

# A27

## Arundel Bypass Walberton Traffic Mitigation Assessment



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## 1. Introduction

- 1.1.1 National Highways (NH) commissioned Linkconnex to carry out the PCF Stage 3 modelling work for the A27 Arundel Bypass scheme (the Scheme). This Scheme entails building a new 8-kilometre dual carriageway bypass to the south of the existing A27 and Arundel town with an upgrade to Crossbush junction at the eastern end of the scheme to grade separated standard.
- 1.1.2 During Statutory Consultation in January to March 2022, information was published on the traffic impacts that were likely to result from the Scheme. In particular, this information showed that there was forecast to be significant additional traffic passing through Walberton, especially on The Street.
- 1.1.3 This increase in traffic through Walberton is caused by a number of factors. The first, is due to rat-running<sup>1</sup> as traffic seeks to avoid the increased delay experienced at Fontwell Roundabout West, due to extra flow on the A27 after the opening of the Scheme. This increased delay leads to traffic diverting off the A27 to seek other ways through less congested parts of the network. The other cause is traffic that previously travelled to/from Walberton using Tye Lane re-routeing to Yapton Lane/Eastergate Lane due to the severing of Tye Lane as part of the proposed Scheme design.
- 1.1.4 The data published for the Statutory Consultation showed that these effects would increase the two-way Annual Average Daily Traffic (AADT<sup>2</sup>) flows along The Street in Walberton by 1,300 vehicles per day (after rounding) in the assumed Scheme opening year of 2027. The traffic model forecasts indicated that this increase would be mainly westbound traffic in the PM Peak.
- 1.1.5 The Statutory Consultation raised a large number of concerns regarding the impact of the Scheme on traffic in Walberton and the surrounding area south of the new A27. Consequently, a package of mitigation measures was developed and modelled in order to reduce the traffic impact on Walberton.
- 1.1.6 A series of future year scenarios and modelled tests have been carried out, showing the impact of various proposed mitigation measures on the level of rat-running through Walberton, both individually and in combination with other measures. All of these variants have been based on the 2027 Do Something scenario (which includes the Scheme) that was used to produce the data for the Statutory Consultation. All the model runs and tests used the same growth and development assumptions by year as were used previously. The forecast traffic flows predicted to occur following the

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<sup>1</sup> Rat-running is a term used to describe the behaviour of some motorists of using residential or local roads (which are intended for use as local access roads) to short cut through the road network to avoid areas of congestion or delay on the main trunk roads.

<sup>2</sup> AADT is a measure of the total volume of vehicle traffic of a highway or road for a year divided by 365 days.

implementation of the various mitigation measures produced below are therefore directly comparable to those presented during Statutory Consultation.

- 1.1.7 The next section of this Technical Note (TN) details the proposed mitigation measures, with each measure tested being described in isolation. The impacts of the tests of these mitigation measures on the level of rat-running through Walberton are then presented, including the cumulative impact of the combinations tested.

## 2. Description of Mitigation Measures

2.1.1 A range of mitigation measures were developed to address the issue of the increased traffic flow through Walberton. These measures were developed using professional judgement and experience in light of the causes of the increase, as well as taking verbal and written feedback from the Statutory Consultation into account. This section describes the measures developed before they were tested in the traffic model forecasting.

### 2.2 Fontwell West Signals (Stage 2 signals)

2.2.1 As part of future development works, not associated with the Scheme, the Fontwell West Roundabout will be signalised in 2022 or 2023 through the introduction of traffic lights.

2.2.2 The PCF Stage 2 traffic analysis (contained in the Stage 2 ComMA report<sup>3</sup>) showed little-to-no rat-running through Walberton. This was also noted by some Walberton residents during the Statutory Consultation. Analysis of the differences between the Stage 2 and Stage 3 runs showed that one of the important variations was that the Stage 2 traffic forecasts used different assumptions about signal timings on the Fontwell West roundabout. The Stage 2 signal timings in the PM Peak gave a higher proportion of the cycle to the A27 west-bound traffic than the signal timings in the PM Peak in the Stage 3 model.

2.2.3 This mitigation measure therefore involves replacing the signal timings supplied for Stage 3 (by National Highways Spatial Planning division) at Fontwell West with the signal timings used in Stage 2 (altering the cycle lengths on the other roundabout approach arms as required). The offsets were optimised and re-set for each time period, but otherwise no further optimisation work was carried out.

2.2.4 This mitigation should reduce the delays at Fontwell West roundabout experienced by the A27 traffic while maintaining accessibility for the other arms at the junction. This would then make the rat-running route through Walberton less attractive relative to the main A27 route through the Fontwell roundabout.

### 2.3 Re-setting of Fontwell West Signals

2.3.1 This mitigation measure is a variation of the above Fontwell West Signals mitigation measure detailed in section 2.2. In addition to the steps mentioned in the previous section, the signal timings at Fontwell Roundabout were examined further and optimisation of the signal timings was carried out for all time periods to try and increase traffic passing through the junction and reduce congestion delays on the A27. Where this resulted in excessive delays on the circulatory arm, the signal timings were

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<sup>3</sup> [https://highwaysengland.citizenspace.com/he/a27-arundel-bypass-further-consultation/supporting\\_documents/Combined\\_Modelling\\_and\\_Appraisal\\_Report\\_ComMA.pdf](https://highwaysengland.citizenspace.com/he/a27-arundel-bypass-further-consultation/supporting_documents/Combined_Modelling_and_Appraisal_Report_ComMA.pdf)

manually adjusted and re-set to remove this delay and ensure reasonable timings to balance delay from all arms of the roundabout. The signal offsets were then optimised for the new signal timings.

- 2.3.2 This mitigation should further reduce the delays at Fontwell West experienced by the A27 traffic while maintaining accessibility for the other arms at the junction. This would then reinforce the effect of making the rat-running route through Walberton less attractive relative to the main A27 route through the Fontwell roundabouts.

## 2.4 Tye Lane (two-way)

- 2.4.1 Part of the Scheme presented at Statutory Consultation involves using the northern part of Tye Lane as a slip-road between the existing route of the A27 and the new route of the A27. To facilitate this, the existing route of Tye Lane would be severed, with traffic no longer able to use this road between the existing A27 and The Street.
- 2.4.2 This mitigation measure tests the re-opening of Tye Lane to traffic passing through Tye Lane but not using the Scheme. Traffic would be permitted to use the full route of Tye Lane between the existing A27 and The Street in both directions. Access to the A27 slip-road would still be from the north only.
- 2.4.3 This mitigation may have a limited impact on the scale of the rat-running through Walberton, but it should remove the rat-running traffic from the section of The Street between Tye Lane and Yapton Lane – which is the narrowest and most safety sensitive section of The Street.

## 2.5 Tye Lane (Southbound-only)

- 2.5.1 This mitigation measure is similar to that described in section 2.4, but Tye Lane would be open to southbound only traffic. Traffic will be permitted to use the full route of Tye Lane between the existing A27 and The Street travelling southbound. Access to the A27 slip-road will still be from the north and the A27 only.
- 2.5.2 The road will remain severed for traffic travelling north between The Street and the existing A27. The reason for this is to stop a potential route opening up to the Scheme which would pass through Walberton and may encourage more traffic to pass through the village to access the scheme.
- 2.5.3 This mitigation may have a limited impact on the scale of the rat-running through Walberton, but similar to the Tye Lane two-way option, it should remove the rat-running traffic from the section of The Street between Tye Lane and Yapton Lane – which is the narrowest and most safety sensitive section of The Street.

## 2.6 Arundel Road junction

- 2.6.1 In the scheme presented at statutory consultation, the left-turn from the westbound A27 carriageway into Arundel Road would be closed as part of

the Scheme design, for safety reasons. This had the impact of preventing cars accessing the Fontwell area through this junction.

- 2.6.2 There was a reduction in the speed limit on the western section of the Scheme to 50mph. This speed reduction allows the new dual carriageway to tie into the existing A27 at an earlier point than what would have been possible with a 70mph design speed, and therefore mitigates significant environmental impacts. This speed reduction also gave the opportunity to review the closure of the exit onto Arundel Road. It was concluded that due to the reduced speed limit, the Scheme design could accommodate the exit onto Arundel Road and it was acceptable to retain this junction in its current form with no need for a closure at the junction. The effect of keeping the arrangements at Arundel Road as they currently are (allowing a left-turn from the westbound A27 carriageway) was tested in the model to assess the impacts.
- 2.6.3 Keeping this junction arrangement as it is currently set up could reduce the delay experienced at Fontwell West by retaining the existing accessibility to Fontwell village for traffic and reducing the flow of vehicles using the A27 west-bound between the two Fontwell roundabouts. This should then make the rat-running route through Walberton less attractive relative to the route through the Fontwell roundabouts, although the effect is small.

## 2.7 Mill Road traffic calming

- 2.7.1 As part of the on-going assessment and traffic modelling work, it was observed that some of the traffic rat-running through Walberton was routeing from the A29 to the north-east of Fontwell to the A29 to the south-west of Fontwell. This traffic used Mill Road to travel between the A29 and the A27 before turning right down Yapton Lane.
- 2.7.2 This mitigation measure is to impose a 30mph speed limit on Mill Road, along with suitable traffic calming measures. This will be represented by the use of a suitable speed-flow curve in the traffic model.
- 2.7.3 This mitigation should increase the time taken to rat-run between these two sections of the A29. This should then make the rat-running route through Walberton less attractive relative to the main route through the Fontwell roundabouts.

## 2.8 Mill Road further traffic calming

- 2.8.1 This mitigation measure is a variation of the above mitigation measure, Mill Road traffic calming. An additional 10 seconds of delay (representing extra management measures, such as chicanes on Mill Road) is imposed on all traffic using the road in addition to the delays generated by the speed-flow curve.
- 2.8.2 This should increase the time taken to rat-run between these two sections of the A29. This should then make the rat-running route through Walberton less attractive relative to the main route through the Fontwell roundabouts.



## 2.9 The Street HGV Ban

- 2.9.1 In response to requests received during the Statutory Consultation, a mitigation measure examined was to restrict the movement of HGVs through the village of Walberton.
- 2.9.2 There already exist weight restrictions on heavy vehicles passing through Walberton. This mitigation measure tests the strict enforcement of these weight restriction measures and to ban HGVs from using The Street.
- 2.9.3 This will make passing through the village of Walberton impossible. HGVs travelling to/from Walberton will need to access the village from the west, thus avoiding the most constrained section of the road. As the model is a large-scale strategic model, which lacks data on the different sizes of HGVs or the reasons for travel of HGVs, this in practice (in modelling terms) would be a full ban for HGVs in Walberton.

## 2.10 Yapton Lane Right-turn

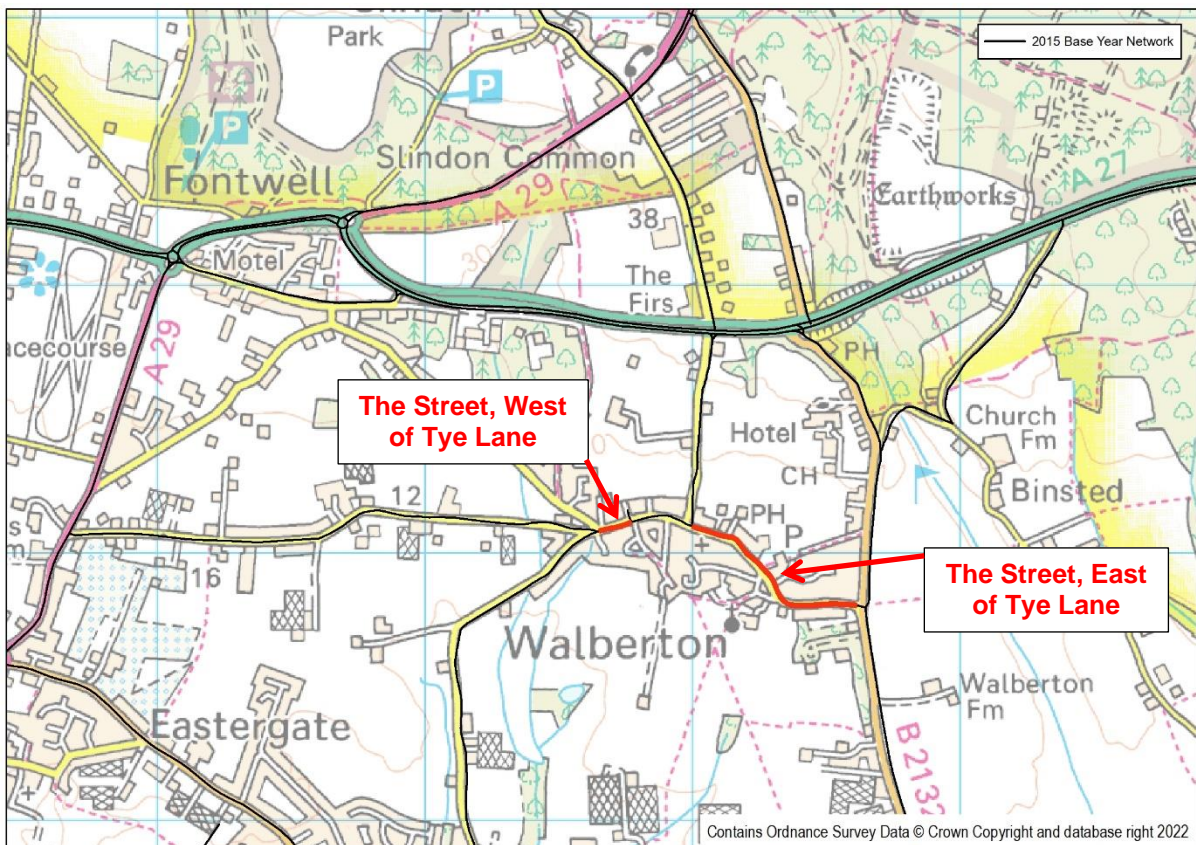
- 2.10.1 The junction between Yapton Lane and the existing route of the A27 is currently not an all-movements junction. Traffic from Yapton Lane is only permitted to turn left onto the A27. The Scheme as proposed at Statutory Consultation leaves this arrangement in place.
- 2.10.2 In response to suggestions received during the Statutory Consultation, this mitigation measure is to permit traffic from Yapton Lane to turn right onto the existing route of the A27 in addition to being allowed to turn left.
- 2.10.3 This is unlikely to have much impact on the rat-running through Walberton. However, it will improve accessibility in the area for Walberton and make travel between Walberton and Arundel shorter and quicker.

## 3. Results

- 3.1.1 In total, 16 traffic model runs were carried out to test the impacts of one or more of the 9 mitigation measures described in the previous section. All nine were tested separately. Once the results from the model runs testing the individual mitigations were known, the mitigations were packaged together based on which were most effective at reducing traffic in Walberton.
- 3.1.2 For this, four runs tested the impacts of two measures operating simultaneously, and three runs tested the impacts of three measures operating simultaneously.
- 3.1.3 This section reports on the results of those tests and which mitigation measures were most successful in reducing traffic flow on The Street.

### 3.2 Model results for individual mitigation measures

- 3.2.1 The impacts of each of these mitigation measures alone on traffic flow along The Street in Walberton have been tabulated below in Table 3-1. The combined impacts of two or more of these measures have been tabulated in Table 3-2 in the following section.
- 3.2.2 The two sections of The Street selected for this analysis are the section between Tye Lane and Yapton Lane (labelled in the table as East of Tye Lane) and the section just to the east of Barnham Lane/West Walberton Lane (labelled in the table as West of Tye Lane). These are shown in Figure 3-1 below.



**Figure 3-1: Base Year Highway Network, with Selected Sections of The Street Highlighted**

- 3.2.3 In each case the impacts are compared against the flows forecast in the Do Minimum (DM) model run for the opening year of 2027, carried out for the Statutory Consultation. The DM is a scenario which models the situation if the Scheme did not go ahead but all other sufficiently certain planned highway schemes are in place. The DM also includes any planned housing or commercial development in the District, constrained to DfT forecasts, to 2051, in order to provide a representative future baseline.
- 3.2.4 The comparison between the DM, the Scheme as presented at Statutory Consultation and the various mitigation options shows the impact on traffic flows and is presented below in Table 3-1. The flows in the table represent changes to traffic flow on The Street, where the positive values are increases in traffic flows in comparison to the DM with no scheme. The table also presents the change in flow, which was presented as part of the statutory consultation, in the first line of the table.

**Table 3-1: Impact on AADTs along The Street, Walberton from the Mitigation Measures Tested Individually**

Scenario or Mitigation tested	AADT Change from DM	
	The Street, East of Tye Lane	The Street, West of Tye Lane
<b>Statutory Consultation with the Scheme</b>	1,272 <sup>4</sup>	1,273
With Scheme plus Arundel Road junction	725	694
With Scheme plus Fontwell West Signals (Stage 2 signals)	864	842
With Scheme plus Fontwell West Signals (Re-set)	685	654
With Scheme plus Tye Lane (two-way)	-52	1,331
With Scheme plus Tye Lane (Southbound-only)	142	1,205
With Scheme plus Mill Road (traffic calming)	1,175	1,173
With Scheme plus Mill Road (further traffic calming)	1,116	1,112
With Scheme plus The Street HGV ban enforcement	1,258	1,337
With Scheme plus Yapton Lane Right-turn	1,264	1,289

3.2.5 Analysis of the results shows that the Yapton Lane right-turn, the HGV Ban, Mill Road traffic calming and Mill Road further traffic calming measures are the least effective mitigation measures in terms of reducing traffic flows along The Street. For all of these mitigation measures, the increase in flow on The Street is still at least over 1,100 vehicles per day after the opening of the scheme. None of these measures reduce the AADT flow on The Street by more than 175 vehicles per day when compared with the Scheme presented at Statutory Consultation.

<sup>4</sup> In the Statutory Consultation, this figure was rounded to 1,300 for traffic increase on The Street

- 3.2.6 The HGV ban enforcement has the effect of shifting HGVs, that have to use The Street, (in order to travel to/from Walberton e.g.) to the section west of Tye Lane, causing an increase in the AADTs on this section.
- 3.2.7 Opening Tye Lane to through traffic in both directions causes traffic flows on The Street, east of Tye Lane, to drop to below the DM values with a flow reduction of -52 AADT when compared against the DM. On their own however, such measures are of limited effectiveness in reducing overall rat-running through Walberton, as the traffic uses Tye Lane to access The Street rather than Yapton Lane. The effects of this can be then seen in the increases in traffic flows west of Tye Lane for this mitigation.
- 3.2.8 Both of the Fontwell West roundabout signal adjustment mitigations and retaining the Arundel Road arrangements as they are, are the most effective at reducing the additional traffic flow on The Street. These mitigation measures, when implemented individually, reduce the traffic flows increases to between 654 and 864 AADT on The Street after the opening of the Scheme.
- 3.2.9 It is also note-worthy that the Tye Lane southbound-only mitigation has similar impacts in terms of reducing traffic flow on the eastern section of The Street to the two-way variant. This makes sense, as most of the rat-running traffic in general is travelling in a western or south-western direction from the A27. As such, both of these mitigation measures are effective in removing traffic from the eastern section of The Street.

### 3.3 Model results for combinations of mitigation measures

- 3.3.1 Given the results above, it is clear that an individual mitigation will not substantially reduce the traffic levels on The Street to that observed in the DM. The next step therefore was to assess which combination of packages would be the most effective in reducing traffic flow on The Street.
- 3.3.2 Mitigation packages were combined where they were the most effective in reducing traffic and where they could be implemented in different parts of the network (e.g., examining the signal settings at Fontwell West roundabout in combination with the re-design of traffic restrictions on Tye Lane).
- 3.3.3 The comparison between the DM, the Scheme as presented at Statutory Consultation and the various combination of mitigation packages is presented below in Table 3-2.

**Table 3-2: Impact on AADTs along The Street, Walberton from the Mitigation Measures Tested in Combination**

Run Description	AADT Change from DM	
	The Street, East of Tye Lane	The Street, West of Tye Lane
<b>Statutory Consultation with Scheme</b>	<b>1,272</b>	<b>1,273</b>
With Scheme plus Fontwell West Signals (Stage 2 signals) and Arundel Road junction	632	623
With Scheme plus Fontwell West Signals (Re-set) and Arundel Road junction	638	621
With Scheme plus Fontwell West Signals (Re-set) and Tye Lane (two-way)	-60	480
With Scheme plus Fontwell West Signals (Re-set), Arundel Road junction, and Tye Lane (two-way)	-44	252
With Scheme plus Fontwell West Signals (Re-set) and Tye Lane (Southbound-only)	126	349
With Scheme plus Fontwell West Signals (Re-set), Arundel Road junction, and Tye Lane (Southbound-only)	148	119
With Scheme plus Fontwell West Signals (Stage 2 signals), Mill Road (further traffic calming), and Arundel Road junction	630	625

- 3.3.4 The modelling showed that the Mill Road (further traffic calming) measures had limited benefit when tested alone and continues to have limited benefit when tested in combination with other measures.
- 3.3.5 The combination of the Fontwell West signal alterations and retaining the current arrangement at Arundel Road junction have a greater impact than the individual measures alone, with the increase in traffic on The Street between 621 and 638 AADT after scheme opening.
- 3.3.6 For the traffic on The Street east of Tye Lane, the Tye Lane two-way arrangement is the most effective at keeping traffic as close to DM traffic flow as possible. However, the Tye Lane southbound only option is also

effective at reducing traffic on The Street east of Tye Lane and keeps the traffic flow increase limited to 126 to 148 vehicles per day, when combined with other mitigations.

- 3.3.7 The combination of the Fontwell West Signals (Re-set) and Tye Lane (Southbound-only) produces a significant reduction in the traffic flow increases compared to the flow increases presented during Statutory Consultation. With this mitigation package the additional traffic flow on The Street west of Tye Lane reduces to about 350 vehicles after the opening of the scheme, all of which access The Street via Tye Lane.
- 3.3.8 The most effective combination of measures west of Tye Lane is the Fontwell West Signals (Re-set), Arundel Road junction and Tye Lane (Southbound-only) combination. This combination of mitigations keeps the increase in traffic on The Street to between 119 and 148 a day, after the scheme opening. This compares to the forecast increases of 1,273 vehicles a day which were presented at Statutory Consultation.

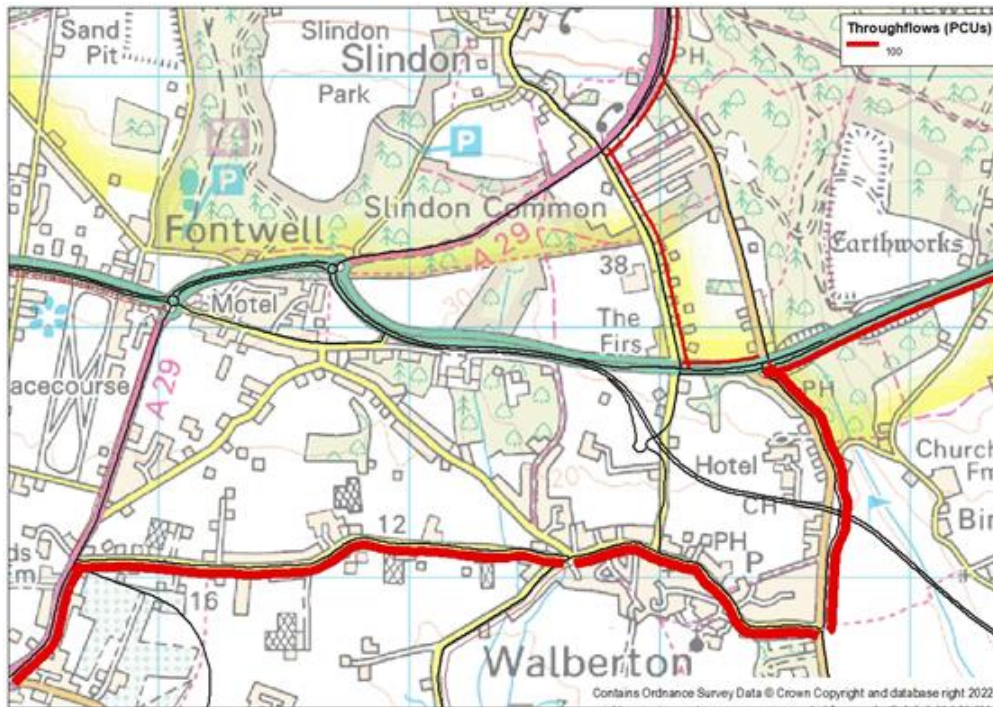
### 3.4 Walberton Through-Traffic

- 3.4.1 In this section, the impact of the rat-running traffic on The Street (as presented at Statutory Consultation) and its origins/destinations is shown by plotting the scale of this traffic when the Scheme is open (known as a Do Something or DS scenario), as well as its origin/destination route patterns.
- 3.4.2 Plots of traffic on The Street have been extracted from the traffic model and are shown for a selection of the mitigation packages shown above. The purpose of this is to demonstrate where the rat-running traffic movements are being lowered to illustrate how the mitigation packages reduce traffic levels on The Street.
- 3.4.3 As this analysis to observe travel patterns is done on a modelled hour period, the flows in the plots are hourly flows measured in Passenger Car Units<sup>5</sup> (PCUs), as opposed to the daily AADT flows which have been reported up to now. The modelled hour periods are either an average hour in the morning peak between 7:00 and 10:00 or an average hour in the evening peak between 16:00 and 19:00.
- 3.4.4 The plots shown in the figures below are traffic volume extracts from the traffic model and plotted to mapping of the Walberton area. The thickness of the red lines indicates the volume of the traffic, with thicker lines indicating larger volumes of traffic.
- 3.4.5 The scale of the rat-running in the PM Peak westbound is shown below in Figure 3-2. In the modelled hour, over 200 PCUs travel west through Walberton in order to avoid the delays at Fontwell West roundabout.

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<sup>5</sup> Passenger Car Unit – a measure of how much road space is taken up by the traffic on a given link. Cars and LGVs are 1 PCU each, HGVs are 2.5 PCUs each.

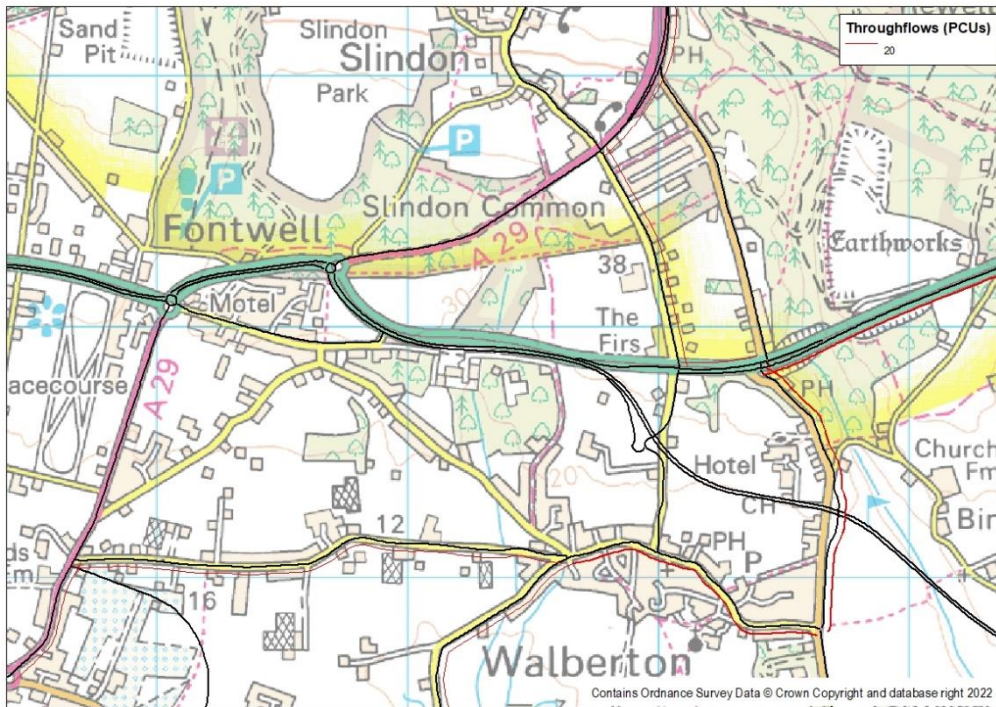
- 3.4.6 Figure 3-2 also shows the travel pattern of the rat-running traffic on The Street, and the areas of the network that traffic is coming from and going to. The red bars (which, as stated, vary in width depending on the level of traffic volume) show from which roads the rat-running traffic is using and how it disperses through the network.



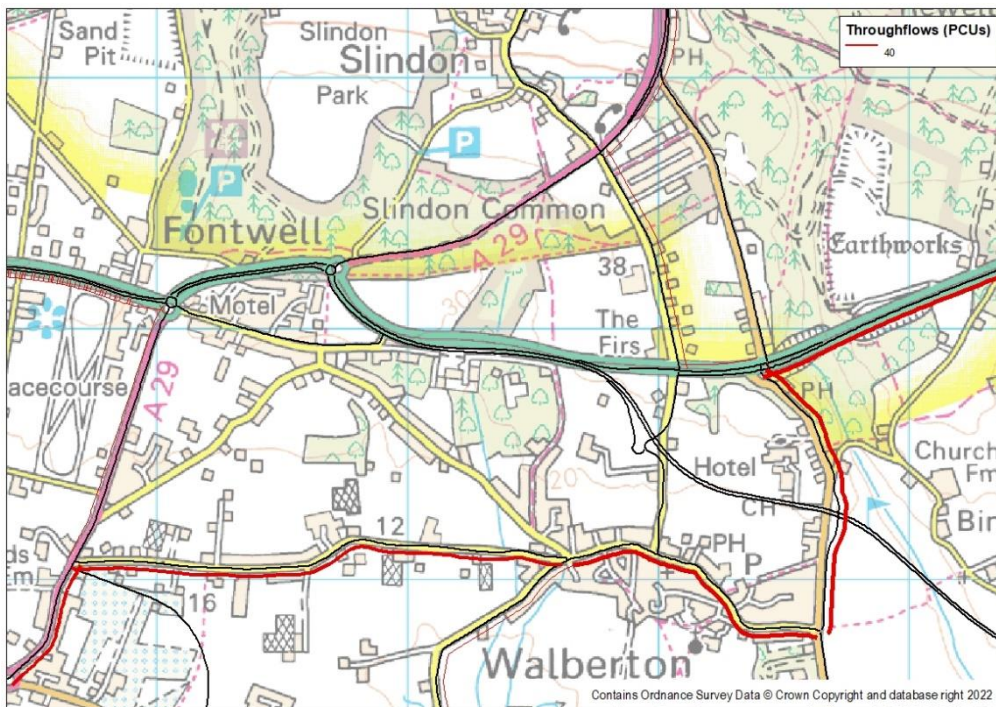
**Figure 3-2: Walberton Rat-running in PM Peak Westbound – Statutory Consultation DS**

- 3.4.7 As noted above and shown in Table 3-1, four of the proposed mitigation measures are of limited effectiveness at reducing the overall traffic levels on The Street. These are Mill Road (traffic calming), Mill Road (further traffic calming), The Street HGV ban enforcement and Yapton Lane Right-turn. The impacts of these on the rat-running are not demonstrated below.
- 3.4.8 The rat-running seen in the PM Peak for the remaining five proposed mitigation measures are demonstrated below.

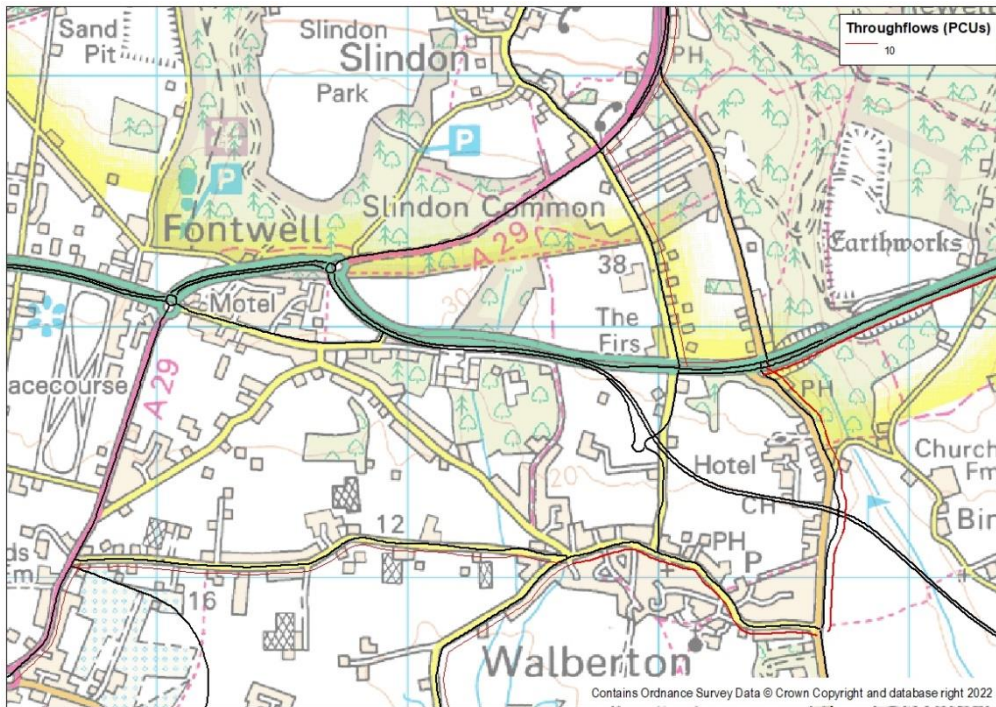




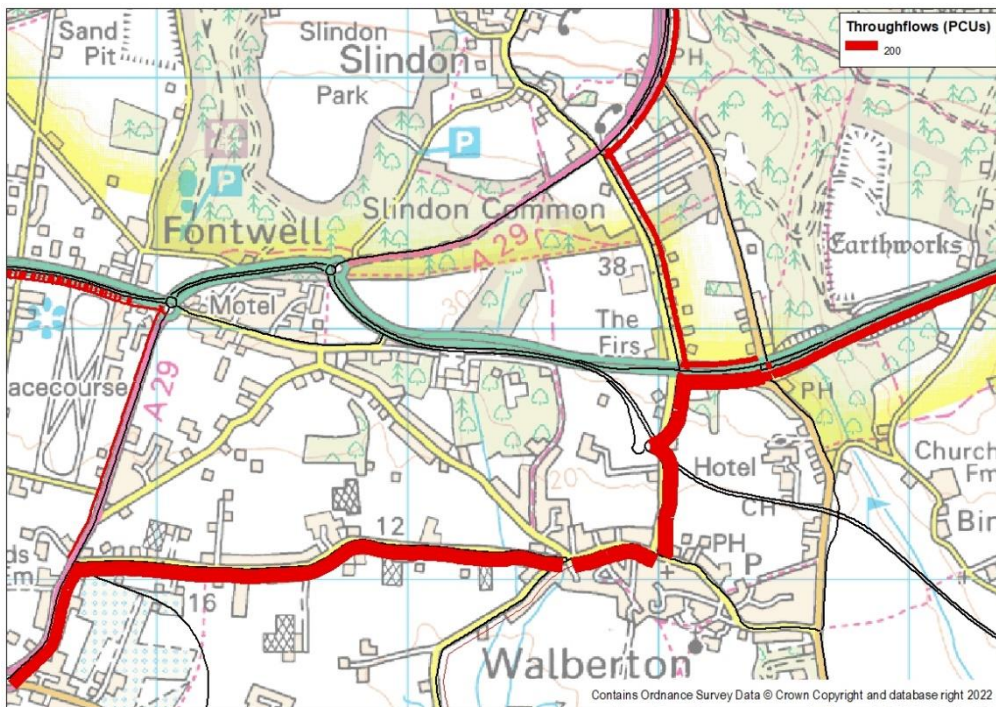
**Figure 3-3: Walberton Rat-running in PM Peak Westbound – DS plus Arundel Road junction**



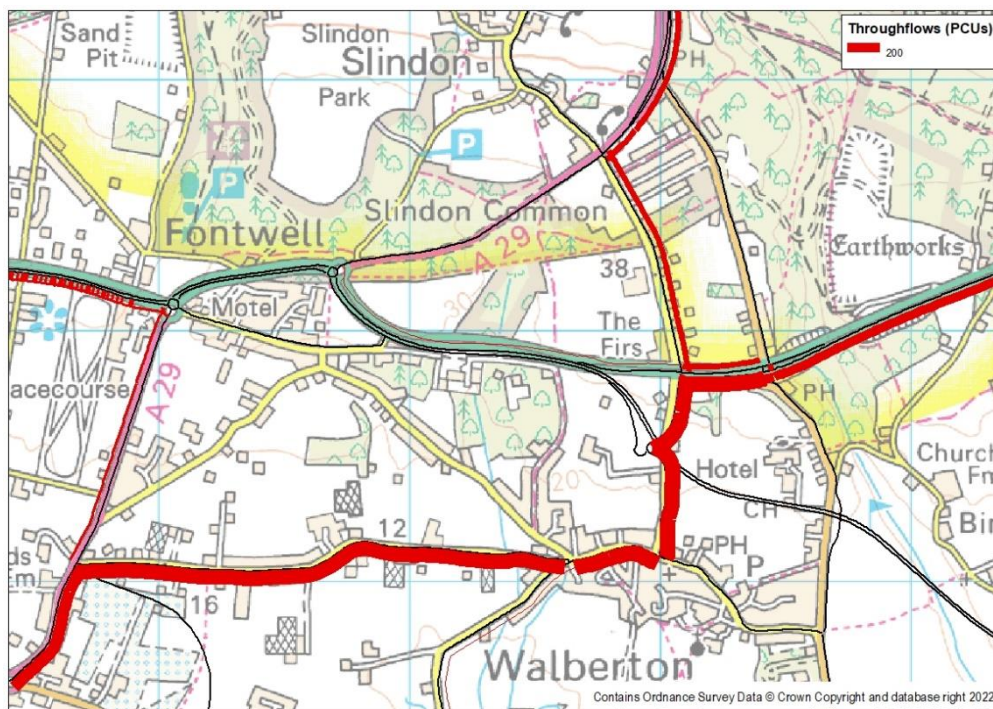
**Figure 3-4: Walberton Rat-running in PM Peak Westbound – DS plus Fontwell West Signals (Stage 2 signals)**



**Figure 3-5: Walberton Rat-running in PM Peak Westbound – DS plus Fontwell West Signals (Re-set)**

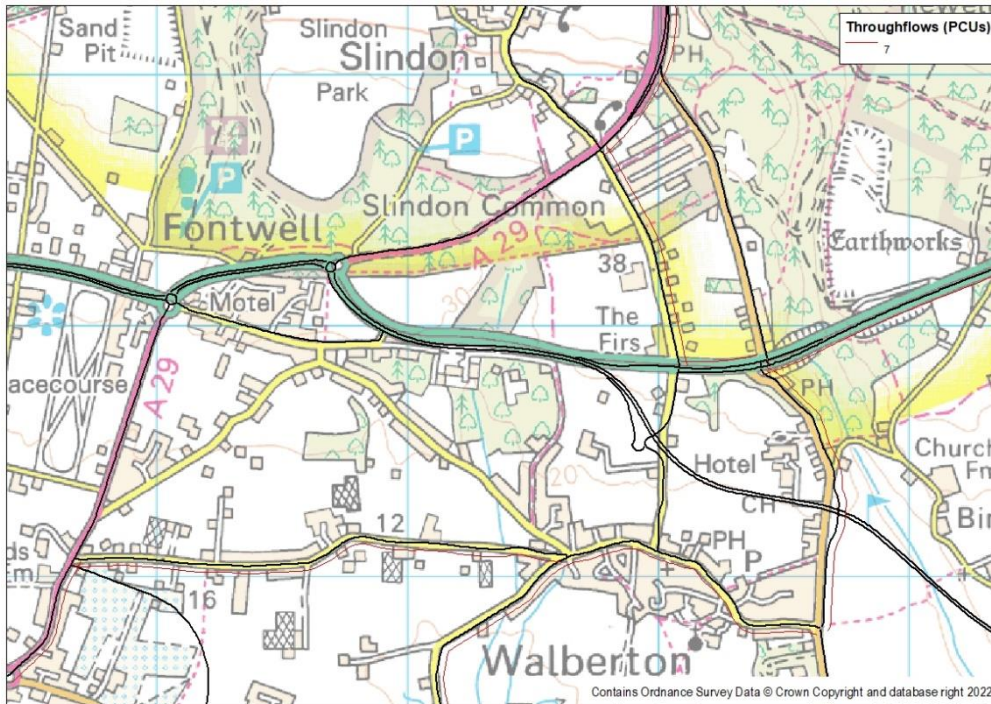


**Figure 3-6: Walberton Rat-running in PM Peak Westbound – DS plus Tye Lane (two-way)**

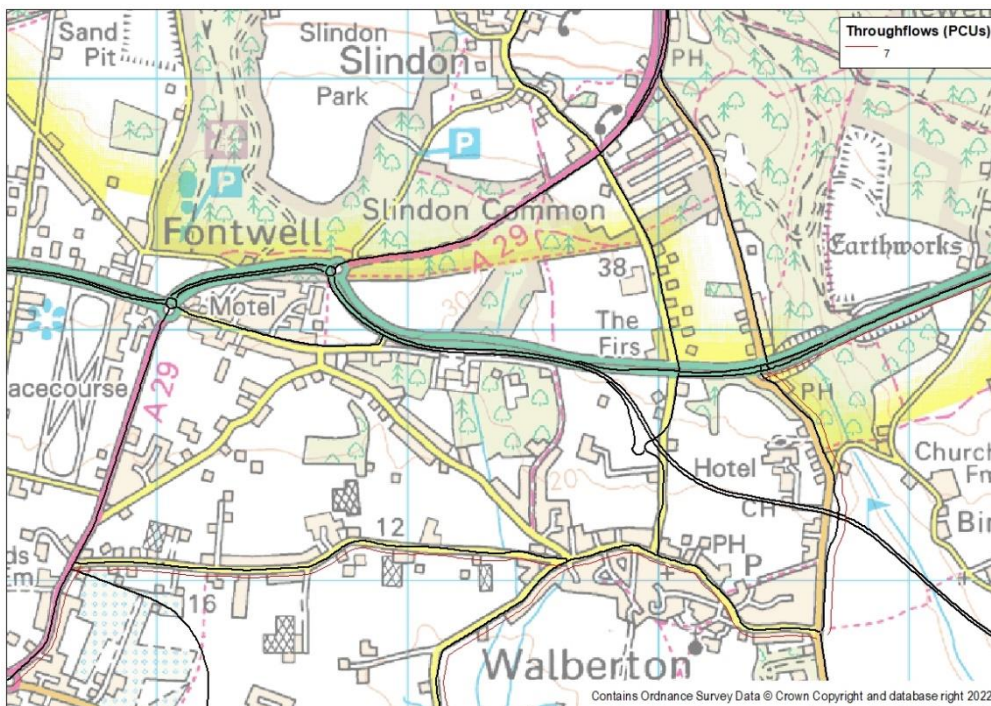


**Figure 3-7: Walberton Rat-running in PM Peak Westbound – DS plus Tye Lane (Southbound-only)**

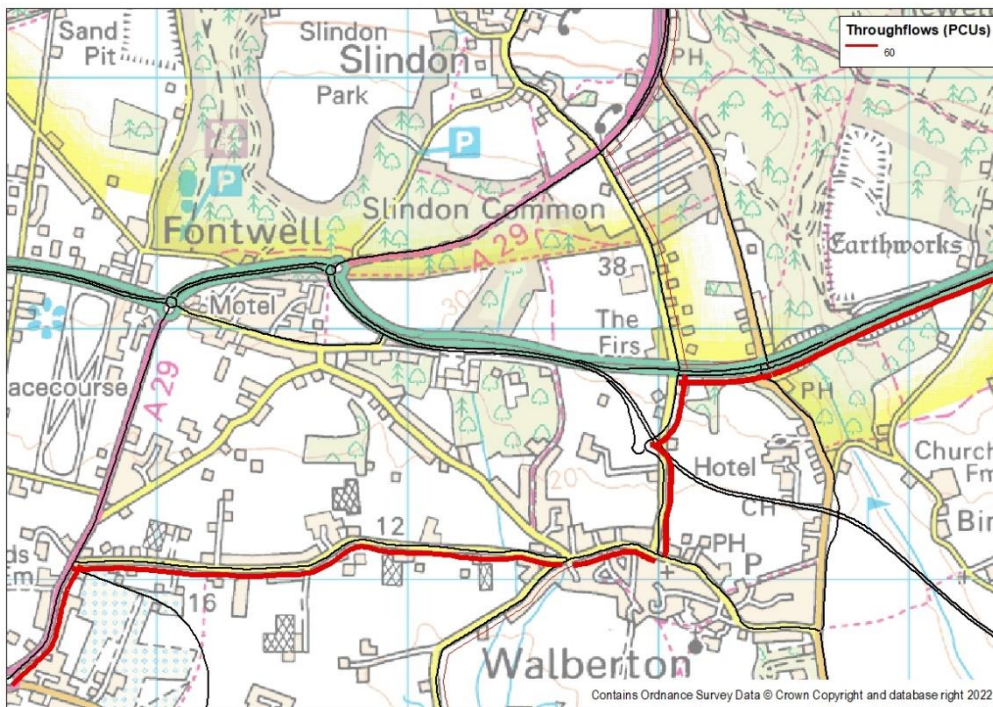
- 3.4.9 The Arundel Road junction mitigation measure is reasonably effective at reducing the rat-running, with these flows dropping to 40 PCUs an hour (Figure 3-3).
- 3.4.10 The Fontwell West signalisation alterations are similarly effective, with both variants showing rat-running through Walberton dropping below 100 PCUs an hour. The second variant is the most effective single measure, reducing the rat-running to below 30 PCUs an hour (Figure 3-4 and Figure 3-5).
- 3.4.11 For the Fontwell West signals and Arundel Road junction mitigation measures, the impact is to remove entirely the rat-running which comes from the A29, with all remaining rat-running traffic passing through Walberton, travelling from the old A27 to the A29 south of Fontwell West.
- 3.4.12 The Tye Lane two-way and southbound only mitigations (Figure 3-6 and Figure 3-7) on their own are effective at reducing the rat-running through the eastern section of The Street, but the opening of Tye Lane to southbound traffic flows reduces the generalised travel time of the rat-running route, and so the volume of rat-runners increases to over 300 PCUs per hour.
- 3.4.13 The impacts on the PM Peak rat-running westbound through Walberton for four of the five combined mitigation tests are shown below. Only six of the seven combined measures are shown because, as noted above in 3.4.11, the Fontwell West Signals (both variants) and Arundel Road junction measures both remove the rat-running from the A29 which routes down Mill Road, so adding the Mill Road (further traffic calming) measure to these in combination will have minimal impact.



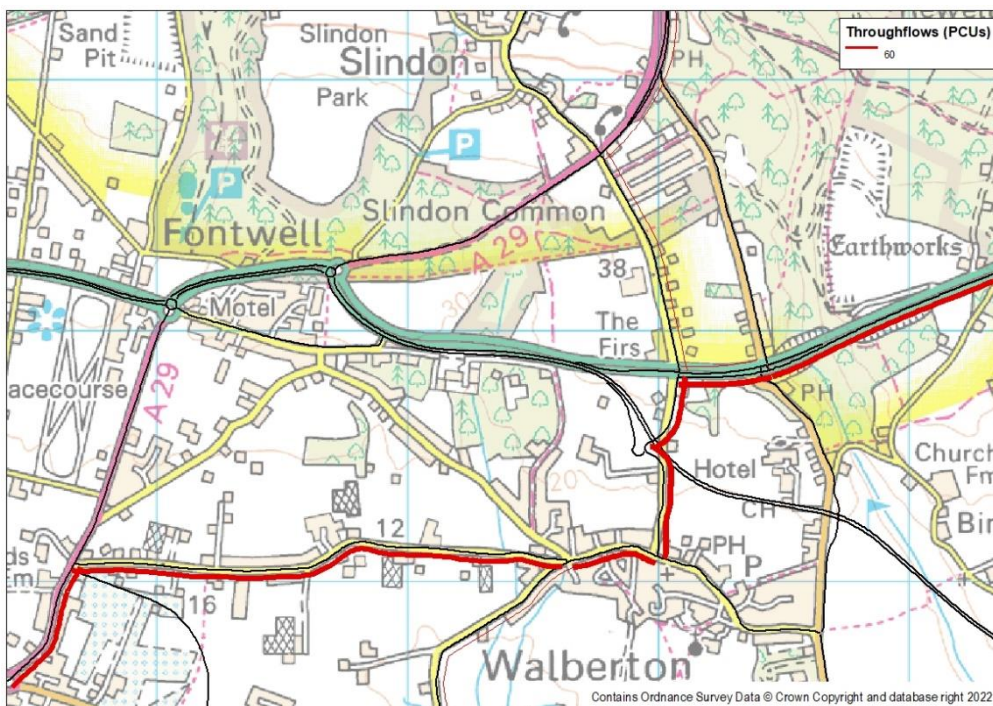
**Figure 3-8: Walberton Rat-running in PM Peak Westbound – DS plus Fontwell West Signals (Stage 2 signals) and Arundel Road junction**



**Figure 3-9: Walberton Rat-running in PM Peak Westbound – DS plus Fontwell West Signals (Re-set) and Arundel Road junction**



**Figure 3-10: Walberton Rat-running in PM Peak Westbound – DS plus Fontwell West Signals (Re-set) and Tye Lane (two-way)**



**Figure 3-11: Walberton Rat-running in PM Peak Westbound – DS plus Fontwell West Signals (Re-set) and Tye Lane (Southbound-only)**

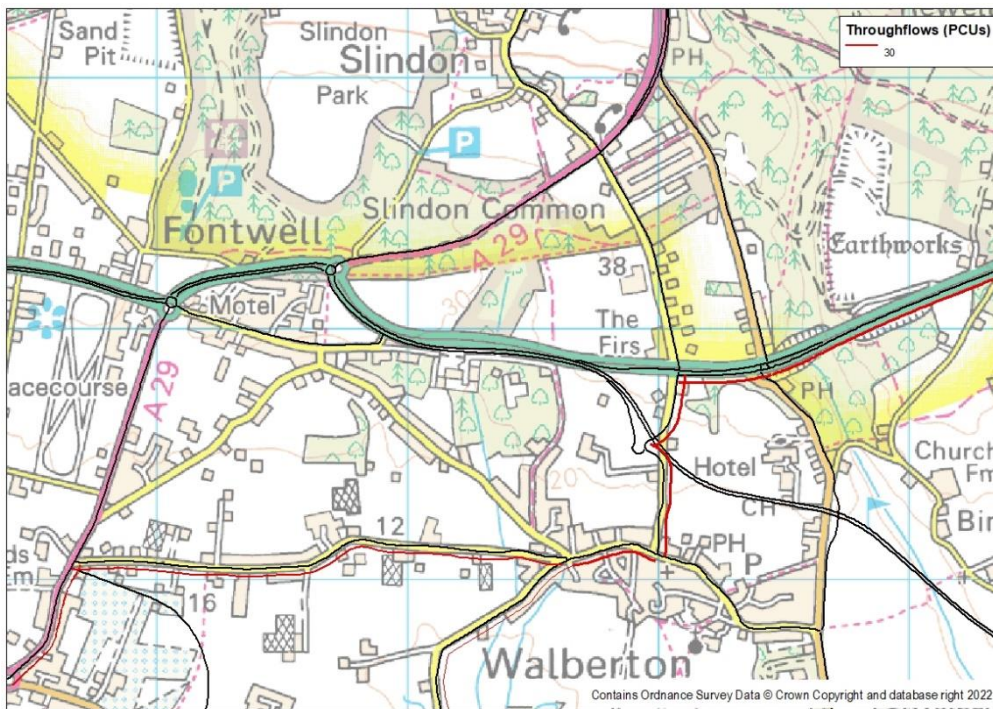


Figure 3-12: Walberton Rat-running in PM Peak Westbound – DS plus Fontwell West Signals (Re-set), Arundel Road junction, and Tye Lane (two-way)

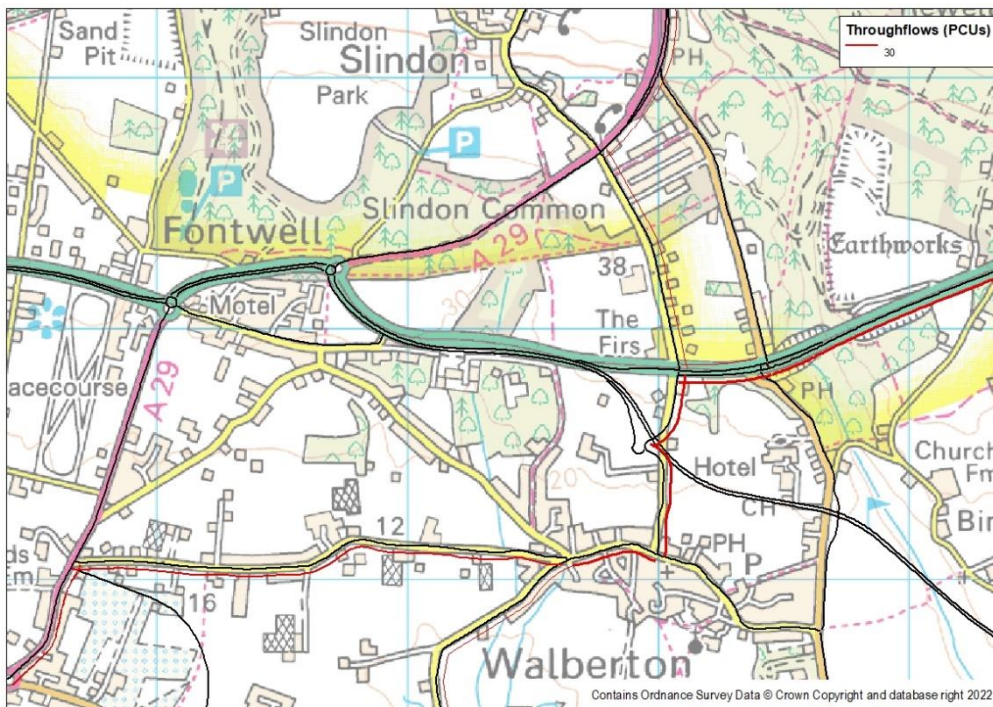


Figure 3-13: Walberton Rat-running in PM Peak Westbound – DS plus Fontwell West Signals (Re-set), Arundel Road junction, and Tye Lane (Southbound-only)

- 3.4.14 The combination of the Fontwell West signalisation alterations and Arundel Road junction (Figure 3-8 and Figure 3-9) significantly reduces the rat-running to under 15 PCUs an hour. This is the case for both variants of the signalisation mitigation measure.
- 3.4.15 Whereas the Tye Lane measures (both variants) on their own had a negative impact on the scale of the rat-running, combining them with the Fontwell West Signals (Re-set) measure is beneficial (Figure 3-10 and Figure 3-11). The rat-running with these two measures combined drops to 120 PCUs per hour.
- 3.4.16 Combining the Tye Lane measures, the signal adjustments at Fontwell with the Arundel Road junction measure, causes the rat-running to reduce further (Figure 3-12 and Figure 3-13) to under 60 PCUs per hour.

### 3.5 Implications Elsewhere in the Network

- 3.5.1 The mitigation measures tested cause re-routeing of traffic away from (or towards) parts of The Street in Walberton to a greater or lesser extent. These measures also have impacts at other locations in the local road network other than The Street.
- 3.5.2 This section examines and tabulates the impacts of the mitigation measures on the traffic flows along a selected number of locations in the vicinity of Walberton village. Those selected locations are (i) Tye Lane, (ii) Yapton Lane and (iii) Arundel Road. It should be noted that traffic impacts could be realised in other locations, but these were the locations where the biggest impacts may be expected to occur and so were selected.
- 3.5.3 For Tye Lane, the section of the road immediately south of the existing A27 has been selected, as this will have the greatest levels of increased traffic flow in the DS variants. This is due to traffic accessing the Scheme and the new A27 alignment along Tye Lane from the current existing A27.
- 3.5.4 For Arundel Road, the section of the road immediately east of the Fontwell West roundabout has been selected. This section of the road could experience changes from the new design proposal to retain access to Arundel Road from the A27. For Yapton Lane the section between The Street and Hedgers Hill has been selected, as this was a section of the network which also experienced increases in rat-running as reported in the Statutory Consultation.
- 3.5.5 To be consistent with the previous reporting in this note, two tables reporting changes in traffic flow have been developed. Table 3-3 reports on the impacts for each of the measures individually, while Table 3-4 reports on changes in flow for the measures in combination.
- 3.5.6 Table 3-3 and Table 3-4 report changes in daily AADT traffic flow at the selected locations.

**Table 3-3: Impact on AADTs at Selected Locations from the Mitigation Measures Tested Individually**

Run Description	AADT Change from DM		
	Tye Lane, south of Existing A27	Yapton Lane, The Street to Hedgers Hill	Arundel Road, east of Fontwell West
Statutory Consultation with Scheme	587	435	-36
With Scheme plus Arundel Road junction	709	-26	717
With Scheme plus Fontwell West Signals (Stage 2 signals)	684	87	-34
With Scheme plus Fontwell West Signals (Re-set)	684	-13	-71
With Scheme plus Tye Lane (two-way)	2,962	-795	-35
With Scheme plus Tye Lane (Southbound-only)	2,589	-590	-47

- 3.5.7 Retaining the current arrangements at Arundel Road junction increases the traffic flow along that road, in comparison to the flows presented at Statutory Consultation where the left-turn from the westbound A27 carriageway into Arundel Road was prohibited. The remaining mitigation measures have minimal impact on the flows on the Arundel Road in comparison to the DM.
- 3.5.8 All mitigation measures result in additional traffic flow along Tye Lane. The Tye Lane (two-way) and Tye Lane (Southbound-only) measures significantly increase this traffic flow, with traffic bound for the new A27 Scheme encompassing a major portion of the increases. The majority of the traffic demand for Tye Lane is southbound, as can be seen by the small reduction in AADTs on Tye Lane with the southbound only option.
- 3.5.9 All measures reduce the traffic flow on Yapton Lane in comparison to the Scheme presented at Statutory Consultation. For the Fontwell West signal adjustments and Arundel Road junction measures, this is mainly being driven by a reduction in rat-running through Walberton as a result of the improvements to the delays at Fontwell West. For the Tye Lane two-way and southbound only measures, rat-running traffic shifts from Yapton Lane to Tye Lane and therefore reduces the flow on Yapton Lane.



**Table 3-4: Impact on AADTs at Selected Locations from the Mitigation Measures Tested in Combination**

Run Description	AADT Change from DM		
	Tye Lane, south of Existing A27	Yapton Lane, The Street to Hedgers Hill	Arundel Road, east of Fontwell West
Statutory Consultation with Scheme	587	435	-36
With Scheme plus Fontwell West Signals (Stage 2 signals) and Arundel Road junction	704	-127	395
With Scheme plus Fontwell West Signals (Re-set) and Arundel Road junction	688	-158	187
With Scheme plus Fontwell West Signals (Re-set) and Tye Lane (two-way)	2,670	-696	-34
With Scheme plus Fontwell West Signals (Re-set), Arundel Road junction, and Tye Lane (two-way)	2,547	-811	264
With Scheme plus Fontwell West Signals (Re-set) and Tye Lane (Southbound-only)	2,298	-508	-34
With Scheme plus Fontwell West Signals (Re-set), Arundel Road junction, and Tye Lane (Southbound-only)	2,186	-621	243

- 3.5.10 The traffic flows for the measures in combination (in Table 3-4) are in general alignment with the measures when considered individually.
- 3.5.11 All combinations of the measures result in an increase in flows along Tye Lane (in comparison to the DM and the Statutory Consultation Scheme), with those including one of the Tye Lane measures being especially noticeable in this regard.
- 3.5.12 All combinations result in a decrease in flows along Yapton Lane, with those combinations of measures which include one of the Tye Lane measures, showing the greatest decrease in flow.

- 3.5.13 Combinations including the Arundel Road junction measure show an increase in traffic flows along Arundel Road, though not to the same extent as when the measure was tested on its own (reported in Table 3-3).

## 4. Initial environmental assessment

- 4.1.1 Following the analysis presented above, it was considered that the Fontwell West Signals (Re-set), Old Arundel Road, and Tye Lane (Southbound-only) combination of measures should be selected to be taken forward in the Scheme design and for further consultation. The reasons for the selection of this combination of measures is presented in Section 5 below.
- 4.1.2 The following table summarises the main preliminary environmental effects of the changes associated with introduction of this combination of measures. This initial environmental assessment compares the effects of the recommended package of measures with the effects of the proposals presented in the Statutory Consultation.
- 4.1.3 Where a topic is not covered in Table 4-1 it is because there are no differences between the effects assessed in the PEIR (Preliminary Environmental Information Report) for the Statutory Consultation against the effects assessed for the Supplementary Consultation proposals.

**Table 4-1: Supplementary consultation environment assessment**

<b>Preliminary Environmental Effects as presented at January Statutory Consultation</b>	<b>Preliminary Environmental Effects after Design Change</b>
<p style="text-align: center;"><b>Noise and Vibration</b></p> <p>The previous proposal would have resulted in potentially significant adverse effects for properties on The Street and Eastergate Lane. There would have been some reductions in traffic noise close to the southern end of Tye Lane (south) due it becoming a no-through road.</p>	<p style="text-align: center;"><b>Noise and Vibration</b></p> <p>The changes will remove potentially significant adverse effects along The Street east of Tye Lane, and Eastergate Lane. There will be some increases in traffic noise for a small number of properties at the southern end of Tye Lane (south) that could lead to some localised significant adverse effects. Initial indications are that this would remove over 150 residential properties from being significantly adversely affected by increases in traffic noise whereas there would be fewer than 10 additional properties subject to significant adverse effects.</p> <p>Elsewhere, the changes in traffic volumes are not expected to lead to effects that differ from those presented at Statutory Consultation</p>
<p style="text-align: center;"><b>Air Quality</b></p> <p>The previous proposals presented no potential significant effects predicted in the areas of the proposed mitigation changes.</p>	<p style="text-align: center;"><b>Air Quality</b></p> <p>The proposed mitigation changes will reduce operational phase traffic and as a result reduce emissions along The Street East and West of Tye Lane, Eastergate Lane, Yapton Lane in comparison to the Scheme presented at Statutory Consultation.</p> <p>The revised proposals will also result in an increase in operational phase traffic flow and as a result increased emissions for a small number of receptors (properties) at the southern end of Tye Lane (south) where they are located closer to Tye Lane than The Street, alongside the A27 West of Fontwell, and the A27 East of Fontwell.</p> <p>No potential significant effects are predicted as a result of the revised proposals, this will be confirmed when the air quality monitoring and modelling is updated and will be presented in the Air Quality ES Chapter which will be submitted with the DCO.</p>

## 5. Recommended package of mitigation measures

- 5.1.1 The most effective individual mitigation measures, both overall and in terms of reducing the rat-running traffic on The Street, are retaining the left-turn into Arundel Road as it currently exists and re-setting and optimisation of the signals at Fontwell West roundabout (paragraphs 3.2.6 to 3.2.9 and Table 3-1).
- 5.1.2 Opening Tye Lane to traffic is very effective at removing the rat-running from the eastern section of The Street between Tye Lane and Yapton Lane, but on its own has limited effectiveness at removing the rat-running west of Tye Lane, and could increase traffic at that location (paragraph 3.2.7). Of the two variants, the Southbound-only variant is slightly better at reducing traffic flows west of Tye Lane, the two-way variant is slightly better at reducing traffic flows east of Tye Lane (this is the case both singly and in combination with other measures).
- 5.1.3 Combination tests show that combining the Arundel Road junction and Fontwell West signal re-setting (both variants) measures is very effective at reducing the rat-running (paragraphs 3.3.6 to 3.3.7 and Table 3-2). These combinations reduce the overall flow increase seen along The Street by about a half.
- 5.1.4 Overall, combining the Fontwell West signal re-setting and Arundel Road junction measures with Tye Lane is very effective, with this combination showing the lowest increase in traffic flows relative to the DM along The Street.
- 5.1.5 The flows along the Arundel Road increase for any combination that includes retaining Arundel Road access from the A27 in the westbound direction. However, including this in combination with other mitigations (such as Tye Lane south only) reduces the impact and scale of traffic increases.
- 5.1.6 The Tye Lane measures significantly increase the traffic flows along Tye Lane, mainly due to the southbound through traffic between the existing A27 and The Street. However, there is very little mitigation that can be done to reduce this flow, as it is a feature of the Scheme design due to the closure of the current A27 in the westbound direction at the junction with Tye Lane.
- 5.1.7 While all measures and combinations reduce the traffic flows on Yapton Lane, combinations involving one of the Tye Lane measures are particularly effective at this.
- 5.1.8 Retaining two-way access on Tye Lane could induce other rat-running effects. With access provided to the new Scheme provided from the south of Tye Lane with two-way access, traffic may try to access the A27 through Walberton. Consequently, there are reservations in proceeding with this mitigation.

- 5.1.9 For this reason, it is recommended that the following package of mitigation measures are proposed for reducing the rat-running traffic on The Street:
- Re-setting of Fontwell West roundabout signals;
  - Tye Lane southbound-only; and
  - Retaining Arundel Road access from the A27.

## 5.2 Limitations of modelling work

- 5.2.1 All of the model testing and results shown above have been based on forecast runs from the traffic model that was used to produce the data for the Statutory Consultation.
- 5.2.2 It should be noted that on many of the roads in and around Walberton, a high proportion of the traffic using the roads will be short-distance traffic, the representation of which is a limitation of a strategic highway model.
- 5.2.3 While the impacts of the measures on longer-distance traffic can be reasonably represented by the model, the impacts of the measures on shorter-distance traffic are not as certain. However, since most of the rat-running traffic on The Street in the model have origins or destinations outside of Walberton village, the modelled impact on these can be treated as reliable.
- 5.2.4 The Statutory Consultation traffic model used for the analysis in this technical note is a “fixed-trip” model. This means that whilst the model can re-route traffic throughout the network, it has not changed the total amount of traffic on the network during the modelled time-period in response to the opening of the Scheme and its impact on changes in travel times or congestion.
- 5.2.5 The purpose of the analysis described within this technical note was to compare traffic mitigation options against each other to select a best performing option (or combination of options) for reducing traffic in Walberton. The analysis was undertaken after the Statutory Consultation and in response to concerns raised during that consultation, which was one reason for choosing the same traffic model as had informed that consultation.
- 5.2.6 More recently, the Variable Demand Model (VDM) module has been developed which models the demand response, often termed induced traffic, which might be expected after the opening of the Scheme.
- 5.2.7 All options described in this Technical note are compared on a similar basis (i.e., without VDM impacts) as the relative performance of the options will be the same with or without VDM module. In addition, the computing requirements and run-times for VDM forecasting would make this disproportionate considering the 16 mitigation measures and packages of measures which were tested.
- 5.2.8 Once the final package of best performing mitigation measures had been identified (see paragraph 5.1.9), this package of measures was tested

using the full model suite, which includes VDM. These forecasts are the forecast traffic flows which are reported in the Supplementary Consultation brochure. The brochure also reports on traffic flows associated with the final version of the scheme design which has also developed since Statutory Consultation finished. For these reasons, the traffic flows in the Supplementary Consultation brochure will have some differences to the flows reported in this technical note.

- 5.2.9 These final sets of forecast flows, which include the recommended package of mitigation measures, VDM impacts and the final Scheme design, inform the assessment contained in the Traffic Assessment report and the Environmental Statement as part of the DCO submission.