

# **A3 BEECHCROFT DRIVE, GUILDFORD GAP STUDY**

## **Collision Analysis**

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October 2009

## A3 Beechcroft Drive – COLLISION ANALYSIS

### INTRODUCTION

The problem of collisions involving U-turns on the A3 and southbound right turns into Beechcroft Drive led to the restriction of U-turn manoeuvres for the gap at this junction. Preliminary design is now being prepared proposing total closure of the gap to eradicate these turns as there is evidence motorists contravene the restriction and continue to use the access.

The design is also considering closing the Beechcroft Drive access to the A3 through landscaping but providing an alternative route by which the residents of Beechcroft Drive can access the A3 at the Egerton Road Roundabout to the northeast.

The purpose of this study is to analyse and investigate personal injury road traffic collisions that have been reported to the police as occurring at this junction of the A3; to consider the likely collision savings for complete closure of the access; and taking account of any collision migration to other parts of the network.

The collision analysis is based on data covering the five year period ending 31<sup>st</sup> December 2008.

### COLLISION ANALYSIS

Read in conjunction with; Collision plot, Drawing Number: 3/500716/DR/2600/001 supplied as Appendix A.

The statistical data referred to in this document was not derived from the National validated collision statistics, but was sourced from Area 3 Operational Data. As this data has not yet been validated by DfT it cannot be assumed to be a complete data set as it may be found to be incomplete or contain inaccuracies. The requirement for up to date information for operational purposes was a consideration in the decision to use this data. It is sourced from the 6 Local Authorities which contain the Area 3 Trunk Road Network on a regular basis and is considered sufficiently robust to be used in this context.

In the 5-year period ending 31<sup>st</sup> December 2008, a total of 14 collisions (3 serious and 11 slight) occurred within a 300m radius of the junction. These resulted in 5 serious and 14 slight casualties.

**Table 1: Collisions by severity of injury by year.**

Year	Fatal	Serious	Slight	Total Collisions
2004	0	2	1	3
2005	0	1	4	5
2006	0	0	3	3
2007	0	0	1	1
2008	0	0	2	2
<b>Total</b>	<b>0(0%)</b>	<b>3 (21%)</b>	<b>11 (79 %)</b>	<b>14 (100%)</b>

With three collisions classified as serious and 11 as slight, this produces a severity ratio of 21%. This ratio is slightly higher than the national average for Non-Built up 'A' Roads of 18.9% (RCGB 2008), however given the number of collisions in the study this is not significant.

**Table 2: Collision data by Time Period**

Hour	00:00	01:00	02:00	03:00	04:00	05:00	06:00	07:00	08:00	09:00	10:00	11:00
Acc	0	0	0	0	0	0	0	1	2	1	0	1
Hour	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
Acc	2	1	0	0	2	2	1	0	0	1	0	0

Looking at the collision distribution by time, the highest number of collisions occurred during normal peak hours, although, due to the small numbers, no great significance should be put on this as it could also be due to the random nature of collisions. However, of the 5 collisions which have gone through the gap, or were intending to use the gap, 4 have been in the morning or evening peak times of 08:00 to 09:00 and 16:00 to 18:00.

Five collisions (36%) have occurred on a wet road surface, this is close to the national average of 38% for Non built-up 'A' Roads.

### **COLLISIONS RELATED TO THE CENTRAL RESERVE GAP**

A total of 5 collisions (No's 2, 3, 4, 6 & 7), two Serious and three Slight, were directly related to a manoeuvre through the gap in the central reservation, two (No's 2 & 4) involved right turn manoeuvres into Beechcroft Drive and three involved actual, or intended (No's 3, 6 & 7) U-turns from the southbound carriageway. In the case of both intended U-turns, they contravened a locally erected 'No Exit' sign from the garage. A further collision (No. 12) involved a vehicle positioned in the entrance of the garage; this may also have been intending to perform a U-turn, although this is not specifically stated in the collision report.

A further two collisions (No's 5 & 8) are due to vehicles being forced to swerve as a result of vehicles changing lane in front, one in each direction, and have ended up travelling through the gap, the northbound one to avoid a collision, and the southbound one following a collision. The closure of the gap would not have any affect on such collisions and so these are not included as part of any collision saving calculations.

### **COLLISIONS RELATED TO LEFT TURN MANOEUVRES IN AND OUT OF BEECHCROFT DRIVE**

Only one collision (No. 5) involved vehicle manoeuvres into, or out of, Beechcroft Drive. The collision involved northbound vehicle 1 braking hard to turn left into Beechcroft Drive, the following vehicle 2 could not slow and so changed lane into lane 2. Vehicle 3, to avoid vehicle 2, drove through the gap in the central reserve. Vehicle 4 tried to follow vehicle 3 but struck the kerb on the central reserve. This collision is also referred to in the gap collisions above.

Remedial measures to the approach to the junction at Beechcroft drive were implemented in March 2009 as a result of the A3 Guildford to Ripley Accident Investigation Study carried out by Mott MacDonald in 2007/08. These works consisted of the replacement and upgrade of the warning signs to include yellow backing boards on the approach to the junction, application of red high friction surfacing on the northbound approach, SLOW road markings and general vegetation clearance to highlight the junction. The effects of these remedial works will be monitored through the Road Safety Audit process with the Stage 4a Audit due in April 2010 and the Stage 4b due in April 2012.

## **NON-INJURY INCIDENTS**

Details from the Area 3 Network Control Centre (NCC) log have been obtained. These records only go back 12 months, to the start of the commission. These records show four logged incidents in the vicinity of Beechcroft Drive which either specifically mentioned a Road Traffic Collision or referred to street furniture damage which may have been the result of a collision. In general it is expected that approximately 7 non-injury collisions occur for every injury collision. The lack of non-injury collisions for this area suggests that there is not a major problem.

## **MIGRATION OF COLLISIONS TO OTHER PARTS OF NETWORK**

There is always a possibility that where a route is stopped up collisions could migrate to other parts of the network. In this case, the diversion may include a new access road from Gill Avenue. As we do not have access to local road collisions, no attempt has been made to quantify the migration of collisions onto the local road network. The following purely relates to collisions elsewhere on the trunk road network.

For the purpose of this document the available traffic data from the Highways Agency's Traffic Annual Report Year 2008 for the A3 between the A31 and the A322 was used. Site 311 Northbound has an AADT of 43168; site 312 Southbound an AADT of 41336. Therefore for 2008 the combined AADT was 84,500.

No traffic counts have been carried out, so it is difficult to tell how many vehicles would normally turn right on the A3 into Beechcroft Drive. However, there are a total of 21 houses on Beechcroft Drive and assuming 8 vehicular movements per day per house, in and out of Beechcroft Drive this gives a total of 168 movements. Some of these movements would be using the left turn into the drive already, if we take an estimated 50%, 84 vehicle movements for the purpose of assessing any migration.

If only the gap is closed, southbound traffic will need to access Beechcroft Drive via the B3000 junction, a total diversion of some 6km. This diversion may include other vehicles that normally exit from Manor Way. There were 36 collisions for this diversion route in the 5 year period 2003 to 2008. Areas where collisions have occurred in clusters are; at the A31 Southbound off slip, Bends at Hogs Back Southbound, Bends at Hogs Back Northbound, and A31 Northbound on-slip. Twelve of the 36 collisions involved loss of control as the primary cause of the collision, a further 10 involved injudicious lane changes. Four collisions involved broken down vehicles. The collision record appears to point to excessive or inappropriate speed. There is a 50mph speed limit which starts/terminates at the west side of Hogs Back, no speed data is available from TRADS to determine if the 85%ile speeds are high. The 24hour AADT for the A3 at this location is 41336 vehicles implying one collision for every 1722 vehicles using them. Although the increase in traffic would be an additional 84 vehicles and would therefore seem to be negligible, the presence of such problems on the diversion route may result in some collision migration.

If the gap and junction are closed, the diverted route for southbound traffic would be to exit the A3 at the University Interchange, head west along Egerton Road and Gill Avenue, turn left on Alexander Fleming Road and then follow a newly constructed access road to Beechcroft Drive. This diversion would be shorter than for the gap closure alone at approximately 1.1 km. As this diversion route would be all on local roads no assessment of any collision migration has been possible.

Should the junction be closed, northbound traffic will access Beechcroft Drive via the University Interchange and follow the same route, a diversion of approximately 3.5km. There were 11 collisions on the trunk road section of this diversion route in the 5 year period 2003 to 2008. No records are available for the local road network, and part of the route would be new construction. Four of the 11 collisions have involved loss of control on the bends north of Beechcroft Drive, a further four collisions involved nose-to-tail collisions, two of which specifically mention slow or stationary traffic. Again excessive or inappropriate speed would appear to be a factor here. Given the road alignment, any excess speed could contribute to any of these 8 collisions. The 24hour AADT for the A3 at this location is 43168 vehicles implying one collision for every 3924 vehicles. Although the increase of traffic by 84 vehicles by the closure of Beechcroft Drive would appear to suggest negligible affect on the collision rate on the trunk road, the suggestion of speed related problems means that it would seem reasonable to assume that there would be collision migration.

A plot of collisions for the diversion routes is provided as Appendix B.

## COLLISION SAVING CALCULATION

### For the Gap

With 5 collisions directly related to the gap then the closure of the gap would save those 5 collisions (one per year).

There will be an extra 84 vehicle movements per day that will be using the diversion route, it would not be unreasonable to expect the extra traffic to result in an additional 0.073 collisions in a five year period, or 0.0146 collisions per year<sup>1</sup>

The cost of a Non built-up road collision is assumed to be £121,000 (RCGB 2008 Table 2 b); the scheme cost for the gap closure alone is estimated to be between £273,000 and £322,000. Therefore the predicted FYRR (First Year Rate of Return) for the proposal is between 43% and 37%.

### For the Junction

With just one collision related to the turning into, or out of, Beechcroft Drive in 5 years, then the collision savings for closing the junction would be 1 collision (0.2 per year).

There will be an extra 84 vehicle movements per day that will be using the diversion route, it would not be unreasonable to expect the extra traffic to result in an additional 0.022 collisions in a five year period, or 0.0044 collisions per year<sup>2</sup>

The cost of a Non built-up road collision is assumed to be £121,000 (RCGB 2008 Table 2 b); the scheme cost for the gap closure alone is estimated to be between £273,000 and £322,000. Therefore the predicted FYRR (First Year Rate of Return) for the proposal is between 9% and 7%.

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<sup>1</sup> 84 extra vehicles per day / 41336 24hr AADT = 0.0020  
 36 collisions on that diversion route in 5 years = 7.2 collision per year  
 7.2 \* 0.0020 = 0.0146 additional collisions per year  
 5 years \* 0.0146 = 0.073 collisions in 5 years

<sup>2</sup> 84 extra vehicles per day / 41336 24hr AADT = 0.0020  
 11 collisions on that diversion route in 5 years = 2.2 collision per year  
 2.2 \* 0.0020 = 0.0044 additional collisions per year  
 5 years \* 0.0044 = 0.022 collisions in 5 years

## Combined

If we assume the garage is to be redeveloped, with 6 collisions related to the gap and junction, then the closure of both the gap and the junction would save 6 collisions (1.2 per year).

The assumption that for the gap closure there is an additional 0.073 collisions in 5 years (0.0146 per year) and 0.022 collisions in 5 years (0.0044 per year) for the junction closure, this means that the collision saving for the implementation of the gap and junction closure is estimated to be  $1.2 - (0.0146 + 0.0044) =$  collisions 1.181 per year.

The cost of a Non built-up road collision is assumed to be £121,000 (RCGB 2008 Table 2 b); the scheme cost for the gap closure and junction closure, including the access road, is estimated to be between £1,578,000 and £1,863,000. Therefore the predicted FYRR (First Year Rate of Return) for this proposal is between 9% and 8%.

If the garage is not redeveloped then the collisions relating to the garage will be saved in any case, so the collision saving from the gap and junction closure would then be 4 collisions (0.8 per year). The collision migration remains unchanged and so the overall collision saving would be 0.781 collisions. This would therefore give a predicted FYRR of between 6% and 5%

## CONCLUSION

With a total of 14 collisions, 3 Serious and 11 Slight, the severity ratio of the collisions is roughly in line with the national average.

Five collisions can be directly attributed to the gap in the central reserve, three of which had a problem whilst actually using the gap and the other two who had intention to use it. However, both collisions which intended to use the gap did so from the garage. This garage is no longer in use and so the access from the garage to the gap may also no longer be a problem unless the site is redeveloped. Of these collisions four occurred either in the morning or evening peak periods.

Only one injury collision, in the 5 year study period, related to left turns into or out of Beechcroft Drive.

NCC log data does not seem to provide proof of a problem at this location.

For a gap closure only, the diversion route that would be required for southbound traffic is some 6km in length. This is considered to be too excessive and may offset the small collision benefits being obtained.

The route shows indications of a speeding or inappropriate speed problem, because of this although the extra traffic using the route through diversion is expected to be small, a small amount of collisions are likely to migrate to the diverted route. Larger collision savings may be able to be achieved by implementation of average speed cameras.

The implementation of the gap closure could have a FYRR of between 43 & 37%, the junction closure is expected to have a FYRR of between 9 & 7% and the combined gap and junction closure could have a FYRR of between 6 & 5%.

Whilst the gap remains open there will always be a high risk of collisions occurring, possibly serious or even fatal, due to traffic travelling at slower speeds negotiating the gap.

## **RECOMMENDATION**

It is recommended that the gap closure be implemented.

It is recommended that a full assessment of the route for the implementation of average speed cameras is carried out.

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# **Appendix A**

## **Drawing No. 3/500716/DR/2600/001 Gap and Junction Collision Plot**

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## **Appendix B**

### **Drawing No. 3/500716/DR/2600/002 Diversion Route Collision Plot**

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