and employment spaces by providing a network with adequate capacity to accommodate additional growth

4.3.1.4. National Infrastructure Delivery Plan 2016-2021

The National Infrastructure Delivery Plan (NIP) is a long-term sustainable plan for infrastructure planning, funding, financing and delivery from UK government, setting out a plan for the next decade and beyond. The NIP is based around providing the infrastructure that it believes the country needs now and, in the future, as discussed below.

This investment will drive wider economic benefits, including:

- supporting growth and creating jobs in the short-term as projects are built – especially where public investment is used to attract private investment
- raising the productive capacity of the economy in the long-term as the benefits of new infrastructure are felt; reduced transaction costs; larger and more integrated labour and product markets; and better opportunities to collaborate and innovate
- driving efficiency – enabling greater specialisation and economies of scale
- boosting international competitiveness – attracting inward investment and enabling trade with foreign partners

A scheme within the study area would align with the NIP by increasing capacity on the SRN, seeking to reduce congestion, and improving reliability and resilience, encouraging economic growth.

4.3.1.5. The National Infrastructure Strategy (2020) (HM Treasury)

The National Infrastructure Strategy sets out the UK government ambition to deliver an infrastructure revolution and improve the quality of the UK's infrastructure to help level up the country, strengthen the Union and put the UK onto the path to net zero emissions by 2050. The aims of the document are to:

- Boost growth and productivity across the whole of the UK, levelling up and strengthening the Union
- Put the UK on the path to meeting its net zero emissions target by 2050
- Support private investment
- Accelerate and improve delivery of infrastructure projects within the UK

The document suggests that increasing investment in infrastructure is necessary to positively impact economic growth and living standards within the UK.

The document also sets out that the government will invest £27.5 billion on England's strategic road network within the current parliament. This would be the largest ever investment of such kind, with the aim of encouraging regional, as well as national, connectivity.

The A27 Worthing and Lancing scheme can contribute towards this goal by reducing some of the congestion on the UK's roads, therefore having a positive impact on growth and productivity and contributing towards environmental sustainability.

4.3.2. Regional policy

4.3.2.1. Transport Strategy for the South East – Transport for the South East (June 2020)

The strategy for the South East sets out Transport for the South East's mission to grow the South East's economy by delivering a safe, sustainable, and integrated transport system that makes the South East more productive and competitive, improves the quality of life for all residents, and protects and enhances its natural and built environment.

Limited capacity along the A27 is recognised within the strategy as well as challenges associated with the A27 in providing east to west connectivity.

The scheme will contribute to the following vision set out within the strategy by improving the quality of the environment for all road users and enhancing the safety and sustainability of access along a ley strategic route within the South East:

"A high-quality, reliable, safe and accessible transport network will offer seamless door-to-door journeys enabling our businesses to compete and trade more effectively in the global marketplace and giving our residents and visitors the highest quality of life."

4.3.2.2. South East Local Enterprise Partnership Growth Deal and Strategic Economic Plan (March 2014)

The South East Strategic Economic Plan SEP outlines plans for a £10 billion investment programme into East Sussex, Essex, Kent, Medway, Southend and Thurrock to generate 200,000 private sector jobs and finance 100,000 new homes.

Proposals focus on the renewal of the physical and intellectual capital of the area. Alongside the upgrade of roads, railways, harbours and homes, there are also plans to raise educational and skills attainment to develop a workforce poised to grasp the new business and high-level job opportunities presented by our growth sectors and industries. The SEP is split into four growth deal areas:

- East Sussex Growth Deal
- Kent and Medway Growth Deal
- Thames Gateway, South Essex Growth Deal
- Essex County Growth Deal

The scheme contributes to improving the performance along a key corridor within the East Sussex Growth Deal area identified within SEP. The scheme will therefore enhance connectivity along a strategic route and contribute to the overall aims of the SEP.

4.3.2.3. Gatwick 360° Coast to Capital Strategic Economic Plan (2018)

The Coast to Capital Strategic Economic Plan (C2CSEP) outlines the economic priorities of the Coast to Capital region, a region which includes Gatwick Airport as well as economic hubs in Greater Brighton, East Surrey and West Sussex. A total of eight priorities are identified in the C2CSEP including:

- Delivering prosperous urban centres
- Developing business infrastructure and support
- Investing in sustainable growth
- Promoting better transport and mobility

In terms of promoting better transport, the SEP describes an ambition to cut congestion on roads and improve air quality by reducing car journeys and encouraging a shift to public transport and zero-emission vehicles. The Brighton main line and transport links to London are mentioned, and the document also identifies upgrades to the A27 as a pressing issue alongside a need for a more resilient road network.

The scheme will improve the capacity, resilience, and reliability of a key strategic route through the Coast to Capital area therefore allowing for improved connections between urban areas. Enhanced performance of the A27 will support other priorities identified in the SEP by allowing sustainable growth to occur.

4.3.3. Local policy

4.3.3.1. West Sussex Transport Plan (2011-2026) – West Sussex County Council (February 2011)

The West Sussex Transport Plan sets out the ways in which the County Council will improve the quality of life for residents by highlighting the strategies they will seek to use to promote economic growth; tackle climate change; provide access to services, employment, and housing; and improve safety, security and health. The plan also highlights four key priorities for the county:

- Improvements to the A27 trunk road to increase capacity, improve reliability and safety, and increase the competitiveness of local business. This includes several key bottleneck locations
- Improvements to the A23 trunk road to increase capacity and improve safety
- Maintaining the highway network
- Improving the safety record on local roads, increasing the usage of healthy and sustainable modes of transport, and providing access to services

The Transport Plan sets out a long-term strategy for the county and an implementation plan for each key area to identify how challenges will be addressed.

The Transport Plan identifies improvements to the A27 trunk road and complementary public transport improvements to the current bottlenecks at Chichester, Arundel and Worthing to increase capacity, improve reliability and safety and increase the competitiveness of local businesses and attract investment as one of the highest priorities within Part 1 of the long-term strategy.

4.3.3.2. Adur Local Plan (2017)

The Adur Local Plan, adopted in 2017, provides an overview of the strategy, guidance, and policy for the Adur district up to 2032. The plan aims to balance the need for developments such as housing and business facilities with protecting and enhancing Adur. The Local Plan also informs strategies and proposed projects which will have an impact on Adur's economy, community, and environment. The Local Plan includes a vision for Adur by 2032 as well as number of objectives that will help to deliver the vision. This includes an objective to deliver a minimum of 3,718 dwellings by 2032 to aid the regeneration of Adur and allow residents access to better choice of housing.

The plan states that the district council will work with National Highways and West Sussex County Council to introduce measures to address congestion and encourage more sustainable travel patterns. An objective has been set to determine how to secure improvements to the A259 and A27, including the management or reduction of congestion. Several Local Plan developments utilise the A27 as a means of access.

Policy 28: Transport and Connectivity states what new developments should do to ensure improvements to transport and mobility in Adur. Amongst other points, this includes:

- Providing for improvements to the road network, including the A259 and A27. This includes junction improvements, traffic calming, and new roads where necessary.

- Encouraging proposals to extend the existing cycle, walking, and bridleway facilities which link urban areas and key sites, as well as encouraging improved access across the A27.

The scheme will improve the capacity, resilience, and reliability of a key strategic route in Lancing. The A27 forms a key access route for several of the developments highlighted in the Local Plan. The A27 improvements will therefore support Local Plan aspirations across the district and ensure growth can be accommodated sustainably.

4.3.3.3. The Worthing Draft Local Plan (2020-2036)

When adopted, the Worthing Local Plan will provide a strategy for sustainable development and change in Worthing up to 2036. The Local Plan provides the broad policy framework and a long-term spatial strategy to manage development, respond to climate change, promote regeneration, protect the environment, deliver infrastructure, and support vibrant healthy communities.

The Local Plan outlines ambitious plans for development including the delivery of 230 dwellings per year between 2020 and 2036. During the period of 2020-2036:

- A minimum of 3,672 dwellings (net) will be delivered in Worthing. The following allocations will make a significant contribution to this figure
- A minimum of 28,000 sqm of employment floorspace (industrial and warehousing) and 10,000 sqm of commercial (retail and leisure) floorspace will be provided

This scheme will improve the capacity, resilience, and reliability of a key strategic route through Worthing, therefore supporting Local Plan aspirations and ensuring growth can be accommodated sustainably.

4.3.4. Environmental policy

A detailed summary of the Environmental Policy can be found in the PCF Stages 1 and 2 Environmental Assessment Report (EAR) (HE608509-MMD-ENG-OP00-RP-LE-0004). It details the various environmental aspects described in section 1.3 and the associated legislative and policy frameworks.

5. Summary of options

5.1. Stage 0 development

The A27 Worthing and Lancing scheme was initially part of Road Investment Strategy 1 (RIS1), with a RIS1 statement that read: “Improvements to the capacity of the road and junctions along the stretch of single carriageway in Worthing and narrow lane dual carriageway in Lancing. The extent and scale of the improvements, including the option of full dualling, are to be agreed in consultation with West Sussex County Council and the public.”

A single, online option (Option 1), which sought to improve six junctions along the corridor, was taken to public consultation between July and September 2017 and was opposed by 76% of those who responded.

Due to this lack of key local stakeholder and public support, the RIS1 project was paused in November 2018 before Preferred Route Announcement (PRA) could be made on Modified Option 1, a refined solution which considered factors concerning safety, meeting scheme objectives, value for money and feedback from the public consultation.

After 16 months of little activity and engagement, the project returned to Project Control Framework (PCF) Stage 0 in September 2020. The approach to option appraisal for the purposes of PCF Stage 0 focused upon informal stakeholder engagement and the concept of indicative delivery packages.

A longlist of 58 interventions were grouped together by theme into one of four strategies, identified from the workshops between National Highways, WSP, West Sussex County Council (WSCC) and Adur and Worthing Councils (AWC).

Several interventions were selected from each strategy to build potential packages of measures. The interventions were selected based on their likely performance against the scheme objectives, assessed using a high level three-point RAG (red, amber, green) rating. The packages considered a range of possible funding mechanisms and funding sources for each intervention, for example joint National Highways and Local Authority funding. The leading delivery packages proposed at Stage 0 are presented in Figure 5-1 and Figure 5-2.

Figure 5-1: Stage 0 – Indicative Package 1

	Location	Description	Benefits	Delivery	RAG
	A27 Grove Lodge junction*	Major junction improvement including widening of the circulatory carriageway to provide two lanes for the A27, widening on A27 exits and improvements to traffic signals.	More capacity within the existing highway	Highways England Major Projects	
	A27 Grove Lodge junction*	Removal of traffic signals and provision of a footbridge.	Convert to roundabout with priority control, and provide alternative NMU facilities	Highways England Major Projects	
	A27 Sompting Road /Lyons Farm junction	Localised widening of the A27 to extend the westbound internal merge (3 lanes) at Sompting Road.	May provide an efficient way to improve junction performance	Highways England Major Projects	
	Grinstead Lane Junction	Convert to a part time signalised roundabout	More capacity; but part time signals may affect safety and disrupt pedestrian and cycle connectivity	Highways England Major Projects	
	Local road network	Parallel cycle route to the A27 linking Offington junction and Lyons Way via the local road network.	Improves connectivity for cycling	WSCC and Designated Funds	
	Local road network	Parallel cycle route following Route 210 identified in the LCWIP. Connecting A27 Lyons Farm and A27 Grinstead Lane junctions via the local road network.	Improves connectivity for cycling	WSCC and Designated Funds	
	MRN	Minor capacity changes at key junctions on the MRN coordinate with changes on the A27 corridor.	More capacity	WSCC / Section 106 Contributions	
	Network wide	Provision of improved Active Traffic Management including improved UTMC systems, improved travel information and car parking management	Manages existing traffic on the network without road layout upgrades	WSCC and Designated Funds	
	Network wide	Various Travel Demand Management (TDM) measures identified through the Designated Funds programme	Manages existing traffic on the network	WSCC and Designated Funds	

Source: National Highways

Local Cycling Walking and Infrastructure Plan (LCWIP), Urban Traffic Management and Control (UTMC), Non-Motorised User (NMU)

Figure 5-2: Stage 0 – Indicative Package 2

	Location	Description	Benefits	Delivery	RAG
	A27 Grove Lodge junction*	Major junction improvement including widening of the circulatory carriageway to provide two lanes for the A27, widening on A27 exits and improvements to traffic signals.	More capacity within the existing highway	Highways England Major Projects	
	A27 Grove Lodge junction*	Removal of traffic signals and provision of a footbridge.	Convert to roundabout with priority control, and provide alternative NMU facilities	Highways England Major Projects	
	A27 Sompting Road /Lyons Farm junction	Localised widening of the A27 to extend the westbound internal merge (3 lanes) at Sompting Road.	May provide an efficient way to improve junction performance	Highways England Major Projects	
	A27 Offington Junction	Consolidate local road access to A27 Corridor. Closure of Goodwood Road arm at the roundabout.	Improves driver compliance and smoother function of roundabout	Highways England Major Projects	
	A27 Durrington Hill to Grinstead Lane	Consolidate local road accesses to A27 corridor. Closing central reserve gaps. Ban right turns. Convert to left in left out. Cycle / bus gates	Improves traffic flow on the A27	Highways England Major Projects	
	Local road network	Parallel cycle route to the A27 linking Offington junction and Lyons Way via the local road network.	Improves connectivity for cycling	WSCC and Designated Funds	
	Local road network	Parallel cycle route following Route 210 identified in the LCWIP. Connecting A27 Lyons Farm and A27 Grinstead Lane junctions via the local road network.	Improves connectivity for cycling	WSCC and Designated Funds	
	MRN	Minor capacity changes at key junctions on the MRN coordinate with changes on the A27 corridor.	More capacity	WSCC / Section 106 Contributions	
	Network wide	Provision of improved Active Traffic Management including improved UTMC systems, improved travel information and car parking management	Manages existing traffic on the network without road layout upgrades	WSCC and Designated Funds	
	Network wide	Various Travel Demand Management (TDM) measures identified through the Designated Funds programme	Manages existing traffic on the network	WSCC and Designated Funds	

Source: National Highways

5.2. Option generation

5.2.1. Constraints

The assessment of identifying constraints was undertaken during the creation of each option including the design of appropriate mitigation measures to minimise existing impacts within the study area. Each option was analysed in terms of environmental impact, land encroachment, impacts on existing features around the Worthing and Lancing section, cost estimate and safety. The constraints listed below were analysed by conducting desktop studies, receiving advice from technical professionals, consultations with appropriate stakeholders and undertaking a site visit. The following constraints that significantly impact the option identification process are:

- Environmental Designated sites: There are no internationally designated sites within 2km of the scheme options. However, three Special Areas of Conservation (SAC) designated for bat populations, including The Mens, Ebernoe Common and Singleton and Cocking Tunnels, are located within 30km of the scheme options. There are two Sites of Special Scientific Interest (SSSIs) located within 2km of all scheme options at their closest point, including Adur Estuary and Cissbury Ring SSSI.
- Biodiversity: There are no areas of ancient woodland within 1km of the scheme options. The closest Local Wildlife Sites (LWS) to the scheme options is Offington Cemetery LWS, located approximately 150m to the west.
- Water environment: These scheme does not intersection any main rivers and is not within any Flood Zones.
- Listed buildings: There are approximately 20 listed buildings and four conservation areas within 250m of the scheme options. Any impacts on these buildings were avoided and all options were created to have no effects on the structures.
- Existing utilities: The Statutory Undertakers search was completed with all identified and affected services measured for the options following Sift 2. Existing utilities apparatus, including Statutory Undertakers for water, sewage, gas, electricity, and telecommunications, as well as other utility providers including, but not limited to, pipeline operators and other telecommunication providers were identified within the search area.
- Landowners: There are numerous private and business properties / land around the A27 Worthing and Lancing area that will be directly or indirectly affected by the proposed options. A balance between the services affected and land take to be considered when developing the options.
- Existing structures: There is footbridge over A27 Upper Brighton Road in the scheme extent connecting Manor Road with Upper Boundstone but will not be affected by our proposal. There is as well a small retaining wall next to Argos

which may be affected by our proposal and will need to be investigated in future design stage.

- Walking, Cycling and Horse-Riding routes: There are multiple existing pedestrian and cycle crossings along the A27. Maintaining these crossings is important to the public and will need to be investigated whether proposed options can improve existing crossing provision or new provisions are required.
- Scheme budget and objectives: All proposed options will need to be in line with the budget in the National Highways' scheme requirements.
- Buildability: The A27 Worthing and Lancing section experiences high traffic volumes with significant queuing. The traffic management is important in determining the capacity of any diversion routes and phase working to understand what would be required to meet the normal traffic flow on the A27. The proposed options would need to have a balance of maintaining the existing traffic and reducing any risks to road worker safety.

5.2.2. Options generated

The two indicative delivery packages developed at Stage 0 formed the basis of the Stage 1 option generation, which sought to identify various improvement interventions at key junctions and sections of the A27 shown in Figure 5-3. The sections considered for improvement include all bottlenecks identified in Section 3.1, plus additional locations which are key to the overall performance of the corridor. Each location was attributed an identification letter to help with naming interventions later in the process. Locations considered for improvement and their respective identification letters were as follows:

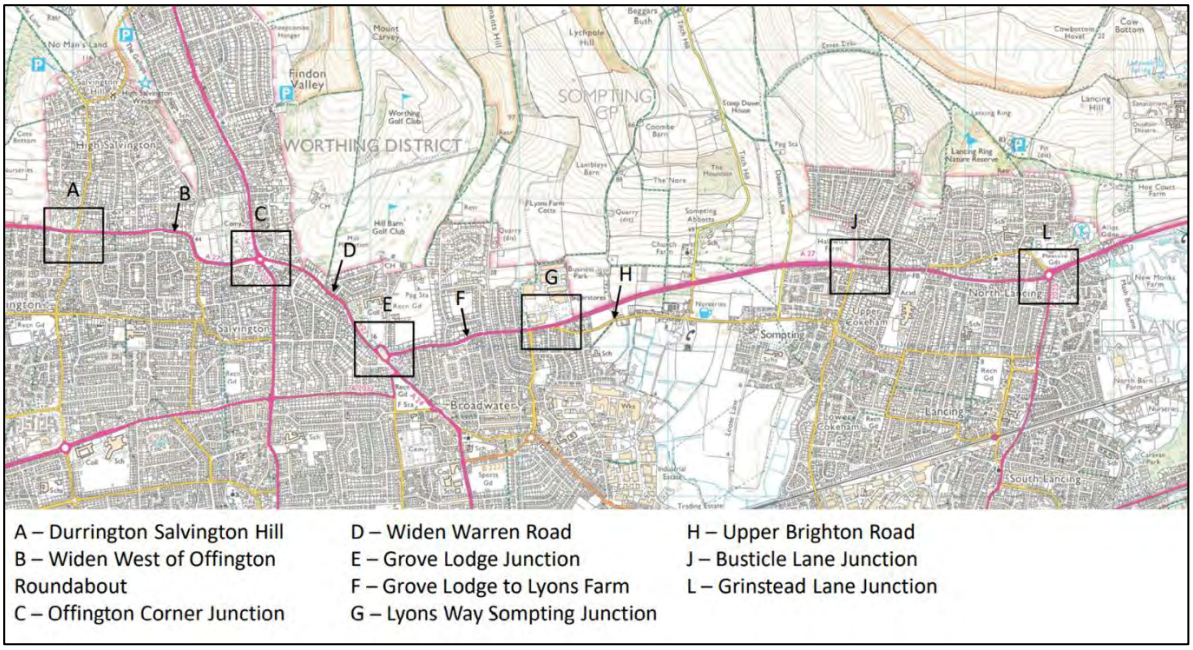
- A – Durrington Salvington Hill
- B – Widen west of Offington Roundabout
- C – Offington Corner Junction
- D – Widen Warren Road
- E – Grove Lodge Junction
- F – Grove Lodge to Lyons Farm
- G – Lyons Way Sompting Junction
- H – Upper Brighton Road
- J – Busticle Lane Junction
- L – Grinstead Lane Junction

With the constraints in mind, an initial desktop study was undertaken which identified a longlist of 51 'strategic road network (SRN)' improvement interventions at key locations on the A27. Additionally, 18 'non-SRN' improvement interventions

were identified, comprising smaller community-focussed improvements which could be delivered alongside the main highway scheme.

The longlist of SRN and non-SRN improvements are summarised in Appendix A: Table A.1 and Table A.2 respectively. All interventions identified in the longlist were progressed through the sifting process, which is described in the following sections.

Figure 5-3: 'Longlist' interventions location plan



Source: Mott MacDonald. Contains Ordnance Survey data Crown copyright and database right (2021)

5.3. Sifting methodology

To ensure a robust approach to option selection a sifting methodology was developed following both the latest National Highways' guidance, and the Department for Transport's (DfT) Transport Analysis Guidance (TAG). The process involves two 'Sifts': Sift 1 filters out options which are considered wholly infeasible or significantly failing to meet project objectives and Sift 2 undertakes a more detailed comparison to select the options for further assessment.

The sifting process was developed to maximise the engagement between the A27 Worthing and Lancing team and various technical specialists, whilst also making the most efficient use of individuals' time. The sifting process is defined by a series of steps, shown in Figure 5-4.

Figure 5-4: Sifting methodology

Source: Mott MacDonald

5.4. Sift 1

Sift 1 was undertaken in early September 2021 to remove infeasible interventions from the shortlisting process. The process removed twenty-seven SRN and nine Non-SRN interventions, with 33 passing through to Sift 2. The outcome of Sift 1 is shown in Appendix A.

Sift 1 reduced the SRN longlist from 51 to 24. The most common reasons for rejection were infeasible delivery within the scheme budget, lack of predicted benefit over the base case, significant land take, and the demolition of properties. Grade separated interventions typically performed the best from a traffic modelling perspective but were all rejected during the sift due to high predicted costs, significant land take and required property demolition.

Sift 1 reduced the non-SRN longlist from 18 to nine. The most common reasons for rejection were a lack of Local Authority and/or key stakeholder support, costs outweighing benefits, not complementing the main SRN scheme, and benefits being captured better by other shortlisted interventions.

5.5. Sift 2

Sift 2 was undertaken in the middle of September 2021 to shortlist the interventions to those that should be developed and assessed further. It was decided that as several of the interventions are similar in nature, applying a scoring methodology and then selecting the top scoring options would very likely end up with several almost identical options chosen, which would not provide a robust assessment of the options available at the junction. This is particularly acute at this stage in the design process where traffic modelling and environmental impact data is unavailable, so a qualitative analysis is used instead. A view was instead taken to pick the best performing intervention or interventions from each type based on the available information. The outcome of the Sift 2 workshop is shown in Appendix B.

Eight SRN interventions and four non-SRN interventions were selected for further development and assessment following Sift 2. The most common reasons for interventions not being selected were significant local impacts from construction, traffic management and land take requirements, and other interventions at the same location being able to offer better cost and benefit values.

5.6. Options selected for further development

Following the completion of Sift 2 the selected interventions were combined to form three individual delivery packages (termed 'options'), guided by the scheme budget constraints, land constraints, and maximising benefit for all users. These options and their respective interventions are summarised in Table 5-1.

Table 5-1: Summary of options following Sift 2

Option 1	Option 2	Option 3
(C) A27 Offington Corner roundabout	(C) A27 Offington Corner Roundabout	(A) A27 Durrington Hill/Salvington Hill
(E) A27 Grove Lodge Roundabout	(E) A27 Grove Lodge Roundabout	(C) A27 Offington Corner Roundabout
(L) A27 Grinstead Lane Roundabout	(G) A27 Lyons Way/Sompting Road Junction	(E) A27 Grove Lodge Roundabout
	(H) Upper Brighton Road	(H) Upper Brighton Road
	(L) A27 Grinstead Lane Roundabout	(J) A27 Busticle Lane Junction
	Cycle Route 212	(L) A27 Grinstead Lane Roundabout
	Cycle Route 310	Cycle Route 212
		Cycle Route 310

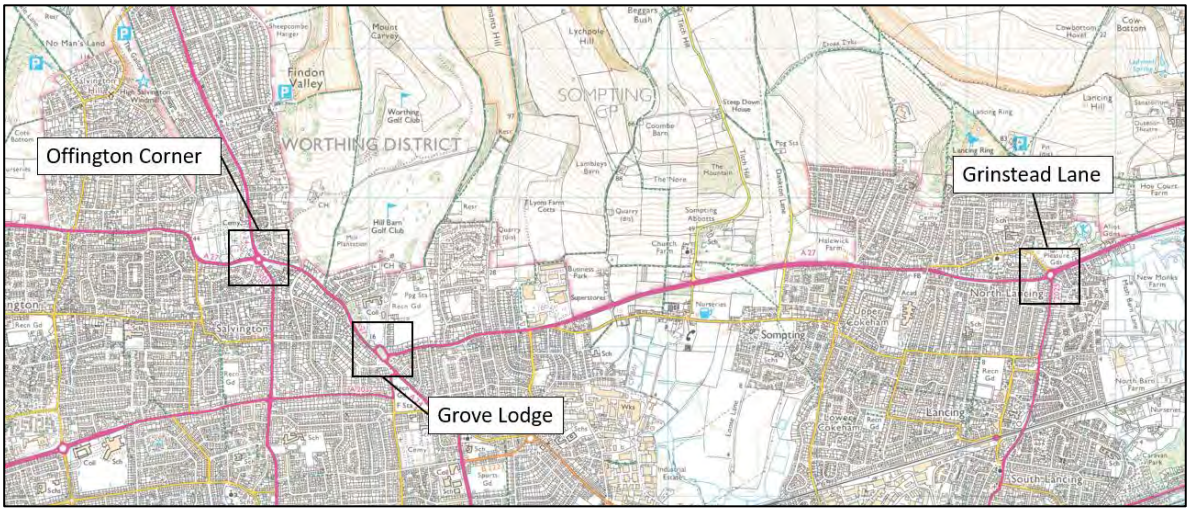
5.6.1. Option 1

Following the completion of Sift 2, Option 1 proposed:

- Major improvement works to A27 Offington Corner roundabout, A27 Grove Lodge roundabout and A27 Grinstead Lane roundabout, including widening of the existing circulatory carriageways, widening of roundabout exits, and the improvement of crossing provision around the junctions
- A package of technological improvements, including the provision of new technology assets along the length of the A27, to enhance safety, provide real-time information to users, and facilitate improved and better-informed journeys

The locations of the junctions considered for improvement under Option 1 are shown in Figure 5-5.

Figure 5-5: Option 1 intervention locations following Sift 2



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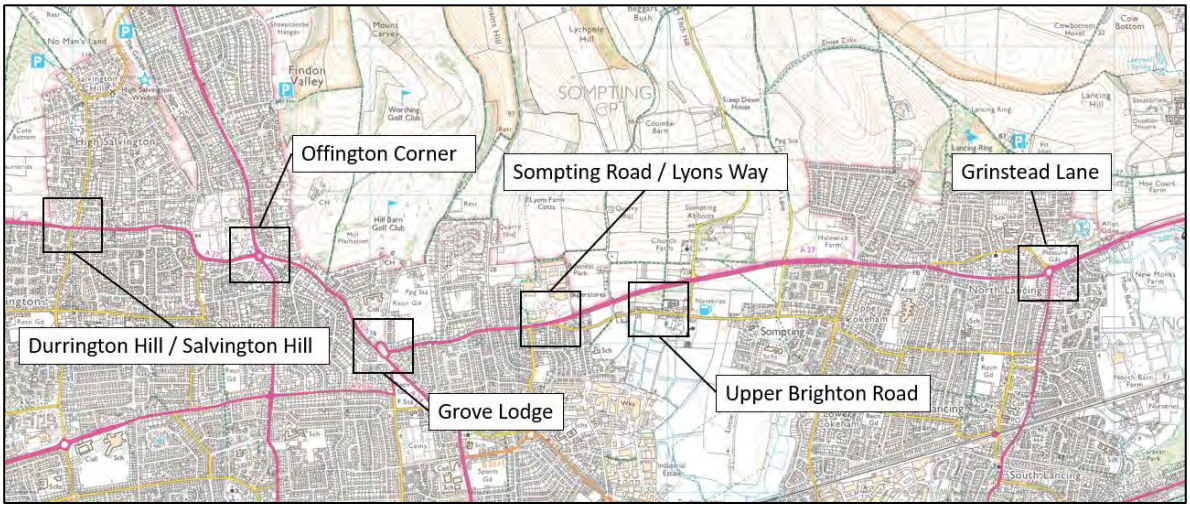
5.6.2. Option 2

Following the completion of Sift 2, Option 2 proposed:

- Major improvement works to A27 Offington Corner roundabout, including widening and realignment of the existing circulatory carriageway, widening of exits and approaches to the junction, and provision of new signal-controlled crossings for pedestrians and cyclists.
- Minor improvement works to A27 Grove Lodge roundabout, A27 Lyons Way / Sompting Road junction and A27 Grinstead Lane roundabout, including optimisation of existing traffic signal arrangements, upgrades of existing crossings, and restrictions on some local road approaches.
- Conversion of Upper Brighton Road to an eastbound-only one-way street, to stop A27 westbound traffic using it as a rat-run.
- A package of technological improvements, including the provision of new technology assets along the length of the A27, to enhance safety, provide real-time information to users, and facilitate improved and better-informed journeys.
- A new segregated, shared-use route for pedestrians and cyclists connecting A27 Durrington Hill / Salvington Hill junction with Grove Lodge roundabout, comprising Cycle Routes 212 and 310 of Adur and Worthing Councils' Local Cycling and Walking Infrastructure Plan.

The locations of the junctions / roads considered for improvement under Option 2 are shown in Figure 5-6.

Figure 5-6: Option 2 intervention locations following Sift 2



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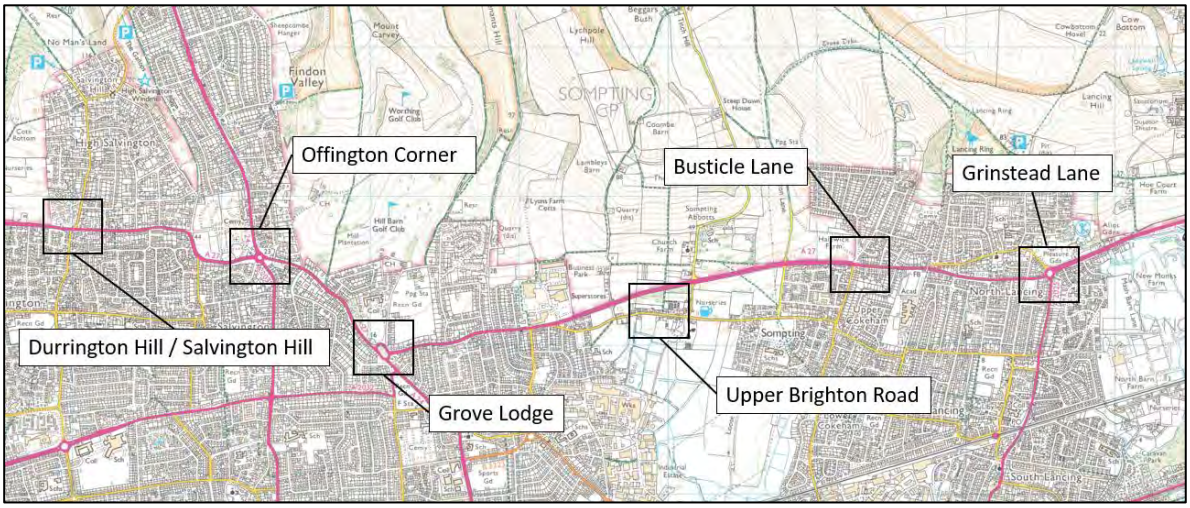
5.6.3. Option 3

Following the completion of Sift 2, Option 3 proposed:

- Major improvement works to A27 Offington Corner roundabout and A27 Durrington Hill / Salvington Hill junction, including widening and realignment of the existing carriageways, widening of exits and approaches to the junctions, and provision of new signal-controlled crossings for pedestrians and cyclists.
- Minor improvement works to A27 Grove Lodge roundabout, A27 Busticle Lane junction and A27 Grinstead Lane roundabout, including optimisation of existing traffic signal arrangements, upgrades of existing crossings and some small areas of carriageway widening.
- Conversion of Upper Brighton Road to an eastbound-only one-way street, to stop A27 westbound traffic using it as a rat-run.
- A package of technological improvements, including the provision of new technology assets along the length of the A27, to enhance safety, provide real-time information to users, and facilitate improved and better-informed journeys.
- A new segregated, shared-use route for pedestrians and cyclists connecting A27 Durrington Hill / Salvington Hill junction with Grove Lodge roundabout, comprising Cycle Routes 212 and 310 of Adur and Worthing Councils' Local Cycling and Walking Infrastructure Plan.

The locations of the junctions / roads considered for improvement under Option 3 are identified in Figure 5-7.

Figure 5-7: Option 3 intervention locations following Sift 2



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5.7. Value engineering workshop

Following more detailed cost estimation work undertaken on the selected options, it became apparent that all three options exceeded the scheme delivery budget in their original configurations.

A value engineering workshop was held between Mott MacDonald and National Highways on the 3 March 2022 to identify cost reducing measures that could be applied to all three options, to bring them in line with the proposed scheme delivery budget.

Through the value engineering workshop, it was agreed that the proposed upgrades at Grinstead Lane roundabout and Durrington Hill / Salvington Hill junction should be removed from the scheme altogether, suitably reducing the cost of all three options. Additionally, it was decided that Cycle Routes 212 and 310 would be included in Option 1, and the same package of technological improvements should be included across all options.

5.8. Finalised options

The finalised options following the value engineering workshop are combination of the SRN elements and non-SRN elements which will be delivered as part of the separate scheme. A package of technological improvements and a new segregated, shared-use route for pedestrians and cyclists will be delivered separately and are not part of the main SRN scheme. All elements are summarised in Table 5-2 and described in detail in the subsequent sections.

Table 5-2 : Finalised options following value engineering workshop

Option 1	Option 2	Option 3
(C) A27 Offington Corner roundabout	(C) A27 Offington Corner roundabout	(C) A27 Offington Corner roundabout
(E) A27 Grove Lodge roundabout	(E) A27 Grove Lodge roundabout	(E) A27 Grove Lodge roundabout
Cycle Route 212	(G) A27 Lyons Way/Sompting Road junction	(H) Upper Brighton Road
Cycle Route 310	(H) Upper Brighton Road	(J) A27 Busticle Lane junction
	Cycle Route 212	Cycle Route 212
	Cycle Route 310	Cycle Route 310

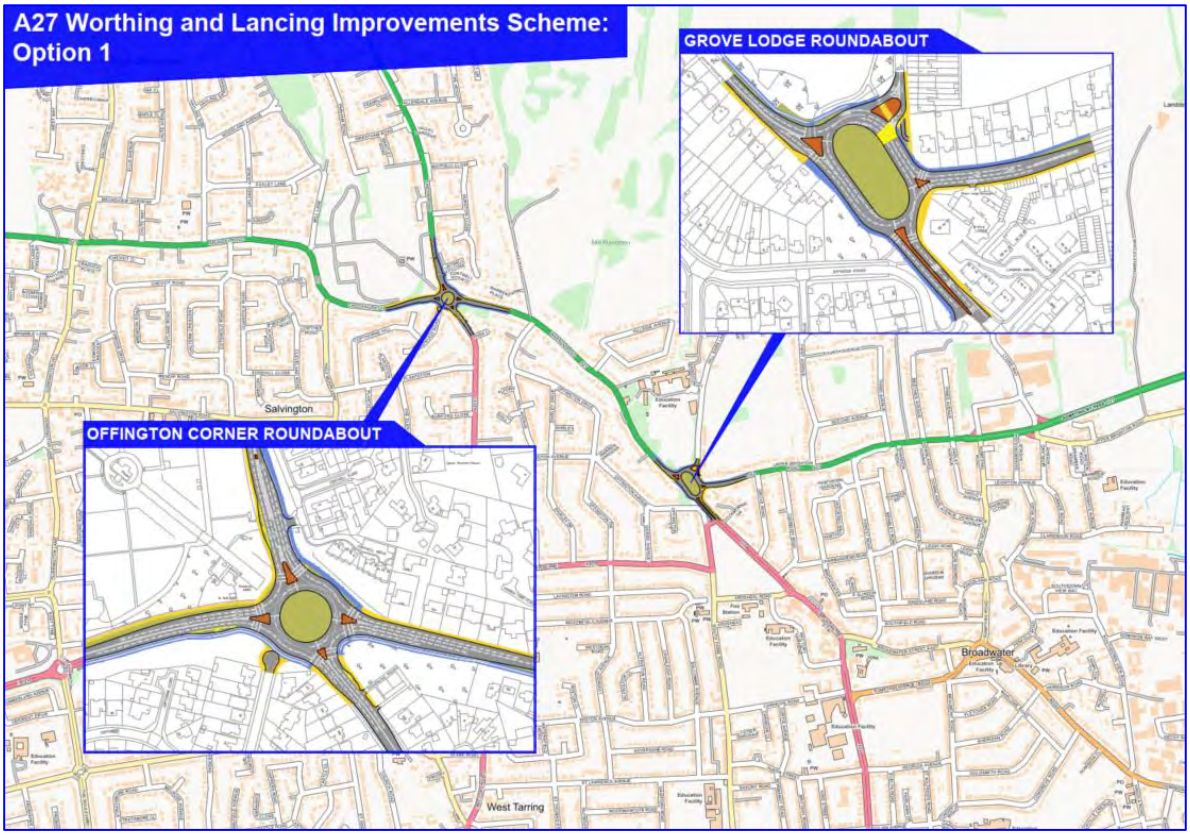
Options scheme drawings has been divided to two parts. Main scheme drawings and non-SRN elements which will be delivered separately. For Option 1 drawings refer to Appendix C, for Option 2 drawings refer to Appendix D and for Option 3 drawings refer to Appendix E.

5.8.1. Option 1

Option 1 proposes:

- Major improvement works to A27 Offington Corner roundabout (described in Section 5.8.4)
- Major improvement works to A27 Grove Lodge roundabout (described in Section 5.8.5)
- A package of technological improvements, including the provision of new technology assets along the length of the A27 (described in Section 5.8.9)
- A new segregated, shared-use route for pedestrians and cyclists connecting A27 Durrington Hill / Salvington Hill junction with Grove Lodge roundabout (described in Section 5.8.10)

Figure 5-8: Option 1 finalised intervention locations



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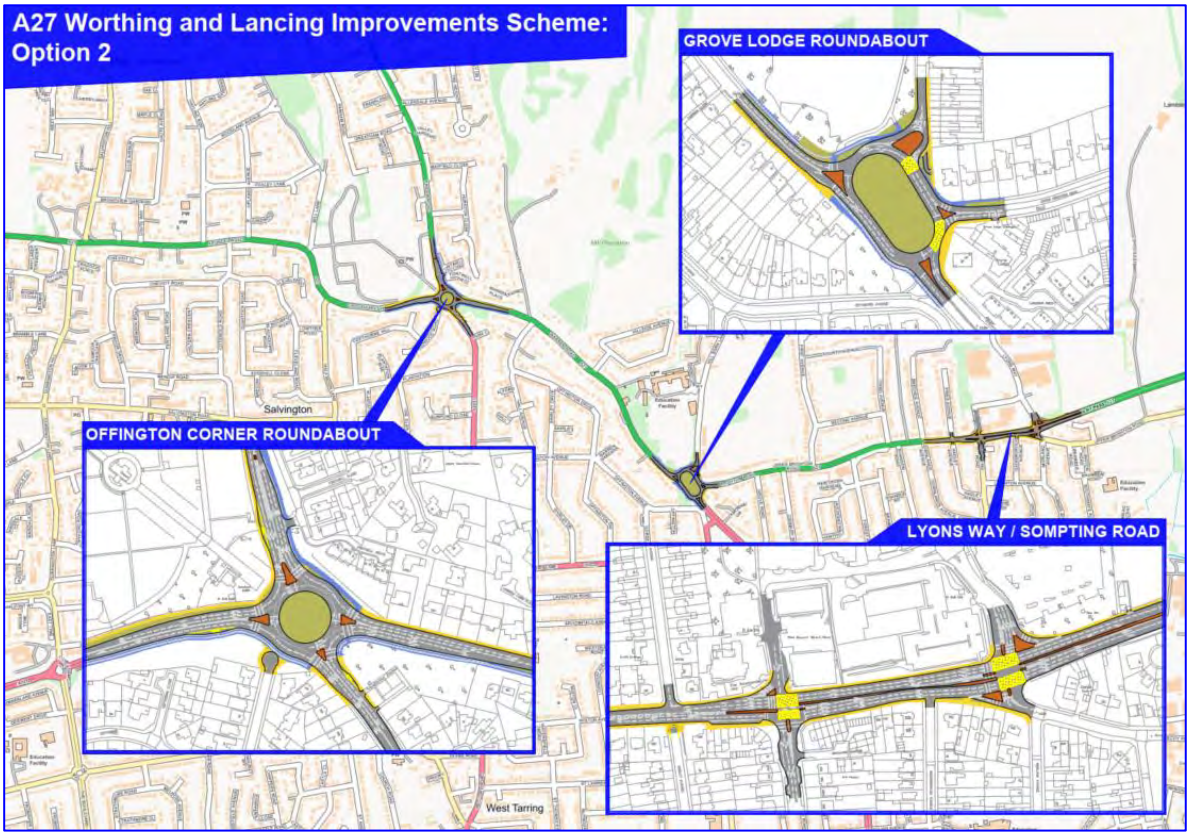
5.8.2. Option 2

Option 2 proposes:

- Major improvement works to A27 Offington Corner roundabout (described in Section 5.8.4)
- Minor improvement works to A27 Grove Lodge roundabout (described in Section 5.8.5)
- Minor improvement works to A27 Lyons Way / Sompting Road junction (described in Section 5.8.6)
- Conversion of Upper Brighton Road to an eastbound-only one-way street (described in Section 5.8.7)
- A package of technological improvements, including the provision of new technology assets along the length of the A27 (described in Section 5.8.9)
- A new segregated, shared-use route for pedestrians and cyclists connecting A27 Durrington Hill / Salvington Hill junction with Grove Lodge roundabout (described in Section 5.8.10)

Figure 5-9: Option 2 finalised intervention locations



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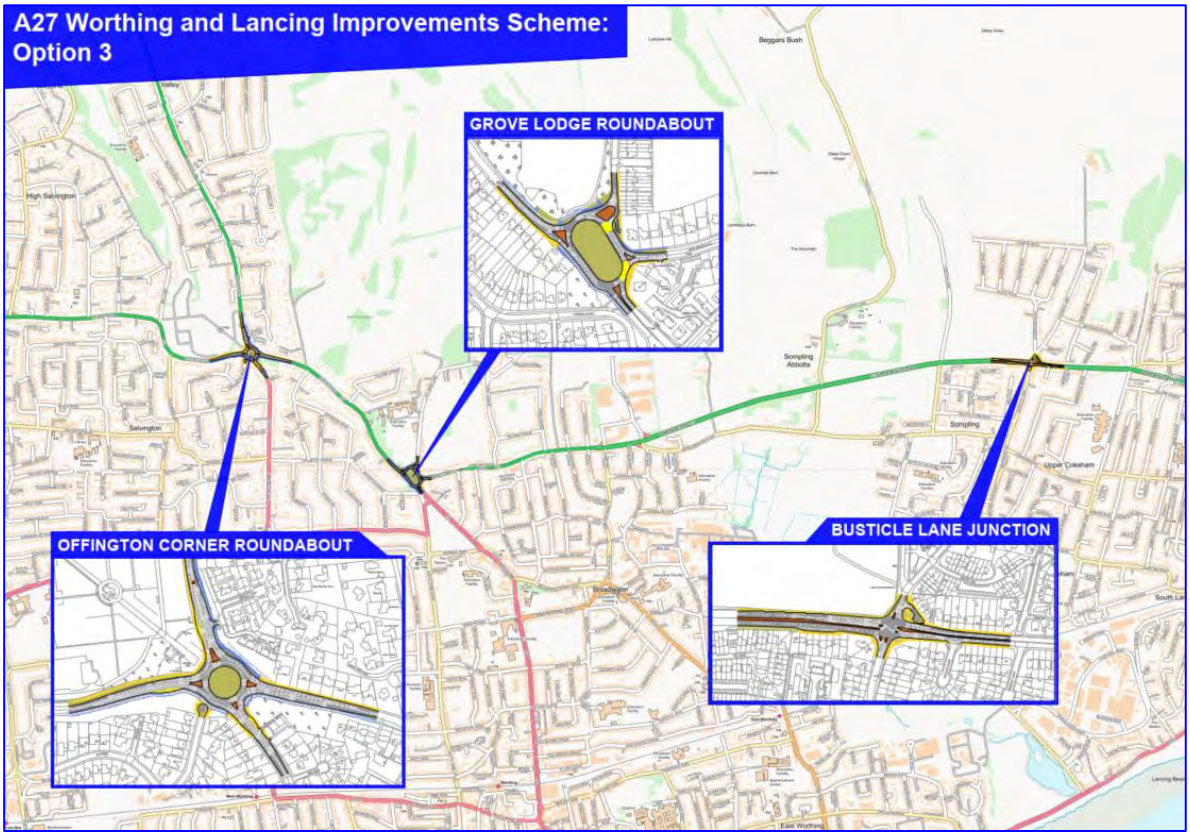
5.8.3. Option 3

- Major improvement works to A27 Offington Corner roundabout (described in Section 5.8.4)
- Minor improvement works to A27 Grove Lodge roundabout (described in Section 5.8.5)
- Minor improvement works to A27 Busticle Lane junction (described in Section 5.8.8)
- Conversion of Upper Brighton Road to an eastbound-only one-way street (described in Section 5.8.7)
- A package of technological improvements, including the provision of new technology assets along the length of the A27 (described in Section 5.8.9)
- A new segregated, shared-use route for pedestrians and cyclists connecting A27 Durrington Hill / Salvington Hill junction with Grove Lodge roundabout (described in Section 5.8.10)

Figure 5-10: Option 3 finalised intervention locations



Source: Mott MacDonald. Contains Ordnance Survey data Crown copyright and database right (2021)

5.8.4. A27 Offington Corner Roundabout

Improvement works at Offington Corner roundabout are the same for all Options and comprise:

- Widening and realignment of the existing roundabout circulatory carriageway to accommodate two lanes
- Widening of the A27 eastbound and westbound approaches, A24 southbound approach, and Offington Lane northbound approach to accommodate three lanes
- Widening of all exits from the roundabout to accommodate two lanes
- Removal and stopping up of the Goodwood Road arm
- Provision of new traffic signals
- Provision of new signal-controlled crossings for cyclists and pedestrians on the northern and eastern arms
- Widening of south-side footway to accommodate a segregated shared-use path to connect to Cycle Route 212 (and Durrington Hill / Salvington Hill junction)

5.8.5. A27 Grove Lodge Roundabout

5.8.5.1. Option 1

Improvement works at Grove Lodge roundabout for Option 1 comprise:

- Widening of the existing roundabout circulatory carriageway to accommodate four lanes
- Widening of the A27 eastbound exit to accommodate two lanes
- Provision of a new signal-controlled pedestrian crossing on the A27 southern arm
- Review and upgrade of existing signal-controlled crossings around the junction
- New segregated shared-use path provided on the north-eastern arm to connect with Cycle Route 310 (and Offington Corner roundabout)

5.8.5.2. Option 2 and 3

Improvement works at Grove Lodge roundabout for Options 2 and 3 comprise:

- The existing roundabout layout will be retained
- The traffic signal arrangement will be reviewed, validated, and optimised to improve traffic flow
- The existing crossing provision will be reviewed and upgraded to accommodate cyclists
- New segregated shared-use path will be provided on the north-eastern approach arm to connect with Cycle Route 310 (and Offington Corner Roundabout).

5.8.6. A27 Lyons Way / Sompting Road Junction

Improvement works at Lyons Way / Sompting Road for Option 2 comprise:

- Widening of the A27 carriageway through the junction to accommodate three lanes in both directions
- Provision of an additional right-turn lane from the A27 westbound to Sompting Road
- Closure of the direct access from Hadley Avenue to the A27, and extension of the existing westbound merge
- Sompting Road changed to a northbound-only one-way road
- Review of existing traffic signal and crossing provision at the junction and upgrade where necessary

5.8.7. Upper Brighton Road

Improvement works at Upper Brighton Road for Options 2 and 3 comprise:

- Change from existing two-way carriageway to an eastbound-only one-way street to reduce rat-running
- Repositioning of existing bus stops and minor diversion of bus route

5.8.8. A27 Busticle Lane Junction

Improvement works at Busticle Lane junction for Option 3 comprise:

- Widening of the A27 eastbound carriageway to accommodate three lanes through the junction
- Closure and stopping-up of current exit from Hillbarn Parade

5.8.9. Technological improvements

As noted above, a package of improvements will be provided as part of a separate scheme, and includes:

- Variable Message Signs (VMS) and Vehicle Activated Signs (VAS) provided throughout the scheme extents
- Enhanced Network Camera Programme (ENCP) CCTV and downstream detection monitoring provided throughout the scheme extents
- All-red vehicle detection added to existing and proposed traffic signals
- Real Time Passenger Information (RTPI) provided to all bus stops along the A27 within the scheme extents
- Urban Traffic Management and Control (UTMC) dashboards and air quality monitors added at junctions selected for improvement
- The specific technology assets and the rationale behind their inclusion is discussed in further detail in Section 6.2.5

5.8.10. Cycle routes

As noted above, a new segregated, shared-use route for pedestrians and cyclists will be provided along the A27 to connect A27 Durrington Hill / Salvington Hill junction with Grove Lodge roundabout as part of a separate scheme. The route comprises Cycle Routes 212 and 310, originally identified in Adur and Worthing Council's Local Cycling and Walking Infrastructure Plan.

5.8.10.1. Cycle Route 212

Cycle Route 212 comprises a new segregated shared-use path for pedestrians and cyclists to connect A27 Durrington Hill / Salvington Hill junction at the west side of the scheme with A27 Offington Corner roundabout. The existing footway along the

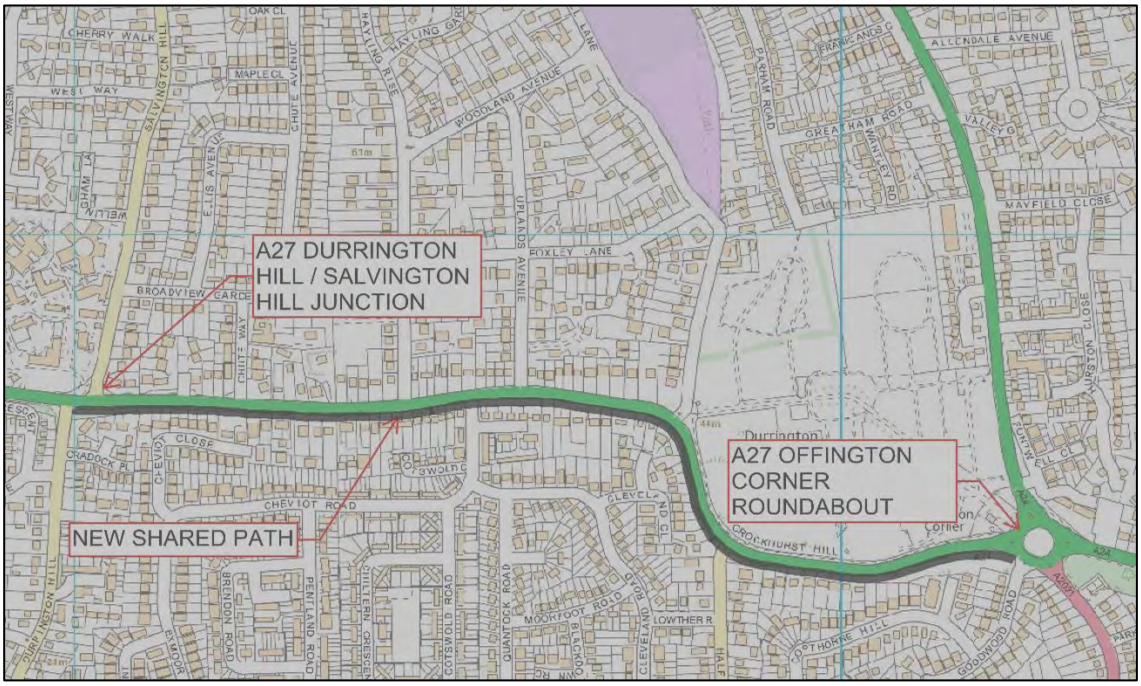
southern side of the A27 will be widened to accommodate both pedestrians and cyclists.

Where possible a 4m wide shared-use path will be provided comprising a 2.5m reservation for cyclists and 1.5m reservation for pedestrians, delineated by a white line. Where the route is horizontally constrained a 3m shared-use path will be provided instead, comprising a 1.5m reservation for cyclists and a 1.5m reservation for pedestrians, plus a 0.5m physical separation from the live carriageway.

Existing traffic signal crossing points along the proposed cycle route will also be upgraded to accommodate cyclists.

The proposed alignment of Cycle Route 212 is shown in Figure 5-11.

Figure 5-11: Cycle Route 212



Source: West Sussex County Council Interactive Map

5.8.10.2. Cycle Route 310

Cycle Route 310 comprises a new segregated shared-use path for pedestrians and cyclists to connect Offington Corner roundabout with Grove Lodge roundabout. Sections of the existing footway on both the south and north side of the A27 will be widened to accommodate both pedestrians and cyclists.

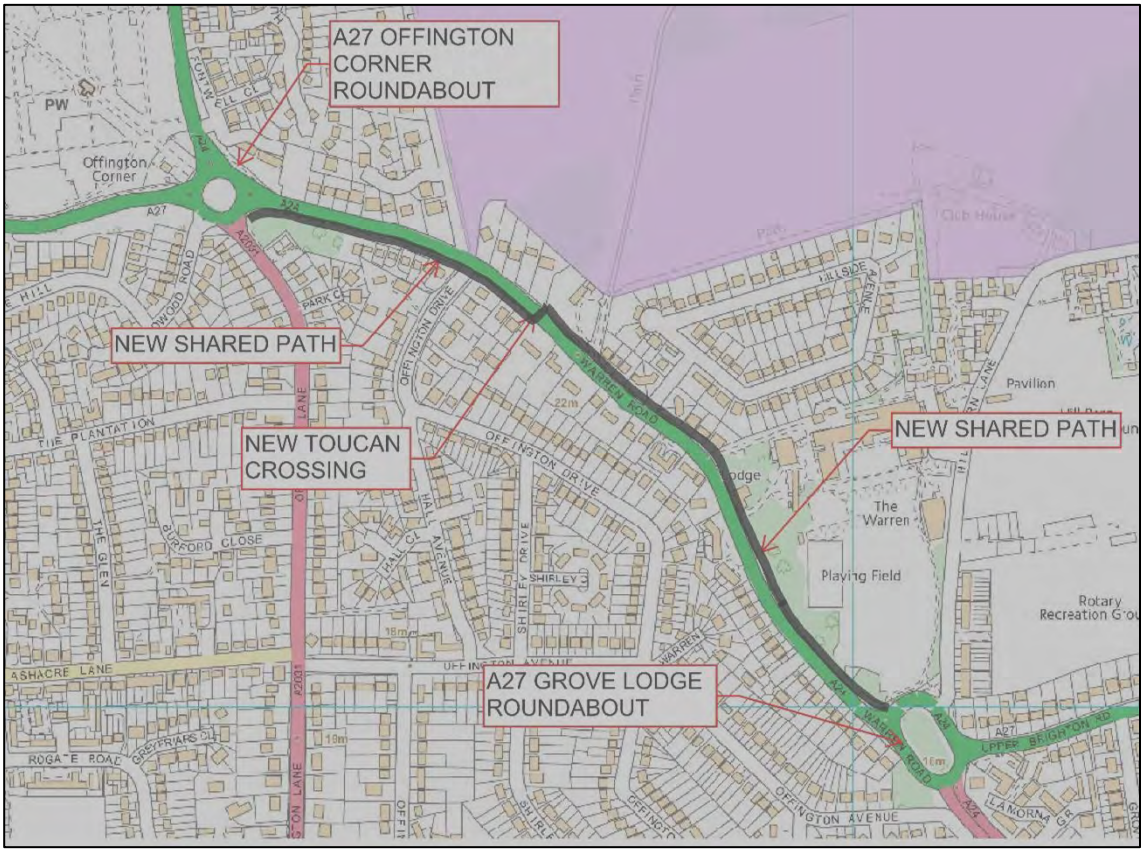
Where possible a 4m wide shared-use path will be provided comprising a 2.5m reservation for cyclists and 1.5m reservation for pedestrians, delineated by a white line. Where the route is horizontally constrained a 3m shared-use path will be provided instead, comprising a 1.5m reservation for cyclists and a 1.5m reservation for pedestrians, plus a 0.5m physical separation from the live carriageway.

However, there is an approximately 50m section near Hillside Avenue where an unsegregated path is proposed instead, due to constraints imposed by an existing bus stop and lay-by.

A new toucan crossing will be provided between Offington Corner roundabout and Grove Lodge roundabout to facilitate safer crossing for cyclists and pedestrians, and existing traffic signal crossing points along the route will be upgraded to accommodate cyclists.

The proposed alignment of Cycle Route 310 is shown in Figure 5-12.

Figure 5-12: Cycle Route 310



Source: West Sussex County Council Interactive Map

6. Summary of design and analysis

6.1. Road layout and standards

6.1.1. Use of Design Manual for Roads and Bridges standards

All intervention designs have been developed in accordance with Design Manual for Roads and Bridges (DMRB) standards, in particular:

- CD 109 - Highway link design
- CD 116 - Geometric design of roundabouts
- CD 123 - Geometric design of at-grade priority and signal-controlled junctions
- CD 127 - Cross-sections and headrooms
- CD 143 - Designing for walking, cycling and horse-riding
- CD 169 - The design of lay-bys, maintenance hardstandings, rest areas, service areas and observation platforms
- CD 195 - Designing for cycle traffic

The existing A27 mainline is a single carriageway between A27 Durrington Hill / Salvington Hill junction to A27 Sompting Road junction, and a dual carriageway from A27 Sompting Road junction to A27 Grinstead Lane roundabout. It is classified as a trunk road and maintained by National Highways.

The design speed for the single carriageway section of the A27 is 70km/h (40mph), and 120km/h (70mph) for dual carriageway sections outside any junction extents. All options were designed using DMRB, to ensure compliance with the appropriate geometric requirements where possible. However, in some instances improvements were made to inherently non-compliant sections of carriageway, and the resulting reinstatement was also non-compliant due to the limited scope for road realignment.

For several interventions, carriageway widening or additional lanes have been proposed to improve the flow of traffic and improve safety. A minimum lane width of 3.0m has been proposed throughout the scheme extents, except for a single right-turn lane to Pines Avenue where the existing layout is reinstated.

The majority of existing bus stops within the scheme extents are not designed to DMRB standards. Where they have been reinstated, spatial constraints have typically prevented the necessary improvements to meet DMRB requirements, and so departures from standard may be required in some instances.

For shared-use pedestrian and cyclist paths, DMRB CD 143 recommends a desirable minimum width of 5m, and an absolute minimum width of 3m (comprised of a 1.5m reservation for cyclists and a 1.5m reservation for pedestrians). Given

the spatial constraints throughout the scheme, a 4m wide shared-use path will be provided where possible, comprised of a 2.5m reservation for cyclists and a 1.5m reservation for pedestrians, delineated by a white line. In sections that are particularly constrained a 3m wide shared-use path will be provided instead, comprised of a 1.5m reservation for cyclists and a 1.5m reservation for pedestrians, plus a 0.5m physical separation from the live carriageway.

6.1.2. Other standards

Additionally, several non-DMRB standards have been used to guide aspects of the intervention designs:

- LTN 1/20 - Cycle Infrastructure Design
- LTN 2/90 - The Design of Pedestrian Crossings
- Traffic Signs Manual Chapter 5 - Road Markings 2018
- Traffic Signs Manual Chapter 6 - Traffic Control 2019
- The Traffic Signs Regulations and General Directions 2016

6.1.3. Local roads standards

All proposed new roads and geometry upgrades have been designed based on DMRB standards, and no local road standards were used on connector roads or upgrades to the local network.

6.1.4. Any departures and reasoning behind their application

Numerous existing departures have been identified along the A27 within the scheme extents. In particular, existing lane widths, and the geometry and location of bus lay-bys have been identified as substandard. Due the land and cost constraints of the scheme the majority of these departures will have to be reinstated in proposed designs, as any widening to improve compliance would require encroachment outside the highway boundary and potentially the demolition of private properties.

The identified departures include:

- Existing bus lay-bys do not comply with the requirements of DMRB CD 169
- Pedestrian crossings staggered the wrong way, in contravention to LTN 1/95, due to spatial constraints
- Localised narrowing of footways to below the 2m requirement of DMRB CD 143
- Lane widths narrower than the requirements of CD 116 due to spatial constraints

6.2. Engineering assessment

6.2.1. Road safety assessment

6.2.1.1. Option 1

Option 1 includes the provision of additional traffic lanes at Offington Corner and Grove Lodge roundabouts. The capacity of all junctions will be increased, improving journey times and reducing congestion. The reduction in congestion should improve vehicle safety and reduce the incidence of rear-end shunt collisions which are common in slow moving stop-start traffic.

New signalised crossings for pedestrians and cyclists will be provided at Offington Corner roundabout, reducing the conflict between non-motorised users and motorists and improving safety for all users.

Offington Corner roundabout will be reduced from five to four arms by the closure and stopping up of the Goodwood Road arm, reducing the number of movements and complexity of the junction and improving vehicle safety.

New shared-use paths will be provided along the A27 between Durrington Hill / Salvington Hill and Grove Lodge roundabout. The paths will remove conflict between cyclists and motorists and improve comfort and safety for all users.

Vehicle Activated Signs (VAS) provision will be increased throughout the scheme extents. Their increased presence will help improve speed limit compliance, particularly along single carriageway 40mph sections, and improve safety for all users.

6.2.1.2. Option 2

Option 2 includes the provision of additional traffic lanes at Offington Corner roundabout and A27 Lyons Way / Sompting Road junction. The capacity of both junctions will be increased, improving journey times and reducing congestion. The reduction in congestion should improve vehicle safety and reduce the incidence of rear-end shunt collision which are common in slow moving stop-start traffic.

New signalised crossing for pedestrians and cyclists will be provided at Offington Corner roundabout, reducing conflict between non-motorised users and motorists and improving safety for all users. The existing crossing at Grove Lodge roundabout will be upgraded to accommodate cyclists, similarly, benefiting all users.

Offington Corner roundabout will be reduced from five to four arms by the closure and stopping up of the Goodwood Road arm, reducing the number of movements and complexity of the junction and improving vehicle safety.

Upper Brighton Road will be changed to an eastbound-only one-way street, with the reduction in traffic improving safety for all users.

New shared-use paths will be provided along the A27 between Durrington Hill / Salvington Hill and Grove Lodge roundabout. The paths will remove conflict between cyclists and motorists and improve comfort and safety for all users.

Vehicle Activated Signs (VAS) provision will be increased throughout the scheme extents. Their increased presence will help improve speed limit compliance, particularly along single carriageway 40mph sections, and improve safety for all users.

6.2.1.3. Option 3

Option 3 includes the provision of additional traffic lanes at Offington Corner roundabout and A27 Busticle Lane junction. The capacity of all junctions will be increased, improving journey times and reducing congestion. The reduction in congestion should improve vehicle safety and reduce the incidence of rear-end shunt collisions which are common in slow moving stop-start traffic.

New signalised crossing for pedestrians and cyclists will be provided at Offington Corner roundabout, reducing conflict between non-motorised users and motorists and improving safety for all users. The existing crossing at Grove Lodge roundabout will be upgraded to accommodate cyclists, similarly benefiting all users.

Offington Corner roundabout will be reduced from five to four arms by the closure and stopping up of the Goodwood Road arm, reducing the number of movements and complexity of the junction and improving vehicle safety.

Upper Brighton Road will be changed to an eastbound-only one-way street, with the reduction in traffic improving safety for all users.

New shared-use paths will be provided along the A27 between Durrington Hill / Salvington Hill and Grove Lodge roundabout. The paths will remove conflict between cyclists and motorists and improve comfort and safety for all users.

Vehicle Activated Signs (VAS) provision will be increased throughout the scheme extents. Their increased presence will help improve speed limit compliance, particularly along single carriageway 40mph sections, and improve safety for all users.

6.2.2. Maintenance assessment

National Highways are responsible for maintaining junctions within the scheme extents, which includes both routine and cyclic maintenance.

The proposals at the junctions would introduce new maintenance requirements, including the maintenance of new retaining walls, traffic signals, and new technology equipment as well as the continued maintenance of existing infrastructure such as signs, street lighting, and existing traffic signal provision.

For all options, the overall layout will be similar to the existing and as such, maintenance access arrangements are anticipated to be broadly similar to the existing arrangements.

The scheme runs through an urban residential area with many side roads and existing lay-bys which provide safe access for maintenance activities. No new maintenance lay-bys are proposed at this stage, although this should be reviewed in future design stages after preferred route announcement.

6.2.3. Structures assessment

The requirement for a couple of small retaining walls has been identified during the development of interventions.

6.2.3.1. Option 2

A27 Lyons Way / Sompting Road junction: Due to the widening of the A27 eastbound carriageway, the existing retaining wall to the immediate north of the A27 will need to be repositioned and reinstated.

6.2.3.2. Option 3

A27 Busticle Lane junction: Due to the widening of the A27 eastbound carriageway a retaining wall will be required along the reinstated footpath on the northern side of the carriageway.

6.2.4. Road pavement assessment

At this stage the road pavement construction has not been identified.

It is proposed that at junctions were widening works are proposed, full depth construction to be provided and for other parts of the junction 100mm inlay is proposed.

For junctions where minor works are required, i.e., no carriageway widening, 50mm inlay is proposed.

6.2.5. Technology assessment

The proposed technology deployment for the scheme is the same for all options.

Variable Message Signs (VMS) will be located ahead of decision points along the A27 and on the West Sussex County Council (WSCC) road network to provide a range of information to users. This could include message sets to warn of the occurrence of incidents on the A27 or to provide current journey time information to typical locations along the route.

The existing Vehicle Activated Signs (VAS) will be supplemented along the route, their increased presence on the single carriageway sections of the route would help to improve compliance with the 40mph speed limit for much of these areas.

Although there are a number of existing traffic monitoring CCTV installations along this route, these are not linked to the main National Highways CCTV system. To overcome the limitations of the existing cameras, it is recommended that the deployment of Enhanced Network Camera Programme (ENCP) installations is investigated for strategic sites on this route.

Downstream vehicle congestion monitoring at signalised junctions can be used to implement special plans within the traffic signal controller to overcome the issue of queueing vehicles blocking the exits at these junctions, resulting in them becoming 'grid locked'. Once triggered, this feature is used to 'meter' traffic flow through the junction and by relocating the traffic queue to the A27 approaches of the junction, allows the downstream congestion to dissipate.

Real Time Passenger Information (RTPI) will be provided to all bus stops along the A27 within the scheme extents. Modern Real Time Passenger Information can make use of new display technologies, such as ePaper, that are both energy efficient and robust.

All-red vehicle detection will be added to the signalised junctions within the central conflict zone to reduce the incidence of congestion at these traffic signals by allowing time for traffic to clear the junction prior to allowing more traffic to flow.

Provision to WSCC of access to the National Highways Urban Traffic Management and Control (UTMC) junction dashboards for the strategic junctions on the A27. These dashboards have been implemented elsewhere by National Highways to facilitate interaction with local highway authorities effected by the presence of the strategic road network (SRN) within their area. This is of particular relevance in this area due to the urban nature of much of the scheme area and the interaction the A27 has on the local road network.

Small air quality monitors to provide indications of pollution levels. The data from these can also feed into the junction dashboards to influence strategy plans in order to improve air quality.

In addition to the Real Time Passenger Information screens at bus stops, a number of modern bus shelters could be provided at strategic locations along the route in order to enhance the users experience of public transport. Shelters are now commercially available that incorporate a range of safety and convenience features, such as lighting and CCTV coverage, along with WiFi hotspots and wireless charging for mobile devices. The provision of a cycle rack at the bus stop allows it to act as a local transportation hub.

6.2.6. Public utilities assessment

Mott MacDonald was appointed to act on behalf of National Highways in obtaining Statutory Undertakers information relevant to the scheme. C2 preliminary enquiries were undertaken in April 2021, where relevant Statutory Undertakers were identified and provided with the location plan of the scheme and asked to return

information of any apparatus within the extents. All C2 returns were received by the end of May 2021, and the returned information was assessed to identify the potential impact on public utilities of each proposed design option. The impacts are summarised as follows:

6.2.6.1. Option 1

Option 1 primarily affects two roundabouts, Offington Corner and Grove Lodge where the following utilities apparatus have been identified:

- Three 11kV circuits at the bus stop, one 11kV circuit at Warren Road, one 11kV circuit at Upper Brighton Road and one 11kV circuit at Old Shoreham Road
- 12”, 10”, 6” and 1” Low Pressure Gas mains spread between all intervention locations
- Three Openreach main alignments
- Four Virgin Media main alignments

6.2.6.2. Option 2

Option 2 primarily affects Offington Corner roundabout, Grove Lodge roundabout and Lyons Way / Sompting Road junction, where the following utilities apparatus have been identified:

- Three 11kV circuits at the bus stop and one 11kV circuit at Warren Road
- 12”, 10”, 6” and 1” Low Pressure Gas mains spread between all intervention locations
- Two Openreach main alignments
- Four Virgin Media main alignments

6.2.6.3. Option 3

Option 3 primarily affects the following locations Offington Corner roundabout, Grove Lodge roundabout and Lyons Way / Sompting Road junction. Of the three options this appears to have the greatest impact on the existing utility apparatus, identified as follows:

- Three 11kV circuits at the bus stop and one 11kV circuit along Warren Road
- 12”, 10”, 6” and 1” Low Pressure Gas mains at Offington Corner
- One Openreach main alignments
- Four Virgin Media main alignments

Based on the preliminary assessment of information received from Statutory Undertakers, and the scale of the works to support the scheme, no apparatus is considered to be of sufficient scale or complexity to place the viability of the scheme at risk.

However, it is important to note that the information received from the Statutory Undertakers is indicative only, and the extents of telecom infrastructure in particular can be difficult to appreciate due to the lengths of fibre optic cables. There is therefore a risk that the telecoms networks may be more complex than initially indicated.

6.2.7. Drainage assessment

For all options, the proposed widening works are considered to be minor and will not have any substantial impact on catchment areas. It is anticipated that the existing highway drainage outfall points would be retained.

In areas of proposed widening works, drainage gullies will need to be re-located to the new edges of the carriageway and provision increased if necessary. To mitigate the impact of the additional paved areas larger diameter storm attenuation pipes may need to be provided.

Details of any existing drainage provision are not known at this stage, and will be assessed in future design stages.

6.2.8. Lighting assessment

Street lighting is provided throughout the entire extents of the scheme. No formal lighting assessment has been undertaken at this stage, but it is assumed that lighting provision in its current arrangement is still required throughout the scheme extents.

In locations where the existing carriageway is to be widened, or new shared-use paths provided, the existing lighting infrastructure will have to be relocated and renewed. Lighting provision will be formally assessed in future design stages.

6.2.9. Geotechnical assessment

A high-level assessment of existing geotechnical information was undertaken to understand historical land use and possible ground conditions throughout the scheme extents.

As outlined in Section 2.4.7, the underlying geology is characterised by head deposits of clay, silts, sands, and gravels overlying chalk bedrock. Towards the western end of the scheme (at Durrington / Salvington), chalk deposits outcrop at the ground surface.

The structures associated with the various options are small and relatively simple with associated negligible risk, however shallow groundwater levels are expected within the study area. According to BS EN 1997-1, the geotechnical category 2 is considered appropriate for the scheme, due to the possibility that associated excavations will be located below groundwater level.

Additionally, the Environment Agency classifies the majority of the site into regions of high groundwater vulnerability excluding the Upper Brighton Link from Lyons Way to Busticle Lane which has intermediate vulnerability. The Grinstead Lane junction to the east of the site is also classified as an area within flood zone 3.

At this stage in the design process the level of information available is limited, but this would be investigated in further detail as the project progresses to ensure a robust design is produced.

6.3. Traffic analysis

Strategic traffic forecasting was carried out using SATURN software to identify the impact of the proposed options. This is described in detail in the A27 Worthing and Lancing Traffic Forecast Package (HE608509-MMD-GEN-OP00-RP-TR-010). The forecasting included variable demand modelling of mode choice, time period and distribution choice. Forecasting was carried out for three forecast years of 2027, 2042 and 2051 for three time periods namely AM peak, inter-peak (IP) and PM peak.

6.3.1. Forecast option results

The forecasting for each option shows significant reductions in delay along the A27 in particular in the eastbound direction between west of Durrington Hill junction and Offington Corner roundabout. This aligns with the additional lane provided as well as the introduction of traffic signals at Offington Corner roundabout in all options. Traffic reroutes from the minor road network through Worthing (A2032, A259) onto the A27 strategic route with reduced journey times forecast for several local roads.

With the additional lane through Grove Lodge roundabout in Option 1 the increased traffic volumes can continue a smooth journey through this junction with travel time reductions in particular in the westbound PM peak.

Option 2 shows travel time improvements between Grove Lodge roundabout and Lyons Farm junctions as well as the Lyons Farm retail park access roads are forecast with travel time reductions. With the improvements to capacity at the Lyons Farm junctions there is no considerable adverse effect on travel time for the A27 westbound due to the closure of Upper Brighton Road westbound.

With the improvements at Busticle Lane junction Option 3 represents capacity enhancements at either end of the congested corridor. However, without improvements at Grove Lodge roundabout or Lyons Farm junctions the additional traffic attracted by these improvements cannot be accommodated. Therefore, little journey time improvements are forecast east of Offington Corner roundabout. The westbound closure of Upper Brighton Road results in slightly increased delays at Sompting Road towards the junction with the A27.

6.3.2. Forecast journey time savings

A summary of the forecast journey time savings across the scheme corridor is shown below for the intermediate forecast year of 2042 comparing each option (Do-Something (DS)) to the without scheme (Do-Minimum (DM)) scenario.

Table 6:1 Journey time savings – DM minus DS option 2042 forecast

		Option 1			Option 2			Option 3		
Time Period	Direction	DM	DS	Time Saving	DM	DS	Time Saving	DM	DS	Time Saving 2051
AM	EB	35:15	30:58	**04:17**	35:15	31:03	**04:12**	35:15	31:20	**03:55**
	WB	23:51	23:36	**00:15**	23:51	23:38	**00:13**	23:51	23:30	**00:21**
IP	EB	24:59	23:00	**02:00**	24:59	22:57	**02:02**	24:59	23:09	**01:50**
	WB	21:34	21:46	**-00:12**	21:34	21:37	**-00:03**	21:34	21:42	**-00:07**
PM	EB	27:41	25:54	**01:47**	27:41	25:01	**02:41**	27:41	25:53	**01:48**
	WB	25:18	26:23	**-01:05**	25:18	26:46	**-01:28**	25:18	26:45	**-01:28**

The table indicates that particularly in the eastbound directions significant savings of over 4 minutes are forecast based on the additional capacity proposed at Offington Corner roundabout. Savings are forecast in the eastbound direction for all time periods. The savings forecast for the westbound direction in the AM peak are less significant while slight additional delays are forecast across the route for the westbound direction during the PM peak. These are caused by a combination of the additional traffic lights at Offington Corner roundabout adding stopping time without additional lane increases as in the eastbound as well as increased volumes of traffic.

6.4. Economic assessment

The economic impact of all three options were assessed based on the strategic modelling described in section 6.3. A detailed description of all assessments carried out is described in A27 Worthing and Lancing Economic Assessment Package (HE608509-MMD-GEN-OP00-RP-TR-011).

The economic assessment included the quantified scheme option impact on noise, local air quality, greenhouse gases, accidents, construction and user benefits. All assessments were carried out in line with Transport Analysis Guidance (TAG) guidance using recommended software tools.

The user benefits include the assessment of all time periods in line with the ARR. The introduction of additional traffic signals at Offington Corner roundabout is expected to be of benefit during the peak periods but is likely to cause disbenefits during the off-peak times. As the off-peak model is not a fully validated model (more detail provided in the HE608509-MMD-GEN-OP00-RP-TR-007) the level of

assurance in these results is lower and these are outlined separately. The weekend periods are based on the interpeak and off-peak weekday models with adjustments to the purpose splits. As these are also considered of lower assurance impacts are stated separately.

Table 6:2: Summary of user benefits (£,000's) – all options

Analysis of Monetised Costs and Benefits	Option 1	Option 2	Option 3
Weekday peak benefits			
Economic Efficiency: Consumer Users (Commuting)	12,511	14,235	2,373
Economic Efficiency: Consumer Users (Other)	14,899	11,101	-1,955
Economic Efficiency: Business Users and Providers	22,144	21,445	8,323
Wider Public Finances (Indirect Taxation Revenues)	943	1,417	1,723
Total	**50,497**	**48,198**	**10,464**
Weekday off-peak benefits			
Economic Efficiency: Consumer Users (Commuting)	-257	-592	-672
Economic Efficiency: Consumer Users (Other)	-822	-1,683	-2,083
Economic Efficiency: Business Users and Providers	-210	-476	-421
Wider Public Finances (Indirect Taxation Revenues)	-108	-126	73
Total	**-1,397**	**-2,877**	**-3,103**
Weekend benefits (peak and off-peak)			
Economic Efficiency: Consumer Users (Commuting)	580	328	-87
Economic Efficiency: Consumer Users (Other)	2,876	-210	-1,765
Economic Efficiency: Business Users and Providers	2,074	1,352	624
Wider Public Finances (Indirect Taxation Revenues)	77	185	363
Total	**5,607**	**1,655**	**-865**
Total user benefits			
Economic Efficiency: Consumer Users (Commuting)	12,834	13,971	1,614
Economic Efficiency: Consumer Users (Other)	16,953	9,208	-5,803
Economic Efficiency: Business Users and Providers	24,008	22,321	8,526
Wider Public Finances (Indirect Taxation Revenues)	912	1,476	2,159
Total	**54,707**	**46,976**	**6,496**

The mean scheme costs excluding portfolio risk provided by National Highways Commercial Services Division in November 2022 were used for the assessments. The costs, which include construction inflation and risk, have been provided in 2010 undiscounted prices in the factor cost unit of account. The costs exclude all recoverable VAT and all historic costs have been removed.

The Analysis of Monetised Costs and Benefits (AMCB) Table 6:3 provides the net present value (NPV) and the benefit cost ratio (BCR).

Table 6:3: Analysis of monetised costs and benefits (£,000's) – all options

Analysis of Monetised Costs and Benefits	Option 1	Option 2	Option 3
Standard assessment			
Noise	153	509	1,353
Local Air Quality	-1,219	-1,497	-1,324
Greenhouse Gases*	-3,213	-3,998	-3,378
Journey Quality	Not Assessed	Not Assessed	Not Assessed
Physical Activity	Not Assessed	Not Assessed	Not Assessed
Accidents	-3,981	-4,666	-4,266
Construction	-96	-222	-75
Economic Efficiency: Consumer Users (Commuting)	12,834	13,971	1,614
Economic Efficiency: Consumer Users (Other)	16,953	9,208	-5,803
Economic Efficiency: Business Users and Providers	24,008	22,321	8,526
Wider Public Finances (Indirect Taxation Revenues)	912	1,476	2,159
Present Value of Benefits (PVB)	**46,351**	**37,102**	**-1,193**
Broad Transport Budget	13,775	15,209	14,092
Present Value of Costs (PVC)	**13,775**	**15,209**	**14,092**
Net Present Value (NPV)	**32,577**	**21,894**	**-15,285**
Benefit Cost Ratio (BCR) (Initial)	**3.36**	**2.44**	**-0.08**
Wider economic Impacts – adjusted assessment			
%10 Business User Benefits	2,401	2,232	853
Reliability	2,708	2,674	765
PVB Adjusted	**51,460**	**42,009**	**425**
BCR Adjusted	**3.74**	**2.76**	**0.03**

Note: This table includes costs and benefits which are regularly or occasionally presented in monetised form in transport appraisals, together with some where monetisation is in prospect. There may also be other significant costs and benefits, some of which cannot be presented in monetised form. Where this is the case, the analysis presented above does NOT provide a good measure of value for money and should not be used as the sole basis for decisions. Wider Public Finances sign has changed from PA table, as PA table represents costs, not benefits. All entries are present values discounted to 2010, in 2010 prices.

For all three options the majority of impacts is contributed by user benefits, which align with the travel time savings forecast. There are slight benefits assessed for noise due to the reduction in congestion. Slight disbenefits are assessed for local air quality and greenhouse gases. The calculated disbenefits for accidents is impacted by the limitation of the assessment tools where traffic reductions on slow minor roads cannot be quantified as benefits.

Overall, the scheme accident impact is considered neutral with junction improvements resulting in accident benefits but increased traffic volumes on the faster speed roads without improvements results in a slight disbenefit. Accidents remain forecast to reduce throughout the assessment period.

The results show Option 1 is assessed with the highest benefits and the lowest cost resulting in the highest BCR of 3.74. This aligns with the increase in road capacity.

Option 2 can be considered in the same range to Option 1 with only slightly higher costs and just over 10% less benefits. It has been assessed with a BCR of 2.76.

Option 3 benefits are substantially lower while the costs are similar to the other two options. Therefore, the BCR for Option 3 is very low. This is a result of the highway improvements accommodating more traffic at each end of the scheme corridor while increasing congestion at some junctions within the corridor.

6.5. Environmental impacts

An Environmental Scoping Report was completed in February 2022, identifying the potential environmental impacts of the scheme. Further details can be found in the PCF Stage 1 and 2 Environmental Scoping Report (ESR) (HE608509-MMD-EGN-OP00-RP-LE-0003). An Environmental Assessment Report (EAR) (HE608509-MMD-EGN-OP00-RP-LE-0004) has been produced with traffic data to inform the environmental assessments, where appropriate. The information within this section is based on the desk-based studies undertaken for the ESR and the findings available from the EAR.

6.5.1. Air quality

The main risks to sensitive receptors during the construction phase for all options include on site dust emissions arising from construction activities and vehicle movements. Dust can be mechanically transported, either by wind or re-suspension by vehicles. It can also arise from wind erosion on material stockpiles, earth moving activities and other similar activities. These effects would be temporary, minimal and are anticipated to be restricted to receptors within 200m of construction activities.

Once operational, all scheme options have the potential to directly affect ambient concentrations of nitrogen dioxide (NO_2) and fine particulates (PM_{10}) through changes in the road alignment, and changes to traffic flows and speeds. All three scheme options are predicted to result in a similar change in concentrations as the changes in traffic are broadly similar but Option 1 has slightly larger changes than Options 2 and 3. Furthermore, one exceedance of the annual mean NO_2 Air Quality Objective (AQO) is predicted at a human health receptor in the 2027 opening year for all scheme options. This receptor, which currently exceeds the AQO, is anticipated to experience a small increase in concentrations as a result of Option 1, whilst it is anticipated to experience an imperceptible change as a result of Options 2 and 3.

Overall, the outputs from the compliance risk assessment demonstrate that there are no exceedances of the limit value or no risk to the UK's reported date of compliance due to all scheme options. However, predicted concentrations are close to the limit value so the risk of non-compliance with the limit value requires careful consideration at future PCF stages of the scheme development.

6.5.2. Cultural heritage

All scheme options have negligible potential to cause temporary or permanent adverse effects on heritage assets during construction and operation. Land take

associated with the scheme options from outside the highway boundary is marginal and in locations likely to have been previously disturbed from the construction of the existing A27. As such, the scheme options would likely have a negligible or minor impact on any unknown archaeological, if present.

There are 8 designated heritage assets within 250m of the scheme options. None of these heritage assets would be physically impacted. Overall, there is very low potential for the construction and operation of the scheme options to alter the setting of the heritage assets identified within the study area of the scheme.

There are two conservation areas within 250m of the scheme options, including Sompting and Broadwater Conservation Areas. Sompting Conservation Area is also situated within the scheme boundary for Options 2 and 3 at Upper Brighton Road. The value of these conservation areas would not be affected by the scheme options.

No significant effects are anticipated on the historic environment at this stage, as a result of the scheme options. As such, an assessment on the historic environment has been scoped out of the EAR at PCF Stages 1 and 2.

6.5.3. Landscape and visual effects

During construction of all options, the presence of construction, plant, materials, machinery, construction compounds, and the presence of construction lighting has the potential to adversely affect the landscape character of the area temporarily. However, significant adverse landscape and townscape effects are not anticipated during construction for all scheme options. Temporary moderate adverse visual effects are however predicted during construction for all options. This would be limited to residential receptors in the immediate areas of Offington Corner Roundabout, Grove Lodge Roundabout, Lyons Way / Sompting Road Junction and Busticle Lane Junction. These residents are predicted to experience foreground views of a number of detracting features associated with the construction works. However, these effects would be temporary in nature. Significant effects on views are not predicted for any other visual receptors during construction.

During the operational phase of all options, impacts would be limited where works are at-grade and contained within the existing highway corridor. Proposed highway interventions for all options would, however, have the potential to result in permanent impacts on existing grassed verges and vegetation in order to accommodate the infrastructure. Furthermore, widening of the highway at Busticle Lane junction associated with Option 3, would result in a permanent loss of a small area of farmland within the SDNP. Overall, Options 1 and 2 would result in a slight adverse (not significant) residual effect on visual amenity, whilst a neutral effect on landscape is anticipated. A combined slight adverse (not significant) residual effect on landscape and visual amenity is anticipated as a result of Option 3.

As such, significant landscape and visual effects during operation are not anticipated as a result of any scheme option.

6.5.4. Biodiversity

Construction of the scheme would potentially result in damage to or direct loss of priority habitats. Vegetation clearance to accommodate the construction works has the potential to result in loss, isolation and fragmentation of terrestrial habitats for protected species. Any night-time works required may directly affect nocturnal species, such as bats and badgers, due to increased lighting pollution, noise and vibration. This disturbance could potentially contribute to the displacement of these species from the area.

For all scheme options, during operation, there is the potential for adverse effects on protected and notable species as a result of additional permanent lighting. Congestion is also expected to reduce during operation, associated with all options, which would result in faster traffic flows. This has the potential to increase the risk of killing and injuring protected and notable species. At this stage however, significant effects are not anticipated on protected and notable species during operation. Further surveys are required to assess the status of populations and likelihood of significant effects on protected species.

A detailed habitat mitigation strategy would be developed alongside the Biodiversity Net Gain assessment. This strategy would replace and enhance lost habitat as a result of the scheme and will aim to provide overall net gains in biodiversity. The strategy will include the creation of diverse habitat corridors around the scheme, providing links to offsite habitats.

In respect to all scheme options, there is the potential for adverse effects as a result of new road infrastructure, however effects are not anticipated to be significant.

6.5.5. Geology and soils

As a result of the construction works associated with all options, there is the potential for on-site human exposure to contaminated soils, dusts, and vapours during excavations. In addition, mobilisation of existing contamination within the Made Ground during excavation works may create additional pathways to surface water receptors. There is also the potential for spills and leaks from storage of fuel and refuelling operations during the construction phase. The construction phase impacts relating to controlled waters will be addressed via ground investigations and a contaminated land risk assessment, as well as in the assessment of road drainage and the water environment. During the operational phase of all options, there is potential for fuel leakage from vehicles during operation to impact controlled waters. However, the highways drainage would be designed to ensure the collection of potentially contaminated site run off.

Due to the absence of sensitive baseline receptors, no significant construction and operational effects relating to geology and soils from the proposed works are anticipated. As such, an assessment of geology and soils has been scoped out of the EAR at PCF Stages 1 and 2.

6.5.6. Material assets and waste

All three scheme options would be likely to require a moderate quantity of material resources for construction, and would, therefore, have the potential for some direct adverse effects on the environment, through the reduction in the availability of material resources and potentially the depletion of natural resources. The generation and management of waste could lead to the temporary occupation of space in waste management facilities (from the treatment of waste) or the permanent reduction of landfill capacity (from the disposal of waste).

In respect of all scheme options, significant effects relating to material resource use and waste generation effects during construction and operation are not anticipated. As such, this element of the assessment is scoped out at PCF Stages 1 and 2.

6.5.7. Noise and vibration

During construction of all options, temporary noise and vibration impacts associated with the scheme have the potential to directly affect nearby sensitive receptors. The affected receptors are expected to be those in the vicinity of the scheme options, although this could extend along the existing road network, subject to diversions, haul routes and construction-related traffic. Significant effects during construction are not anticipated for any scheme option.

It is considered that there would likely be adverse and beneficial noise effects at a number of receptors as a result of all of the scheme options. For all scheme options, all short-term minor adverse impacts occur outside of Noise Important Areas. Additionally, no short-term moderate or major adverse impacts are anticipated as a result of any of the scheme options.

Results indicate that noise impacts due to changes in road traffic using the A27 as a result of Option 1 would not be significant, whist a slight adverse effect is anticipated as a result of Options 2 and 3 on residential receptors on Offington Lane (A2031).

6.5.8. Road drainage and water environment

Potential temporary adverse effects on water quality during the construction phase of all options could occur through the release of suspended soils, fuel, oil, concrete liquors, and hydrocarbons or the disturbance and release of excess fine sediment and suspended solids. Construction may reduce recharge to the underlying aquifer, thereby interrupting flow, leading to a reduction or loss of water supply to abstractions, springs, streams, and wetland, increased flood risk and potential loss of aquatic habitat (which may be permanent). Changes in surface water flow pathways (changes in drainage layout) may increase the risk of flooding associated with all scheme options.

Once operational, the scheme has the potential to permanently adversely affect the surface water due to numerous impacts including the pollution of watercourses,

alteration of ground levels which may cause changes in flood flow pathways, and the overloading of surface watercourses. In addition, the scheme has the potential to permanently affect groundwater due to impacts including groundwater mounding (due to structures), the reduction in recharge to the underlying aquifers, and groundwater pollution through infiltration of run off.

At this stage of the assessment, all scheme options are likely to result in similar construction and operational effects, which are not considered to be significant.

6.5.9. Population and human health

There will be temporary slight adverse effects during construction due to increased traffic and construction may affect access to some properties, as well as access for businesses. During operation there is the potential for decreased congestion on the local road network improving access for properties leading to beneficial effects.

There will be a temporary reduction in access to community land and assets due to increased Heavy Goods Vehicles and construction traffic during construction, resulting in a temporary slight adverse effect. A beneficial effect is anticipated during operation of the scheme, as the scheme is likely to improve accessibility for community land and assets, including schools, churches and hospitals.

The construction of the scheme has the potential to provide the temporary creation of jobs necessary for the delivery of the scheme. Through operation the improvements to traffic have the potential to improve access to employment for the population within the local impact area.

There is the potential for walker, cyclist and horse-riding facilities to experience temporary diversions resulting in journey length and time increases, and increased severance of routes used by local people for accessing community facilities. A slight adverse effect is anticipated as a result of Options 2 and 3, whilst a neutral effect is anticipated for Option 1.

Temporary changes to the local environment through construction (such as distracting features, e.g. machinery, introduced into the local landscape, an increase in dust and noise, and severance) are likely to affect the amenity and health of communities. During operation, there may be positive or negative health outcomes from a combination of environmental impacts such as air quality, noise, landscape and visual, and transport impacts on receptors in close proximity to the scheme. The scheme proposes the provision of infrastructure that supports a potential reduction in pollutants and access to employment, with the potential for positive health and wellbeing effects.

Overall, no significant effects are anticipated during construction or operation of the scheme options at this stage of the assessment in relation to population and human health.

6.5.10. Climate

During construction the scheme will result in carbon emissions from the embodied emissions within the construction materials used, construction plant and from the transport of materials. The emissions are not considered likely to affect the UK Government in achieving its carbon budgets. Due to the short timescales, the scale of the works and the rate of climate change, it is unlikely the scheme construction will be affected by climate change.

In reference to anticipated embodied carbon emissions as a result of each option during construction, Option 2 presents the highest lifecycle carbon emissions at 546tCO_{2e}, Option 1 presents less lifecycle stage carbon emissions at 430tCO_{2e} and Option 3 presents the lowest lifecycle stage carbon emissions of all options at 406tCO_{2e}. At such, Option 2 is anticipated to have the greatest adverse effect in terms of construction emissions, whilst Option 3 is anticipated to have the smallest effect in terms of construction emissions.

The impacts during the operational phase are anticipated to be carbon emissions from changes to traffic flows on the affected road network, energy use for the scheme in operation, including lighting and signage, and maintenance activities, which would include materials, construction plant and the transport of materials. During operation there is the potential that assets such as pavement and drainage will be impacted by forecast climate change including increased summer temperatures and winter rainfall. Option 3 is anticipated to have the greatest adverse effect in terms of operational emissions, whilst Option 1 is anticipated to have the smallest effect on operational emissions.

Overall, significant adverse effects are not anticipated during construction or operation as a result of the scheme options on climate.

7. Summary of stakeholder engagement and public consultation

7.1. Identifying and engaging with stakeholders

In compliance with Stage 1 Project Control Framework (PCF) requirements, a communications plan was developed to include a Key Points Brief, a Questions and Answers document and a Stakeholder Tracker. Each document is a 'live' document and following approval by National Highways consultees, continued to be developed and updated as live and evolving documents throughout Stage 1. Each document is then revised and updated as a new stage commences and continues to be live and evolving documents.

7.1.1. The Stakeholder Tracker

The Stakeholder Tracker includes details of all relevant stakeholders that may be impacted by or have an interest in the scheme proposal. It includes details of organisations and individuals that would be categorised as statutory stakeholders under either the Planning Act 2008 or Highways Act 1980. It also includes details of other organisations and individuals that would be classified as non-statutory stakeholders under the Planning Act 2008 and Highways Act 1980.

The Stakeholder Tracker includes details of relevant engagement that has taken place with each stakeholder. As well as ensuring that we are able to retain a record of stakeholder engagement that captures current understanding of stakeholder positions, the Stakeholder Tracker is compliant with best practice audit requirements that are required for major infrastructure schemes.

7.1.2. The Key Points Brief

The Key Points Brief (KPB) is an internal document containing top level information about the proposals, including summary overview of the scheme elements, geographic location, customer insight, timelines, budget, success criteria, equality, diversity and inclusion information, as well as noted links to other relevant projects.

It is designed as a record of key messages and core project information for National Highways and the broader project team to use as a central point of reference and to ensure consistency across all external communications.

The KPB is a 'live' document requiring updates at all project milestones to ensure the latest information is contained. The KPB document has been updated during Stages 1 and 2 to reflect small changes in the project, such as personnel changes and key contacts.

7.1.3. Q&A document

The Q&A (question and answer) document holds a similar purpose to the KPB in that it represents a central point of reference for National Highways and the project team to ensure consistency in responding to likely questions that stakeholders or members of the public might ask.

The Q&A document is an internal document covering issues such as scheme overview, benefits, costs and construction period.

As with the KPB, the Q&A document is a 'live' document requiring updates at all project milestones to ensure the latest responses to likely questions is contained. The KPB document has been reviewed during Stages 1 and 2 to ensure it contains the latest relevant information and addresses the most frequently asked questions.

7.1.4. Public Consultation Strategy

A Public Consultation Strategy has been developed as a Stage 2 PCF product. The Public Consultation Strategy explains how identified stakeholders will be engaged with appropriate messaging and through optimal channels.

The Public Consultation Strategy will provide a detailed programme about Stage 2 stakeholder engagement and the non-statutory Options Public Consultation.

The Public Consultation Strategy incorporates assessment of the Equality Impact Assessment (EqIA) undertaken for the A27 Worthing to Lancing Improvements scheme. It includes a strategy for engaging with hard to reach audiences.

The engagement approach set out in the Public Consultation Strategy is aligned with best practice guidance and legislative requirements for consultation, such as the Gunning Principles, and updated guidance introduced through the course of the Covid-19 pandemic to ensure timely, appropriate and accessible engagement with stakeholders and consultees.

7.2. Embedding the customer

National Highways' Customer Imperative runs as a guiding principle through the stakeholder engagement activity strategies developed and helps inform all engagement activity.

The National Highways Customer Service Plan sets out six core customer themes including 'empowering our people' and 'developing better relationships' in order to help 'deliver a well maintained and safe network', 'provide better information' leading to a better end to end experience and ultimately 'improving journey times'.

A Mott MacDonald National Highways Customer Strategy and Plan have been developed and are aligned to the National Highways Customer Imperative. The Strategy and Plan enable us to drive continuous customer and stakeholder

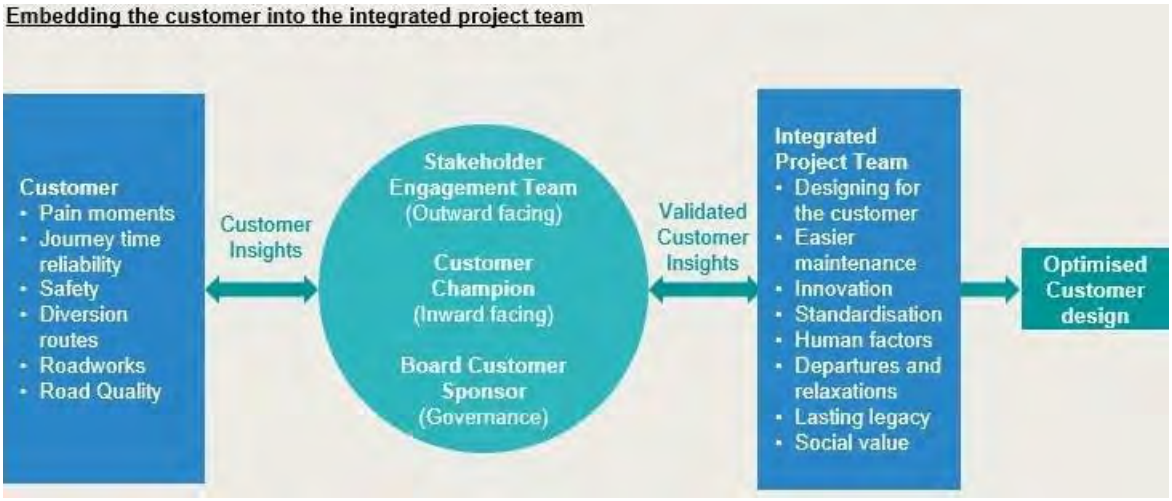
improvement within our internal communications by embedding the customer at the heart of everything we do.

Stakeholder engagement activity and consultation has a key role to play in delivering the six core customer themes.

Customer insight has therefore been a focus of the consultation approach strategy, and the proposed options consultation will seek to incorporate the views of the customer into the scheme design and development. This will be achieved through the appointment of a Customer Champion to operate alongside the Stakeholder Engagement Team through the process.

Figure 7-1 shows how the Customer Feedback Loop can be embedded within the integrated project team to deliver customer insight throughout the development process.

Figure 7-1: Customer Feedback Loop



Source: Mott MacDonald

7.3. Technical working groups

During Stage 1 Technical Working Groups (TWGs) were developed to enable effective early engagement with key stakeholders. The TWGs have permanent membership of agreed technical experts from statutory and key stakeholders. TWG meetings are held on a quarterly basis (or as otherwise agreed) throughout Project Control Framework (PCF) Stages 1 and 2.

The role of the TWGs is to study scheme specific issues, consider appropriate scheme solutions, and pave the way to agree statements of common ground (SoCGs) on technical matters between National Highways and key stakeholders. The work undertaken by these groups underpins the direction of the evolving scheme design.

We have formed the following Technical Working Groups to provide inputs and guidance to the A27 Worthing to Lancing Improvements scheme:

- Focus Group – serves as a two-way communications channel between National Highways and representatives from the key statutory bodies with an interest in the scheme
- Engineering – relevant and appropriate engineering design issues
- Environment – relevant and appropriate environmental issues
- Socio-Economic – relevant and appropriate socio-economic issues

We have carried out early and ongoing communication with statutory and key stakeholders throughout Stages 1 and 2 via two rounds of TWGs. The first round took place during November 2021, with a second round during February 2022 and a third round in April 2022 prior to the commencement of the options consultation.

Terms of Reference including membership for the TWGs were drafted and agreed by members at the initial meetings in November 2021.

The TWG meetings held during Stages 1 and 2 (Focus, Engineering, Environment and Socio-Economic – during November 2021 and February 2022) provided an opportunity to discuss the following points:

- The A27 between Worthing and Lancing is at capacity
- The road is an important local road and strategic transport route
- Traffic congestion is leading to delays, increased journey time and decreased reliability
- Traffic congestion is contributing to air pollution in local area
- There is often congestion along a number of sections. The key bottlenecks are the junctions at Offington Corner, Grove Lodge, Sompting Road / Lyons Farm, Busticle Lane and Grinstead Lane. As a result, some traffic diverts away from the A27 to alternative local routes that are less suited to high volumes.
- Above average accidents on this section of A27

The themes of future meetings will be based on topics raised by stakeholder feedback. We will share information / data (where appropriate) so that we can successfully embed customer requirements into scheme design and development.

7.4. Stakeholder meetings

In addition to the Technical Working Group meetings, a number of other stakeholders have been engaged with directly to discuss the early proposals.

These include:

- West Sussex County Council and Adur and Worthing Council to discuss the proposals and share information (September 2021)
- West Sussex County Council technology briefing (November 2021)
- South Downs National Park to discuss the proposals and share information (February 2022)

Minutes of all meetings detailing specific feedback and discussion points have been drafted and agreed.

7.5. Relevant workshops

A Value Management Workshop was held during Stage 1 (July 2021). The purpose of the workshop was to review and refine the scheme objectives, to make sure that options will be sifted against relevant objectives for the area.

The workshop attendees were drawn from National Highways and Mott MacDonald. Attendees considered current context, environmental constraints and potential future issues (such as the forthcoming development of strategic housing sites in proximity to the identified site). Objectives set at Stage 0 were then reviewed against the latest information and a number of revisions were made to wording to provide more clarity on the desired objective outcome.

A Value Management Workshop Report includes detailed information about this process.

7.6. Conclusion

To date there has been a positive response to outreach with relevant stakeholders, and lines of communication have been developed with relevant consultees enabling discussion of early principles, current context and agreed forward activity.

Engagement to date has confirmed many of the constraints and local network issues identified during Stage 0, and feedback from stakeholders has been valuable in consolidating modelling, assessment work and surveys undertaken during Stages 1 and 2.

Shared data and information provided by West Sussex County Council, Adur and Worthing Council and South Downs National Park fed into technical work, and a positive working relationship has been developed through meetings and the TWGs.

All stakeholders have had relevant key messaging explained to them about the scheme, and understand the future consultation programme. Future dates for TWG meetings and further engagement have been agreed in principle to ensure continued positive dialogue as the scheme progresses to Stage 3.

8. Walking, cycling and horse-riding assessment and review

Several opportunities for improving walking, cycling and horse-riding (WCH) conditions have been identified through the Walking, Cycling and Horse-riding Assessment and Review (WCHAR) process and included in the finalised design options:

8.1. Option 1

For Option 1, the scheme will accommodate new, segregated, shared-use paths for pedestrians and cyclists to connect A27 Durrington Hill / Salvington Hill junction with Grove Lodge roundabout, covering Cycle Routes 212 and 310 from Adur & Worthing Councils Local Cycling & Walking Infrastructure Plan (LCWIP).

Additionally Option 1 will include:

- A27 Offington Corner roundabout - New traffic signal control crossings for pedestrians and cyclists will be provided
- A27 Grove Lodge roundabout - New pedestrians signalised crossing on A24 Broadwater Street West will be provided and a review of the existing signalised crossing provision is proposed

8.2. Option 2

For Option 2, the scheme will accommodate new, segregated, shared-use paths for pedestrians and cyclists to connect A27 Durrington Hill / Salvington Hill junction with Grove Lodge roundabout, covering Cycle Routes 212 and 310 from Adur & Worthing Councils LCWIP.

Additionally, Option 2 will include:

- A27 Offington Corner roundabout - New traffic signal control crossings for pedestrians and cyclists will be provided. The existing south-side footway will be widened to accommodate a shared-use, segregated path for cyclists and pedestrians
- A27 Grove Lodge roundabout - New, segregated, shared-use path for pedestrians and cyclists to connect A27 Offington Corner roundabout with Grove Lodge roundabout. Existing signalised crossing provision will be reviewed and upgraded, if necessary, to accommodate cyclists
- A27 Lyons Way / Sompting Road junction - Existing traffic signals provision will be reviewed and crossings upgraded

- Upper Brighton Road - Changed to an eastbound-only one-way street, to stop rat-running, improve safety, and encourage active travel

8.3. Option 3

For Option 3, the scheme will accommodate new, segregated, shared-use paths for pedestrians and cyclists to connect A27 Durrington Hill / Salvington Hill junction with Grove Lodge roundabout, covering Cycle Routes 212 and 310 from Adur & Worthing Councils LCWIP.

Additionally, Option 3 will include:

- A27 Offington Corner roundabout - New signal-controlled crossings for pedestrians and cyclists will be provided. The existing south-side footway will be widened to accommodate a shared-use segregated path for cyclists and pedestrians
- A27 Grove Lodge roundabout - New, segregated, shared-use path for pedestrians and cyclists to connect A27 Offington Corner roundabout with Grove Lodge roundabout will be provided. Existing signalised crossing provision will be reviewed and upgraded to accommodate cyclists
- Upper Brighton Road - Changed to an eastbound-only one-way street, to stop rat-running, improve safety, and encourage active travel.

8.4. General opportunities

The following general opportunities have been identified based on the feedback from West Sussex County Council and previous consultations.

Table 8-1: WCHAR – General opportunities

Ref	Intervention	Source	Description	Benefits
1	Upper Brighton Road Traffic Calming	Site Visit Desktop study	Provision of traffic calming measures / infrastructure along Upper Brighton Road to discourage rat-running and improve safety for cyclists and pedestrians.	- Reduces rat-running along Upper Brighton Road - Encourages / facilitates active travel

8.5. Strategic and specific opportunities

The following strategic and specific opportunities have been identified based on the feedback from West Sussex County Council (WSCC) and previous consultations.

Table 8-2: WCHAR – Strategic opportunities

Ref	Intervention	Source	Description	Benefits
1	A24 Sustainable Transport Corridor	WSCC Integrated Transport Strategy	Bus Priority corridor incorporating bus lanes and bus priority technology in traffic signals.	- Reduction in car travel demand due to mode shifting - Reduce bus journey times and improve reliability - Could enable some bus routes to be consolidated
2	Coastal Transport System	WSCC Integrated Transport Strategy	Former WSCC and Brighton & Hove County Council (BHCC) major scheme. Bus Priority corridor incorporating bus lanes and bus priority technology in traffic signals.	- Reduction in car travel demand due to mode shifting - Reduce bus journey times and improve reliability - Could enable some bus routes to be consolidated
3	Improved Bus and Cycle Lanes	Public consultation response	Network wide improved bus and cycle lanes.	- Improved connectivity for sustainable travel modes - Encourages mode shift to sustainable travel

Table 8-3: WCHAR – Pedestrian-specific opportunities

Ref	Intervention	Source	Description	Benefits
1	Cote Street Crossing Improvement	North Durrington Residents' Group - Public Consultation Response	Provision of a new at-grade crossing or overbridge across the A27 at or near Cote Street. Intended to connect to proposed WSCC Sustainable Transport Packages route west of Worthing.	- Improved pedestrian and cycle connectivity - Encourages mode shift to active travel
2	A27 Castle Goring Foot/Cycle Bridge	WSCC - A27 Corridor, April 2020	Foot / cycle bridge across the A27 to connect Public Right of Way (PRoW) that are currently severed by A27.	- Provides connectivity for non-motorised users - Reduces car travel demand for local trips
3	A27 High Salvington Foot/Cycle Bridge	WSCC - A27 Corridor, April 2020	Foot / cycle bridge across the A27 to connect High Salvington with Durrington, which are currently served by at-grade crossing facilities.	- Provides connectivity for non-motorised users - Reduces car travel demand for local trips
4	A27 Sompting/Lancing Foot/Cycle Bridge	WSCC - A27 Corridor, April 2020	Walking and cycling bridge across the A27 at Church Lane to reconnect Sompting village and the western end of North Lancing and improve access to the South	- Provides connectivity for non-motorised users - Reduces car travel demand for local trips - Reduces number of

Ref	Intervention	Source	Description	Benefits
			Downs currently severed by the A27.	traffic signal controls on A27
5	A27 Lancing Manor Foot/Cycle Bridge	WSCC - A27 Corridor, April 2020	Foot / cycle bridge across A27 to reconnect eastern end of North Lancing with the rest of the village which is currently served by at-grade crossing. (Dependent on A27 Grinstead Lane junction design).	- Provides connectivity for non-motorised users - Reduces car travel demand for local trips - Reduces number of traffic signal controls on A27
6	A27 Worthing College Foot/Cycle Bridge	WSCC - A27 Corridor, April 2021	Foot / cycle bridge connecting north-south to Worthing College, which is currently served by at-grade crossing facilities.	- Provides connectivity for non-motorised users - Reduces car travel demand for local trips - Reduces number of traffic signal controls on A27
7	A27 Durrington Hill/ Salvington Hill Junction	Site Visit Desktop study	Existing crossing points to be upgraded and/or signalised, and relocated nearer to the junction.	- Provides better connectivity for non-motorised users - Improves safety for non-motorised users
8	A27 Offington Corner Roundabout	Site Visit Desktop study	Existing crossing points on Findon Road and Offington Lane can be upgraded and/or signalised, and relocated nearer to the junction.	- Provides better connectivity for non-motorised users - Improves safety for non-motorised users
9	A27 Grinstead Lane Roundabout	Site Visit Desktop study	Existing crossing points on Manor Road and Grinstead Lane can be upgraded and/or signalised, and relocated nearer to the junction.	- Provides better connectivity for non-motorised users - Improves safety for non-motorised users

Table 8-4: WCHAR – Cyclist-specific opportunities

Ref	Intervention	Source	Description	Benefits
1	A27 Cycle Route 210: Goring to Fishergate Cycleway	Adur & Worthing Council LCWIP	A parallel cycle route to the A27 following Route 210 identified in the Adur & Worthing Councils LCWIP. Connecting A27 Lyons Farm and A27 Grinstead Lane junctions via the local road network. Anticipated matched local authority funding.	- Improves connectivity for cycling - Reduces car travel demand for local trips - Reduces emissions and improves air quality locally
2	A27 Cycle Route 212:	Adur & Worthing	Off A27 carriageway cycle route following route 212	- Improves connectivity for cycling

Ref	Intervention	Source	Description	Benefits
	A27 at Arun Boundary to A27/A24 junction at Offington Corner	Council LCWIP	identified in the Adur & Worthing Councils LCWIP, between the Durrington Hill / Salvington Hill and Offington junctions. Anticipated matched local authority funding.	- Reduces car travel demand for local trips - Reduces emissions and improves air quality locally
3	A27 Warren Road Cycle Route 310: Worthing-Findon Valley Cycle Way	Adur & Worthing Council LCWIP	Off A27 carriageway cycle route following route 310 identified in the Adur & Worthing Councils LCWIP, between the Offington and Grove Lodge Junctions. Anticipated matched local authority funding.	- Improves connectivity for cycling - Reduces car travel demand for local trips - Reduces emissions and improves air quality locally
4	A27 Parallel Cycle Route	Sustrans - Public Consultation Response	A parallel cycle route to the A27, linking Offington junction and Lyons Way via the local road network.	- Improves connectivity for cycling - Reduces car travel demand for local trips - Reduces emissions and improves air quality locally
5	A27 Worthing College Foot/Cycle Bridge	WSCC - A27 Corridor, April 2021	Foot / cycle bridge connecting north-south to Worthing College, which is currently served by at grade crossing facilities	- Provides connectivity for non-motorised users - Reduces car travel demand for local trips - Reduces number of traffic signal controls on A27

9. Conclusions and recommendations

9.1. Assessment summary

At the start of Project Control Framework (PCF) Stage 1, a longlist of 51 'strategic road network' (SRN) and 18 'non-SRN' improvement interventions was developed guided by the historical PCF Stage 0 indicative delivery packages, identified constraints and opportunities, and the scheme objectives. The 51 SRN interventions were concentrated around 10 key junctions on the A27, and the supplementary non-SRN interventions were spread along and around the corridor.

The sifting process was undertaken in two steps; Sift 1 was undertaken in early September 2021 to remove the obviously infeasible interventions from the shortlisting process. The process removed 10 SRN and nine non-SRN interventions, with 33 passing through to Sift 2.

Eight SRN interventions and four non-SRN interventions were selected for further development and assessment following Sift 2. The most common reasons for interventions not being selected were significant local impacts from construction, traffic management and land take requirements, and other interventions at the same location being able to offer better cost and benefit values.

Following the completion of Sift 2 the selected interventions have been combined to form three individual delivery packages (termed 'options'), which have been subject to further design, traffic, economic and environmental assessments. From these assessments a number of conclusions have been drawn.

9.1.1. Design conclusions

The design speed for the single carriageway section of the A27 is 70km/h (40mph), and 120km/h (70mph) for dual carriageway sections outside any junction extents. All options were designed using Design Manual for Roads and Bridges (DMRB), to ensure compliance with the appropriate geometric requirements where possible. However, in some instances improvements were made to inherently non-compliant sections of carriageway, and the resulting reinstatement was also non-compliant due to the limited scope for road realignment.

For several interventions, carriageway widening or additional lanes have been proposed to improve the flow of traffic and improve safety. A minimum lane width of 3.0m has been proposed throughout the scheme extents, except for a single right-turn lane to Pines Avenue where the existing layout is reinstated.

For shared-use pedestrian and cyclist paths, DMRB CD 143 recommends a desirable minimum width of 5m, and an absolute minimum width of 3m (comprised of a 1.5m reservation for cyclists and a 1.5m reservation for pedestrians). Given the spatial constraints throughout the scheme, a 4m wide shared-use path will be provided where possible, comprised of a 2.5m reservation for cyclists and a 1.5m

reservation for pedestrians, delineated by a white line. In sections that are particularly constrained a 3m wide shared-use path will be provided instead, comprised of a 1.5m reservation for cyclists and a 1.5m reservation for pedestrians, plus a 0.5m physical separation from the live carriageway.

9.1.2. Traffic and economic conclusions

There are several pinch points along the A27 Worthing and Lancing corridor at present with mostly peak period delays when traffic volumes exceed capacity. Strategic modelling of the corridor has shown these delays to increase as traffic volumes are forecast to grow in the future. As capacity is exceeded traffic diverts along alternative routes to the south.

The proposed Options 1 and 2 show significant improvements to the capacity problems between Offington Corner roundabout and Grove Lodge roundabout or Lyons Farm, respectively. The proposed capacity improvements ensure traffic can continue to use the strategic road network when this seems the most appropriate route and ensures journey times and reliability are improved.

This is also reflected in the economic assessment, which shows Option 1 with the highest BCR of 3.74 and Option 2 with 2.76. The benefits are slightly greater for Option 1 based on the additional capacity achieved at Grove Lodge roundabout and has slightly lower costs than Option 2.

Although Option 3 shows similar improvements at Offington Corner roundabout the additional capacity at Busticle Lane junction does not achieve the same reduction in delays and generates significantly less benefit overall. The calculated BCR for this option is 0.03.

9.1.3. Environment conclusions

During the operational phase of the scheme for air quality, all three scheme options are predicted to result in a similar change in concentrations as the changes in traffic are broadly similar, but Option 1 has slightly larger changes than Options 2 and 3.

No significant effects are anticipated on the historic environment at this stage, as a result of the scheme options. As such, an assessment on the historic environment has been scoped out at PCF Stages 1 and 2.

For landscape and visual amenity, overall, Options 1 and 2 would result in a slight adverse (not significant) residual effect on visual amenity, whilst a neutral effect on landscape is anticipated. A combined slight adverse (not significant) residual effect (in year 15) on landscape and visual amenity is anticipated as a result of Option 3.

For biodiversity, an increase in traffic volume has the potential to have an adverse effect on air quality as a result of all options. Receptors to this include Local Wildlife Sites (LWS) and other habitats as well as protected and notable species. An increase in NO_2 emissions could lead to increased levels of nitrogen deposition

on sensitive habitat and may result in an irreversible damage to habitats of principal importance (HPI) used for foraging by terrestrial invertebrate species, therefore affecting future survival. However, the degree of increased level of nitrogen deposition impacts is currently unknown.

Due to the absence of sensitive baseline receptors, no significant construction and operational effects relating to geology and soils from the proposed works are anticipated.

All three scheme options would be likely to require a moderate quantity of material resources for construction, and would, therefore, have the potential for some direct adverse effects on the environment, through the reduction in the availability of material resources and potentially the depletion of natural resources. In respect to all scheme options, material resource use and waste generation effects during operation are considered to be negligible.

It is considered that there would likely be adverse and beneficial noise effects at a number of receptors as a result of any of the scheme options. For all scheme options, all short-term minor adverse impacts occur outside of Noise Important Areas (NIA). Additionally, no short-term moderate or major adverse impacts are anticipated as a result of any of the scheme options. Results indicate that noise impacts due to changes in road traffic using the A27 as a result of Option 1 would not be significant, whist a minor adverse effect is anticipated as a result of Options 2 and 3 on residential receptors on Offington Lane (A2031).

At this stage of the assessment, all scheme options present similar effects on the water environment.

Similar effects on population and human health receptors are considered for all scheme options. One exception lies with the temporary reduction in use and enjoyment anticipated for users of Public Rights of Way (PRoW) within the local impact area. A temporary adverse effect is anticipated for Options 2 and 3, whilst a neutral effect is anticipated for Option 1.

In reference to carbon, Option 2 is anticipated to have the greatest adverse effect in terms of construction emissions, whilst Option 3 is anticipated to have the smallest effect in terms of construction emissions. Option 3 is anticipated to have the greatest adverse effect in terms of operational emissions, whilst Option 1 is anticipated to have the smallest effect on operational emissions.

9.2. Options recommended for public consultation

It is recommended that the following options be taken forward to non-statutory public consultations in PCF stage 2 where the preferred option will be determined at the end of Stage 2.

Option 1 proposes:

- Major improvement works to A27 Offington Corner roundabout, including widening and realignment of the existing circulatory carriageway, widening of exits and approaches to the junction, and provision of new signal-controlled crossings for pedestrians and cyclists.
- Major improvement works to A27 Grove Lodge roundabout, including widening of the existing circulatory carriageway, widening of roundabout exits, and the improvement of crossing provision around the junction.
- A package of technological improvements, including the provision of new technology assets along the length of the A27, to enhance safety, provide real-time information to users, and facilitate improved and better-informed journeys.
- A new segregated, shared-use route for pedestrians and cyclists connecting A27 Durrington Hill / Salvington Hill junction with Grove Lodge roundabout. The route comprises Cycle Routes 212 and 310 of Adur and Worthing Councils' Local Cycling and Walking Infrastructure Plan.

Option 2 proposes:

- Major improvement works to A27 Offington Corner roundabout, including widening and realignment of the existing circulatory carriageway, widening of exits and approaches to the junction, and provision of new signal-controlled crossings for pedestrians and cyclists.
- Minor improvement works to A27 Grove Lodge roundabout, including optimisation of the existing traffic signal arrangement, upgrade of the existing crossing provision to accommodate cyclists, and provision of a section of segregated shared-use path to connect with new Cycle Route 310.
- Minor improvement works to A27 Lyons Way / Sompting Road junction, including widening of the A27 carriageway through the junction, provision of a new turning lane, and restrictions on local road approaches to the junction.
- Conversion of Upper Brighton Road to an eastbound-only one-way street, to stop A27 westbound traffic using it as a rat-run.
- A package of technological improvements, including the provision of new technology assets along the length of the A27, to enhance safety, provide real-time information to users, and facilitate improved and better-informed journeys.
- A new segregated, shared-use route for pedestrians and cyclists connecting A27 Durrington Hill / Salvington Hill junction with Grove Lodge roundabout. The route comprises Cycle Routes 212 and 310 of Adur and Worthing Councils' Local Cycling and Walking Infrastructure Plan.

Option 3 proposes:

- Major improvement works to A27 Offington Corner roundabout, including widening and realignment of the existing circulatory carriageway, widening of exits and approaches to the junction, and provision of new signal-controlled crossings for pedestrians and cyclists.
- Minor improvement works to A27 Grove Lodge roundabout, including optimisation of the existing traffic signal arrangement, upgrade of the existing crossing provision to accommodate cyclists, and provision of a section of segregated shared-use path to connect with new Cycle Route 310.
- Minor improvement works to A27 Busticle Lane junction, including widening of the A27 carriageway through the junction, and stopping up of access from Hillbarn Parade.
- Conversion of Upper Brighton Road to an eastbound-only one-way street, to stop A27 westbound traffic using it as a rat-run.
- A package of technological improvements, including the provision of new technology assets along the length of the A27, to enhance safety, provide real-time information to users, and facilitate improved and better-informed journeys.
- A new segregated, shared-use route for pedestrians and cyclists connecting A27 Durrington Hill / Salvington Hill junction with Grove Lodge roundabout. The route comprises Cycle Routes 212 and 310 of Adur and Worthing Councils' Local Cycling and Walking Infrastructure Plan.

10. Detailed appendices

Appendix A. Sift 1 summary

Sift 1 reduced the strategic road network (SRN) longlist from 51 to 24. The most common reasons for rejection were: infeasible delivery within the scheme budget, lack of predicted benefit over the base case, significant land take, and the demolition of properties. Grade separated interventions typically performed the best from a traffic modelling perspective but were all rejected during the sift due to high predicted costs, significant land take and required property demolition.

Table A.1: Sift 1 Outcome – SRN Interventions

Number	Intervention Description	Sift 1 Comments
A1	Durrington / Salvington Hill – Junction widening & new controlled crossings	**Accepted** – Best performing option based on reserve capacity
A2	Durrington / Salvington Hill – Left in/left out arrangement with dual carriageway	**Rejected** – Left in/left out likely to be too contentious with residents
A3	Durrington / Salvington Hill – Convert to large unsignalised roundabout	**Rejected** – Demolition of properties and land purchase required. Not within scheme budget
A4	Durrington / Salvington Hill – Convert to large part time signal-controlled roundabout	**Rejected** – Demolition of properties and land purchase required. Not within scheme budget
A5	Durrington / Salvington Hill – Convert to normal unsignalised roundabout	**Accepted** – Best performing option in terms of delay but 2nd best in terms of reserve capacity
A6	Durrington / Salvington Hill – Convert to normal signalised roundabout	**Rejected** – Junction model showed negative PRC (practical reserve capacity) by 2027
B1	West of Offington Corner – Widen to 2+1 lanes with central barrier	**Rejected** – Land purchase due to localised widening. Not within scheme budget
B2	West of Offington Corner – Widen to 2+1 lanes without central barrier	**Accepted** – Reduced delays due to increased storage capacity at Offington Corner
B3	West of Offington Corner – Narrow lane dual carriageway	**Rejected** – Land purchase required and likely to receive criticism. Not within scheme budget

Number	Intervention Description	Sift 1 Comments
B4	West of Offington Corner – Consolidation of local accesses and ban on right turns	**Accepted** – No physical constraints identified. Technically feasible and within scheme budget
C1	Offington Corner – Increase roundabout size	**Rejected** – No future improvement as junction modelling showed negative PRC by 2027
C2	Offington Corner – Convert to through-about	**Rejected** – Will not solve congestion problems as traffic flow is high in both directions
C3	Offington Corner – Grade Separated Junction	**Rejected** - Demolition of properties and land purchase required. Not within scheme budget
C4	Offington Corner – Minor junction layout changes, markings and signage	**Accepted** - Improves driver compliance and smoother function of roundabout
C5	Offington Corner – Restrict local movements. Potentially close Goodwood Road arm	**Accepted** – Improve traffic flow on roundabout by closing Goodwood Road arm
C6	Offington Corner - Option C1 + Access to the A27 from Goodwood Road closed	**Rejected** – Marginal improvement to performance. Negative PRC for base and 2027
C7	Offington Corner – Upgrade existing roundabout. Retain access from Goodwood Road	**Rejected** – Marginal improvement to performance. Negative PRC for base and 2027
C8	Offington Corner – Convert to signalised crossroads. Goodwood Road access closed	**Rejected** – Junction modelling showed negative PRC for all peaks by 2027
C9	Offington Corner – Upgrade existing roundabout. Goodwood Road access closed	**Rejected** – Performance not as good as C10. Negative PRC for base and 2027
C10	Offington Corner – Upgrade Findon Road / Offington Lane. Two exit lanes to Offington Lane	**Accepted** – Best performance for PRC and delays, but PM still showed negative PRC by 2027
D1	Warren Road – Widen to 2+1 lanes with central barrier	**Rejected** – Land purchase due to localised widening. Not within scheme budget
D2	Warren Road – Widen to 2+1 lanes without central barrier	**Accepted** – Reduced delays due to increased storage capacity at Grove Lodge Roundabout
D3	Warren Road – Narrow Lane dual carriageway	**Rejected** – Land purchase required and likely to receive criticism. Not within scheme budget

Number	Intervention Description	Sift 1 Comments
D4	Warren Road – Consolidation of local accesses and ban on right turns	**Accepted** – No physical constraints identified. Technically feasible and within scheme budget
E1	Grove Lodge – Roundabout modified to increase capacity. New non-motorised users (NMU) crossings	**Accepted** - Best performing option based on delay and PRC with improvements for 2027
E2	Grove Lodge – Grade Separated Junction	**Rejected** – Demolition of properties and land purchase required. Not within scheme budget
E3	Grove Lodge – Convert to large signal controlled through-about.	**Accepted** – Second best performing option based on junction modelling
E4	Grove Lodge – Remove traffic signals, reconfiguration of layout and new footbridge	**Rejected** – Modelling shows option will not operate effectively and perform worse than base
E5	Grove Lodge – Validate and optimise existing traffic signal arrangement	**Accepted** – Improves traffic flow at all times
F1	Grove Lodge to Lyons Farm – Widen to 2+1 lanes with central barrier	**Rejected** – Land purchase due to localised widening. Not within scheme budget
F2	Grove Lodge to Lyons Farm – Widen to 2+1 lanes without central barrier	**Accepted** – Reduced delays due to increased storage capacity at Grove Lodge Roundabout
F3	Grove Lodge to Lyons Farm – Narrow Lane dual carriageway.	**Rejected** – Land purchase required and likely to receive criticism. Not within scheme budget
F4	Grove Lodge to Lyons Farm – Consolidate local accesses and ban right turns	**Accepted** – No physical constraints identified. Technically feasible and within scheme budget
G1	Lyons Way / Sompting – Junction widening, new signal controls and NMU crossings	**Accepted** – Best performing option based on junction modelling. Positive PRC by 2027
G2	Lyons Way / Sompting – Grade separated junction	**Rejected** – Demolition of properties and land purchase required. Not within scheme budget
G3	Lyons Way / Sompting – Consolidate access to Retail Park. Simplified A27 Junction	**Rejected** – Negative PRC by 2027 for both AM and PM peaks
G4	Lyons Way / Sompting – Extend the westbound exit merge	**Accepted** – May provide an efficient way to improve junction performance. Within budget
G5	Lyons Way / Sompting – Improve operation of eastbound traffic signals	**Accepted** – Improved operation of the junction. Technically feasible and within budget

Number	Intervention Description	Sift 1 Comments
G6	Lyons Way / Sompting – Converting existing junctions to signalised roundabouts	**Rejected** – Demolition of properties and land purchase required. Not within scheme budget
H1	Upper Brighton Road – Convert Upper Brighton Road to one-way from west to east	**Accepted** – Improves journey time reliability on A27 by reducing movements at Lyon's Farm
J1	Busticle Lane Junction – Junction reconfigured to large signal-controlled crossroads	**Accepted** – Improved performance for base but negative PRC for 2027
J2	Busticle Lane Junction – Grade separated junction	**Rejected** – Demolition of properties and land purchase required. Not within scheme budget
J3	Busticle Lane Junction – Convert to a large unsignalised roundabout	**Rejected** – Significant land purchase required. Not feasible within scheme budget
J4	Busticle Lane Junction – Convert to a part time signalised roundabout	**Accepted** – Best performing option. Improvements to delay/journey time for base and 2027
J5	Busticle Lane Junction – Convert to a signalised roundabout.	**Accepted** – No physical constraints identified. Technically feasible and within scheme budget
L1	Grinstead Lane – Increase size of roundabout, provide new signals and crossings	**Accepted** – Best performing option based on junction modelling
L2	Grinstead Lane – Convert roundabout to signal-controlled junction	**Rejected** – Junction modelling showed worse performance than base
L3	Grinstead Lane – Grade Separated Junction	**Rejected** – Demolition of properties and land purchase required. Not within scheme budget
L4	Grinstead Lane – Convert to a large unsignalised roundabout	**Rejected** – Demolition of properties and land purchase required. Not within scheme budget
L5	Grinstead Lane – Convert to a part time signalised roundabout	**Accepted** – Improvements for base for delay and PRC. Technically feasible and within budget
L6	Grinstead Lane – Convert to a signalised roundabout	**Accepted** – Improvements for base for delay and PRC. Technically feasible and within budget

Source: A27 Worthing and Lancing SRN interventions Sift 1 Exercise

Sift 1 reduced the non-SRN longlist from eighteen to nine. The most common reasons for rejection were: a lack of Local Authority and/or key stakeholder support, costs outweighing benefits, not complementing the main SRN scheme, and benefits being captured better by other shortlisted interventions.

Table A.2: Sift 1 Outcome – Non-SRN Interventions

Number	Intervention Description	Sift 1 Comments
M1	Capacity improvements at key junctions in the Worthing and Adur Local Plan	**Accepted** – Reasonably low cost capable of delivering safety and congestion benefits
N1	Reallocation of road space to improve conditions for public transport on A24	**Rejected** – Small impact on journey times and low BCR. Strong public support unlikely.
O1	Active traffic management interventions on A27/A24 corridor	**Accepted** – Potential for high benefits at reasonably low costs. Complements SRN scheme
P1	Electric Vehicle Charging	**Rejected** – Benefits no significant enough for the scheme objectives.
P2.	Car Parking Strategy, including Strategic Park & Ride Scheme	**Rejected** – Significant cost, large environmental impact, unlikely to receive strong support
P3	Travel Demand Management (TDM) Measures from the A27 TDM Strategy	**Accepted** – Potential for high benefits at reasonably low costs. Complements SRN scheme
P4	Coastal Transport System (former West Sussex County Council (WSCC) and Brighton & Hove County Council major scheme)	**Rejected** – Significant cost, large environmental impact, unlikely to receive strong support
P5	Improved Bus and Cycle Lanes on SRN and Major Road Network	**Rejected** – Significant cost and benefits are better captured by other, cheaper, interventions
R1	Cote Street at Grade Crossing or overbridge	**Rejected** – Intervention falls significantly far outside of the SRN study area
S1	Cycle Route 210: Goring to Fishersgate Cycle Way	**Accepted** – Complements shortlisted SRN interventions
S2	Cycle Route 310: Worthing–Findon Valley Cycle Way	**Accepted** – Complements shortlisted SRN interventions
S3	Cycle Route 212: A27 at Arun Boundary to A27/A24 junction at Offington Corner	**Accepted** – Complements shortlisted SRN interventions
S4	Parallel Cycle Route to A27	**Accepted** – Complements shortlisted SRN interventions
T1	Castle Goring Foot/Cycle Bridge	**Rejected** – Intervention falls significantly far outside of the SRN study area

Number	Intervention Description	Sift 1 Comments
T2	High Salvington Foot/Cycle Bridge	**Rejected** – Does not complement shortlisted SRN interventions
T3	Sompting/Lancing Foot/Cycle Bridge	**Accepted** – Complements shortlisted SRN interventions. Should receive strong support
T4	Lancing Manor Foot/Cycle Bridge	**Rejected** – Benefits largely captured by SRN interventions. Relatively high cost
T5	Worthing College Foot/Cycle Bridge	**Accepted** – Complements shortlisted SRN interventions. Should receive strong support

Source: A27 Worthing and Lancing Non-SRN interventions Sift 1 Exercise

Appendix B. Sift 2 Summary

Eight SRN interventions and four non-SRN interventions were selected for further development and assessment following Sift 2. The most common reasons for interventions not being selected were significant local impacts from construction, traffic management and land take requirements, and other interventions at the same location being able to offer better cost and benefit values.

Table B.1: Sift 2 Outcome – SRN Interventions

Number	Intervention Description	Sift 2 Comments
A1	Durrington / Salvington Hill – Junction widening and new controlled crossings	**Selected** – Best performing option based on reserve capacity. Reduces severance for NMUs
A5	Durrington / Salvington Hill – Convert to normal unsignalised roundabout	**Not selected** – Intervention scored worse than A1. High impact due to construction and traffic management ™
B2	West of Offington Corner – Widen to 2+1 lanes without central barrier	**Not selected** – Will not increase capacity on SRN. Makes crossing worse for NMUs
B4	West of Offington Corner – Consolidation of local accesses and ban on right turns	**Not selected** – Ban on right turns considered to provide slight negative over existing condition
C4	Offington Corner – Minor junction layout changes, markings and signage	**Not selected** – No significant change over existing conditions
C5	Offington Corner – Restrict local movements. Potentially close Goodwood Road arm	**Not selected** – No significant change over existing conditions
C10	Offington Corner – Upgrade Findon Road / Offington Lane. Two exit lanes to Offington Lane	**Selected** – Best performance option based on LinSig modelling
D2	Warren Road – Widen to 2+1 lanes without central barrier	**Not selected** – Less opportunities for local traffic and worsens crossing for NMUs
D4	Warren Road – Consolidation of local accesses and ban on right turns	**Not selected** – Ban on right turns considered to provide slight negative over existing condition
E1	Grove Lodge – Roundabout modified to increase capacity. New NMU crossings	**Selected** – Improves local traffic by controlled access to SRN. Safer crossing for NMUs

Number	Intervention Description	Sift 2 Comments
E3	Grove Lodge – Convert to large signal controlled through-about	**Not selected** – Intervention scored worse than others. High impact of construction and TM
E5	Grove Lodge – Validate and optimise existing traffic signal arrangement	**Selected** – Intervention is minor in scale, feasible to construct and can improve traffic flow
F2	Grove Lodge to Lyons Farm – Widen to 2+1 lanes without central barrier	**Not selected** – Less opportunities for local traffic and worsens crossing for NMUs
F4	Grove Lodge to Lyons Farm – Consolidate local accesses and ban right turns	**Not selected** – Ban on right turns considered to provide slight negative over existing condition
G1	Lyons Way / Sompting – Junction widening, new signal controls and NMU crossings	**Selected** – Best performing option based on LinSig modelling. Reduces severance for NMUs
G4	Lyons Way / Sompting – Extend the westbound exit merge	**Not selected** – Considered to have a neutral impact. Improvement to be captured by G1
G5	Lyons Way / Sompting – Improve operation of eastbound traffic signals	**Not selected** – Considered to have a neutral impact. No clear change to existing conditions
H1	Upper Brighton Road – Convert Upper Brighton Road to one-way from west to east	**Selected** - Positive intervention which will reduce local west-bound rat-running
J1	Busticle Lane Junction – Junction reconfigured to large signal-controlled crossroads	**Selected** – Second (2nd) best performance from LinSig modelling but lower construction impact
J4	Busticle Lane Junction – Convert to a part time signalised roundabout	**Not selected** – High construction impact and will require land take from South Downs National Park (SDNP)
J5	Busticle Lane Junction – Convert to a signalised roundabout.	**Not selected** – High construction impact and will require land take from SDNP
L1	Grinstead Lane – Increase size of roundabout, provide new signals and crossings	**Selected** – Best performing option for PRC and delay. Large positive impact for NMUs
L5	Grinstead Lane – Convert to a part time signalised roundabout	**Not selected** – Performs better than Do-Minimum but predicted to operate over capacity
L6	Grinstead Lane – Convert to a signalised roundabout	**Selected** – Scores better than L5 on safety due to provision of full-time signals

Source: A27 Worthing and Lancing SRN interventions Sift 2 Exercise

Table B.2: Sift 2 Outcome – Non-SRN Interventions

Number	Intervention Description	Sift 2 Comments
M1	Capacity improvements at key junctions in the Worthing and Adur Local Plan	**Not selected** – Potential to encourage rat-running if improvements are better than the SRN
O1	Active traffic management interventions on A27/A24 corridor	**Selected** – Intervention improves network operation and reduced congestion
P3	Travel Demand Management Measures from the A27 TDM Strategy	**Selected** – Potential to reduce rat-running. Intervention improves network operation
S1	Cycle Route 210: Goring to Fishersgate Cycle Way	**Not selected** – Intervention scores neutral due to impact of construction and TM
S2	Cycle Route 310: Worthing–Findon Valley Cycle Way	**Selected** – Aligns with scheme walking, cycling and horse-riding (WCH) objectives, low construction impact
S3	Cycle Route 212: A27 at Arun Boundary to A27/A24 junction at Offington Corner	**Selected** – Aligns with scheme WCH objectives, low construction impact
S4	Parallel Cycle Route to A27	**Not selected** – Intervention scores neutral due to impact of construction and TM
T3	Sompting/Lancing Foot/Cycle Bridge	**Not selected** – Intervention scores neutral due to impact of construction and TM
T5	Worthing College Foot/cycle Bridge	**Not selected** – Intervention scores neutral due to impact of construction and TM .

Source: A27 Worthing and Lancing Non-SRN interventions Sift 2 Exercise

Appendix C. Option 1 drawings

Appendix D. Option 2 drawings

Appendix E. Option 3 drawings

Appendix F. Environmental Constraints Plan drawing

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