# MID SUSSEX TRANSPORT STUDY

SITES DPD SCENARIO - ROAD SAFETY REVIEW

IDENTIFICATION TABLE	
Client/Project owner	Mid Sussex District Council
Project	Mid Sussex Transport Study
Study	SITES DPD SCENARIO - ROAD SAFETY REVIEW
Date	22/04/2021
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# 1. INTRODUCTION

### 1.1 Work Undertaken

- 1.1.1 Mid Sussex District Council (MSDC) commissioned SYSTRA to:
  - Build a strategic highway model to underpin the Mid Sussex Transport Study (MSTS); and
  - Update the Mid Sussex Transport Study (MSTS) to test the impact of proposed development on the strategic and local transport network.
- 1.1.2 The MSTS was further divided into the following stages:
  - 2017 Base Year Highway Model Production and Validation
  - 2031 Reference Case Scenario;
  - 2031 Sites DPD (Development Plan Documents) Scenario
  - 2031 *Sites DPD Scenario with Mitigation* including potential mitigation schemes
- 1.1.3 This safety review is additionally required as part of the MSTS to consider whether changes in highway demand resulting from the *Sites DPD Scenario* results in adverse impacts on highway safety when compared to the Reference Case.
- 1.1.4 This report should be read in conjunction with the MSTS Sites DPD Scenario Report, which describes the Scenarios in detail and outcomes of the junction capacity assessment.
- 1.1.5 The *Sites DPD Scenario* represents a refined scenario as part of the Council's plan making process, including sustainability appraisal, to help inform preparation of the Draft Site Allocations DPD and select a preferred option.
- 1.1.6 The Reference Case represents the performance of the road network in 2031, and includes committed highway infrastructure, development and background growth to this date. This acts as a baseline when assessing the impacts of the Development Scenarios.

# 1.2 Methodology

- 1.2.1 This review undertakes a junction and road section based assessment of accident clusters, cross-referenced to forecast traffic flow changes as a result of the *Sites DPD Scenario* compared to the *Reference Case*. The tasks undertaken were:
  - **1)** Road accident data was provided by the Sussex Safer Roads Partnership, for Mid Sussex District for the five-year period from 2015 to 2020.
  - 2) The collisions were mapped to help identify injury accident clusters of note according to number and severity of incidents.
  - **3)** Analysis was undertaken to correlate the identified cluster map to where significant traffic flow increases are forecasted to occur as a result of the *Sites DPD Scenario* when compared the *Reference Case*.
  - 4) Where traffic flow increases from the *Sites DPD Scenario* include notable injury accident clusters, further assessment was undertaken to identify already committed or proposed mitigation, or the need for safety mitigation to be considered.
- 1.2.2 **Figure 1** shows the location of all recorded RTCs by severity in the 5 year period.

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Figure 1. RTCs in Mid Sussex District 2015-2020

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# 2. JUNCTIONS

### 2.1 Junction Identification

- 2.1.1 This section assesses the number of accidents at junctions that are forecast to have increased traffic flows due the *Sites DPD Scenario* compared to the *Reference Case*.
- 2.1.2 The MSTS Sites DPD Scenario Final Report identifies junctions with capacity impacts. Appendix C of that report shows detailed results for 45 junctions, which were identified as requiring analysis. These included junctions identified in previous Scenarios or in the previous Mid Sussex Transport Study which, for consistency, were retained in the list even if no 'significant' or 'severe' impacts are identified in the *Sites DPD Scenario without Mitigation*.
- 2.1.3 For the purposes of this report, the safety assessment is based on traffic flow and therefore the process for identifying the junctions for analysis is repeated to ensure no junctions with significantly increased flow are excluded. As a result some additional junctions are identified that were not identified in the capacity assessment.
- 2.1.4 To identify a priority list of junctions, criteria are required to set appropriate thresholds for the number of accidents in a cluster and the increase in traffic flow as a result of the *Sites DPD Scenario.* Junctions that meet both the cluster size and flow criteria are then identified as priority locations for further analysis. Junctions that meet both the following criteria are selected for the priority list:
  - 5 or more accidents at the junction in the five year period
  - A traffic flow increase through the junction of 10% or more, in either AM or PM, in the Sites DPD Scenario or Sites DPD Scenario with mitigation compared to the Reference Case.
- 2.1.5 **Table 1** shows junctions that meet both the criteria. The locations of these are shown in **Figure 2**, which also shows identified road sections which are covered in the Chapter 3.
- 2.1.6 It should be noted that the analysis includes the full area of the model including areas in neighbouring authorities. However, there were no cross boundary locations which met the traffic flow increase criterion above.
- 2.1.7 Some junctions which do not meet the traffic flow criterion are included due to their significant clusters and being close to meeting the traffic flow criterion.

JUNCTION	FATAL	SERIOUS	SLIGHT	TOTAL	HIGHEST FLOW INCREASE SITES DPD	PERIOD	HIGHEST FLOW INCREASE SITES DPD WITH MIT.	PERIOD
B2112 / Lodge Lane	0	0	13	13	17%	PM	10%	PM
Borde Hill Lane / Balcombe Road / Hanlye Lane	0	2	8	10	8%	PM	6%	PM
Gander Hill / Portsmouth Lane / Summerhill Lane	0	2	7	9	14%	PM	12%	PM
B2036 London Road / Victoria Way	0	1	6	7	8%	AM	8%	AM
B2110 Brooklands Way / Railway Approach	0	1	5	6	14%	PM	12%	PM
A273 / B2116 Hassocks (Stonepound)	0	1	5	6	10%	PM	10%	PM
B2115 / A23 Southbound	0	2	3	5	10%	AM	9%	AM

#### Table 1. Identified Junctions

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#### Figure 2. Key Map of Identified Junctions

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# 2.2 Commentary on Identified Junctions

2.2.1 The following section provides a brief commentary on each of the identified locations.

### B2112 / Lodge Lane

2.2.2 This junction south of Keymer has a significant cluster of 13 slight accidents over the five year period. The PM peak traffic flow is forecast to increase by 17% as a result of the Sites DPD Scenario. This is forecast to decrease to 10% in the *with mitigation* Scenario.

### Borde Hill Lane / Balcombe Road / Hanlye Lane

2.2.3 This roundabout in Haywards Heath has 2 serious and 8 slight accidents over the five year period. The PM peak traffic flow is forecast to increase by 8% as a result of the Sites DPD Scenario. This is forecast to decrease to 6% in the *with mitigation* Scenario.

### Gander Hill / Portsmouth Lane / Summerhill Lane, Haywards Heath

2.2.4 This roundabout in Haywards Heath has 2 serious and 7 slight accidents over the five year period. The PM peak traffic flow is forecast to increase by 14% as a result of the Sites DPD Scenario. This is forecast to decrease to 12% in the *with mitigation* Scenario.

### B2036 London Road / Victoria Way

2.2.5 This mini-roundabout has 1 serious and 6 slight accidents over the five year period. The AM peak traffic flow is forecast to increase by 8% in the AM peak as a result of the Sites DPD Scenario. This is forecast to remain at a similar level in the *with mitigation* Scenario.

### B2110 Brooklands Way / Firbank Way / Railway Approach, East Grinstead

2.2.6 This roundabout in East Grinstead has 1 serious and 5 slight accidents over the five year period. The PM peak traffic flow is forecast to increase by 14% as a result of the Sites DPD Scenario. This is forecast to decrease to 12% in the *with mitigation* Scenario.

### A273 / B2116, Hassocks (Stonepound)

2.2.7 This signalised crossroads has 1 serious and 5 slight accidents over the five year period. The PM peak traffic flow is forecast to increase by 10% in the PM peak as a result of the Sites DPD Scenario. This is forecast to remain at a similar level in the *with mitigation* Scenario.

### B2115 / A23 Southbound

2.2.8 This junction on the Highways England network near Warninglid has 2 serious and 3 slight accidents in the last 5 years. The AM peak traffic flow is forecast to increase by 10% as a result of the Sites DPD Scenario. This is forecast to decrease to 9% in the *with mitigation* Scenario.

### 2.3 Other Notable Junctions

2.3.1 Although not meeting the criterion of 5 or more accidents over the five year period the following junctions are additionally commented on due to meeting the flow increase criterion and the occurrence of fatal or serious accidents in the period.

### B2028 Turners Hill Road / Wallage Lane

2.3.2 This priority T-junction in Crawley Down has 1 fatal and 2 slight accidents over the five year period. The PM peak traffic flow is forecast to increase by 13% as a result of the Sites DPD Scenario. This is forecast to decrease to 11% in the *with mitigation* Scenario. This junction is considered in more detail in Section 4.5.

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### A23 / A2300 Eastern Roundabout, Hickstead

2.3.3 This roundabout on the Highways England network near Hickstead has 2 serious and 2 slight over the five year period. It has a large increase in traffic due to its proximity to the proposed Science and Technology Park. The AM peak traffic flow is forecast to increase by 32% as a result of the Sites DPD Scenario. This is forecast to increase to 38% in the *with mitigation* Scenario. This junction is currently being addressed as part of the Science and Technology Park proposal so mitigation will not be considered in this report.

### A23 / A273, Pyecombe

2.3.4 This priority T-junction on the Highways England network, which provides access and egress between the A23 slip roads and the A273, has 2 serious and 2 slight accidents over the five year period. The PM peak traffic flow is forecast to increase by 15% as a result of the Sites DPD Scenario. However, this is forecast to decrease to 1% in the *with mitigation* Scenario, and for this reason mitigation will not be considered here.

### 2.4 Prioritisation of Identified Junctions

2.4.1 Following consultation on the identified junctions with West Sussex County Council (WSCC), Highways England (HE) and MSDC a junction prioritisation analysis was undertaken. **Table 2** summarises the status of recent or planned schemes and the agreed requirement for the next steps.

JUNCTION	RECENT OR PLANNED SCHEMES	NEXT STEPS
B2112 / Lodge Lane	Phase 2 safety scheme	None
Borde Hill Lane / Balcombe Road / Hanlye Lane	Junction recently upgraded to a roundabout	None
Gander Hill / Portsmouth Lane / Summerhill Lane	Scheme completed Feb 2020	None
B2036 London Road / Victoria Way		Written Design and Costing
B2110 Brooklands Way / Railway Approach		Written Design and Costing
A273 / B2116 Hassocks (Stonepound)	Scheme committed	None
B2115 / A23 Southbound		Written Design and Costing

#### Table 2. Safety Review Conclusion and Next Steps

2.4.2 It was agreed with MSDC and WSCC that the highlighted junctions will require additional analysis to gain a better understanding of future work and likely respective costs. The B2028 Turners Hill Road / Wallage Lane is also considered further. It was agreed that the other junctions would not require further analysis, as improvements works had either already been completed or are currently in development.

### 2.5 Review Meeting and Agreement of Mitigation

- 2.5.1 A review of the traffic accident data for the junctions requiring additional analysis was undertaken along with a review of the existing junction layout to identify trends in the type of accidents which are occurring and potential root causes. DMRB-based junction capacity assessments of the traffic flows and turning counts was undertaken to determine if the junctions are nearing capacity. More detail of this assessment is contained within Chapter 4 of this report.
- 2.5.2 At a meeting with WSCC and MSDC the findings were presented and initial concepts discussed, including options for each junction within the highway boundary and with no obvious barriers to delivery.

### 2.5.3 **Appendix A** shows the accidents in more detail.

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# 3. ROAD SECTIONS

### 3.1 Road Section Identification

- 3.1.1 This section assesses the number of accidents on road sections that are forecast to have increased traffic flows due the *Sites DPD Scenario* compared to the *Reference Case*.
- 3.1.2 To identify a priority list of road sections, criteria are required to set appropriate thresholds for the number of accidents on the road section and the increase in traffic flow as a result of the *Sites DPD Scenario*. Road sections that meet both the number of accidents and flow criteria are then identified as priority locations for further analysis. Road sections that meet both the following criteria are selected for the priority list:
  - Five or more accidents on the road section in the five year period
  - A traffic flow increase of 10% or more, or 100 vehicles or more, when averaged across the AM and PM peak hours, in the *Sites DPD Scenario with mitigation* compared to the *Reference Case*.
- 3.1.3 The road sections that meet the criteria are assessed against national accident rates available from the Department for Transport at the location below: <u>https://www.gov.uk/government/statistical-data-sets/ras10-reported-road-accidents</u> (Table RAS10002)
- 3.1.4 The national rates are provided annually as the number of accidents per billion vehicle kilometres for different road types. To enable comparison to these rates the traffic flows from the model are converted to vehicle kilometres. For consistency with the national accident rates, estimates of annual vehicle kilometres are calculated using the 2017 base model flows. Therefore, the quality of the 2017 base year validation, as reported in the Mid Sussex Strategic Highway Model, Local Model Validation Report (LMVR), is referred to in the commentary below. The calculation of vehicle kilometre also requires an annualisation factor to be applied to the modelled peak hours, which is derived using data from permanent traffic counters.
- 3.1.5 **Table 3** shows locations that meet both the above criteria. The locations of these are shown in **Figure 2**. It should be noted that the analysis includes the full area of the model including areas in neighbouring authorities. However, there were no cross boundary locations which met the traffic flow increase criterion above.
- 3.1.6 The table also shows the annual flow in vehicle kilometres for each section and the accident rate which are compared to the national rates in the commentary below.

ROAD	SECTION	FATAL	SERIOUS	SLIGHT	TOTAL	AVER PEAK F IN CRI	RAGE FLOW EASE	SECTION DISTANCE (METRES)	ANNUAL FLOW (MILLION VEH KM)	ACCIDENT RATE PER BILLION VEH KM
College Road, Ardingly	between Ardingly College and B2028	0	2	5	7	57	23%	972	1.39	1007
B2116, Hurstpierpoint	between B2117 and College Lane	0	1	6	7	114	17%	1149	3.58	391
A272	between Ansty and B2036	0	1	4	5	246	15%	981	6.55	153
A23 Southbound	B2118 off slip to B2117 on slip	0	4	7	11	218	7%	4269	52.23	42
A23 Northbound	B2115 on slip to B2110 off slip	0	2	17	19	246	6%	3232	43.25	88
A23 Southbound	A272 off slip to A272 on slip	0	0	5	5	129	4%	932	11.56	87
A23 Northbound	B2110 on slip to J11 off slip	0	2	11	13	192	4%	3144	47.72	54

#### Table 3. Identified Road Sections

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### 3.2 Commentary on Identified Road Sections

3.2.1 The following section provides commentary on the identified locations, and compares the accident rate to the corresponding national rates.

### College Road, Ardingly, between Ardingly College and the B2028

- 3.2.2 This road includes a short rural section north of its junction with Ardingly College and a section through Ardingly. The peak traffic is forecast to increase by 23% due to the Sites DPD with mitigation Scenario. There is a 2017 base year validation site located on this road for the which the LMVR reports good quality in the AM and PM peaks.
- 3.2.3 This section has 2 serious and 5 slight accidents over the five year period which results in an accident rate of 1007 accidents per billion vehicle kilometres. In the national rates for 2017 this is comparable to a rate of 223 for rural non A roads and 384 for urban non A roads.
- 3.2.4 It is recommended that further analysis is undertaken, because the national accident rate is significantly exceeded.

### B2116, Hurstpierpoint, between the B2117 and College Lane

- 3.2.5 The peak traffic for this road section is forecast to increase by 17% as a result of the Sites DPD with mitigation Scenario. The nearest 2017 base year validation site is on the B2116 at Hassocks for which the LMVR reports good quality in the PM peak and lower than observed flows in the AM peak, which would lead to overestimation of the accident rate.
- 3.2.6 This section has 1 serious and 6 slight accidents over the five year period which results in an accident rate of 391 accidents per billion vehicle kilometres. In the national rates for 2017 this is comparable to a rate of 384 for urban non A roads. No further analysis is required for this location, because the national accident rate is not significantly exceeded.

### A272, between Ansty and the B2036

- 3.2.7 The peak traffic is for this road section is forecast to increase by 15% as a result of the Sites DPD with mitigation Scenario. The nearest 2017 base year validation site is on the A272 west of Ansty for which the LMVR reports good quality in the AM and PM peaks.
- 3.2.8 This section has 1 serious and 4 slight accident over the five year period which results in an accident rate of 153 accidents per billion vehicle kilometres. In the national rates for 2017 this is comparable to a rate of 128 for rural A roads. No further analysis is required for this location, because the national accident rate is not significantly exceeded.

### A23 Sections

- 3.2.9 **Table 3** identifies 4 carriageway sections on the A23 where there are five or more accidents over the last five years and the average peak flow increases by 100 vehicles or more.
- 3.2.10 The accident rates ranges from 42 to 88 accidents per billion vehicle kilometres. In the national rates for 2017 this is comparable to a rate of 128 for rural A roads.
- 3.2.11 It is considered that no further analysis is required for these locations, because the national accident rate is not exceeded at any of the identified locations.

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# 4. DEVELOPMENT OF CONCEPT DESIGN PACKAGE AND ASSOCIATED COST ESTIMATE

- 4.1.1 This section of the report describes the existing junction layouts, the evidence base for capacity and safety concerns, the highways design to mitigate these concerns and costing for the designed interventions.
- 4.1.2 This design stage includes:
  - Development of the highway design using DMRB and Manual for Streets design standards as appropriate
  - Swept path analysis, visibility and deflection checks
  - Identification and design of suitable walking and cycling facilities as required
  - Highway boundary design consideration. It is assumed that proposed works should remain within the highway boundary.

# 4.2 B2036 London Road / Victoria Way

### Junction review and agreement on items for mitigation

4.2.1 The junction, in Burgess Hill, is a three arm mini-roundabout with a 30mph speed limit (see image below).



4.2.2 In the most recent 5 year period, there have been a number of collisions at the junction. The location and details of these collisions are provided below.

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REF	SEVERITY	NO. VEH	NO. CAS	DATE	TIME	SURFACE	LIGHTING	WEATHER	ТҮРЕ	DESCRIPTION
1605417	Slight	2	1	08/09/2016	825	Dry	Daylight	Fine without high winds	Motorbike falls to avoid hitting vehicle	Misunderstanding between drivers
1700442	Slight	1	1	22/01/2017	910	Frost/Ice	Daylight	Fine without high winds	Motorbike skidding	Frozen water on gyratory
1900662	Slight	2	1	04/02/2019	745	Wet/Damp	Daylight	Fine without high winds	Vehicle hits bicycle	
856154	Slight	2	1	06/07/2019	2315	Dry	Daylight	Fine without high winds	Vehicle 1 hits vehicle 2	Potential drunk driver
882658	Slight	1	1	27/09/2019	1500	Wet/Damp	Daylight	Fine without high winds	Vehicle hits pedestrian	Driver didn't notice pedestrian
19903576	Slight	2	1	28/11/2019	1845	Dry	Dark: street lights present and lit	Fine without high winds	Vehicle hits motorbike	Misunderstanding between drivers
20931937	Serious	3	2	19/02/2020	1515	Wet/Damp	Daylight	Raining without high winds	Vehicle 2 hits vehicle 1 which hits vehicle 3	Misunderstanding between drivers

- 4.2.3 The collisions appear to show a trend of drivers' uncertainty using the junction. This could be attributed to the existing two lane entries on all arms and lack of lane designation.
- 4.2.4 The traffic flow through the junctions is predicted to increase in the 2031 scenario. This is exacerbated when factoring in the traffic increase of the development scenario (see image below).

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4.2.5 It was agreed at the junction review meeting that the safety issues identified should be the primary focus of the proposals, and these proposals may in turn offer some capacity improvements as a secondary benefit.

### **Concept Design Proposals**

- 4.2.6 In order to address the issues identified, the following improvements are recommended:
  - Revised approach road markings (e.g. arrows to indicate the allowed manoeuvres) to improve roundabout clarity;
  - Improved roundabout road markings (e.g. implementing centre circle and overrunning island) to reduce the perceived circulatory carriageway width, discouraging two vehicle use of the circulatory;
  - Signage introduction to improve roundabout use clarity; and
  - Resurfacing of the roundabout and approaches to improve drainage.
- 4.2.7 The figure (See right), extracted from DMRB, CD116 captures the majority of the potential interventions regarding lane designation and road markings improvement.



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### Junction Cost Estimate

4.2.8 A high-level cost estimate has been prepared for the proposed junction based on benchmarking against other similar schemes . The table below provides the high level cost estimate to implement recommended interventions including Design, Traffic management & Preliminaries and contingency for risk including optimism bias and utilities.

B2036 LONDON ROAD / VICTORIA WAY	COST (£)
Resurfacing, Road markings and Signs	
TOTAL	£31,110
Design (15%)	£4,667
Traffic Management & Preliminaries (20%)	£6,222
Contingency, Risk & Utilities (40%)	£12,444
GRAND TOTAL	£54,443

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# 4.3 B2110 Brooklands Way / Railway Approach

### Junction review and agreement on items for mitigation

4.3.1 This junction is a four arms roundabout with an advisory cycle lane and a 30mph speed limit. National Cycle Route 21 runs across the junction (as shown below).



4.3.2 In the most recent 5 year period, there have been a number of collisions at the junction. The location and details of these collisions are provided below.

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REF	SEVERITY	NO. VEH	NO. CAS	DATE	TIME	SURFACE	LIGHTING	WEATHER	ТҮРЕ	DESCRIPTION
1506626	Serious	2	1	10/11/2015	605	Wet/Damp	Dark: street lights present and lit	Fine without high winds	Vehicle hits bicycle	Misunderstanding between drivers
1507408	Slight	2	1	14/12/2015	641	Dry	Dark: street lights present and lit	Fine without high winds	Vehicle 2 hits vehicle 1	Misunderstanding between drivers
1606850	Slight	2	1	14/11/2016	1828	Wet/Damp	Dark: street lights present and lit	Fine without high winds	Vehicle 1 hits rear wing of vehicle 1	Driver avoiding a car got hit by another vehicle
1800367	Slight	2	1	20/01/2018	1650	Dry	Dark: street lights present and lit	Fine without high winds	Vehicle 1 hits rear of vehicle 2	Driver didn't see stationary vehicle
1900103	Slight	2	1	30/10/2018	1645	Dry	Daylight	Fine without high winds	Bicycle hits passenger door of vehicle	Cyclist undertook
20951034	Slight	2	1	13/05/2020	1820	Dry	Daylight	Fine without high winds	Vehicle 1 hits the front of vehicle 2	Misunderstanding between drivers

- 4.3.3 The collisions identified indicate drivers' uncertainty using the junction. Although, a specific cause of these accidents cannot be confirmed, the unusual cycle road markings and condition of the road surface and road markings could be attributed as a likely cause for uncertainty.
- 4.3.4 The junction is forecast to remain within capacity when modelled for the 2031 scenario, factoring in the traffic increase due to the new development site. The modelling does not consider the supermarket/station arm, however this arm doesn't generate significant traffic flow (see image below).

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- 4.3.5 Considering both the data collected from the model and the traffic information from Google Maps, junction capacity issues are not expected and therefore, no capacity improvements are proposed at this junction.
- 4.3.6 Following the junction review meeting, it was agreed that the safety issues identified should be the primary focus of the proposals, and these proposals may in turn offer some capacity improvements as a secondary benefit.

### **Concept Design Proposals**

- 4.3.7 In order to address the issues identified, two possible interventions have been developed for consideration.
- 4.3.8 The first option provides a do minimum scenario, which looks to make relatively minor modification to the existing layout. It is considered that this option would improve the clarity for drivers by providing new and clear cycle road markings, improving the cycle safety. The proposals include the following:
  - roundabout resurfacing;
  - road markings improvement to widen the cycleway routes and improve driver awareness;
  - repainting of existing road markings for improved clarity;
  - provision of measures to improve cycleway delineation (e.g. wands);
  - improving cycleway to footway transition on the northern arm approaching the A22. Introducing cycle sign for wayfinding which would direct cyclists onto the shared footway;
  - widening the crossing envelope by installing dropped kerbs to enable easier footway access for cyclists on northern arm northbound;
  - extending the cycleway on Brooklands Way southbound by approximately 8m and removing 2 pairs of zigzags; and
  - widening advisory cycle lanes to provide two-metre-wide lanes where possible, whilst ensuring minimum carriageway width is maintained, to provide more width next to the existing gullies;
  - introduction of cycle friendly gullies.

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- 4.3.9 The second option looks to remove the cycle facilities from the roundabout by providing a separated cycle route and associated Toucan crossings on the northern side of the junction. The proposals include the following:
  - resurfacing the roundabout to remove the existing cycle advisory lanes;
  - new white lining, including removal of the spiral cycle lane markings;
  - providing three toucan crossings on the northern arm where crossings are currently located;
  - providing one toucan crossing on Railway Approach, where the existing crossing is currently located; and
  - widening the crossing envelope by installing dropped kerbs to enable easier footway access for cyclists on northern arm northbound.
- 4.3.10 Surveys would be required for this option but can be delayed until movement patterns return to the new post-Covid normal.
- 4.3.11 Option 2 provides more segregation which is likely to be safer overall. It also removes the spiral cycle markings maintenance issue which may arise again in the future. However, both options would provide a safety improvement.

### **Junction Cost Estimate**

4.3.12 A high-level cost estimate has been prepared for the proposed junction based on benchmarking against other similar schemes. The two tables below provide the high level cost estimate to implement two possible interventions including Design, Traffic management & Preliminaries and contingency for risk including optimism bias and utilities.

B2110 BROOKLANDS WAY / FIRBANK WAY / RAILWAY APPROACH (OPTION 1)	COST (£)
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"Do Minimum" - Resurfacing, Cyclelane marking, Road markings, Widen dropped kerbs for cycle lane exit to footway and Gullies

TOTAL	£50,413
Design (15%)	£7,562
Traffic Management & Preliminaries (20%)	£10,083
Contingency, Risk & Utilities (40%)	£20,165
GRAND TOTAL	£88,222

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B2110 BROOKLANDS WAY / FIRBANK WAY / RAILWAY APPROACH (OPTION 2)	COST (£)
Resurfacing, Road markings, Toucan crossings and Gullies	
TOTAL	£170,670
Design (15%)	£25,601
Traffic Management & Preliminaries (20%)	£34,134
Contingency, Risk & Utilities (40%)	£68,268
GRAND TOTAL	£298,673

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# 4.4 B2115 / A23 Southbound

### Junction review and agreement on items for mitigation

4.4.1 The junction is characterised by a left-in and left-out arrangement on the A23. The speed limit through the junction is national speed limit, but advisory 20mph signage is provided on the southbound diverge (see image below).



4.4.2 Although a number of collisions have been identified in the most recent five year period, there is no clear pattern. It is noted that the A23 Handcross to Warninglid scheme opened to traffic in October 2014 and these changes could have had an effect on collisions at the junction. Given the relatively low traffic flows, capacity does not appear to be a factor (see image and table below).



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REF	SEVERITY	NO. VEH	NO. CAS	DATE	TIME	SURFACE	LIGHTING	WEATHER	ТҮРЕ	DESCRIPTION / COMMENT
1504155	Slight	2	1	20/07/2015	1925	Wet/ Damp	Daylight	Raining without high winds	Lorry hits rear of vehicle	HGV error
1507541	Slight	1	1	09/11/2015	2300	Dry	Dark: street lights present and lit	Fine without high winds	Vehicle veers to nearside	Driver fell asleep
1701186	Slight	1	1	26/02/2017	1356	Dry	Dark: street lights present and lit	Fine without high winds	Vehicle loss of control	Driving too fast
1704015	Serious	1	1	17/07/2017	2037	Dry	Daylight	Fine without high winds	Vehicle loss of control	Motorcyclists lost control
1807108	Serious	1	1	20/12/2018	315	Wet/ Damp	Dark: street lights present and lit	Raining without high winds	Vehicle veers to nearside	Driver fell asleep

- 4.4.3 Highways England have also produced the one year Post Opening Project Evaluation (POPE) report which does not identify any safety concerns.
- 4.4.4 The junction is forecast to remain within capacity, when modelled for the 2031 scenario, including the traffic increase due to the new development site (21%). The following figures summarise the traffic flow for the junction.



4.4.5 It was agreed at the junction review meeting that no mitigation will be proposed at this junction. It is noted that Highways England are expected to undertake a 5 year POPE report in the near future and this may identify some requires changes as a result of this scheme.

### **Concept Design Proposals**

4.4.6 No mitigation changes at this junction are proposed subject to Highways England's agreement

### **Junction Cost Estimate**

4.4.7 No costing has been produced for junction 4, because no interventions are proposed.

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# 4.5 B2028 Turners Hill Rd / Wallage Lane

### Junction review and agreement on items for mitigation

4.5.1 The junction is a three arm T-junction with hedgerows on either side of the main line, Turners Hill and of the side road, Wallage Lane (see image below).



- 4.5.2 The speed limit for the junction is 40mph. There is signage to enforce this, however a large number of signs are obscured through their height and position, as well as hedgerow growth.
- 4.5.3 There are no road markings on the mainline approaches to the junction to warn drivers and the junction is unlit. Additionally hedgerows cause some obstruction to visibility on the approach from all arms.
- 4.5.4 In the most recent 5 year period, there have been three collisions at the junction. The location and details of these collisions are provided below:



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REF	SEVERITY	NO. VEH	NO. CAS	DATE	TIME	SURFACE	LIGHTING	WEATHER	ТҮРЕ	DESCRIPTION / COMMENTS
1607375	Slight	3	1	07/12/2016	835	Wet/Damp	Daylight	Fine without high winds	Vehicle 1 hits vehicle 2 which hits vehicle 3	
20925471	Slight	2	1	30/01/2020	1710	Wet/Damp	Dark: no street lighting	Raining without high winds	Vehicle 1 hits vehicle 2	Lighting was highlighted as a possible cause
20959967	Fatal	2	1	25/06/2020	2053	Dry	Daylight	Fine without high winds	Motorbike hits side of turning vehicle	

- 4.5.5 There are only a low number of accidents at this junction and no clear trend in the type of accidents.
- 4.5.6 The following figures summarise the turning flow for the junction, which factors in the impact of the flow on junction operation, such as right turning traffic having a higher impact as the movement affects other movements.



PM



- 4.5.7 Although the junction is forecasted to be at capacity in 2031, this junction is not a primary route and it was agreed at the junction review meeting that increasing capacity at this junction is not desirable, as it could result in facilitating additional traffic using Wallage Lane as a 'rat run' for traffic heading towards Turners Hill.
- 4.5.8 As discussed above there is no trend in the type of accidents but given the increase in traffic, a few simple alterations which seek to bring the junction closer to standard, with no expected negative consequences have been identified on the next page.

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#### **Concept Design Proposals**

- 4.5.9 To address a number of the design deficiencies within the highway boundary, the following mitigation could be considered:
  - Adjusting sign mounting heights to improve visibility, and prevent obstruction by existing trees and hedges;
  - Introduction of new warning and regulatory traffic signs on backing boards to improve the conspicuousness of the signs;
  - Combining signs onto a single backing boards sign to reduce sign clutter and improve clarity;
  - Introduction of "SLOW" road markings to further emphasise the speed limit, alert drivers to the presence of a hazard and encourage reduced vehicle speeds;
  - Introduce Wallage Lane direction sign at the junction, to increase the conspicuousness of the junction; and
  - Keep junction clear of vegetation by trimming overgrown foliage to improve visibility.

#### **Junction Cost Estimate**

4.5.10 A high-level cost estimate has been prepared for the proposed junction layout, based on benchmarking against other similar schemes, provided in the table below including Design, Traffic management & Preliminaries and contingency for risk including optimism bias and utilities.

### **B2028 TURNERS HILL RD / WALLAGE LANE**

Sign rehanging on same posts, New sign post, foundation and sign faces, Vegetation trimming, Road markings

TOTAL	£17,400
Design (15%)	£2,610
Traffic Management & Preliminaries (20%)	£3,480
Contingency, Risk & Utilities (40%)	£6,960
GRAND TOTAL	£30,450

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COST (£)



# 4.6 College Road, Ardingly, between Ardingly College and the B2028

### Link review and agreement on items for mitigation

4.6.1 College Road is characterised by a short rural section north of Ardingly College and a residential section through Ardingly between B2028 and Lodgelands (see image below).





- 4.6.2 The road is a two-way traffic road with a 30mph speed limit. The speed limit changes from 50mph to 30mph 200m south of the Ardingly College junction. The first 30mph sign for southbound traffic is located at 675m from the B2028 junction. This 30mph sign is placed on the right side of the carriageway, potentially reducing its visibility and consequently its effectiveness for southbound traffic.
- 4.6.3 Cars currently park along College Road especially between B2028 and Lodgelands. Parked cars reduce carriageway width allowing only one lane for traffic. In addition, many side roads don't present give way markings when merging with College Road.
- 4.6.4 In the most recent 5 year period, there have been seven collisions on this link. The location and details of these collisions are provided below.

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REF	SEVERITY	NO. VEH	NO. CAS	DATE	TIME	SURFACE	LIGHTING	WEATHER	ТҮРЕ	DESCRIPTION / COMMENTS
1600143	Slight	2	1	09/01/2016	1134	Wet/Damp	Daylight	Fine without high winds	Cyclist fell because Vehicle 1 tried to overtake them	Cars were parked on the road
1600396	Slight	3	1	19/01/2016	815	Dry	Daylight	Fine without high winds	Vehicle 1 hits vehicle 2	
1600577	Slight	2	1	28/01/2016	1240	Dry	Daylight	Fine without high winds	Vehicle 1 hits vehicle 2 parked	Cars were parked on the road
1602048	Serious	1	1	16/03/2016	1546	Dry	Daylight	Fine without high winds	Pedestrian hit by vehicle	Pedestrian in the carriageway because dealing with RTC
1601595	Slight	2	1	16/03/2016	1546	Dry	Daylight	Fine without high winds	Vehicle 1 hits vehicle 2	
1603576	Slight	2	1	15/06/2016	1205	Dry	Daylight	Fine without high winds	Vehicle 1 hits cyclist	
880789	Serious	3	1	24/09/2019	1146	Wet/Damp	Daylight	Fine without high winds	Motorbike (V1) lost control hitting V3 parked and being injured by V2	Cars were parked on the road

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4.6.5 The peak traffic is forecast to increase by 23% due to the Sites DPD with mitigation Scenario but the flows remain well below the capacity of a single carriageway road. There is a 2017 base year validation site located on this road for the which the LMVR reports good quality in the AM and PM peaks.

### **Concept Design Proposals**

- 4.6.6 A new 30mph gate has been introduced 675m from the B2028 junction after August 2016 (see image below). Since August 2016 only one accident has been reported.
- 4.6.7 With just one accident since 2016, no mitigation changes are proposed for College Road.



### Link mitigations Cost Estimate

4.6.8 No costing has been produced for College Road, because no interventions are proposed.

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# 5. APPORTIONMENT ANALYSIS

5.1.1 An apportionment analysis was undertaken in which potential developer contributions were calculated based on proportion of traffic at each junction travelling to or from the developments. This used select link analysis on the *Sites DPD with mitigation* scenario (AM and PM), for the junctions where mitigation is proposed. This was undertaken for the Science and Technology Park and residential developments of 100 units or more. **Table 4** shows a summary of the apportionments for the identified locations.

SITE	B2036 LONDON ROAD / VICTORIA WAY	B2110 BROOKLANDS WAY / RAILWAY APPROACH	B2028 TURNERS HILL RD / WALLAGE LANE
Land south of Crawley Down Road, Felbridge	0.1%	9.5%	7.6%
St. Wilfrids Catholic Primary School, School Close, Burgess Hill	68.0%	0.2%	0.4%
Land south and west of Imberhorne Upper School, Imberhorne Lane, East Grinstead	0.4%	81.3%	67.9%
Land west of Selsfield Road, Ardingly	0.7%	2.0%	17.1%
Land East of Keymer Road and South of Folders Lane, Burgess Hill.	6.6%	2.0%	2.5%
Science and Technology Park	24.2%	5.0%	4.5%
Total	100.0%	100.0%	100.0%

Table 4. Su	mmary of <i>i</i>	Apportionment	Results
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#### Other locations:

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Middle East: Cairo, Dubai, Riyadh

Asia Pacific: Bangkok, Beijing, Brisbane, Delhi, Hanoi, Hong Kong, Manila, Seoul, Shanghai, Singapore, Shenzhen, Taipei

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