Jacobs

# Technical Note

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| **Subject** | **Sniperley Traffic Modelling – Technical Note** | **Project Name** | Sniperley Traffic Modelling |
| **From** | Jacobs | | |
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## Sniperley Traffic Modelling

## 1. Introduction

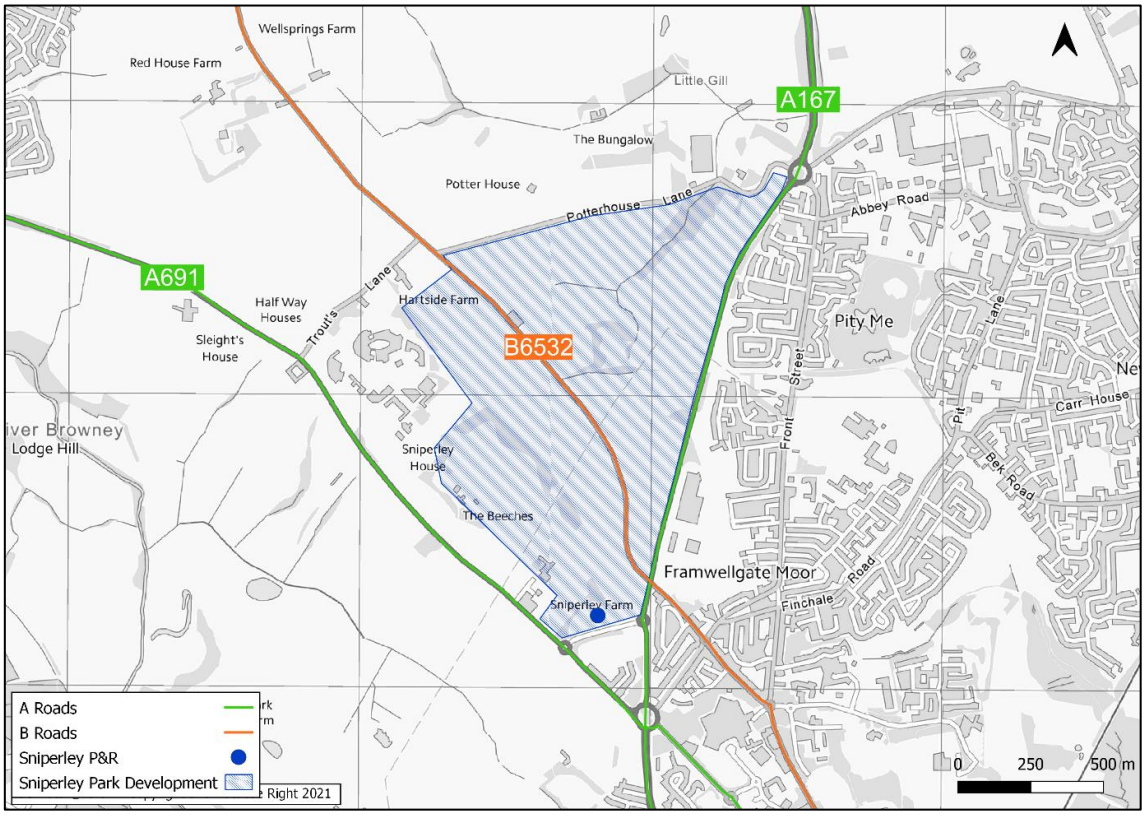
This technical note has been prepared by Jacobs in response to a request from Durham County Council (DCC) to undertake traffic analysis, using the Durham City Transport Model (DCTM), of the effects of various amendments to the internal road layout for the proposed residential development at Sniperley.

## 2. Location

### 2.1 Proposed Sniperley Park Development

The County Durham Plan (CDP) (adopted 2020) has identified Sniperley Park as a housing site. The location of the site is shown in **Figure 2.1.**

**Figure 2.1 – Sniperley Park Development Site**



The site, with an area 107.8 Ha, has an estimated yield of 1700 houses. The CDP also states this will include a local centre with shops and community facilities, a new primary school, a park, structural landscaping, and new roads, cycleways and footpaths.

The site is crossed by the B6352 and a number of public footpaths. The east boundary is defined by the A167 beyond which are the suburban areas of Framwellgate Moor and Pity Me, and to the west is a large hospital, a fire station, Sniperley Hall and the A691. The northern boundary is defined by Potterhouse Lane and Trout's Lane. The Sniperley P&R site is located south of the development.

# 3. Methodology

## 3.1 Existing Durham City Transport Model

DCC previously commissioned the development of a strategic transport model of Durham City, known as the DCTM. The main purpose of the DCTM was to create a fit for purpose modelling tool to examine the traffic and transport implications of the emerging CDP but the DCTM has since been used to support the development of a major scheme for Durham Northern Relief Road, and other local option tests. The DCTM has a base year of 2015.

Jacobs developed various forecast models from the base year to accommodate various purposes and tests of the DCTM. The Local Plan Scenario 2 model for forecast year 2037 contains network improvements that have occurred since 2015, including the Gilesgate roundabout signalisation and Leazes Bowl junction scheme, and residential and employment development sites allocated within the CDP. As this model includes the full build out of 1700 homes at Sniperley Park, it has therefore been considered the most appropriate model to adapt to undertake a traffic assessment of the surrounding road network.

## 3.2 Forecast Year Models

### 3.2.1 Time Periods

The same time periods in the original 2037 Scenario 2 model have been used to assess the traffic and transport implications of the various network changes.

The time periods include the following:

- Average Weekday (Monday to Thursday) AM peak hour = 08:00 – 09:00hr;
- Average Weekday (Monday to Thursday) Inter peak hour = 10:00 – 16:00hrs; and
- Average Weekday (Monday to Thursday) PM peak hour = 17:00 – 18:00hr.

### 3.2.2 Do Minimum

A design of the internal road layout for Sniperley Park was provided by DCC and is shown in **Figure 3.1.**

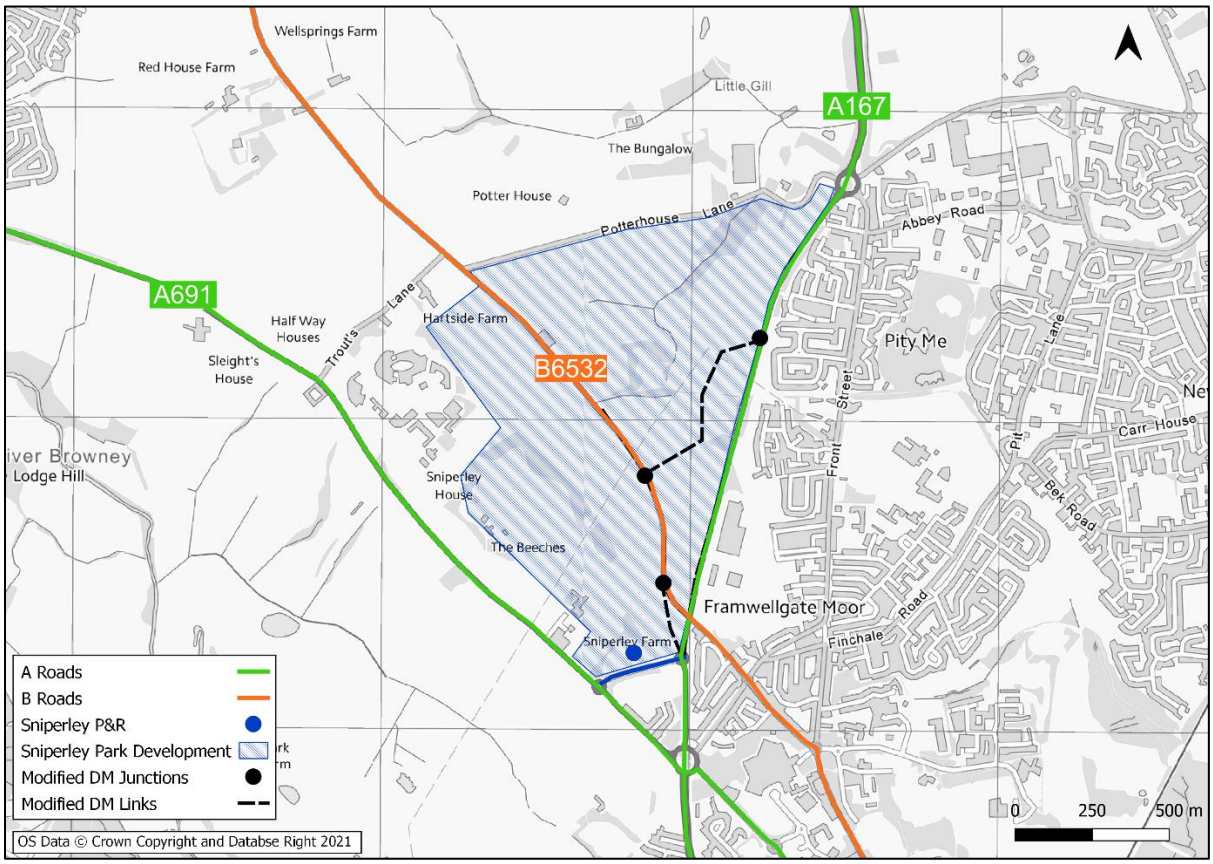
**Figure 3.1 – Internal Road Layout Proposals for Sniperley Park**


Upon the receipt of this layout, the network was modified to accurately reflect the internal layout. This included:

- The inclusion of a primary road connecting A167 and B6532. The junction between the A167 and the new road has been modelled as a roundabout, and the junction between the B6532 and the new road has been modelled as a priority junction.
- The inclusion of a primary road connecting B6532 to the A167/Sniperley junction. The junction between the B6532 and the new road has been modelled as a priority junction.
- Adjusting the connector location for the zone containing Sniperley Park.

A high level diagram of the modifications made to the Do Minimum network are shown in **Figure 3.2.**

**Figure 3.2 – Modifications to the Do Minimum Scenario**



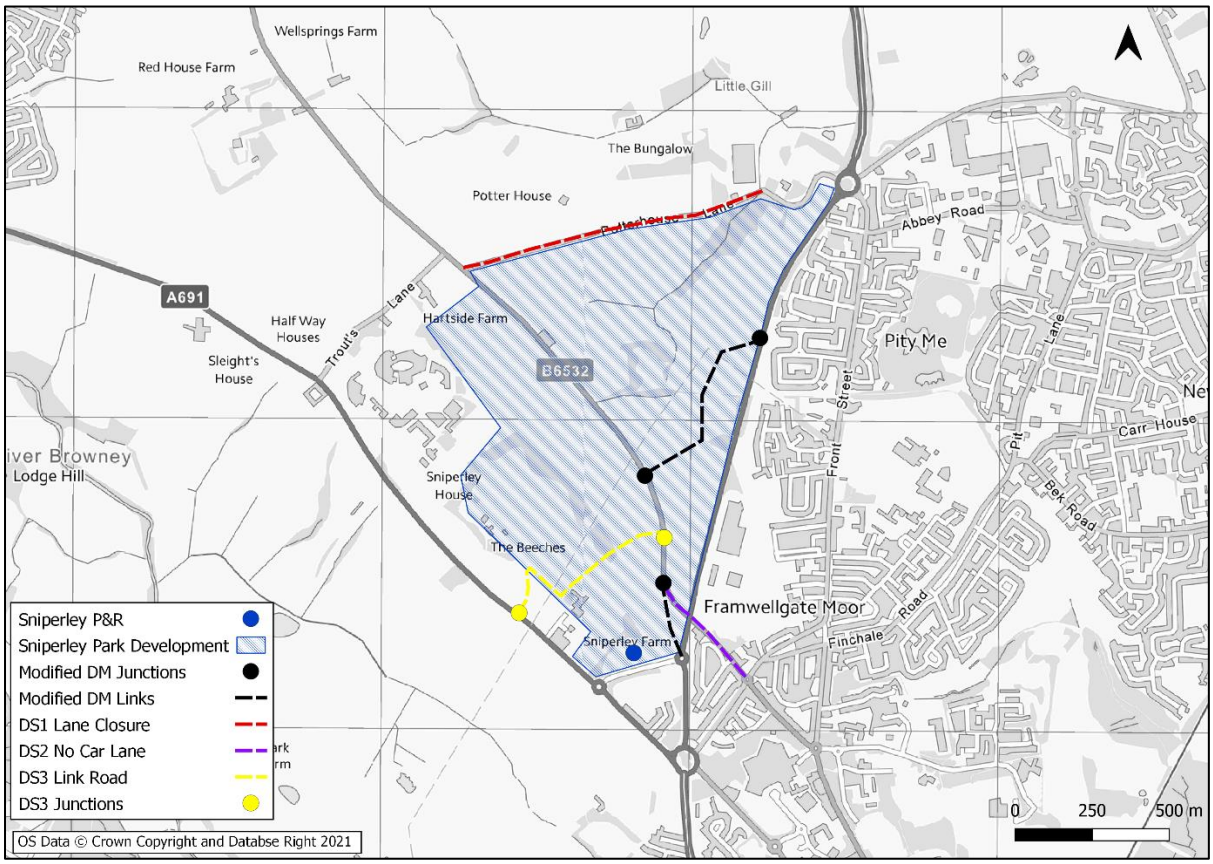

### 3.2.3 Do Something

The impact of three potential options on the road network are to be assessed using the modified DCTM:

- **The closure of Potterhouse Lane (DS1):** Testing the impacts of closing Potterhouse Lane to all vehicles. The B6532 / Potterhouse Lane junction would no longer be operational.
- **The closure of link to Blackie Boy Roundabout (DS2):** Testing the impacts of Blackie Boy roundabout as a bus/cycle only route or remaining open to all traffic. It should be noted that testing the roundabout as remaining open to all traffic would replicate the Do Minimum scenario, and therefore the DS2 option will only assess the impacts of the bus/cycle only access to the roundabout.
- **Additional link road between A691 and B6532 (DS3):** Testing the proposed link road between A691 and B6532 being open to all traffic or as a bus/cycle only route. It should be noted that testing the link road as a bus/cycle only route would replicate the Do Minimum scenario, as this link did not exist so changing it to bus/cycle only would cause traffic to reroute as they would in the Do Minimum scenario. Therefore, the DS3 option will only assess the link road open to all traffic.

The three scenarios are shown in **Figure 3.3.**

**Figure 3.3 – Options Tested**




## 4. Results

This section of the report compares the Do Minimum and Do Something scenarios in 2037. A consistent approach has been applied to each scenario, in terms of the scope of assessment and the metrics used, to ensure that any change between scenarios is clearly identified. The results of the analysis are presented in later sections of this report. The following metrics are analysed:

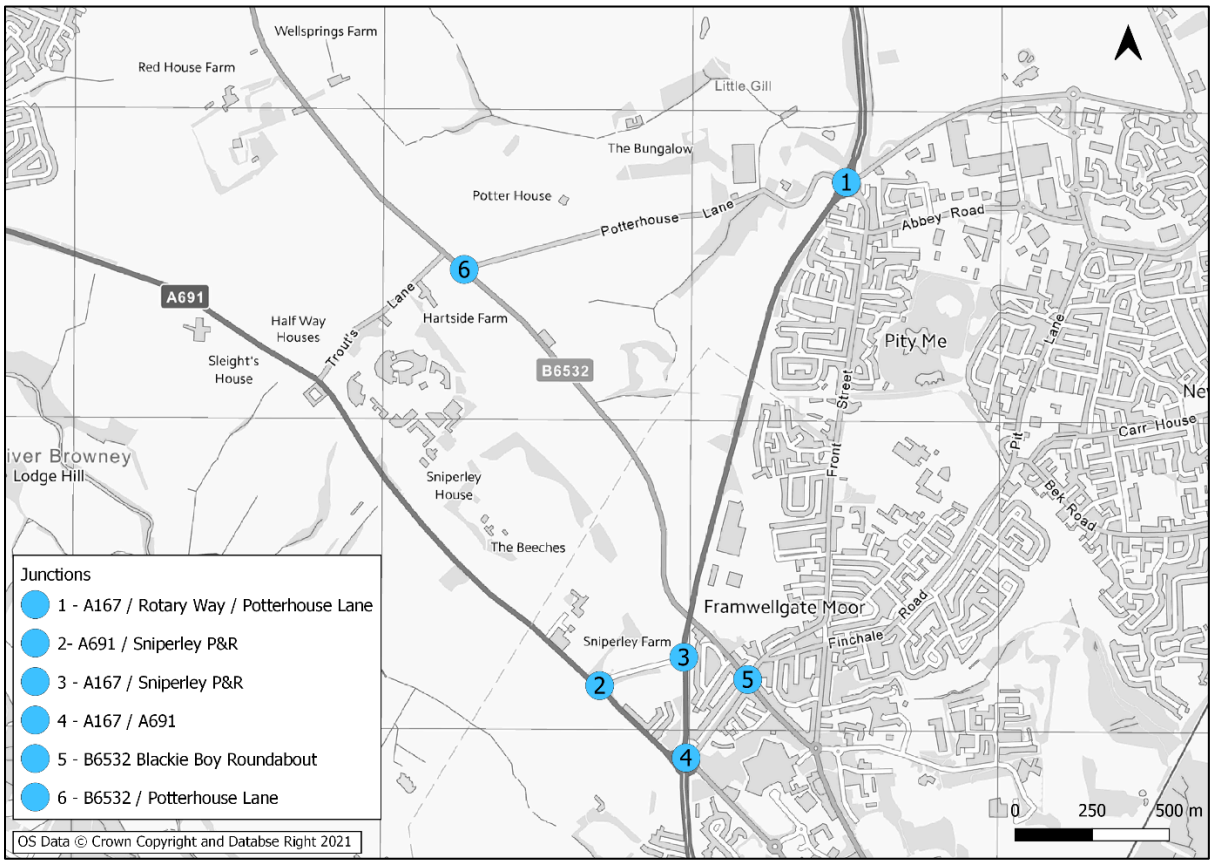
- Flow differences on A167, A691 and B6532.
- Delay differences at key junctions.

The change in delay between each Do Something scenario and the Do Minimum has been assessed for the following key junctions:

1) A167 / Rotary Way / Potterhouse Lane
2) A691 / Sniperley Park and Ride
3) A167 / Sniperley Park and Ride
4) A167 / A691
5) B6532 Blackie Boy Roundabout
6) B6532 / Potterhouse Lane

These junctions are shown in **Figure 4.1**.

**Figure 4.1 – Locations of Junctions Analysed for Delay Impacts**




## 4.1 DS1 - The closure of Potterhouse Lane

### 4.1.1 Flow Impacts

**Figure 4.2** to **Figure 4.4** show the flow differences as a result of the closure of Potterhouse Lane, in the morning, interpeak and evening time periods for the 2037 forecast year. Links coloured blue represent a decrease in flow, and those coloured green represent an increase in traffic flow.

Similar results are observed for all modelled hour periods. The closure of Potterhouse Lane results in traffic reductions on the A691 between the B6312 and Trouts Lane. Less traffic is expected to travel along Trouts Lane, with the greatest decrease in flow expected during the evening peak. There is also a reduction in flow on the A167 between the B6312 and the A167 / Rotary Way / Potterhouse Lane roundabout. In the interpeak and evening peaks, the B6532 between B6312 and Potterhouse Lane experiences a reduction in flow, however in the morning peak there is no significant change in flow. The results suggest traffic previously travelling to/from either of these A roads via Potterhouse Lane re-route one of two ways; via the B6312 which connects both these A-roads north of the Sniperley Park development site, or via the B6532 in the southern part of the development, utilising the link road which connects the B6532 to the A167, both which show significant increases in flow.

**Figure 4.2 - Flow Difference Plot 2037 Do Something 1 – Do Minimum (AM)**

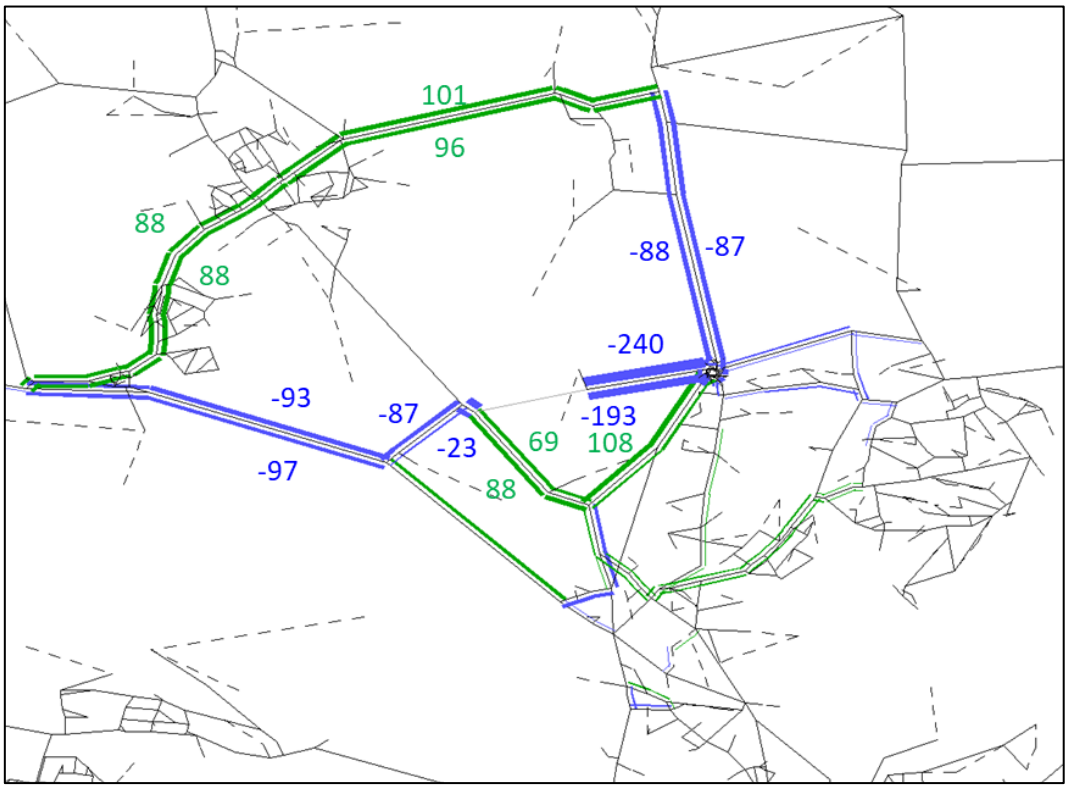



**Figure 4.3 - Flow Difference Plot 2037 Do Something 1 – Do Minimum (IP)**

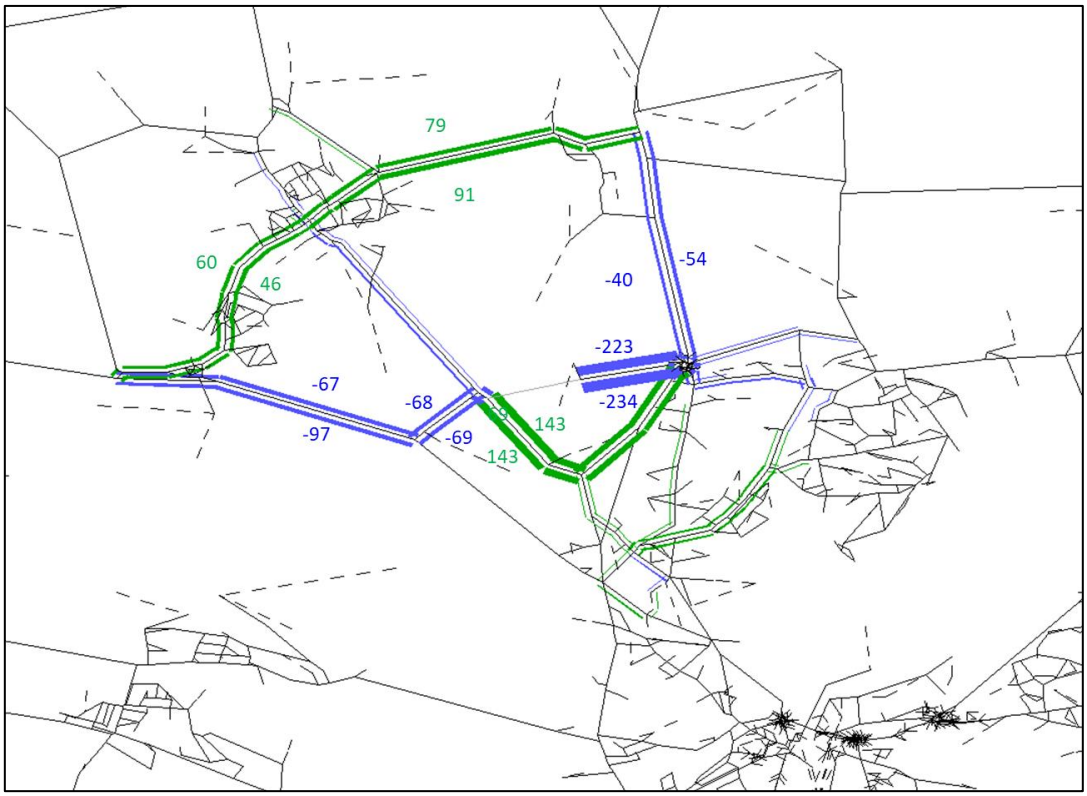
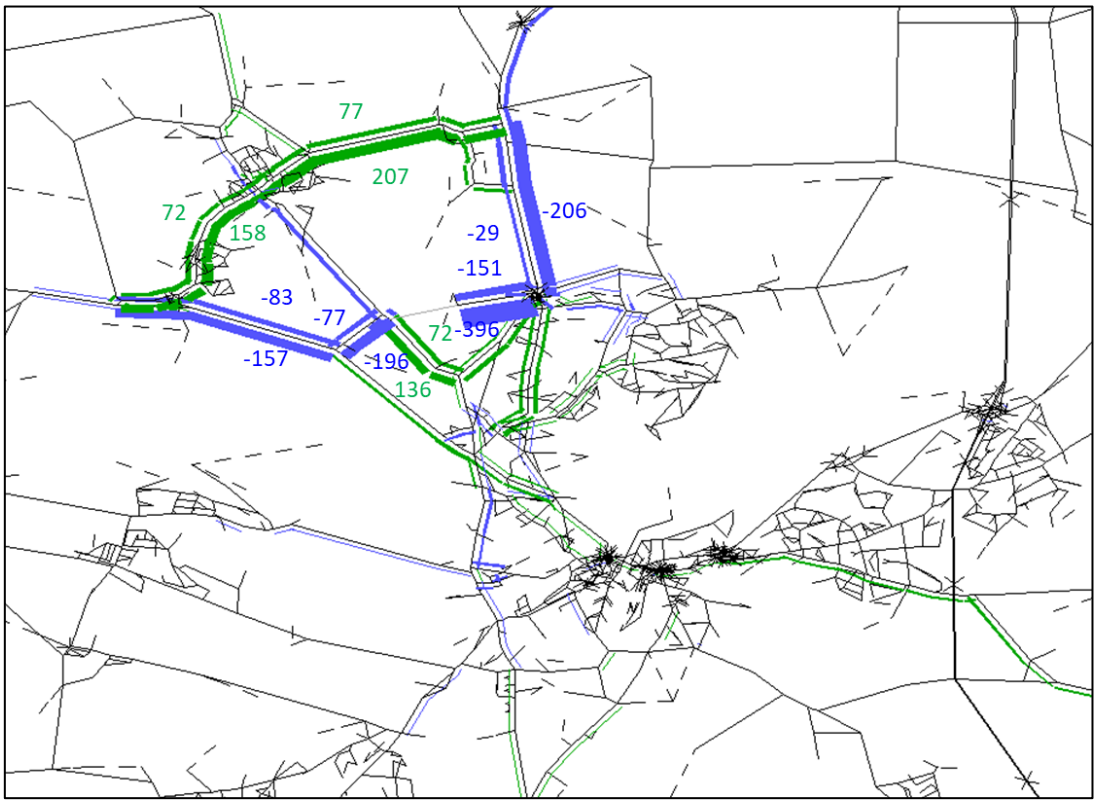


**Figure 4.4 - Flow Difference Plot 2037 Do Something 1 – Do Minimum (PM)**




### 4.1.2 Junction Delay Impacts

The closure of Potterhouse Lane directly impacts the B6532/Potterhouse Lane junction in this Do Something scenario. The results of this junction and the other five key junctions are shown in **Table 4.1.**

**Table 4.1 – Junction Delay Differences between Do Something 1 and Do Minimum**

| No | Site | Entry Arm | Delay Difference (s) | | |
|---|---|---|---|---|---|
| | | | AM | IP | PM |
| 1 | A167 / Rotary Way / Potterhouse Lane | A167 N | -1 | 0 | -1 |
| | | Rotary Way | 0 | 0 | 0 |
| | | Front Street | 0 | 0 | -1 |
| | | A167 SW | 0 | 0 | -1 |
| | | Potterhouse Lane | -1 | -1 | -1 |
| 2 | A691 / Sniperley Park and Ride | A691 NW | 2 | 0 | 0 |
| | | Sniperley P&R | 0 | 0 | -2 |
| | | A691 SE | 0 | 0 | 1 |
| 3 | A167 / Sniperley Park and Ride | A167 N | -1 | 0 | 0 |
| | | A167 S | 0 | 0 | 0 |
| | | Sniperley P&R | 0 | 0 | 0 |
| | | B6532 | -1 | 0 | 0 |
| 4 | A167 / A691 | A167 N | 4 | 0 | 1 |
| | | Dryburn Park | -8 | 0 | 0 |
| | | A691 SE | 0 | 0 | 1 |
| | | A167 S | 0 | 0 | 1 |
| | | A691 NW | -9 | 0 | 0 |
| 5 | B6532 Blackie Boy Roundabout | B6532 NW | 0 | 0 | 0 |
| | | Dryburn View | 0 | 0 | 0 |
| | | B6532 SE | 0 | 0 | 0 |
| | | Dryburn Park | 0 | 0 | 0 |
| 6 | B6532 / Potterhouse Lane | B6532 NW | -2 | -2 | -2 |
| | | Potterhouse Lane | -6 | -6 | -9 |
| | | B6532 SE | -1 | -1 | 0 |

Overall, the differences in delay are larger in the AM peak when compared to the PM and IP peak periods.

There is no or minimal delay across all time periods at the A167 / Rotary Way / Potterhouse Lane junction for all arms. The largest reduction of approximately 1 second is observed at the Potterhouse Lane arm. The junctions at Sniperley Park and Ride and B6532 Blackie Boy roundabout experience minimal changes in delay across all time periods.

There is a variation of changes in delay at the A167 / A691 roundabout, with the most significant changes in the AM peak. There is a 4 second increase in delay at the A167 approach from the north. This may be due to vehicles which would previously travel via Potterhouse Lane to access the B6532 now need to travel south along the A167 to re-route. However, there are reductions in delay of over 8 seconds at the Dryburn Park and A691 from the north-west approaches.

## 4.2 DS2 - The closure of link to Blackie Boy Roundabout

### 4.2.1 Flow Impacts

**Figure 4.5** to **Figure 4.7** show the flow differences as a result of the access to the Blackie Boy roundabout as bus/cycle only, in the morning, interpeak and evening time periods for the 2037 forecast year. Links coloured blue represent a decrease in flow, and those coloured green represent an increase in traffic flow.

The changes in flow along the internal road network of the Sniperley Park development are similar across the modelled periods. The greatest reduction in flow occurs along the B6532 between the junction connecting the primary road connected to the A167/B6532 and Blackie Boy roundabout; this is expected as the links on this approach are no longer open to cars.

In all time periods, there is a reduction in flow along the B6532 through the development site. In the AM, the reduction in flow also occurs north of the development as the B6532 approaches Sacriston, this reduction is less in the IP and PM peak periods.

The flow changes on other roads vary between the peak hours. In the AM, there is an increase in flow along the A167 between the A167 / B6312 junction and the A167 / Rotary Way / Potterhouse Lane roundabout. In the IP, there is no significant change in flow and in the PM a decrease in flow is expected. In all time periods there is an increase in flow along Front Street, suggesting vehicles previously travelling to/from Blackie Boy roundabout re-route along this road due to the link closure.

Flow changes along the A691 also vary between the peak hours. The increase in flow along the A691 between Trouts Lane and A691 / A167 junction is greater in the PM than the AM and IP. In the AM, there is also a decrease of flow along the A691 as it approaches Witton Gilbert, however in the IP there is no significant change and there is a decrease in flow in the PM.

**Figure 4.5 - Flow Difference Plot 2037 Do Something 2 – Do Minimum (AM)**

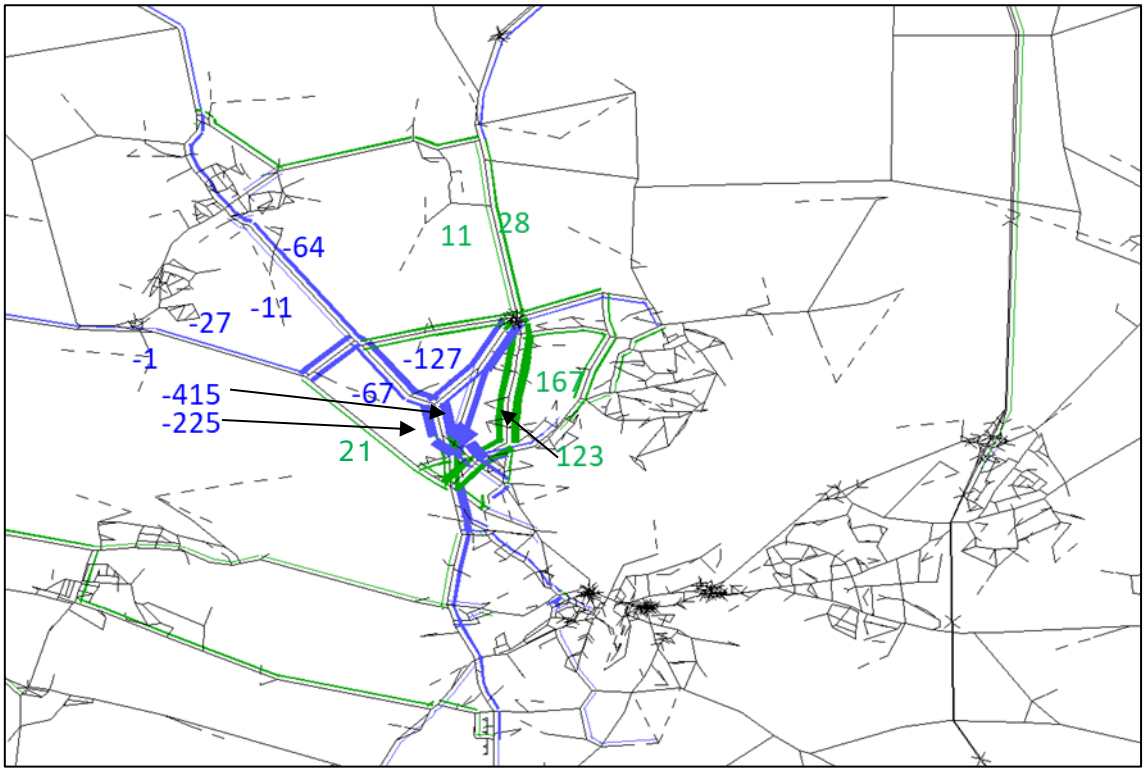


**Figure 4.6 - Flow Difference Plot 2037 Do Something 2 – Do Minimum (IP)**

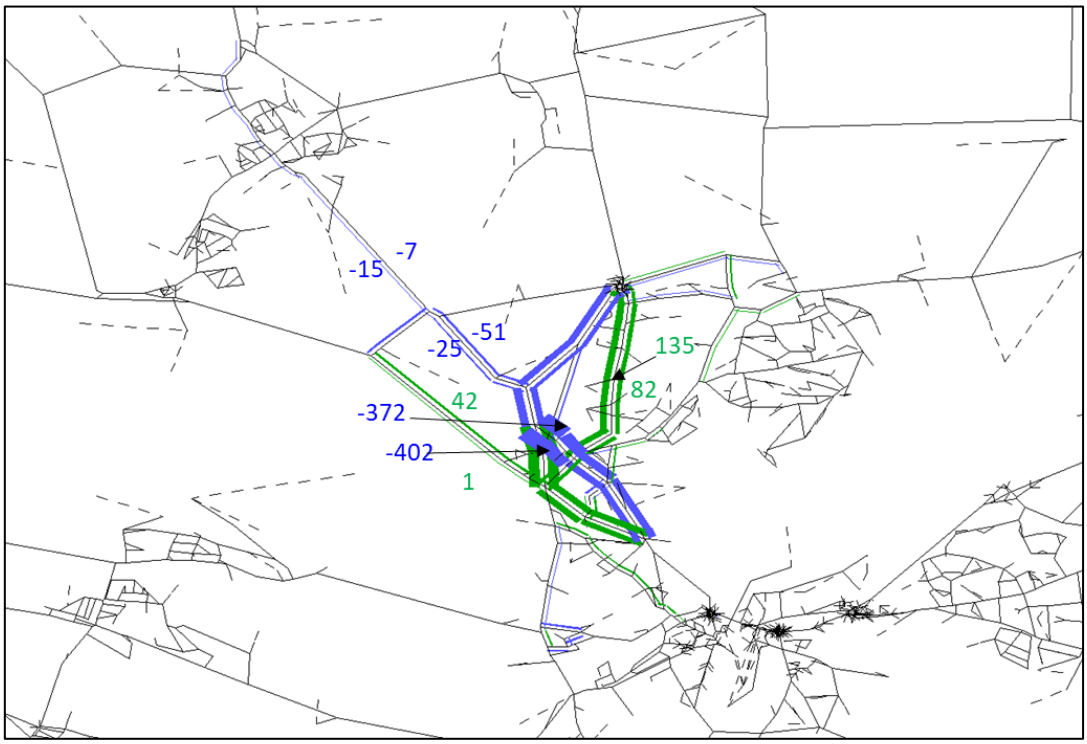
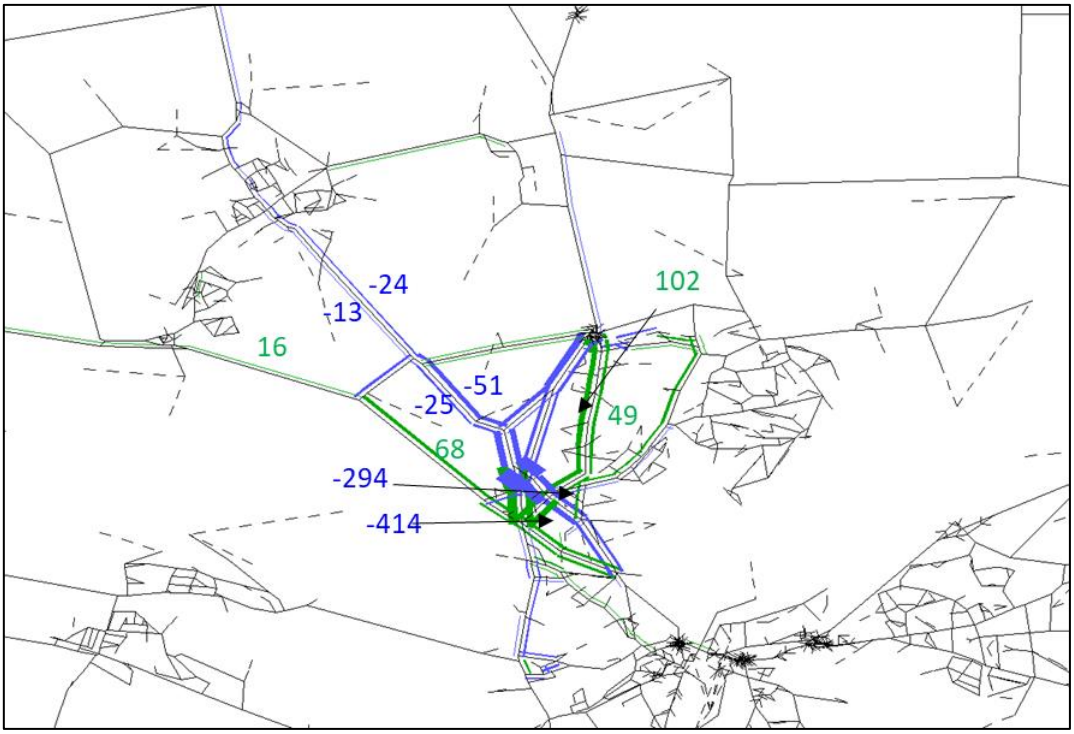



**Figure 4.7 - Flow Difference Plot 2037 Do Something 2 – Do Minimum (PM)**




### 4.2.2 Junction Delay Impacts

Amending the access to Blackie Boy roundabout as a bus/cycle only to/from the B6532 from the north west directly impacts the Blackie Boy roundabout. The results of this junction and the other five key junctions are shown in **Table 4.2.**

**Table 4.2 – Junction Delay Differences between Do Something 2 and Do Minimum**

| No | Site | Entry Arm | Delay Difference (s) | | |
|---|---|---|---|---|---|
| | | | AM | IP | PM |
| 1 | A167 / Rotary Way / Potterhouse Lane | A167 N | 0 | 0 | 0 |
| | | Rotary Way | 0 | 0 | 0 |
| | | Front Street | 0 | 0 | 1 |
| | | A167 SW | 0 | 0 | 0 |
| | | Potterhouse Lane | 0 | 0 | 0 |
| 2 | A691 / Sniperley Park and Ride | A691 NW | 0 | 1 | 1 |
| | | Sniperley P&R | 0 | 0 | -2 |
| | | A691 SE | 0 | 0 | 0 |
| 3 | A167 / Sniperley Park and Ride | A167 N | -1 | 0 | -1 |
| | | A167 S | 1 | 5 | 11 |
| | | Sniperley P&R | 3 | 0 | 5 |
| | | B6532 | 5 | 1 | 0 |
| 4 | A167 / A691 | A167 N | 99 | 5 | 4 |
| | | Dryburn Park | 67 | 2 | 4 |
| | | A691 SE | -1 | 2 | 4 |
| | | A167 S | 0 | 1 | 3 |
| | | A691 NW | 85 | 1 | 3 |
| 5 | B6532 Blackie Boy Roundabout | B6532 NW | 1 | 0 | 1 |
| | | Dryburn View | 0 | -1 | -1 |
| | | B6532 SE | 1 | -1 | -1 |
| | | Dryburn Park | 0 | 0 | 0 |
| 6 | B6532 / Potterhouse Lane | B6532 NW | 0 | 0 | 0 |
| | | Potterhouse Lane | 0 | 0 | 0 |
| | | B6532 SE | 0 | 0 | 0 |

As observed in the Do Something 1 scenario, the differences in delay are generally larger in the AM peak when compared to the PM and IP peak periods.

Despite a reduction in traffic approaching Blackie Boy roundabout from the B6532 from the north-west due to the change in access for cars, there is a very small increase in delay. All other approaches experience similar minimal changes in delay. The A167 / A691 junction is impacted the most, with significant increases in delay experienced at various junction approaches. The A167 approach from the north experiences an increase in delay of 99 seconds in the AM peak period which coincides with the increase in flow along the A167 across all peak periods. Delays at the Dryburn Park approach are expected to increase by over one minute in the AM peak. Increases in flow along the A691 from the north west are also reflected in an increase in delay times at this junction approach, with delay increasing by 85 seconds in the AM period.

The A167 / Sniperley Park and Ride junction experiences some delay which is larger in the PM peak than the AM peak periods. Delay at the A167 approach from the south increases by 5 seconds in the IP period and 11 seconds in the PM period. Delay at the B6532 approach increases the most in the AM period by 5 seconds. These changes in delay suggest vehicles now travel to/from the new road in the Do Minimum scenario which connects B6532 to A167 and arrives at this junction instead of Blackie Boy roundabout. In addition, the P&R approach also experiences increase in delay, with delays of 5 seconds in the PM period. The changes in delay at the A691 / Sniperley Park and Ride remain minimal.

## 4.3 DS3 - Additional link road between A691 and B6532

### 4.3.1 Flow Impacts

**Figure 4.8** to **Figure 4.10** show the flow differences as a result of the proposed link road between A691 and B6532, in the morning, interpeak and evening time periods for the 2037 forecast year. Links coloured blue represent a decrease in flow, and those coloured green represent an increase in traffic flow.

Across all time periods, changes in flow are largely contained within the network surrounding and within the Sniperley Park development. In this scenario, vehicles travel along the new link road connecting the A691 and B6532. There is an increase in flow along the A691 between Trouts Lane and the new link road. In the AM, a smaller increase in flow also occurs north of the development as the B6532 approaches Witton Gilbert. There is a reduction in flow along Trouts Lane and the B6532 which travels west of the development. These changes in flow suggest that vehicles which would previously travel along the B6532 re-route to use the new link road via the A691.

There are reductions in flow along the A691 across all time periods, and in the PM, there is a reduction in flow along the road used to access Sniperley P&R. In the IP period, there is an increase in flow along the B6532 between the new link road and Blackie Boy roundabout.

In the AM period, there is are small increases in flow beyond the Sniperley Park development along Potterhouse Lane and the A167 north of the A167 / Rotary Way / Potterhouse Lane roundabout, and a small reduction in flow along the B6312.

**Figure 4.8 - Flow Difference Plot 2037 Do Something 3 – Do Minimum (AM)**

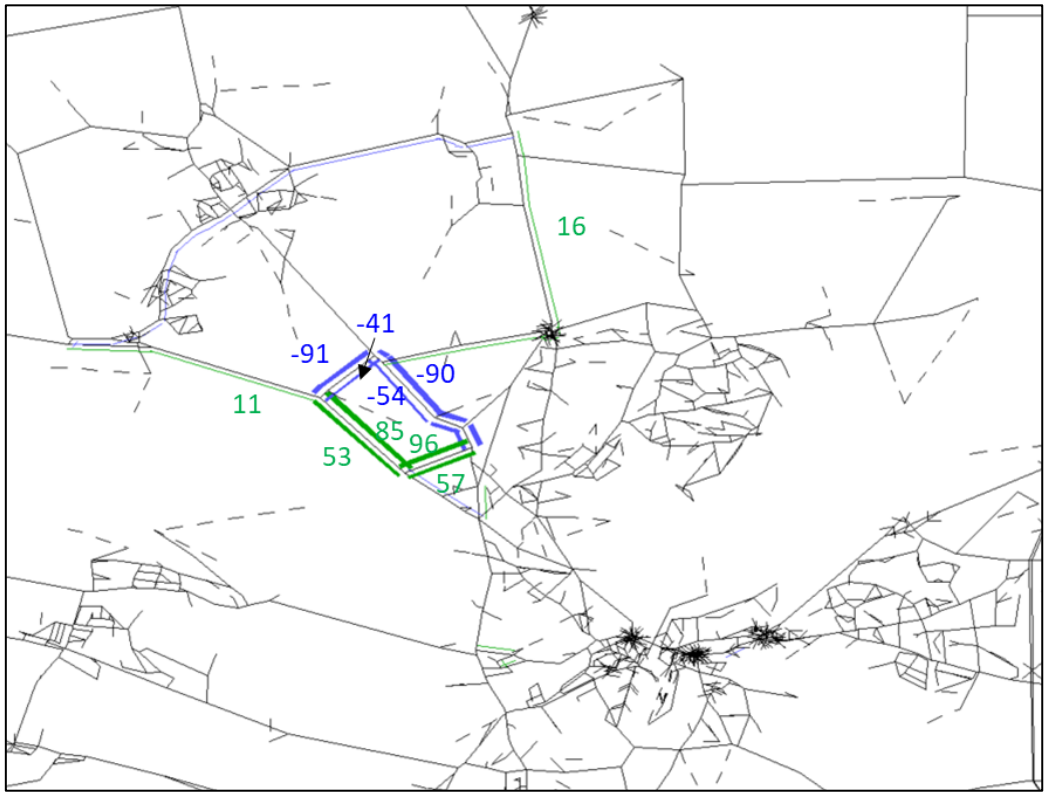


**Figure 4.9 - Flow Difference Plot 2037 Do Something 3 – Do Minimum (IP)**

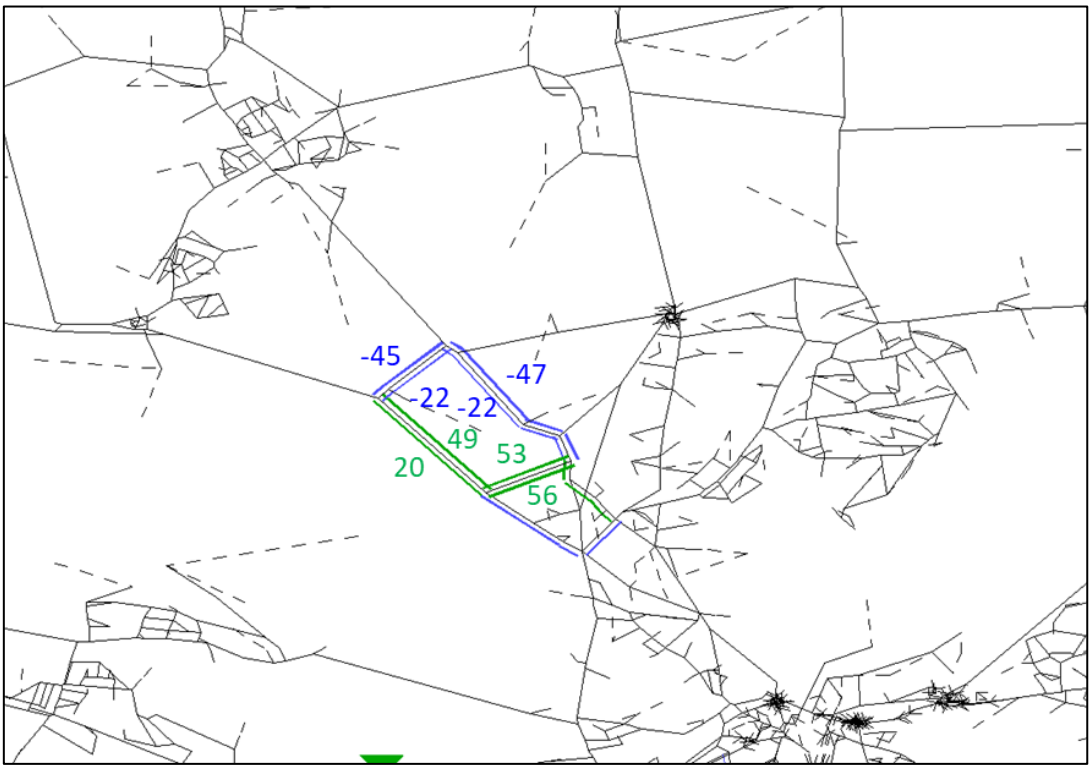
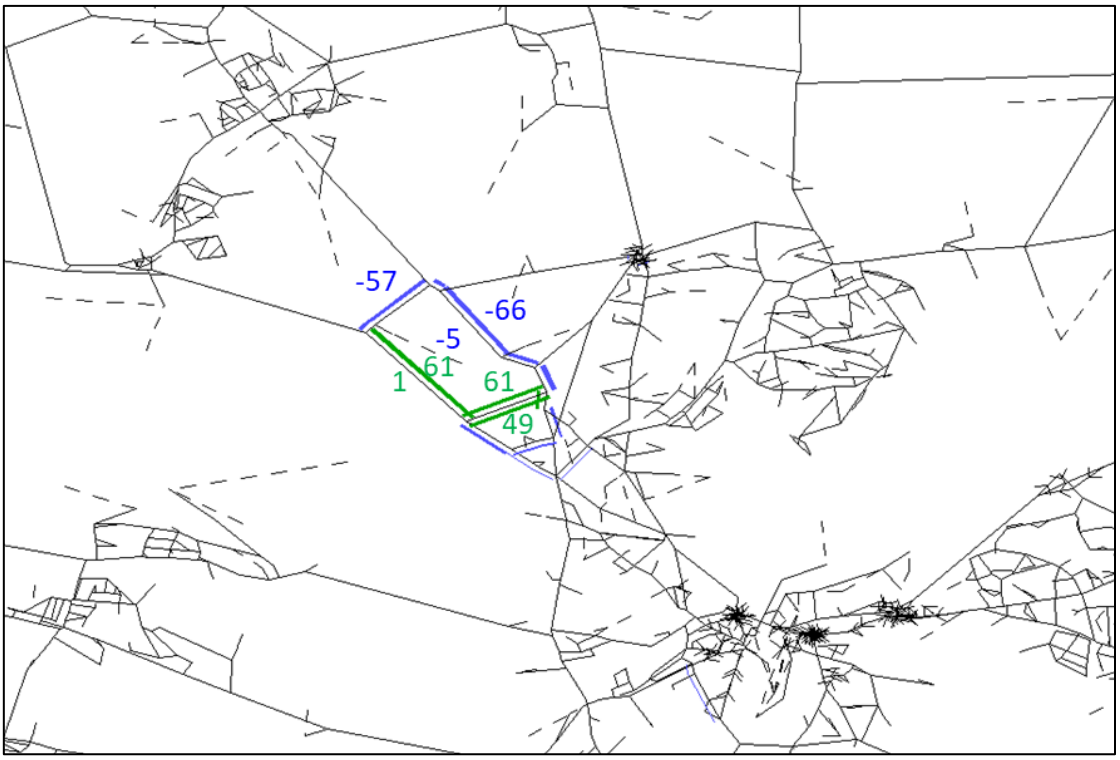



**Figure 4.10 - Flow Difference Plot 2037 Do Something 3 – Do Minimum (PM)**




### 4.3.2 Junction Delay Impacts

The impact of the new link road between the A691 and B6532 on the six key junctions are shown in **Table 4.3.**

**Table 4.3 - Junction Delay Differences between Do Something 3 and Do Minimum**

| No | Site | Entry Arm | Delay Difference (s) | | |
|---|---|---|---|---|---|
| | | | AM | IP | PM |
| 1 | A167 / Rotary Way / Potterhouse Lane | A167 N | 0 | 0 | 0 |
| | | Rotary Way | 0 | 0 | 0 |
| | | Front Street | 0 | 0 | -1 |
| | | A167 SW | 0 | 0 | 0 |
| | | Potterhouse Lane | 0 | 0 | 0 |
| 2 | A691 / Sniperley Park and Ride | A691 NW | -5 | -1 | -2 |
| | | Sniperley P&R | 0 | 0 | -3 |
| | | A691 SE | 0 | 0 | 0 |
| 3 | A167 / Sniperley Park and Ride | A167 N | -4 | 0 | 1 |
| | | A167 S | -3 | -2 | -8 |
| | | Sniperley P&R | -1 | 0 | -2 |
| | | B6532 | -2 | 0 | -1 |
| 4 | A167 / A691 | A167 N | -32 | 0 | -2 |
| | | Dryburn Park | -44 | -1 | -1 |
| | | A691 SE | -2 | -1 | -3 |
| | | A167 S | 0 | 0 | -1 |
| | | A691 NW | -33 | 0 | -1 |
| 5 | B6532 Blackie Boy Roundabout | B6532 NW | 1 | 0 | 0 |
| | | Dryburn View | 1 | 0 | 0 |
| | | B6532 SE | 2 | 1 | 2 |
| | | Dryburn Park | 1 | 1 | 1 |
| 6 | B6532 / Potterhouse Lane | B6532 NW | 0 | 0 | 0 |
| | | Potterhouse Lane | -1 | 0 | 0 |
| | | B6532 SE | 0 | 0 | 0 |

The two junctions providing access to Sniperley Park and Ride experience reductions in delay across most approaches and time periods. In the AM peak, the A691 approach from the north west at the A691 / Sniperley P&R junction experiences a five second reduction in delay. The increase in flow along the A691 suggests that vehicles are turning off the A691 at the new link road to access the B6532 as opposed to using the existing junction. The A167 / Sniperley P&R junction also experiences reductions in delay. The A167 approach from the north experiences a 4 second reduction in delay in the AM period, again this suggests that vehicles are turning off at the new link road as opposed to using the existing junction. However, in the PM a small increase in delay of one second is experienced. The A167 approach from the south experiences a reduction in delay in the PM of over 7 seconds, with smaller reductions in the AM and IP.

The A167 / A691 junction is impacted the most by the link road, with significant decreases in delay experienced at various junction approaches. The A167 approach from the north experiences a reduction in delay of over 30 seconds in the AM peak period which coincides with the decrease in flow along the A167 in the AM period. Delays at the Dryburn Park approach are expected to decrease by over 40 seconds in the AM peak. Decreases in flow along the A691 from the north west are also reflected in a decrease in delay times at this junction approach, with delay reducing by 30 seconds in the AM period.

The changes in delay at the A167 / Rotary Way / Potterhouse Lane and B6532 / Potterhouse Lane junctions are minimal across all junction approaches in all three peak periods.

## 5. Summary

Jacobs was commissioned by Durham County Council to use the Durham City Transport Model to test several scenarios relating to the proposed Sniperley Park development.

This technical note summarises the work carried out in developing and testing the forecast networks and flow and delay summary outputs for a forecast year of 2037.

The forecast models were developed to test three network changes within the Sniperley Park area:

1) The closure of Potterhouse Lane;

2) The closure of link to Blackie Boy Roundabout to cars; and

3) Additional link road between A691 and B6532.

In Scenario 1, the closure of Potterhouse Lane results in traffic reductions on the A691 between the B6312 and Trouts Lane and on the A167 between the B6312 and the A167 / Rotary Way / Potterhouse Lane roundabout. The results suggest traffic previously travelling to / from either of these A roads via Potterhouse Lane re-route via the B6312 or via the B6532 in the southern part of the development. Across most junctions in this scenario, there are minimal changes to delay.

In Scenario 2, there is a reduction in flow along the B6532 between the junction connecting the primary road to the A167/B6532 and Blackie Boy roundabout as the links on this approach are no longer open to cars. In all time periods there is an increase in flow along Front Street, suggesting vehicles previously travelling to/from Blackie Boy roundabout re-route along this road due to the link closure. The A691 / A167 experiences the largest increases in delay in this scenario.

In Scenario 3 there is an increase in flow along the A691 and new link road, and a reduction in flow along B6532 and Trouts Lane. This suggests that in future years vehicles re-route to utilise this new link road. The A691 / A167 junction experiences significant reductions in delay as a result of the link road.