



## TECHNICAL MEMORANDUM

# Managing Keynsham's Future Growth

## Task 2: Five Ways Junction Safety Study

PREPARED FOR: Nick Simons

COPY TO: David Lear

PROJECT NUMBER: 674726.AI.08.01

This Document has been issued and amended as follows:

| Version | Date     | Description | Prepared by  | Approved by |
|---------|----------|-------------|--------------|-------------|
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### 1.0 Introduction

This Technical Note has been prepared to identify potential highway improvements at the Charlton Road/Woollard Lane 'Fiveways' junction located approximately 3km southwest of Keynsham. **Figure 1** shows the location of the junction in relation to Keynsham.

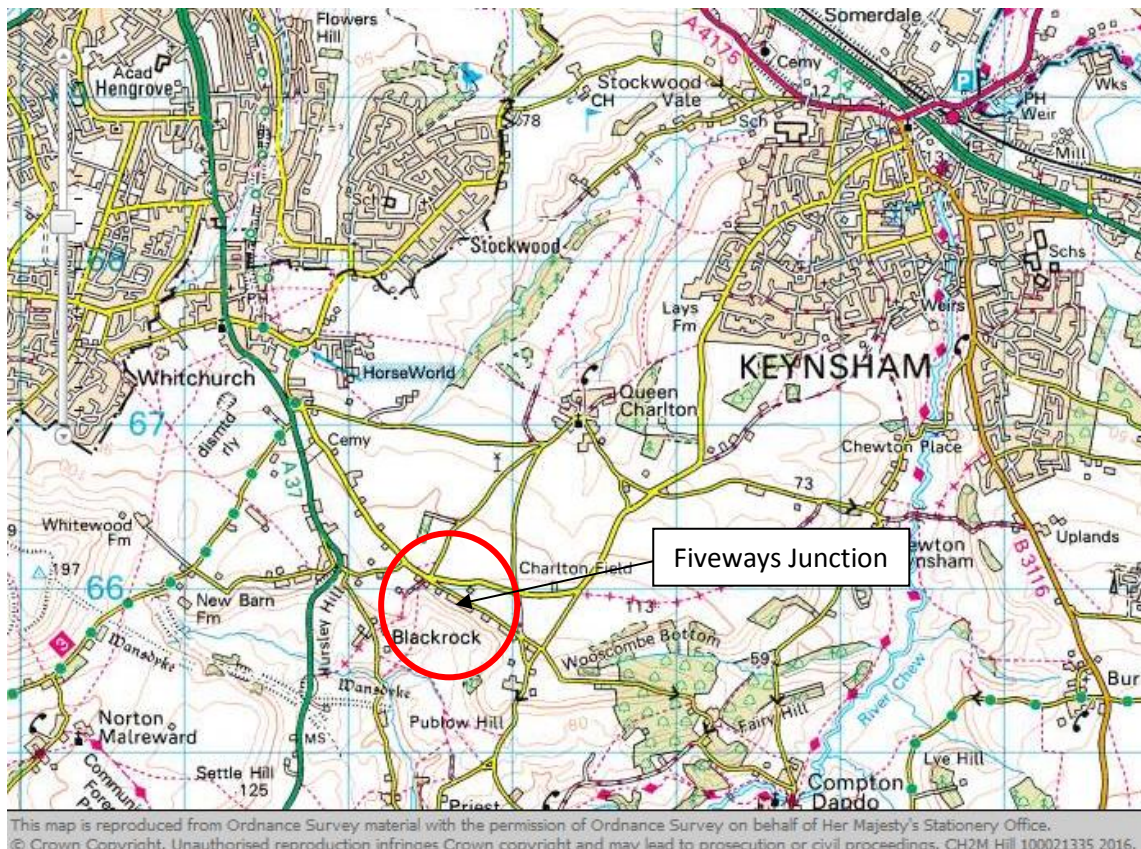


Figure 1: Location Plan



## TASK 2: FIVE WAYS JUNCTION SAFETY STUDY

Improvements are being sought due to the likely increase in traffic flows on Charlton Road and onto the A37 as a result of committed housing development in south west Keynsham, such as Bilbie Green and KE4.

This Technical Note looks at the existing highway conditions at the junction, considers contemporary collision data and identifies three potential options for improvements at the junction.

## 2.0 Existing Conditions

‘Fiveways’ is a five-arm priority junction, the priority road being Woollard Lane. Charlton Road and Highwall Lane form the minor arms and Ringspit Lane the fifth approach, which is a byway. Although the Woollard Lane approaches have priority the predominant traffic movement is between Charlton Road and Woollard Lane (west). **Figure 2** (drawing number 001) in Appendix A shows the existing junction layout including highway boundaries.

The current priority arrangement at the junction requires traffic from Keynsham to give way and results in observed queuing on the Charlton Road approach.

In the reverse direction drivers are reported failing to indicate when intending to turn left into Charlton Road. This is most likely because the highway alignment presents little deviation in order to turn off the main Woollard Lane and into Charlton Road. Drivers failing to indicate their intention to turn left has the potential to confuse drivers waiting to move off from Charlton Road, resulting in hesitation which may exacerbate the queuing and the risk of rear shunts.

During the site visit drivers travelling east on Woollard Lane turning into Charlton Road were observed routinely driving over the hatching provided between Charlton Road and Highwall Lane (Photo 1). Drivers did not appear to decelerate when making this manoeuvre resulting in traffic heading in the opposite direction hesitating to pull out.



*Photo 1: Over running of hatching*

### Visibility

Existing visibility is restricted from Charlton Road and Ringspit Lane approaches due to the horizontal alignment of the carriageway and vegetation/hedgerows bounding the carriageway. The junction is subject to the national speed limit and therefore desirable minimum visibility slays of 215m should be provided.

From Charlton Road visibility splays of approximately 110m to the west (Photo 2) and 50m to the east (photo 3) are achieved from an x distance of 2.4m back from the giveaway line. This is substantially below the desirable minimum of 215m or one step below desirable minimum of 160m





and uses an x distance which is appropriate for exceptionally difficult circumstances. If an x distance of 4.5m was assumed, the distance back from the giveway line used in difficult circumstances for lightly trafficked simple junctions, these splays would be considerably less. Forward visibility eastbound along Woollard Lane is also restricted by the horizontal alignment of the carriageway and vegetation/hedgrows in the verges.



*Photo 2: Visibility west from Charlton Road*



*Photo 3: Visibility east from Charlton Road*

### **Signing and road markings**

On the Charlton Road approach to the junction give-way signs are provided on both sides of the carriageway. Direction signing is limited to a white finger post sign and there is a staggered crossroad advance warning sign on Woollard Lane for eastbound traffic, although the sign face has been rotated.

Carriageway markings consist of a short length of central hatching on Charlton Road to encourage drivers to approach the junction perpendicular to Woollard Lane to maximise visibility. SLOW markings and rumble strips are provided on Charlton Road approximately 500m from the junction in association with an advance bend warning sign. The markings are in reasonably good condition although the hatching is becoming worn.

The junction and its approaches are unlit.

### **Collision Analysis**

Collision data has been obtained in the vicinity of the 'Fiveways' junction for the five year period 1<sup>st</sup> March 2011 to 29<sup>th</sup> February 2016. Five collisions have been recorded in the vicinity of the junction although only two slight have been recorded at the junction, one in 2012 and one in 2015. Both involved a loss of control on the approach to the junction from Charlton Road.

The collision recorded in 2012 occurred during the hours of darkness and in icy/wet conditions. The car was approaching the junction from Charlton Road and failed to give-way, lost control and collided with a wall.

The collision recorded in 2015 involved the loss of control of a car also on the Charlton Road approach to the junction on a wet road surface.

Both collisions have been recorded on the Charlton Road approach and resulted in a loss of control in unfavourable driving conditions. No contributory factors have been provided with the collision data however it is possible that speed, the lack of advance signing or the condition of the surfacing were factors.

The remaining three collisions included a loss of control on Charlton Road heading towards Keynsham Road and classified as slight; a shunt behind a vehicle turning off Woollard Lane into an



access, classified as serious; and a rear shunt involving a pedal cyclist also on Woollard Lane and classified as slight.

### 3.0 Options

Three options for improving the junction have been considered:

- Maintain the existing priority arrangement but improve the alignment of the Charlton Road approach within the existing highway boundary;
- Revise the priority at the junction to reflect the predominant traffic movement; and
- A normal four arm roundabout.

#### Option 1

Option 1 maintains the existing priority arrangement but tightens the Charlton Road arm to encourage drivers to approach the give way perpendicular to Woollard Lane. This also enables the hatching between Highwall Lane and Charlton Road to be kerbed necessitating drivers to slow down to turn into Charlton Road and stopping them from cutting across the hatching. The closure of Highwall Lane at the junction could also be considered although the needs of farmers who use it for access will have to be considered. Currently there are four unclassified roads which provide access to the village of Queen Charlton, two off Woollard Lane and two of Charlton Road, Highwall Lane being one of them. Its closure would simplify the junction and reduce the number of conflicting turning movements.

An advance junction ahead sign with associated distance plate will also be provided on Charlton Road to highlight the junction. **Figure 3** (drawing number 002) in Appendix A illustrates the layout and the swept path analysis which indicates that an articulated vehicle can negotiate the left turn into Charlton Road.

#### Option 2

Option 2 revises the priority at the junction to reflect the predominant traffic flow between Charlton Road and Woollard Lane. The change in priority could encourage higher vehicle speeds through the junction and may warrant a reduction in speed limit. A speed limit review of Charlton Road from the existing 30mph limit at Bilbie Green to the A37 would be necessary to establish if this was appropriate, enforceable and self-explaining.

The realignment of Woollard Lane (east) encourages drivers to pull further forward to maximise visibility along Charlton Road and Woollard Lane (west) but requires drivers to look over their shoulder due to the skewed angle of the approach. Visibility splays of approximately 120m to the west and 55m to the east from an x distance of 2.4m are achieved from Woollard Lane (east). This is similar to the existing visibility from Charlton Road but still represents a departure from standard. The combination of potentially higher vehicle speeds through the junction, the skewed angle of Woollard Lane and substandard visibility from Woollard Lane (east) is likely to increase the risk of failure to give way collisions from this approach.

Map type direction signs will be provided on Charlton Road and Woollard Lane (west) in conjunction with 'SLOW' markings. Give way and advance junction ahead signs are proposed on Woollard Lane (east). **Figure 4** (drawing number 003) in Appendix A illustrates the proposed layout and the swept path analysis which indicates that an articulated vehicle can negotiate the left turn from Woollard Lane east to west.

#### Option 3

Option three introduces a four arm 28m inscribed circular diameter (ICD) normal roundabout with both Woollard Lane approaches, Charlton Road and Highwall Lane forming the four approaches. Ringspit Lane will form an access off the Woollard Lane (west) arm.



A 28m ICD roundabout at this location will extend outside of the existing highway boundary between Charlton Road and Highwall Lane. It likely that additional land will be needed on the north side of Woollard Lane (west) to provide adequate forward visibility to the giveway line on this approach and sufficient visibility to the left at the roundabout, measured 15m back from the giveway line.

An over-run apron around the central island is likely to be required to accommodate articulated vehicles.

Very little entry deflection is achieved on the Woollard Lane (east) approach. Measures including signing will be necessary to highlight the junction from this approach. **Figure 5** (drawing number 003) in Appendix A illustrates the conceptual layout and the swept path analysis.

Table 1 summarises the benefits and disbenefits of the three options.

| Option  | Benefits  | Disbenefits   |
|---|---|---|
| <b>Option 1 – improvements to existing priority</b> | <p>No land take requirements</p> <p>Low cost</p> <p>The revised layout and tightening of the Charlton Road approach may encourage slower speeds at the junction.</p> <p>Consideration of closing Highwall Lane at the junction would simplify the layout.</p> | <p>Does not change the priority at the junction in line with the predominant traffic flow.</p> <p>Queuing on the Charlton Road approach is likely to increase as development continues in south west Keynsham.</p> <p>Visibility splays remain substandard.</p>   |
| <b>Option 2 – revised priority</b>                  | <p>Low cost, excluding third party land costs.</p> <p>Priority reflects predominant traffic movements</p>   | <p>Could encourage higher speeds through the junction.</p> <p>Visibility splays from Woollard Lane (E) are restricted and would require a Departure from Standard or third party land. Reduced visibility is likely to increase the risk of failure to giveway collisions from this approach.</p> <p>Skewed approach of Woollard Lane (E)</p>             |
| <b>Option 3 – normal roundabout</b>                 | <p>Introduces a layout that encourages slower speeds and presents an opportunity to reduce the speed limit.</p>   | <p>Third party land required to achieve forward visibility on the Woollard Lane (W) approach.</p> <p>Visibility from Woollard Lane (E) is restricted and would require a Departure from Standard.</p> <p>Significant construction costs</p> <p>Requirement for an over run apron to accommodate heavy goods vehicles</p> <p>May require illumination.</p> |



## 4.0 Conclusions

The existing simple priority junction does not replicate the predominant traffic movement between Charlton Road and Woollard Lane. The increase in development in south west Keynsham is likely to result in additional queuing on the Charlton Road approach.

Visibility at the existing junction is restricted from the Charlton Road approach by the horizontal alignment of Woollard Lane and adjacent hedgerows/vegetation.

Collision data from the last five years has identified two collisions at the junction, both on the Charlton Road approach and on a wet/icy road surface. The condition of the carriageway at the junction should be checked to ensure that it has not deteriorated above the investigatory level. Improvements to the advance warning signing of the junction on the Charlton Road approach would highlight the junction further.

Three options for improving the junction have been considered: improvements to the existing layout; revised priority at the junction; and a new roundabout. The proposed junction layouts have not been modelled as part of this study.

Option 1 includes signing and lining improvements and the provision of a kerbed verge between Highwall Lane and Charlton Road. This will prevent drivers from cutting across the face of Highwall Lane and encourage slower speeds through the junction. Visibility from Charlton Road remains restricted and reported queuing on this approach is likely to increase as development in southwest Keynsham continues.

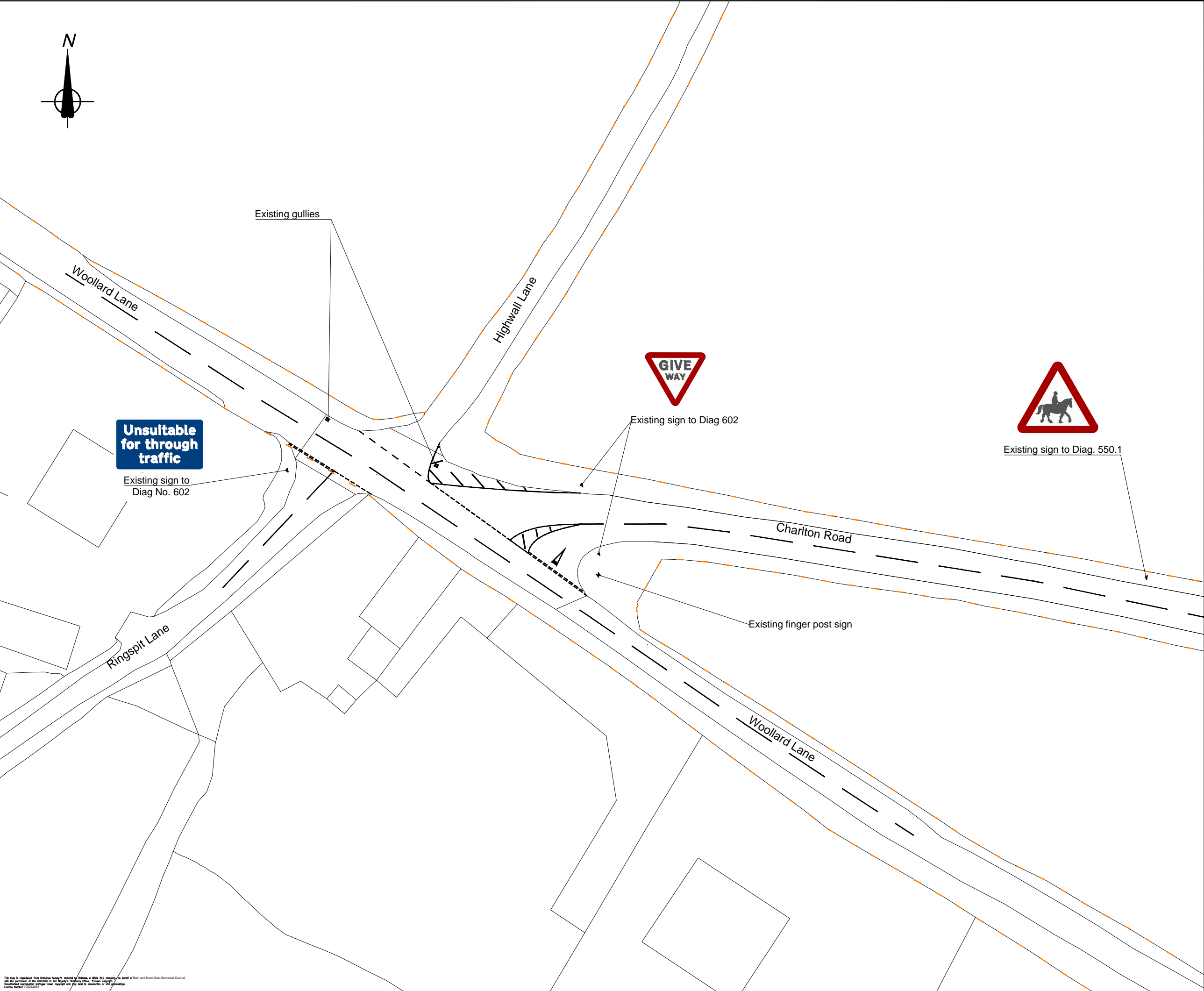
Option 2 revises the priority at the junction in line with the predominant traffic flow. This could encourage higher vehicle speeds between Charlton Road and Woollard Lane (W) and additional signing/road markings and a reduction in speed limit may be required to mitigate this. A speed limit review of Charlton Road, between Bilbie Green and the A37, would be necessary to establish an appropriate, enforceable and self-explaining limit. Visibility from Woollard Lane (E) is restricted. This, combined with the skewed approach angle, is likely to increase the risk of failure to give way collisions from this approach, and would require a departure from Standard or acquisition of third party land.

Option 3 introduces a 28m normal roundabout which requires third party lane in order to achieve forward visibility on the Woollard Lane (W) approach. Visibility from Woollard Lane (E) is restricted and would require a Departure from Standard. The junction would reduce vehicle speeds and enable a lower speed limit to be introduced but at considerable cost in comparison to options 1 and 2.

Summary - Option 2 is likely to represent the most favourable cost benefit ratio in terms of safety and potentially address the anecdotal queuing issues on Charlton Road. To determine the operational benefits of the change in priority, Option 2 should be modelled. This will establish if there is a favourable cost benefit ratio in terms of economy and safety to warrant the likely purchase of third party land required to provide appropriate visibility splays from Woollard Lane (east) under the revised priority arrangement.



## Appendix A: Figures



- Notes
1. All signs, road markings and gully locations are indicative.
  2. All sign faces are based to the Traffic Signs Regulations and General Directions 2016.

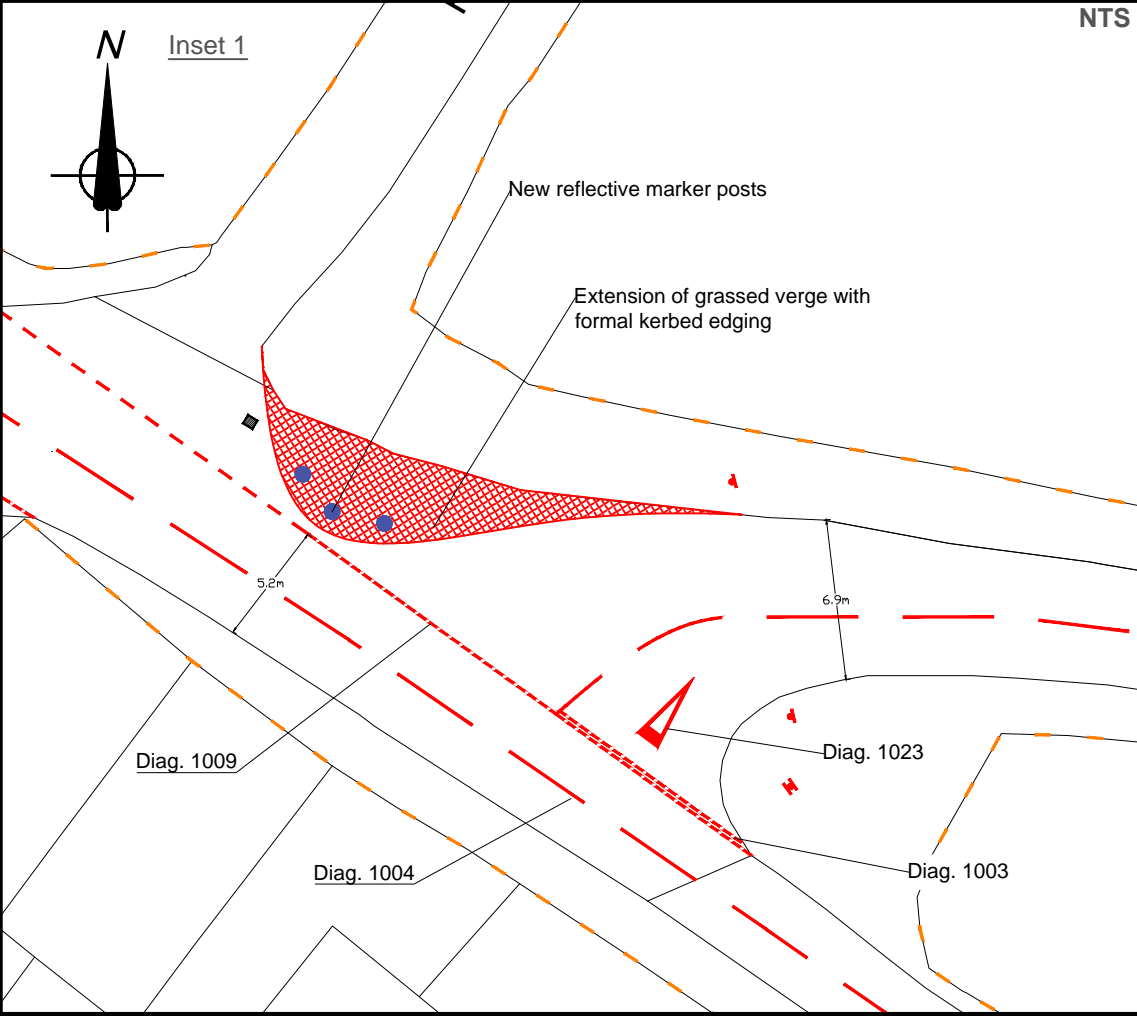
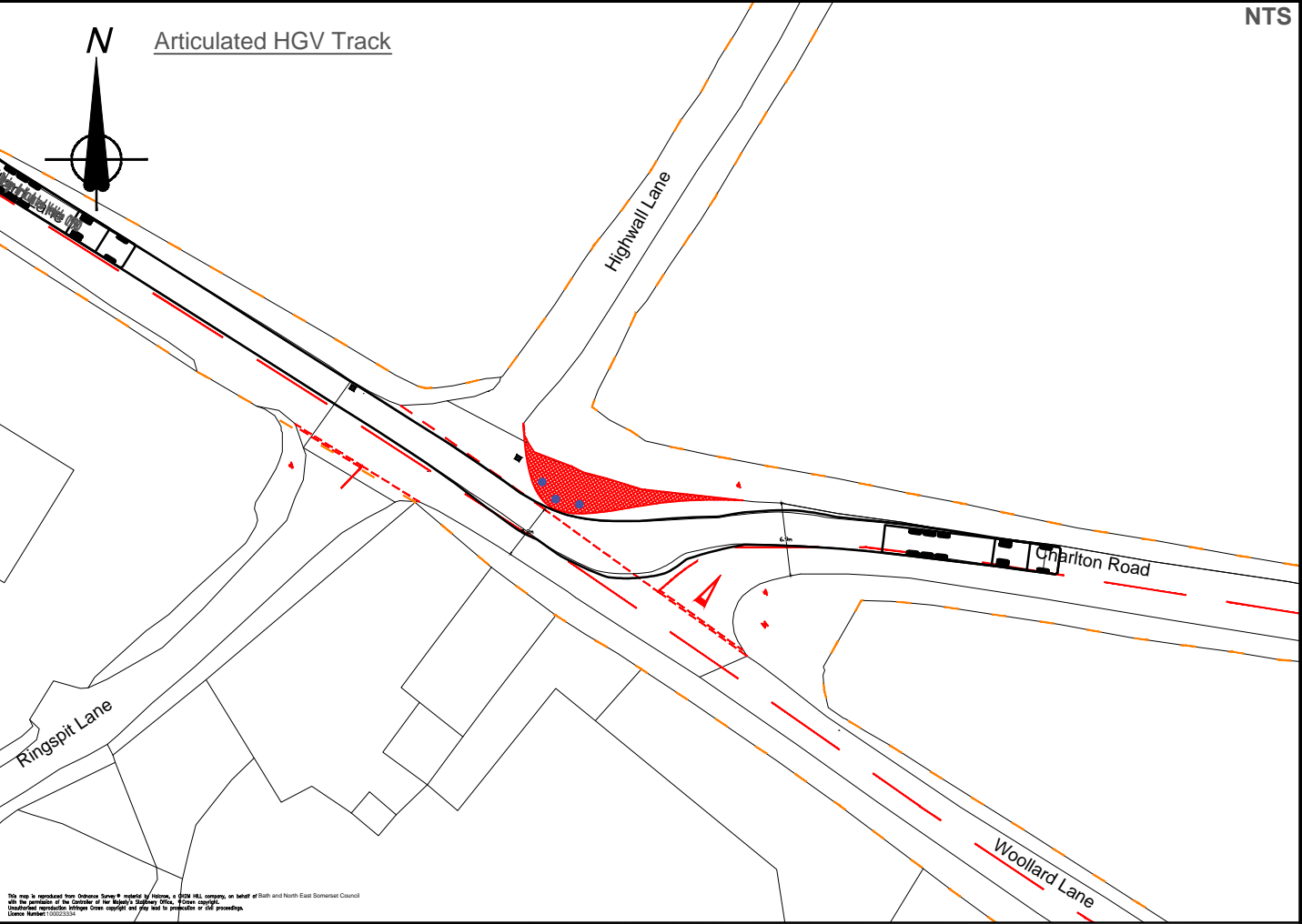
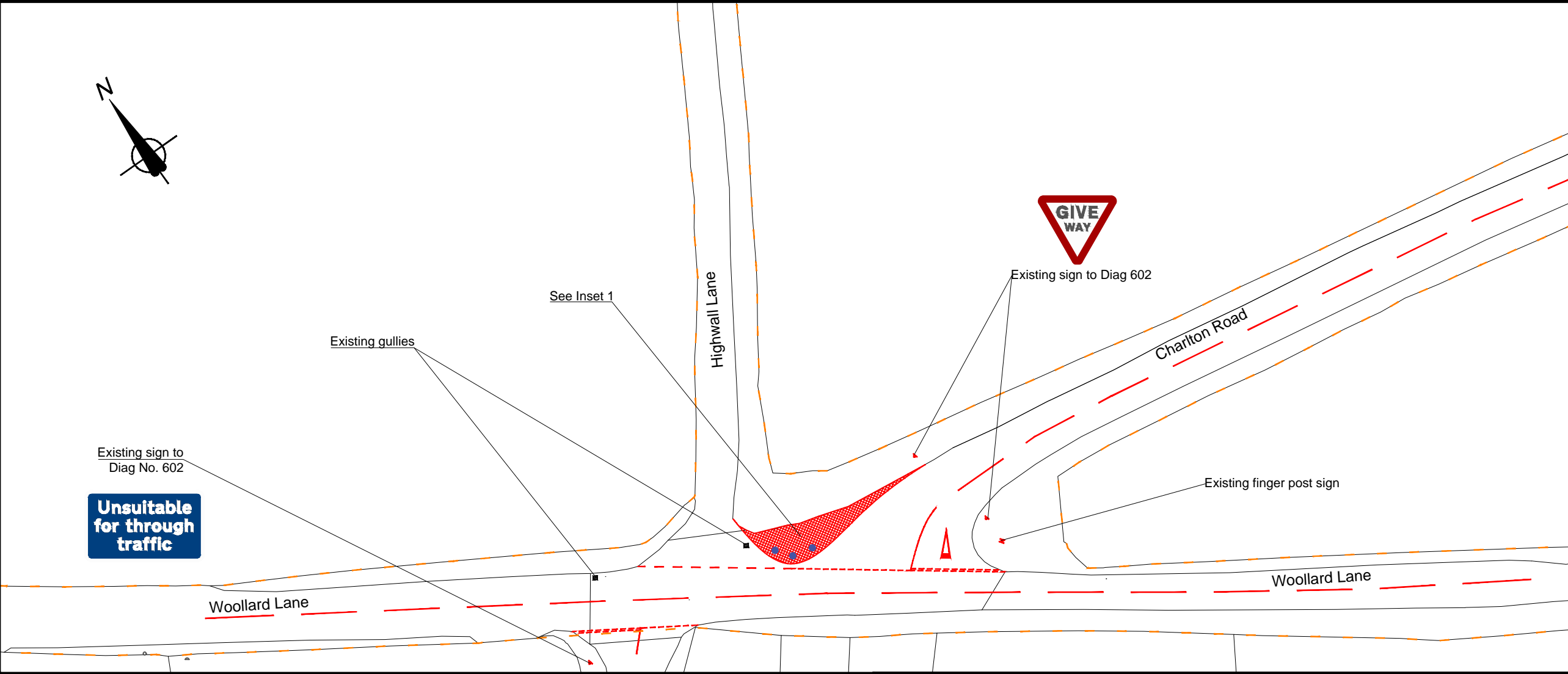
- Legend
- Sign
  - Finger Post Sign
  - Gully
  - Highway Boundary

| Rev  | By | Chkd | Apprd | Date | Description    |
|--|----|------|-------|------|----------------|
| Client   |    |      |       |      |                |
|  |    |      |       |      |                |
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|  |    |      |       |      |                |
| Project  |    |      |       |      |                |
| Keynsham - Five Ways Junction  |    |      |       |      |                |
| Drawing  |    |      |       |      |                |
| Figure 2<br>Existing Layout  |    |      |       |      |                |
| Drawn by: SM Date: 06/07/2016  |    |      |       |      |                |
| Checked by: AF Date: 14/07/2016  |    |      |       |      |                |
| Approved by: AF Date: 14/07/2016   |    |      |       |      |                |
| Drawing No.<br>674726.AI.08.01-FW-Fig2   |    |      |       |      | Revision<br>-- |
| Drawing Scale: 1:250 at A1; 1:500 at A3  |    |      |       |      |                |

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Drawing file path & name  
X-reference file path  
User and Plot Date





- Notes
1. All signs, road markings and gully locations are indicative.
  2. All sign faces are based to the Traffic Signs Regulations and General Directions 2015.
  3. New sign to Diag 501 and 502 to be located 180m (200 yards) from give way markings on Charlton Road.



- Legend
- Sign
  - Finger Post Sign
  - Gully
  - Highway Boundary

| Rev | By | Chkd | Appvd | Date | Description |
|-----|----|------|-------|------|-------------|
|-----|----|------|-------|------|-------------|

Client  
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Project  
**Keynsham - Five Ways Junction**

Drawing  
**Figure 3  
Option 1  
Minor improvements to  
existing priority**

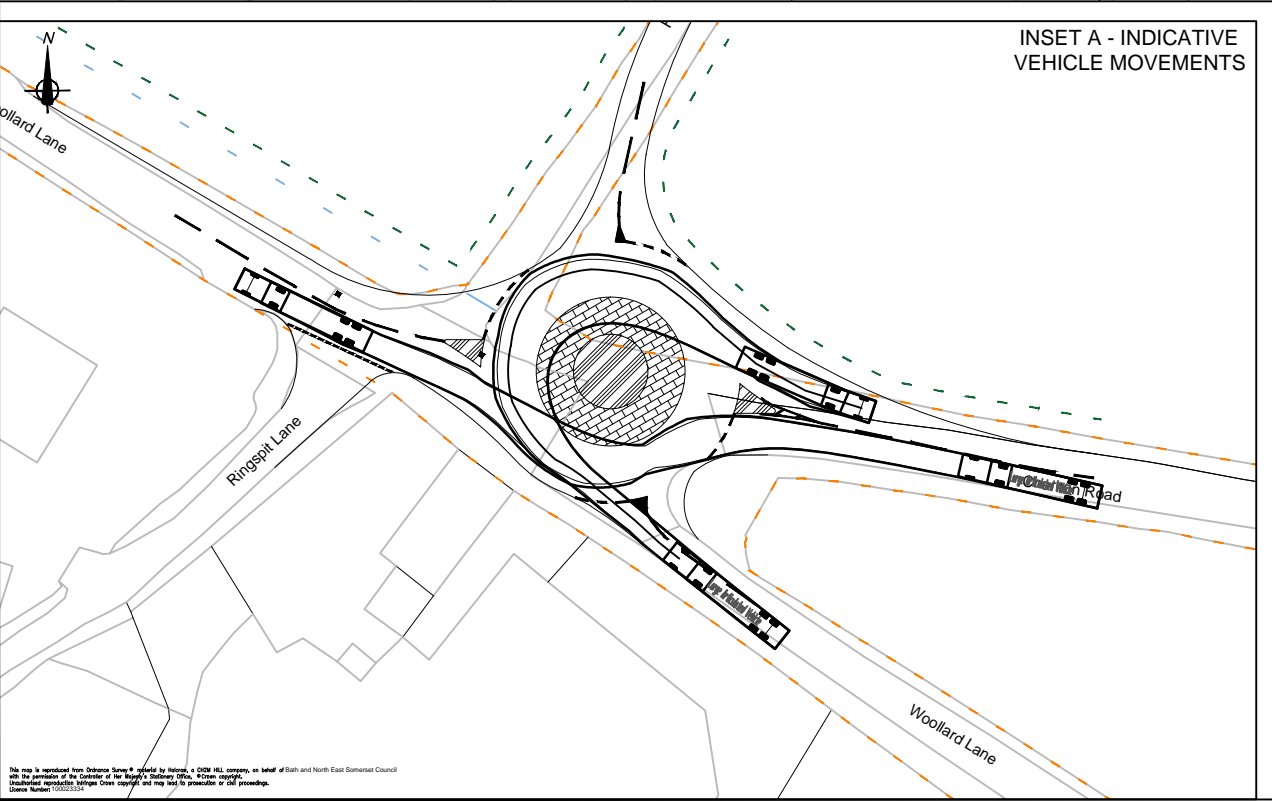
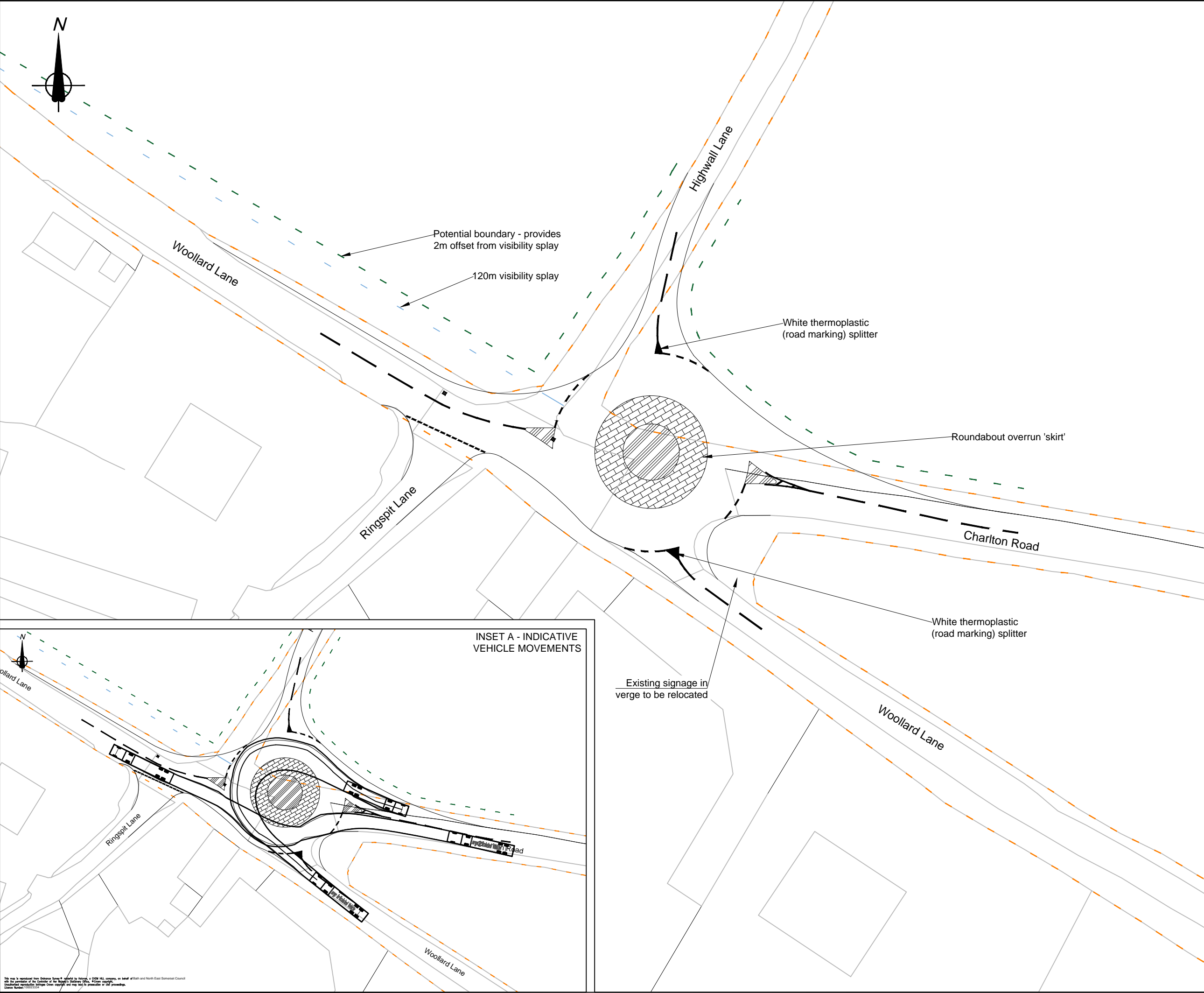
|                  |                   |
|------------------|-------------------|
| Drawn by : SM    | Date : 06/07/2016 |
| Checked by : AF  | Date : 14/07/2016 |
| Approved by : AF | Date : 14/07/2016 |

| Drawing No.            | Revision |
|------------------------|----------|
| 674726.AI.08.01-FW-002 | --       |

Drawing Scale : 1:250@A1; 1:500@A3 (main) & 1:250@A1; 1:500@A3 (inset)







Notes

1. All road markings and gully locations are indicative.

Legend

- Existing Gully
- Proposed kerb line
- Built up splitter/rbt island
- Roundabout overrun
- Highway Boundary
- Potential rbt boundary
- 120m visibility splay
- Road markings

**CONCEPT**

| Rev  | By | Chkd | Apprvd | Date | Description |
|--|----|------|--------|------|-------------|
| Client   |    |      |        |      |             |
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| Project  |    |      |        |      |             |
| Keynsham - Five Ways Junction  |    |      |        |      |             |
| Drawing  |    |      |        |      |             |
| Figure 5 - Option 3<br>28m ICD Standard Roundabout   |    |      |        |      |             |
| Drawn by : DH Date : 15/07/2016  |    |      |        |      |             |
| Checked by : AF Date : 18/07/2016  |    |      |        |      |             |
| Approved by : AF Date : 18/07/2016   |    |      |        |      |             |
| Drawing No.  |    |      |        |      | Revision    |
| 674726.AI.08.01-FW-005   |    |      |        |      | --          |
| Drawing Scale : 1:250 at A1; 1:500 at A3 - Inset NTS   |    |      |        |      |             |

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