

Asda Roundabout Improvement Study

Preliminary Design Report

Hampshire County Council / Portsmouth City Council

15 January 20133

ATKINS

Notice

This document and its contents have been prepared and are intended solely for Hampshire County Council / Portsmouth City Council's information and use in relation to the Asda Roundabout Improvement Study.

Atkins Limited assumes no responsibility to any other party in respect of or arising out of or in connection with this document and/or its contents.

This document has 37 pages including the cover.

Document history

Job number: 5113005			Document ref: 5113005 Asda Roundabout Improvement Study V1.0			
Revision	Purpose description	Originated	Checked	Reviewed	Authorised	Date
Rev 0.7	Draft	JM / RF	JM	SS	SS	11/01/13
Rev 1.0	Final	JM	RF	JM	SS	15/01/13

Client signoff

Client	Hampshire County Council / Portsmouth City Council
Project	Asda Roundabout Improvement Study
Document title	Asda Roundabout Improvement Study
Job no.	5113005
Copy no.	
Document reference	5113005 Asda Roundabout Improvement Study V1.0

Table of contents

Chapter	Pages
1. Introduction	6
1.1. Background	6
1.2. Study Objectives	6
1.3. Report Structure	6
2. Existing Situation	7
2.1. Description	7
2.2. Issues	9
3. Accident Analysis	11
3.1. Analysis by Location	11
3.2. Summary	13
4. Proposed Development	14
4.1. Dunsbury Hill Farm Development	14
4.2. McDonalds	14
5. Design Options and Assessment	15
5.1. Methodology	15
5.2. Options Tested Using SRTM Scenario	15
5.3. Options Tested Using 2011 Plus Low Growth Scenario	19
6. Preferred Design	21
6.1. Scheme Details	21
6.2. Preliminary Construction Cost Estimate	24
6.3. Stage 1 Road Safety Audit	25
7. Conclusions and Recommendations	26
7.1. Conclusions	26
7.2. Recommendations	26
Appendices	28
Appendix A. 5113005/TP/LP/002 Rev A	29
Appendix B. Accident Data	30
B.1. Injury Collision Data	30
B.2. Contributory Factors Report Summary	30
Appendix C. Junction Modelling Technical Note	31
Appendix D. Land Ownership Plan	32
Appendix E. Preferred Option Preliminary Design Drawings	33
Appendix F. Preliminary Construction Cost Estimate	34
Appendix G. Stage 1 Road Safety Audit	35

Tables

Table 1.	Local Bus Routes and Frequencies	7
Table 2.	Queue Length Survey Summary	9
Table 3.	Bus Journey Time Survey Summary	9
Table 4.	Collisions by Severity from 21/06/2007 – 27/03/2012	11
Table 5.	LinSig Modelling Results for Preferred Option – AM Peak	22
Table 6.	LinSig Modelling Results for Preferred Option - PM Peak	23
Table 7.	Preliminary Cost Estimate	25

Figures

Figure 1. Local Bus Routes

1. Introduction

Atkins has been commissioned jointly by Hampshire County Council (HCC) and Portsmouth City Council (PCC) to investigate options to improve the operation of the Asda Roundabout and the Park House Farm Way junction in Havant, Hampshire.

1.1. Background

The 'Asda' roundabout in Havant is a five arm roundabout forming the junction of Hulbert Road / Purbrook Way / Asda Access. HCC have identified that there are currently congestion and operational issues at the junction and have programmed to investigate measures to improve the junction in the future.

As part of the proposed Dunsbury Hill Farm development the traffic modelling has indicated that the traffic flows generated by the development would further exacerbate peak hour congestion on some arms of the Asda Roundabout. In addition, the proposed McDonalds development adjacent to the junction will contribute further to the existing and future congestion and operational issues.

At a meeting on 13th February 2012 between HCC and PCC, as land owner of Dunsbury Hill Farm, it was agreed that measures are to be investigated to resolve the current and future congestion at the roundabout.

It has also been identified by HCC that there are currently delays to buses exiting Park House Farm Way onto Purbrook Way, and a general perception that there is a higher than average number of accidents at this location. As such, the adjacent Park House Farm Way junction has also been included within the study.

1.2. Study Objectives

The objective of the study is to develop a scheme at the Asda Roundabout to accommodate the 2026 background traffic flows plus the additional development traffic directly associated with Dunsbury Hill Farm proposal.

The study will also quantify and assess the issues identified at the Park House Farm Way / Purbrook Way junction and as such will include a review of accidents and identification of bus delays at the junction. Any solution developed for the Park House Farm Way junction will be considered in conjunction with the solution at the Asda Roundabout to ensure they operate effectively as they are in close proximity.

1.3. Report Structure

The remainder of the report is structured as follows:

- Section 2 outlines the existing conditions;
- Section 3 summarises the accident analysis;
- Section 4 outlines the proposed future developments within the vicinity, including Dunsbury Hill Farm and McDonalds;
- Section 5 presents the design options and assessment;
- Section 6 outlines the preferred design; and
- Section 7 summarises the document and outlines recommendations.

2. Existing Situation

2.1. Description

The Purbrook Way / Hulbert Road junction ('Asda Roundabout') is located to the east of the A3(M) at Havant, forming the junction of Hulbert Road / Purbrook Way / Asda Access (Larchwood Avenue). It is a five arm conventional roundabout with a two lane circulatory carriageway. The following lane arrangements exist on the approaches:

- Purbrook Way East - single lane carriageway flaring to two lanes on the approach to the roundabout;
- Hulbert Road South - single lane carriageway flaring to two lanes on the approach to the roundabout;
- Asda Access Road - single lane approach, although vehicles typically queue in two lanes;
- Purbrook Way West - single lane carriageway flaring to two lanes on the approach to the roundabout; and Hulbert Road South - single lane approach.

The Park House Farm Way / Purbrook Way junction is located to the east of the Asda Roundabout. It is a three arm priority junction, with the following lane arrangements:

- Park House Farm Way – single lane carriageway flaring to two lanes on the approach to the junction; and
- Purbrook Way – single lane carriageway with a right-turn pocket for access to Park House Farm Way.

The Purbrook Way / Winchfield Crescent junction is located in close proximity to the Purbrook Way / Park House Farm Way junction. Winchfield Crescent provides access to a residential area.

2.1.1. Public Transport

There are five bus routes that operate within the vicinity of the study area, as summarised in Table 1 below and illustrated in Figure 1.

Table 1. Local Bus Routes and Frequencies

Route	From	To	Peak Hour Frequency (buses per hour)
20	Havant	Portsmouth	2
36	Southbourne	Asda	1
37	Havant	Alton	1
39	Havant	Wecock Farm	4
63	Havant	Fareham	1

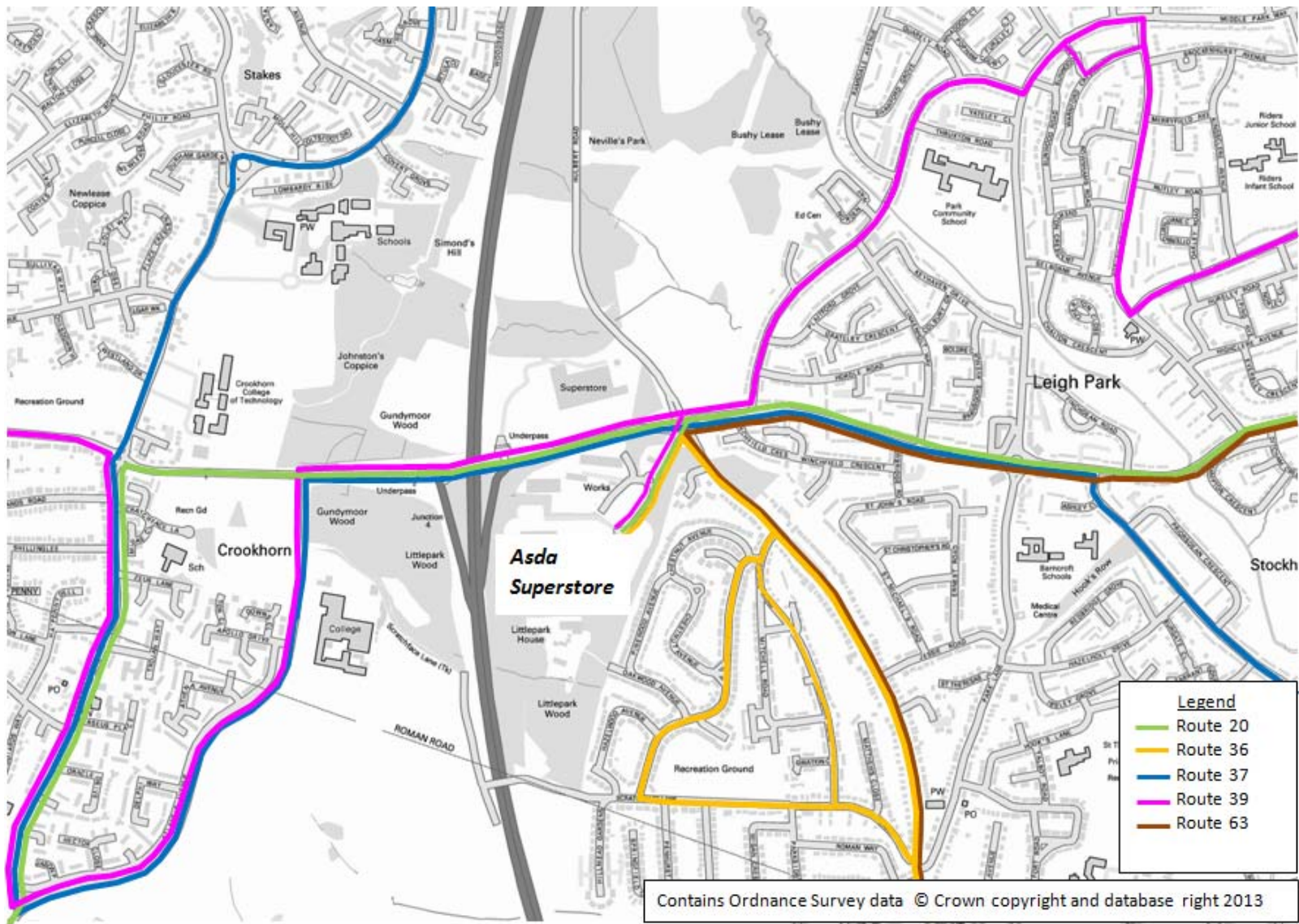
In addition to the above services, Asda operate a number of free bus services. These provide separate services between Asda and Eastney, Milton, Portchester, Petersfield, Hayling Island, Denmead, Clanfield, Southbourne and Westbourne. Services operate on one day of the week to each location.

In the vicinity of the Asda Roundabout there are bus stop lay bys at the following locations:

- Purbrook Way West – Westbound carriageway on the exit from the Asda Roundabout, served by Routes 20, 37 and 39;
- Purbrook Way East – Eastbound carriageway between Hulbert Road and Park House Farm Way, served by Routes 20, 37, 39 and 63; and
- Hulbert Road South – Southbound carriageway between the Asda Roundabout and Willowdene Close, served by Routes 36 and 63.

There are on-carriageway bus stops on Park House Farm Way between Hordle Road and Purbrook Way. These stops are served by Route 39. The nearest rail station is Bedhampton, located approximately 1.8 km to the south of the Asda Roundabout.

Figure 1. Local Bus Routes



2.2. Issues

2.2.1. Traffic Conditions

The Asda Roundabout currently experiences congestion and together with Park House Farm Way has been identified as a bus congestion location. A VISSIM micro-simulation model has been developed as they key indicator of traffic impact of the Dunsbury Hill Farm proposals covering the key junctions in the area, including the Asda Roundabout. The model is based on traffic counts carried out in May 2011, and has been validated and approved by the Highways Agency. The forecast scenarios assessed in the VISSIM model include Forecast Year 2026 without development.

The modelling results indicate that in 2026, congestion will increase at the Asda Roundabout without either the Dunsbury Hill Farm or McDonald's developments. The largest increases in queue lengths (without these developments) are generally predicted in the PM Peak, with an increase of 52 metres (approximately 10 vehicles) on Hulbert Road North; 374 metres (75 vehicles) on Hulbert Road South; and 310 metres (62 vehicles) on Purbrook Way West. The largest increase on Purbrook Way East is in the AM Peak, with an additional 212 metres of queued vehicles predicted (approximately 42 additional vehicles).

2.2.2. Pedestrians

To ensure any proposed scheme accommodates the pedestrian movements at the junction site observations were undertaken to understand pedestrian desire lines. The observations are illustrated on Drawing Number 5113005/TP/LP/002 Rev A in Appendix A. The observations indicate that the main pedestrian movements are east-west with the majority of north-south crossings occurring at the pedestrian refuge in the vicinity of Park House Farm Way and at the controlled crossing on Purbrook Way West.

2.2.3. Bus Delays

To assess the level of delay to buses on the Park House Farm Way approach to the Purbrook Way junction queue length and bus journey time surveys were undertaken on Thursday 24th May and Friday 25th May 2012 between 0700-1000 hours and 1600-1900 hours.

The queue length data is summarised in Table 2 and indicates that the queue lengths are on average 25 metres in the AM Peak and 19 metres in the PM Peak. The maximum recorded queues occurred in the AM Peak and reached 70 metres.

Table 2. Queue Length Survey Summary

Day	Queue Length (metres)			
	AM Peak (0700-1000 hours)		PM Peak (1600-1900 hours)	
	Average	Maximum	Average	Maximum
Thursday 24 th May	27m	70m	17.5m	50m
Friday 25 th May	23m	70m	21m	45m

The journey time data recorded the time taken from joining the back of the queue on Park House Farm Way to the time the bus crossed the give way line at the Purbrook Way junction. The results are summarised in Table 3.

Table 3. Bus Journey Time Survey Summary

Day	Journey Time (mm:ss)			
	AM Peak (0700-1000 hours)		PM Peak (1600-1900 hours)	
	Average	Maximum	Average	Maximum
Thursday 24 th May	00:21	00:51	00:22	00:39
Friday 25 th May	00:38	01:04	00:28	01:02

The results of the journey time analysis indicate that the average journey time is 29 seconds in the AM Peak and 25 seconds in the PM Peak. However, journey times were observed to reach a maximum of just over one minute.

Based on the data above the level of delay to buses is not significant and alternative methods of control may not improve bus journey times exiting Park House Farm Way. However, site observations on other days to the survey indicate that bus delays could be higher.

3. Accident Analysis

A high level review of accident data has been undertaken using injury collision data provided by Hampshire County Council.

Injury collision data was provided for the period from 21 June 2007 to 27 March 2012 for the existing highway network shown in Appendix B.1.

Table 4 below shows the reported injury collisions that occurred by severity in the latest available five year period from 21/6/2007 – 27/3/2012.

Table 4. Collisions by Severity from 21/06/2007 – 27/03/2012

Collisions in the period:	Fatal collisions (casualties)	Serious collisions (casualties)	Slight collisions (casualties)	Total collisions (casualties)	KSI %
21/06/2007 – 31/01/2007	0	2 (2)	3 (3)	5 (5)	6.4
01/01/2008 – 31/01/2008	0	0	2 (2)	2 (2)	0
01/01/2009 – 31/01/2009	0	0	7 (7)	7 (7)	0
01/01/2010 – 31/01/2010	0	1 (1)	5 (8)	6 (9)	3.2
01/01/2011 – 31/01/2011	0	0 (0)	8 (10)	8 (10)	0
01/01/2012 – 27/03/2012	0	2 (2)	1 (1)	3 (3)	6.4
Total	0 (0)	5 (5)	26 (31)	31 (36)	16

As shown in Table 4 above, five serious and 26 slight injury collisions occurred between 21/06/2007 and 27/03/2012 in the area under consideration. There was an average of 7.2 casualties per year (1.1 casualties per collision).

A study of the interpreted listings (Contributory Factors Report Summary Appendix B.2) showed that the general injury collision characteristics were as follows:

- Most collisions (28, 90%) occurred in dry conditions with three (10%) in wet/damp conditions;
- Most collisions (30, 97%) occurred during fine weather conditions, with one (3%) occurring when it was raining; and
- Four (13%) collisions occurred in dark conditions.

3.1. Analysis by Location

This section provides a high level analysis of the clusters of collisions in the area under consideration. The clusters are discussed from west to east of the study area.

3.1.1. Purbrook Way west of the Asda Roundabout

There were two serious and three slight collisions that resulted in two serious and three slight casualties on the section of Purbrook Way west of the Asda Roundabout. Analysis of the collision trends in this location revealed that four of these collisions had the Contributory Factor 'Failed to look properly', and four involved vulnerable road users; there were three pedestrian collisions (two of which were children), and one involving a cyclist.

The pedestrian collisions are described in more detail below:

- The serious collision occurred when a vehicle travelling west in slow moving traffic hit a pedestrian that was looking the wrong way and walked in front of the vehicle from the driver's offside.
- One slight collision occurred when a vehicle travelling east along Purbrook Way struck a child pedestrian who walked from the near side travelling south without looking.

- One slight collision occurred when a vehicle in heavy traffic stopped to allow a pedestrian to cross Purbrook Way from the north pavement and a southbound pedestrian ran into the road without looking and was struck by a vehicle travelling east approaching the roundabout.

The serious collision with a cyclist injury occurred when a cyclist travelling east on the cycle path stopped to let two other pedal cyclists travelling west pass, and as this happened the eastbound cyclist was knocked from the cycle path into the road and struck by a vehicle travelling east.

There was one slight collision that involved a vehicle colliding with the rear of another parked vehicle and had the 'Contributory Factor 'Failed to look properly' (Driver/Rider – Error).

3.1.2. Asda Roundabout

There was one serious and nine slight collisions that resulted in one serious and 13 slight casualties on the Asda Roundabout. The serious collision involved pedestrian injury and occurred when a pedestrian that was travelling east along Larchwood Avenue stepped out across the path of traffic travelling northeast along Purbrook Way. The Contributory Factor was 'Failed to look properly' (pedestrian). The nine slight collisions are discussed in further detail below:

Five of the collisions were the result of one vehicle hitting the rear of another vehicle:

- One collision occurred when a vehicle travelling north-west stopped at the roundabout and was hit in the rear by another vehicle;
- One collision occurred when a vehicle travelling north-east along Larchwood Avenue entered the roundabout with B2150 Purbrook Way and collided into another vehicle travelling west on the roundabout;
- One collision occurred when a vehicle travelling north-west along the B2150 Hulbert Road entered the roundabout from Purbrook Way and stopped on the roundabout ahead of a van and collided with the rear of the vehicle;
- One collision occurred when two vehicles were travelling north-east along Larchwood Avenue from Asda superstore and one of the vehicles failed to brake and collided with the rear of the other vehicle waiting at the roundabout junction with B2150 Hulbert Road; and
- One collision occurred when a vehicle travelling north-west along Hulbert Road stopped at Purbrook Way roundabout and was struck from behind by another vehicle.

One collision occurred when a HGV travelling north-east towards the roundabout was in the right hand lane but indicating left due to length of the vehicle. A motorcycle then attempted to come up the inside as the vehicle was turning left, and as a result the motorcycle collided with the nearside of the HGV.

One collision occurred when a vehicle travelling north along the B2150 Hulbert Road failed to give way and pulled onto the roundabout causing another vehicle travelling west to brake and stop on the roundabout. A vehicle also travelling north along the B2150 Hulbert Road pulled out and hit the vehicle that was travelling west.

One collision occurred when a taxi travelling west along Purbrook Way broke hard on the approach to the roundabout due to oncoming traffic, which forced the driver to swerve onto the footpath and resulted in the rear seat passenger being thrown forward into the driver's seat.

One collision occurred when the driver of a vehicle travelling west negotiating the roundabout from Purbrook Way blacked out. The vehicle continued and hit the offside of another vehicle facing northwest waiting to enter the roundabout from Hulbert Road and pushed it onto the nearside verge.

3.1.3. Purbrook Way and Park House Farm Way Junction

There were seven slight collisions at the Purbrook Way and Park House Farm Way junction (one slight collision incorrectly plotted as occurring on Purbrook Way on the approach to the junction with Winchfield Crescent).

- Five slight collisions involved one vehicle travelling east along Purbrook Way colliding with a right turning vehicle from Park House Farm Way. On three occasions the second vehicle failed to give way;

- One slight collision occurred when one vehicle failed to stop and collided with the rear of a vehicle that was travelling west and stationary at temporary traffic signals; and
- One slight collision involved a pedal cyclist travelling east crossing into the path of a vehicle turning left from Purbrook Way.

3.1.4. Purbrook Way link section east of Park House Farm Way

There was one serious and two slight collisions on the link section of Purbrook Way east of the Park House Farm Way.

- The serious collision occurred when a car travelling east along Purbrook Way pulled into a bus stop against a north kerb before returning back onto the main carriageway without looking and collided with a motorcyclist travelling east. The collision had two Contributory Factors both of which were Driver/Rider – Error.
- One slight collision occurred when a vehicle travelling east along Purbrook Way in slow moving traffic collided with a vehicle in front as a result of the driver's foot slipping off the brake.
- One slight collision occurred when a van that was situated in a layby facing east pulled out to complete a U-turn in order to head west collided with a motorcyclist that was travelling east along Purbrook Way.

3.2. Summary

Although the above analysis indicates that there are not a high number of reported accidents in the study area, it should be noted that damage only accidents are not accounted for but may still cause delay at the junctions.

As outlined above, it has been identified by HCC that there are currently delays to buses exiting Park House Farm Way onto Purbrook Way, and a general perception that there is a higher than average number of accidents at this location. It should be noted that there were four similar accidents at Park House Farm Way (that occurred when one vehicle travelling east along Purbrook Way colliding with a right turning vehicle from Park House Farm Way) which may be due to traffic exiting the Asda Roundabout and still having their left turn indicator on.

4. Proposed Development

4.1. Dunsbury Hill Farm Development

Atkins has been commissioned by Portsmouth City Council (PCC) to prepare a hybrid planning application for the development of land at Dunsbury Hill Farm (DHF), near Waterloooville in Hampshire. The development proposal involves the construction of a business park in two phases with an associated hotel development, the impact of which is assessed within a Transport Assessment (TA) report produced in support of the planning application. It should be noted that this proposal is at planning stage, and therefore not a committed development.

A new access will be provided via a link to the B2150 Hulbert Road to the west and to the east into Leigh Park. The latter will operate as a bus only link enforced via a bus gate and will also serve to provide a second point of access in emergencies.

The site is proposed to be developed in two phases with an anticipated timescales of four years to completion for each phase. Full occupation is currently expected by 2026.

The results from the associated VISSIM micro-simulation modelling show that the local highway network is predicted to experience an increase in queues, delays and journey times between the future base and 'with development' scenarios on most approaches. One location is at the Asda Roundabout, although all queues were predicted to be within available queuing space. The roundabout is predicted to experience an increase in congestion and journey times without the development, with the additional development exacerbating the baseline (without development) congestion and queuing issues. However; it should be noted that the queues and delays do not increase on all approaches; some approaches would see a decrease with development. This is a result of different flows on all arms, due to increased demand, affecting the priority and gap opportunities at the roundabouts, and hence different affects on queues and delays.

The TA concludes that capacity is constrained at the Asda Roundabout in the future years of assessment even without development. Therefore it recommends that improvements would be required at this junction to improve capacity and reduce the queues and delays even without the development.

4.2. McDonalds

ADL Traffic Engineering has prepared a TA to support the planning application for a 462sqm GFA McDonald's Restaurant with drive-thru facilities at Larchwood Avenue, Havant, adjacent to the existing Asda supermarket.

The restaurant will provide 35 car parking spaces, including three disabled spaces, two motorcycle spaces, and eight cycle parking spaces.

The traffic generation of the development has been calculated within the TA based on traffic counts and customer interview surveys at existing McDonald's in locations associated with major food retail, and a daily trip profile calculated from transaction data from the surveyed restaurants.

Within the TA the traffic impact of the proposed development is not considered to be material in traffic engineering terms, with a less than five percent daily variation in flows being predicted. The results from the junction modelling analysis show that the Asda Roundabout will operate over capacity with or without the development, and that the proposed development would not materially alter the base situation.

5. Design Options and Assessment

This section provides details of the options considered for the Asda Roundabout and the Park Farm House Way / Purbrook Way junction.

As part of the West of Waterlooville MDA development, Purbrook Way is being widened to two lanes in each direction from Stakes Hill Road / Crookhorn Lane to just east of the A3(M) J4. HCC have highlighted a desire to continue this widening eastwards along Purbrook Way to the Asda Roundabout. The option development has therefore included consideration of implementing a dual carriageway on Purbrook Way between the A3(M) and the Asda Roundabout.

5.1. Methodology

As discussed and agreed with HCC, two sets of traffic data were used in the assessment and development of the options for improvements at Asda Roundabout. The Options were then tested using LinSig and ARCADY to deduce the predicted delays, queue lengths and degree of saturations (junction capacity), as detailed below:

- 1. Sub-Regional Transport Model (SRTM) 2026 with Dunsbury Hill Development (Phase 1 and 2).**
Traffic Volumes from the SRTM (with the proposed Dunsbury Hill Farm mixed use development) was initially used to identify options for the roundabout improvement. It was noted that using the SRTM traffic distribution and flows meant that unrealistic conditions were observed during our assessment. For example, the SRTM model routes 70 percent of DHF development traffic travelling to / from the A3(M) South via the Asda Roundabout, with the remaining 30 percent travelling via the A3(M) J3. Using VISSIM dynamic assignment, only 15 percent of the development traffic travelling to / from the A3(M) South uses the Asda Roundabout, which is considered a more realistic distribution on a local level when the proximity of the DHF site to the A3(M) J3, and the existing congestion at the Asda Roundabout, are taken into consideration. Options derived and tested with this scenario represent a worst-case scenario.
- 2. 2011 traffic counts growthed using Low Growth from TEMPRO**
As outlined above, it is considered that the traffic flows derived from the SRTM represented unrealistic conditions. As such, in order to assess the junctions more realistically an alternative scenario was considered. Following discussions with HCC, it was agreed that 2011 baseline traffic counts growthed using Low Growth from TEMPRO should be used in place of the baseline SRTM flows to test the options with more realistic conditions.

The findings of the modelling are presented within the Junction Modelling Technical Note (Appendix C), with the key findings also presented for each option below.

There are a number of land owners in the vicinity of the Asda Roundabout. Any land take required to achieve a feasible scheme has been limited to land owned by PCC or that is within the existing highway boundary for which HCC are the authority. A plan of land ownership is provided on Drawing Number 5113005/TP/LO/001 Rev A in Appendix D.

5.2. Options Tested Using SRTM Scenario

5.2.1. Asda Roundabout

5.2.1.1. Larger Conventional Roundabout

This option comprises a larger roundabout than existing, which aims to provide more gap seeking opportunity, hence reducing the delays and queues at the critical approaches such as Purbrook Way East, Hulbert Road North and Purbrook Way West.

The junction layout has been tested using ARCADY. The results indicate that the proposed design has insufficient capacity to accommodate the anticipated traffic flows (with development). The model predicts that the Purbrook Way East approach will experience the highest queues and delays of all the arms in both Peak Hours, operating over capacity in the AM Peak Hour and at capacity in the PM Peak Hour. This is

likely to be due to vehicles being unable to find suitable gaps to enter the roundabout because of high circulatory flow.

5.2.1.2. Signalised Crossroads

This option comprises the signalisation of the junction to create a crossroads and adjacent signal controlled T-junction to access the Asda superstore. The proposed signal controlled layout includes:

- Three lanes and a flare lane on the Purbrook Way West approach;
- Three lanes and a flare lane on the Purbrook Way East approach;
- Two lanes and two flare lanes on the Hulbert Road North approach; and
- Three lanes on the Hulbert Road South approach.

The junction layout has been tested using LinSig. The model predicts that three out of the five approaches will operate within capacity in both the AM and PM Peak Hours. The highest degree of saturation recorded is 125 percent, with an associated queue of 56 PCUs, on the Hulbert Road North approach in the PM Peak Hour. The highest degree of saturation recorded in the AM Peak Hour is 105 percent, with an associated queue of 34 PCUs, on the Purbrook Way East approach.

Whilst this layout offers additional capacity to accommodate the anticipated traffic flows, HCC have noted that the footprint of the scheme is considered too large compared to the expected duration of the congestion (i.e. the design was based on peak flows and the large junction may not be warranted in the off peak periods). HCC have also noted a desire to retain the existing roundabout to ensure the junction is sympathetic to the surrounding area and that vegetation/trees on the central island are retained.

5.2.1.3. Signalised Crossroads (Reduced Footprint)

Following feedback from HCC regarding the desire to ensure the junction is sympathetic to the surrounding area, the above design option was amended to reduce the footprint. The proposed signalised crossroads with reduced footprint layout includes:

- Two lanes and a flare lane on the Purbrook Way West approach;
- Two lanes and a flare lane on the Purbrook Way East approach;
- Two lanes and a flare lane on the Hulbert Road North approach; and
- Two lanes on the Hulbert Road South approach.

The junction layout has been tested using LinSig. The model predicts that the junction will operate over theoretical capacity, with only the Asda Access operating within capacity in both the AM and PM Peak Hours. As the junction offers limited capacity improvements compared to the future baseline scenario and involves a change in the junction type, which differs to HCC's aspirations, this option is not considered appropriate.

5.2.1.4. Signalised Conventional Roundabout

This option includes testing of a combination of different approaches to the roundabout being signalised, and different signal strategies applied. Various combinations have been tested using LinSig, including:

- Only Purbrook Way East node signal controlled with single lane exit on all arms;
- Only Purbrook Way East node signal controlled with two lane exit on Purbrook Way West and one lane exit on all other arms;
- Purbrook Way East, Purbrook Way West and Hulbert Road North nodes signal controlled with two stage timing plan;
- Purbrook Way East, Purbrook Way West and Hulbert Road North nodes signal controlled with three stage timing plan; and
- All approaches signal controlled.

The junction layouts have been tested using LinSig. The third option above (three nodes signalised) returns the best operational performance out of the five options, although the model for this option predicts that the northern circulatory carriageway operates over capacity, creating a queue which blocks back to the Purbrook Way West approach.

The modelling results for all of the signalisation options (based on 'with development' traffic flows) indicate that there is insufficient queuing capacity on the roundabout, resulting in congestion at the junction. As such, an alternative method was considered with each approach and the circulatory carriageway having exclusive right of way. However; this did not resolve congestion on the approaches.

5.2.1.5. Elongated Signalised Roundabout

This option comprises an elongated roundabout, which aims to optimise stacking capacity for the circulatory traffic, with the two Purbrook Way nodes signalised. All other nodes would remain priority controlled. Two different exit lane configurations have been tested using LinSig, comprising:

- Two lanes merging to one on all exits of the Asda Roundabout, with the exception of the Asda Access and Purbrook Way East; and

Two lanes merging to one on all exits of the Asda Roundabout, with the exception of the Asda Access. With single-lane exits on the Asda Access and Purbrook Way East (No. 1 above) the model indicates that the junction will operate over theoretical capacity on Hulbert Road North and Purbrook Way West, and will be approaching capacity on the circulatory carriageway. The highest degree of saturation recorded is 111 percent on Hulbert Road North in the PM Peak Hour, with an associated queue of 77 PCUs. In the AM Peak Hour the junction is predicted to operate under capacity, with the highest degree of saturation recorded being 98 percent on Purbrook Way East.

If the Purbrook Way East exit is increased to two lanes (No. 2 above), the model indicates that the roundabout would continue to operate over capacity, with a reduction of only four percent in the highest degree of saturation recorded being 107 percent on Hulbert Road North in the PM Peak Hour with an associated queue of 60 PCUs. The addition of two exit lanes on Purbrook Way East would however improve the operation of the circulatory carriageway.

5.2.1.6. Dedicated Left Turn Lane (Purbrook Way West to Hulbert Road North)

The provision of a dedicated left turn lane from Purbrook Way West to Hulbert Road North has been considered. DMRB TD 51/03 states that, when considering the use of segregated left turn lanes, vehicle composition and the total inflow at the roundabout entry, the proportion of left turning vehicles, and the number of entry lanes should all be examined. The following formula can be used as an initial assessment to determine whether the provision of a left turn lane merits further consideration.

The inclusion of a segregated left turn lane should be considered if:

$$L \geq \frac{F}{E}$$

Where: L is the flow of left turning vehicles;

F is the total entry arm inflow in vehicles per hour;

E is the number of proposed entry lanes onto the roundabout, including the segregated left turn lane.

When the flows for the worst case scenario (2026 + DHF development) are applied to the formula the flow of left turning vehicles is too low to consider a segregated left turn lane in both the AM and PM Peak Hours.

It should be noted that the possibility of introducing a sixth arm on the roundabout to provide access to PCC land to the north of the junction was raised by HCC. However, as this is dependent on PCC releasing the land for development, the provision of an additional arm has not been included in the design.

5.2.2. Park House Farm Way

A number of design options were developed for the Park House Farm Way junction and circulated to HCC for comment prior to completion of traffic modelling. Below is a summary of the options.

5.2.2.1. Traffic Calming

Given relatively low number and type of accidents recorded, it is considered that the implementation of traffic calming measures could improve safety at the junction, such as:

- Implementation of a raised table at the junction;
- Wider pedestrian refuges to encourage lower traffic speeds and provide more protection to pedestrians and cyclists;
- Reduction of the turning radii to encourage lower traffic speeds;
- Provision of anti-skid surfacing at the junction.; and
- Installation of a give way warning sign on Park House Farm Way.

5.2.2.2. Signalised Junction: All Movements Permitted

The accident review identified that there were four similar accidents at Park House Farm Way which may be due to traffic exiting the Asda Roundabout and still having their left turn indicator on. It was considered that the implementation of a signalised junction would mitigate this problem. This option comprises the signalisation of the junction with single lane approaches and all movements permitted. The existing right turn into Park House Farm Way would be retained.

Following a review of the design, the following feedback was provided by HCC:

- Vehicles turning right out of Winchfield Crescent will have limited space to join Purbrook Way before the stop line, and therefore may block westbound traffic on this road; and
- The reduction in turning space for right turners from Park House Farm Way onto Purbrook Way, due to the reduction from two lanes to one lane on Park House Farm Way, may impact queue lengths on Park House Farm Way, or block vehicles travelling on Purbrook Way.

Due to the above concerns, this option has been discounted and therefore not tested.

5.2.2.3. Signalised Junction: Winchfield Crescent Left-In / Left-Out.

This option comprises the signalisation of the junction with single lane approaches, as per the above, with Winchfield Crescent operating as left-in, left-out.

Following a review of the design, the following feedback was provided by HCC:

- As per the above, vehicles turning right from Park House Farm Way onto Purbrook Way may not be able to clear the junction due to queues on Purbrook Way. This may consequently increase queue lengths on Park House Farm Way, or block vehicles travelling east on Purbrook Way;
- The proposed continuous kerb line to eliminate turning into Winchfield Crescent will result in a single carriageway for eastbound traffic on Purbrook Way approaching the Asda Roundabout, which will not allow traffic to overtake in case of breakdown; and
- As the layout is restrictive, a no U-turn ban will need to be implemented.

Due to the above concerns, this option has been discounted and therefore not tested.

5.2.2.4. Signalised Junction: Additional Lanes

This option comprises the signalisation of the Park House Farm Way junction, with the Winchfield Crescent junction operating as left-in, left-out. The proposed signal controlled layout includes:

- One lane on the Purbrook Way East approach;
- One lane on the Park House Farm Way approach; and
- Two lanes on the Purbrook Way West approach, with a two lane exit on Purbrook Way East, merging to a single lane.

The junction layout has been tested using LinSig. The model predicts that the Park House Farm Way approach will operate over capacity in both the AM and PM Peak Hours, with Purbrook Way East also operating over capacity in the AM Peak Hour. The highest degree of saturation recorded is 120 percent, with an associated queue of 188 PCUs, on the Purbrook Way East approach in the AM Peak Hour. The highest degree of saturation recorded in the PM Peak Hour is 99 percent, with an associated queue of 10 PCUs, on the Park House Farm Way approach.

HCC noted that there is potential conflict where the eastbound lanes merge to one lane downstream of the junction in the vicinity of the parking bays. A potential solution would be for the nearside lane to be designated for traffic turning left only.

5.2.2.5. Mini Roundabout

This option comprises a mini roundabout, with single lane approaches on Purbrook Way and a two lane approach on Park House Farm Way.

Following a review of the design, the following feedback was provided by HCC:

- A roundabout is not suitable in this location as the flows on each arm are not balanced, hence will not allow the opportunity for vehicles to safely exit Park House Farm Way; and
- HCC would not favour a mini roundabout as it would not solve the flow issue which means that opportunities to exit from Park House Farm Way are minimal.

Due to the above concerns, this option has been discounted and therefore not tested.

5.2.2.6. Bus Gate

This option comprises a southbound bus only link on Park House Farm Way, between Hordle Road and Purbrook Way. A rising bollard would be installed on Park House Farm Way south of Hordle Road and the exit from Park House Farm Way would be restricted to right turns only.

Following a review HCC noted that the design would be difficult to enforce, and may cause safety problems. Consequently this option has been discounted and therefore not tested.

5.2.3. Combined Traffic Model

In order to ascertain how the Asda Roundabout and Park House Farm Way junctions will interact, the elongated roundabout and signalised junction options outlined above (with two lanes merging to one on all exits of the Asda Roundabout, with the exception of the Asda Access) have been combined within a model.

The combined junction layout has been tested using LinSig. The results indicate that the Asda Roundabout will operate over theoretical capacity on the Hulbert Road North and Purbrook Way West approaches, with the highest degree of saturation recorded being 107 percent with an associated queue of 87 PCUs. The Park House Farm Way signalised junction is predicted to operate over capacity on the Park House Farm Way arm, with the highest degree of saturation being 102 percent on the Park House Farm Way approach with an associated queue of 11 PCUs. It is also predicted that the queue on Purbrook Way West at the Park House Farm Way junction would extend back to the Asda Roundabout. Therefore, this option was not considered feasible.

5.3. Options Tested Using 2011 Plus Low Growth Scenario

Following discussions with HCC it was agreed that the designs should be tested using the 2011 traffic count data growthed using Low Growth from TEMPRO. The results are summarised below.

5.3.1. Elongated Roundabout and Signalisation of Park House Farm Way Junction

In order to consider how the Asda roundabout and Park House Farm Way junctions will interact, the elongated roundabout and signalised junction options have been combined within a model, comprising.

- Two lanes merging to one on all exits of the Asda Roundabout, with the exception of the Asda Access; and
- The signalisation of the Park House Farm Way junction.

The combined junction layout has been tested using LinSig for the worst-case Peak Hour (PM). The results indicate that the Asda Roundabout will operate over theoretical capacity on the Hulbert Road North approach, with the highest degree of saturation recorded being 109 percent with an associated queue of 101 PCUs. The Park House Farm Way signalised junction is predicted to operate within theoretical capacity, with the highest degree of saturation being 99 percent on the Park House Farm Way approach with an associated queue of 10 PCUs.

Following a meeting with HCC on 13th December 2012, it was identified that the merge on the eastbound exit from Park House Farm Way is unacceptable due to merging in close proximity to the well used existing

parking bays. The initial traffic modelling indicates that with a single lane exit from Asda Roundabout on Purbrook Way East the eastbound queue on the approach to Park House Farm Way would extend back through the Asda Roundabout. Consequently, if Park House Farm Way is to be signalised a two eastbound lanes through the junction would be required to avoid queues blocking back through the Asda Roundabout.

5.3.2. Additional Option

Following the meeting with HCC on 13th December 2012, a further option for the two junctions was tested. It was identified that the merge on the eastbound exit from Park House Farm Way is unacceptable due to merging in close proximity to the well used existing parking bays. As such, the alternative option comprised:

- Left turn flare on Purbrook Way West on the approach to Asda Roundabout designated for vehicles turning left into Hulbert Road North and Park House Farm Way;
- Three lanes on the northern circulatory section of the elongated roundabout to allow for the above;
- Two lane exit on Purbrook Way East with the nearside lane designated for vehicles turning left into Park House Farm Way and the offside lane for straight ahead traffic.
- One lane on the Purbrook Way East approach to the Park House Farm Way junction;
- One lane on the Park House Farm Way approach to the Park House Farm Way junction;
- One lane on each of the exits of the Park House Farm Way junction.

The combined junction layout has been tested using LinSig for the worst-case Peak Hour (PM).

The results indicate that Asda Roundabout will operate over theoretical capacity on the Hulbert Road North approach, with the queue in this location increasing significantly to 340 PCUs. This is a result of the need for traffic on Hulbert Road North to give way to three lanes of circulating traffic. However; the Park House Farm Way junction is predicted to operate within theoretical capacity on all arms, with the highest degree of saturation recorded being 79 percent on Park House Farm Way, with an associated queue of six PCUs. The longest queue recorded is 24 PCUs on Purbrook Way East.

In addition to the large increase in queues on Hulbert Road North there are a number of operational issues that have been identified:

- Given the high west-east flow at the roundabout it will be difficult for vehicles on Hulbert Road North to gap seek to access the circulatory carriageway. Consequently this could create a safety issue where drivers take risks to enter the roundabout;
- Signing traffic to use the nearside lane on Purbrook Way West to turn left into Hulbert Road North and Park House Farm Way would be difficult; and
- It is anticipated that the left turn lane into Park House Farm Way will have a relatively short queue compared to the straight ahead lane. Therefore, drivers may use the outside lane of the roundabout to bypass the queues and then merge on the exit of the roundabout. Similarly vehicles turning left from Hulbert Road North are likely to be positioned in the nearside lane designated as left turn only into Park House Farm Way. These vehicles would need to merge into the offside lane to continue ahead.

Based on the above modelling results and concerns, this option has been discounted.

6. Preferred Design

Following discussion and assessment, outlined in Section 5, a preferred design has been identified. This has been tested using 2011 baseline traffic counts growthed using a Low Growth from TEMPRO, plus the committed McDonald's flows and the development flows, within a model combining both junctions. The findings of the modelling are presented within the Junction Modelling Technical Note (Appendix C), with the key findings presented for the preferred design below.

6.1. Scheme Details

As outlined in Section 5, it is not considered appropriate to provide two lanes on the exit from Asda Roundabout and through the Park House Farm Way junction as providing a merge on the eastbound exit from Park House Farm Way was deemed unacceptable by HCC due to merging in close proximity to the well used parking bays.

6.1.1. Highway Layout

A summary of the key element of the preferred design is provided below. The design is detailed on Drawing No. 5113005/TP/PD/004 Rev C as provided in Appendix E.

Asda Roundabout

The preferred design comprises a signalised elongated roundabout. The proposed layout includes:

- The signalisation of the Purbrook Way East and Purbrook Way West approaches and adjacent circulatory carriageway;
- Two lane approaches on Hulbert Road North, Purbrook Way East and Hulbert Road South;
- A three lane approach on Purbrook Way West;
- A one lane approach on the Asda Access;
- Two lanes merging to one on all exits with the exception of the Asda Access and Purbrook Way East ;
- Three lane circulatory carriageway between the Purbrook Way West and Hulbert Road North exits, and between the Purbrook Way East and Hulbert Road South exits, with the remainder of the circulatory carriageway having two lanes.

Park House Farm Way

As outlined above, the modelling results indicate that the Park House Farm Way junction will operate over capacity (with queues blocking back to the Asda Roundabout) if signalised unless two lanes are provided on the exit from Asda Roundabout towards Park House Farm Way. However; due to concerns over merging, HCC have deemed this configuration unacceptable. As such, the preferred option is to retain the priority junction at Park House Farm Way.

A high level review of accident data has been undertaken using injury collision data provided by HCC due to a general perception that there is a higher than average number of accidents at this junction. The analysis indicates there are not a high number of reported accidents at the Park House Farm Way although there are four similar accidents associated with vehicles turning right out of Park House Farm Way. As the traffic modelling indicates signalisation of this junction is not feasible alternative measures have been considered to address the existing problem(s) identified.

The preferred solution for the junction comprises the retention of the priority junction, with the implementation of traffic calming measures to reduce traffic speeds, heighten awareness of a change in the environment for eastbound traffic on Purbrook Way and consequently improve safety. The proposed measures are detailed on Drawing No. 5113005/TP/PD/004 Rev B and include implementation of:

- A raised table at the junction with buff surface treatment;
- Gateway feature on the eastbound approach;
- Wider pedestrian refuge (2 metres wide) on Park House Farm Way to improve provision for pedestrians and cyclists;
- Wider pedestrian refuge (2 metres wide) on Purbrook Way West to narrow the carriageway and improve provision for pedestrians and cyclists;

- Reduced kerb radii to encourage lower traffic speeds;
- Extension of two lanes on Park House Farm Way to aim to reduce queues;
- “Slow” markings with red surface treatment on the Purbrook Way West approach;
- Refreshment of road markings from the Asda roundabout through to the Park House Farm Way junction; and
- Install a Give Way sign on Park House Farm Way.

The above design has been developed based on swept path analysis for

- A single deck bus turning left into and right out of Park House Farm Way; and
- A 7.5T box van completing all movements at the junction.

Although the speed table is shown within the design as one isolated table, implementation of additional raised tables at similar nearby junctions on Purbrook Way could be considered to provide a consistent environment, which may encourage slower speeds. Speed cushions could also be considered on the Purbrook Way West approach to the Park House Farm Way junction

6.1.2. Modelling Results

The model indicates that with no signalisation on Park House Farm Way, the roundabout will operate within theoretical capacity on all arms with the exception of Hulbert Road North in the PM Peak Hour. The highest degree of saturation recorded is 116 percent on Hulbert Road North in the PM Peak Hour, with an associated queue of 99 PCUs. In the AM Peak Hour the junction is predicted to operate under capacity, with the highest degree of saturation recorded being 95 percent on Hulbert Road North with an associated queue of 15 PCUs. The modelling results are presented in Table 5 and 6 and provide a comparison between the 2026 without development with no change to the existing junction and 2026 with development with the preferred design.

It should be noted that due to the land availability at this stage of the scheme there is a short section of stacking space on the western side of the proposed circulatory carriageway. As a result the traffic modelling indicates that the queues are likely to extend beyond the available stacking space (30 metres per lane) and may block traffic exiting onto Purbrook Way West. In practice, this problem may be able to be managed by refinements to the signal timings at this node.

Table 5. LinSig Modelling Results for Preferred Option – AM Peak

Location	2026 Without Development + McDonalds + Existing Geometry at Asda Rbt		2026 With Development + McDonalds + Proposed Scheme at Asda Rbt	
	DoS (%)	Queue (PCU)	DoS (%)	Queue (PCU)
Hulbert Road North	35	1	95	15
Purbrook Way East	146	406	86	11
Hulbert Road South	65	2	68	4
Asda Access Road	57	2	51	4
Purbrook Way West	111	86	80	10
Internal East	-	-	85	12
Internal West	-	-	65	9

Table 6. LinSig Modelling Results for Preferred Option - PM Peak

Location	2026 Without Development + McDonalds + Existing Geometry at Asda Rbt		2026 With Development + McDonalds + Proposed Scheme at Asda Rbt	
	DoS (%)	Queue (PCU)	DoS (%)	Queue (PCU)
Hulbert Road North	155	310	116	99
Purbrook Way East	126	193	89	12
Hulbert Road South	56	2	60	3
Asda Access Road	105	30	101	59
Purbrook Way West	122	146	92	16
Internal East	-	-	88	13
Internal West	-	-	83	13

6.1.3. Bus Facilities

It should be noted that a relatively low number of buses per hour are predicted to use the junctions, and that the preferred scheme should improve journey times for all vehicles, including buses.

As part of the proposals, a number of existing bus stops will require relocation as detailed below:

- The stop on Hulbert Road South (southbound) will be relocated approximately ten metres south of its existing location.
- In order to accommodate the proposed two lane exit to Purbrook Way West, the existing westbound bus stop will be relocated approximately 65 metres to the west.
- Due to the realignment of the roundabout, the bus stop currently located on the eastbound carriageway of Purbrook Way East will be relocated approximately 70 metres to the north-west of its existing location, with a bus stop lay by provided on the northern circulatory carriageway of the proposed roundabout.

As the proposed junction changes affect a large area the available space for bus stops is limited. As a result it will be necessary to agree the bus stop locations and dimensions with bus operators to ensure they are appropriate for the local bus operations.

The potential for bus priority measures has been investigated, including changes to junction geometry to include bus lanes. However, due to land ownership restrictions, there are limited opportunities to achieve any additional physical changes to implement bus priority. The traffic modelling indicates that queues on approaches where bus routes operate would reduce compared to the 2026 baseline situation, with the exception of Hulbert Road South where queues are predicted to marginally increase. Therefore bus journey times should improve on the majority of links. If additional bus priority is required the use of Selective Vehicle Detection (SVD) at the Asda Roundabout could be investigated further.

6.1.4. Pedestrian and Cycle Facilities

The existing predominant pedestrian movements at the Asda roundabout have been identified from on-site observations, as illustrated in Appendix A.

In order to retain and improve accessibility for pedestrians and cyclists, the proposed scheme has been designed to accommodate the above identified desire lines. Shared cycleway / footways (3 metres wide) are provided on the northern and southern sides of the roundabout to provide east-west connections.

On the northern side the proposed shared cycleway / footway will extend east to the Park House Farm Way junction with a 2 metre wide island provided on Park House Farm Way, allowing connection into the existing Borough Cycle Network. On Hulbert Road South the proposed shared cycleway / footway will also be provided to allow connection into the Borough Cycle Network. To the west the proposed cycleway / footway will be extended to the relocated westbound bus stop.

The design includes the provision of a staggered toucan crossing across the proposed dual carriageway, to the west of the Asda roundabout. The crossing is four metres wide, as per the minimum requirement of the Department for Transport's Local Transport Note 2/95 *The Design of Pedestrian Crossings*. At the Park House Farm Way junction it is proposed to increase the width of the existing pedestrian refuge on Purbrook Way to 2 metres.

At the Asda Roundabout it is proposed to retain uncontrolled crossings across Hulbert Road North, Hulbert Road South and the Asda Access. However, it is not proposed to retain the any crossing on Purbrook Way East and West. The implementation of uncontrolled crossings was considered but would require pedestrians to cross three lanes of traffic on Purbrook Way West which could create a safety hazard. In addition, site observations indicate most north-south crossing take place away from the Asda Roundabout. The implementation of controlled crossings at these location was considered but due to the potential reduction in traffic capacity and that fact the current crossings are not well used it was agreed not to provide a crossing point across these arms. .

The accident review indicated that there are several accidents where the contributory factor indicated pedestrians failed to look properly when crossing the road. At the detailed design stage it is therefore suggested that "Look Left / Look Right" markings are installed at pedestrian / cycle crossing points.

6.1.5. Parking

Due to the realignment of the roundabout, the on-street parking bays currently located on the eastbound carriageway of Purbrook Way East will be relocated approximately five metres to the north of their existing location. It should be noted that the number of spaces provided will remain the same, including the disabled bay.

6.1.6. Summary

The preferred scheme involves the:

- Elongation of Asda Roundabout;
- Dual carriageway on Purbrook Way (West);
- Park House Farm Way retained as a priority junction, but with traffic calming measures including the implementation of a raised table and gateway feature on the eastbound approach.

6.2. Preliminary Construction Cost Estimate

The construction cost estimate for the proposed design is summarised in Table 7, with a breakdown presented in Appendix F. The estimate assumes new carriageway construction at 800mm thick and new footway at 210mm thick, and includes an optimism bias to reflect the level of design carried out at this stage. The optimism bias has been included at 40% and can be reduced as the scheme progresses and certainty on risks resolved. The rates used in the estimate are based on recent similar schemes.

Table 7. Preliminary Cost Estimate

Series	Description	Cost
200	Site Clearance	£20,000
500	Drainage and Service Ducts	£302,500
600	Earthworks	£525,600
700	Pavements – Highway Construction	£504,500
	Pavements – Footway Construction	£98,200
1100	Kerbs, Footways and Paved Areas	£191,200
1200	Signs and Road Markings	£20,000
-	Additional Items – Traffic Signals	£140,000
-	Landscaping	£224,000
Sub Total		£2,026,000
-	Preliminaries (25%)	£506,500
-	Contingency (10%)	£202,600
-	Design Fees (19%)	£384,940
-	Site Supervision (8%)	£162,080
-	Project Management (6%)	£121,560
Statutory Undertakers' Diversions		
-	BT Openreach	£204,146
-	Cable & Wireless	Unknown
-	Portsmouth Water	Unknown
-	Redstone	£80,500
-	SSE Telecoms	Unknown
-	Scotia Gas Networks	Unknown
-	Virgin Media	£100,000
Sub Total		£3,788,326
Optimism Bias (40%)		£1,515,330
Total		£5,303,656

This excludes:

- Environmental mitigation;
- Contractor Price Fluctuation; and
- VAT.

6.3. Stage 1 Road Safety Audit

A Stage 1 Road Safety Audit is currently being completed for the preferred design and a designer's response to the audit will be completed following the audit. Copies of these documents will be provided in Appendix G.

7. Conclusions and Recommendations

7.1. Conclusions

Atkins has been commissioned jointly by Hampshire County Council (HCC) and Portsmouth City Council (PCC) to investigate options to improve the operation of the Asda Roundabout and the Park House Farm Way junction in Havant, Hampshire.

HCC have identified that there are currently:

- Congestion and operational issues at the Asda roundabout junction;
- Delays to buses exiting Park House Farm Way onto Purbrook Way; and
- A general perception that there is a higher than average number of accidents at the Park House Farm Way junction.

As part of the proposed Dunsbury Hill Farm development the traffic modelling has indicated that the traffic flows generated by the development would further exacerbate peak hour congestion at the Asda Roundabout. In addition, the proposed McDonalds development adjacent to the junction will contribute further to the existing and future congestion and operational issues.

The objective of the study is to develop a scheme to accommodate the 2026 background traffic flows plus additional development traffic at the Asda Roundabout.

To assess the level of delay to buses on Park House Farm Way queue length and bus journey time surveys were undertaken. The results of the surveys indicate that the level of delay to buses is not significant and alternative methods of control may not improve bus journey times exiting Park House Farm Way. However, site observations indicate that bus delays could be higher.

A high level review of accident data has been undertaken using injury collision data provided by HCC. The results of the analysis indicate that there are a limited number of accidents at the junction but there are similarities in several accidents, specifically vehicles turning right out of Park House Farm Way failing to give way.

As part of the study, numerous options were considered and tested using two scenarios:

1. Sub-Regional Transport Model (SRTM). It was noted that using the SRTM traffic distribution and flows meant that unrealistic conditions were observed during our assessment. Options derived and tested with this scenario represent a worst-case scenario.
2. 2011 baseline traffic counts growthed using a Low Growth from TEMPRO. Following discussions with HCC, it was agreed that 2011 baseline traffic counts growthed using Low Growth from TEMPRO should be used in place of the baseline SRTM flows to test the options with more realistic conditions.

7.2. Recommendations

The preferred design comprises a partly signalised elongated Asda Roundabout and traffic calming measures at the Park House Farm Way junction, which would be retained as a priority junction.

At the Asda Roundabout the following measures are suggested to address the current and future capacity problems at the roundabout and any direct congestion arising from the Dunsbury Hill Farm development at this location:

- The signalisation of the Purbrook Way East and Purbrook Way West nodes of the roundabout;
- Two lane approaches on Hulbert Road North, Purbrook Way East and Hulbert Road South;
- A three lane approach Purbrook Way West;
- A one lane approach on the Asda Access;
- Two lanes merging to one on all exits with the exception of Purbrook Way East and the Asda Access;

- Three lane circulatory carriageway between the Purbrook Way West and Hulbert Road North exits, and between the Purbrook Way East and Hulbert Road South exits, with the remainder of the circulatory carriageway having two lanes.

At the Park House Farm Way junction the following measures are proposed:

- A raised table at the junction with buff surface treatment;
- Gateway feature on the eastbound approach;
- Wider pedestrian refuge (2 metres wide) on Park House Farm Way to improve provision for pedestrians and cyclists;
- Wider pedestrian refuge (2 metres wide) on Purbrook Way West to narrow the carriageway and improve provision for pedestrians and cyclists;
- Reduced kerb radii to encourage lower traffic speeds;
- Extension of two lanes on Park House Farm Way to aim to reduce queues;
- “Slow” markings with red surface treatment on the Purbrook Way West approach;
- Refreshment of road markings from the Asda roundabout through to the Park House Farm Way junction; and
- Install a Give Way sign on Park House Farm Way.

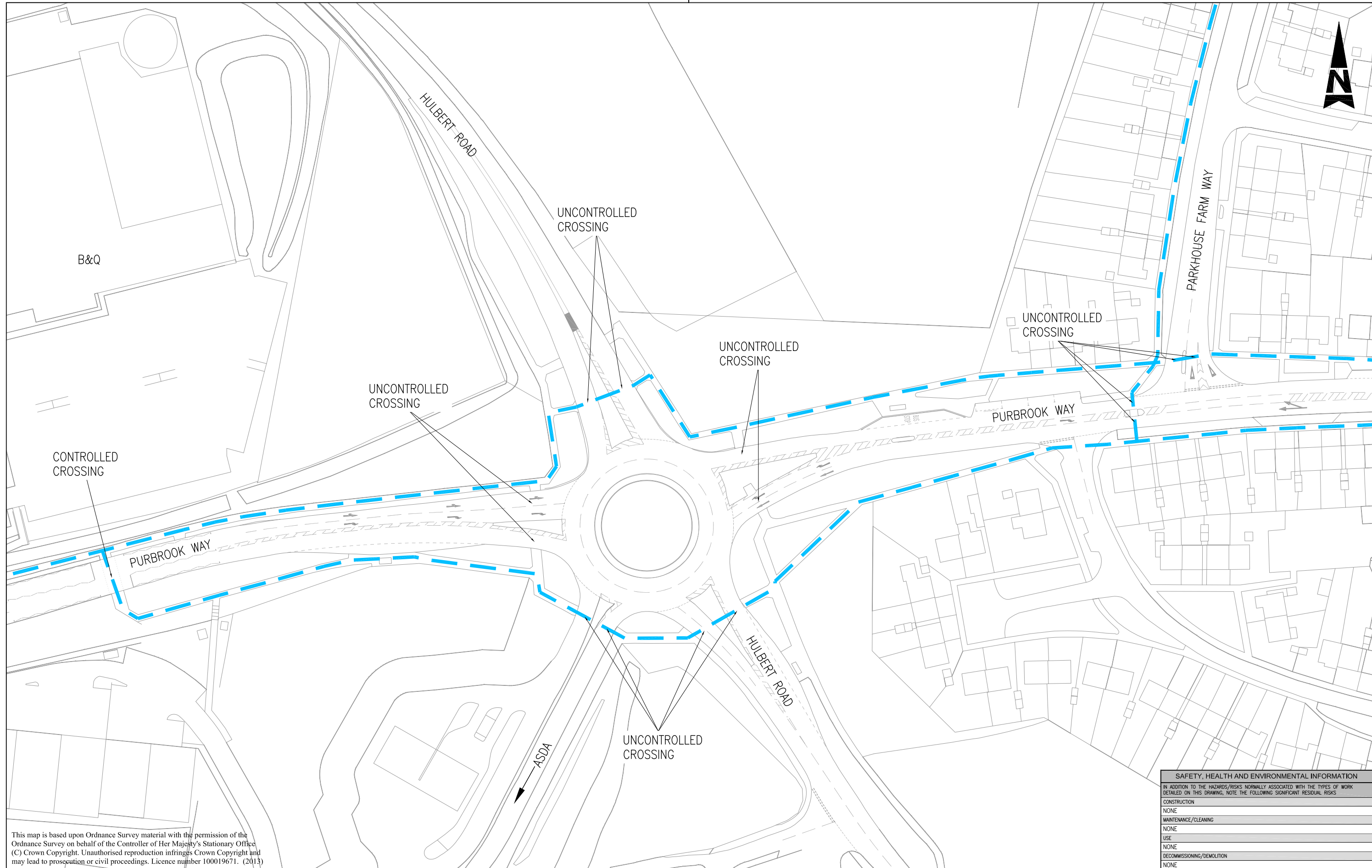
The traffic modelling results for the preferred scheme indicate that the roundabout will operate within theoretical capacity on all arms with the exception of Hulbert Road North in the PM Peak Hour. In the AM Peak Hour the junction is predicted to operate under capacity,

Due to the land availability at this stage of the scheme there is a short section of stacking space on the western side of the proposed circulatory carriageway. As a result the traffic modelling indicates that the queues are likely to extend beyond the available stacking space and may block traffic exiting onto Purbrook Way West. In practice, this problem may be able to be managed by refinements to the signal timings at this node.

It is also recommended that further surveys of the bus delays exiting Park House Farm Way are undertaken to establish if journey times are consistent with the survey data obtained as part of this study.

Appendices

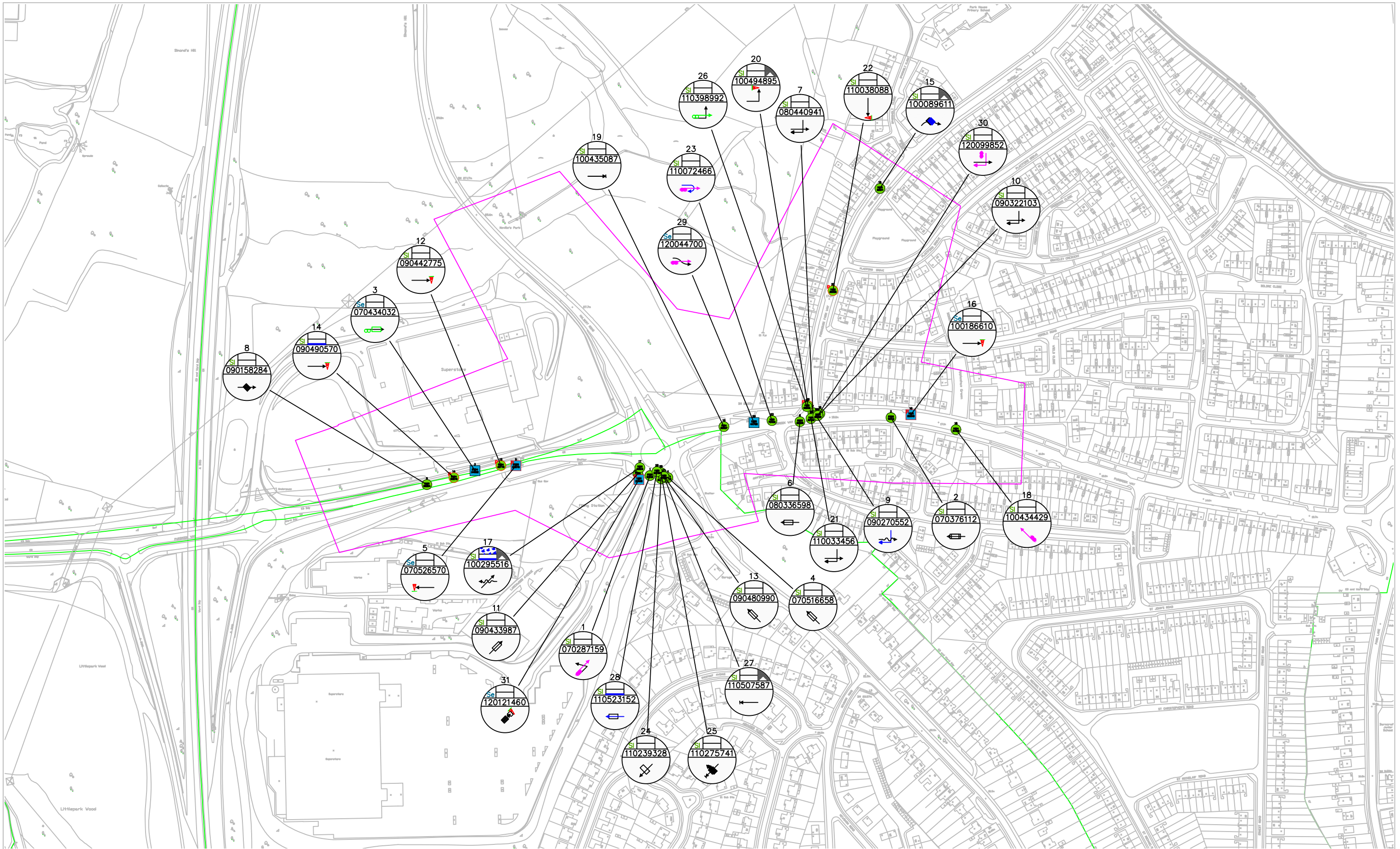
Appendix A. 5113005/TP/LP/002 Rev A

[illegible]

Appendix B. Accident Data

B.1. Injury Collision Data

B.2. Contributory Factors Report Summary



Contributory Factors Report Summary - Purbrook Way junction

Accidents Found Date Range: 21/06/2007 - 27/03/2012

Grid Coordinate Range: 469529,107728 - 470058,108024

Accident Severity

	2007	2008	2009	2010	2011	2012	Total
Serious	2	0	0	1	0	2	5
Slight	3	2	7	5	8	1	26
Total	5	2	7	6	8	3	31

Casualty Severity

	2007	2008	2009	2010	2011	2012	Total
Serious	2	0	0	1	0	2	5
Slight	3	2	7	8	10	1	31
Total	5	2	7	9	10	3	36

Casualty KSI

	2007	2008	2009	2010	2011	2012	Total
Adult KSI	2	0	0	1	0	2	5
Slight	3	2	7	8	10	1	31
Total	5	2	7	9	10	3	36

Purbrook Way junction

Purbrook Way junction

Accident Reference:070287159 Slight B2150 HULBERT RD/PURBROOK WAY RBT JW ASDA ACCESS RD, Accident 1 of 31
 Thursday 21/06/2007 12:17 Grid Coords 469752/107737 Daylight Daylight
 Surface Dry Weather Fine without high winds

Contributory Factors	Participant	Confidence	Did a police officer attend?
403 Poor turn or manoeuvre (Driver/Rider - Error)	Vehicle 001	Very likely	Yes

Accident Description

HGV TRAVELLING NORTH EAST TOWARDS ROUNDABOUT IN RIGHTHAND LANE BUT INDICATING LEFT DUE TO LENGTH OF VEHICLE M/C THEN ATTEMPTED TO COME UP THE INSIDE AS THE VEHICLE IS TURNING LEFT M/C COLLIDES WITH NEAR SIDE OF HGV

Vehicles

1 Goods > 7.5t	Turning left	No skid	Negative	SW to W	Male Age 56
2 M/cycle 50 - 125cc	Going ahead other	No skid	Negative	SW to NE	Male Age 70

Casualties

1 Driver or Rider	Slight	Vehicle no.2	Male 70
-------------------	--------	--------------	---------

Accident Reference:070376112 Slight PURBROOK WAY 85M E OF PARK HOUSE FARM WAY HAVANT Accident 2 of 31
 Monday 13/08/2007 18:00 Grid Coords 469993/107795 Daylight Daylight
 Surface Dry Weather Fine without high winds

Contributory Factors	Participant	Confidence	Did a police officer attend?
306 Exceeding speed limit (Driver/Rider - Injudicious)	Vehicle 003	Possible	No - reported
307 Travelling too fast for conditions (Driver/Rider - Injudicious)	Vehicle 003	Possible	'over the
405 Failed to look properly (Driver/Rider - Error)	Vehicle 003	Possible	counter'
601 Aggressive driving (Driver/Rider - Behaviour)	Vehicle 003	Possible	
602 Careless/Reckless (Driver/Rider - Behaviour)	Vehicle 003	Possible	

Accident Description

STAT CAR2 FACING WEST IN HEAVY TRAFFIC STRUCK IN REAR BY CAR1 WHICH WAS SHUNTED BY FOLLOWING CAR3

Vehicles

1 Car	Waiting to go ahead but held up	No skid	Not contacted	E to W	Female Age 29
2 Car	Waiting to go ahead but held up	No skid	Not contacted	E to W	Female Age 48
3 Car	Going ahead other	No skid	Not contacted	E to W	Male Age 18

Casualties

1 Driver or Rider	Slight	Vehicle no.1	Female 29
-------------------	--------	--------------	-----------

Purbrook Way junction

Accident Reference:070434032 Serious C423 PURBROOK WAY HAVANT ? Accident 3 of 31

Tuesday 18/09/2007 08:15 Grid Coords 469577/107742 Daylight Daylight
Surface Dry Weather Fine without high winds

Contributory Factors

999 Other (Special Codes)

Participant Confidence
Vehicle 001 Very likely

Did a police officer attend?
No - reported 'over the counter'

Accident Description

P/C2 TRAV EAST ON CYCLE PATH C423 PURBROOK WAY 2 YOUNG LADS ON P/CS TRAV WEST APPROACH. P/C2 STOPS TO LET THEM PASS AS THEY DO SO KNOCK P/C2 CAUSING BACK WHEEL TO ENTER RD STRUCK BY CAR1 TRAV EAST

Vehicles

1 Car	Going ahead other	No skid	Not contacted	W to E	Female Age 45
2 Pedal Cycle	Waiting to go ahead but held up	No skid	Not contacted	W to E	Female Age 21

Casualties

1 Driver or Rider Serious Vehicle no.2 Female 21

Accident Reference:070516658 Slight B2150 HULBERT RD/PURBROOK WAY RBT B2150 HULBERT RD Accident 4 of 31
NORTHWEST BOUND APPROACH HAVANT

Monday 29/10/2007 15:15 Grid Coords 469770/107735 Daylight Daylight
Surface Dry Weather Fine without high winds

Contributory Factors

308 Following too close (Driver/Rider - Injudicious)

Participant Confidence
Vehicle 002 Very likely

Did a police officer attend?
No - reported 'over the counter'

Accident Description

CAR1 TRAV NORTHWEST B2150 STOPS AT RBT AND IS HIT IN REAR BY CAR2

Vehicles

1 Car	Waiting to go ahead but held up	No skid	Not contacted	SE to NW	Female Age 39
2 Car	Going ahead other	No skid	Not contacted	SE to NW	Male Age -1

Casualties

1 Passenger Slight Vehicle no.1 Male 15

Purbrook Way junction

Accident Reference:070526570 Serious C423 PURBROOK WAY 125M WEST OF B1250 HULBERT RD Accident 5 of 31
HAVANT
Wednesday 14/11/2007 15:24 Grid Coords 469618/107747 Daylight Daylight
Surface Dry Weather Fine without high winds

Contributory Factors

802 Failed to look properly (Pedestrian)
803 Failed to judge vehicle's path/speed (Pedestrian)
808 Careless/Reckless (Pedestrian)
810 Disability or illness (Pedestrian)

Participant	Confidence	Did a police officer attend?
Casualty 001	Very likely	Yes
Casualty 001	Very likely	
Casualty 001	Very likely	
Casualty 001	Possible	

Accident Description

CAR1 TRAV WEST C423 PUBROOK WAY IN SLOW MOVING TRAFFIC ADULT MALE PED WALKED IN FRONT OF CAR1 FROM DRIVER'S O/SIDE S/BOUND PED LOOKING WRONG WAY WHILST CROSSING

Vehicles

1 Car	Going ahead other	No skid	Negative	E to W	Female Age 67
-------	-------------------	---------	----------	--------	---------------

Casualties

1 Pedestrian	Serious Vehicle no.1	Male 18
--------------	----------------------	---------

Accident Reference:080336598 Slight PURBROOK WAY JW PARK HOUSE FARM WAY HAVANT Accident 6 of 31
Wednesday 30/07/2008 09:30 Grid Coords 469902/107791 Daylight Daylight
Surface Dry Weather Fine without high winds

Contributory Factors

602 Careless/Reckless (Driver/Rider - Behaviour)
405 Failed to look properly (Driver/Rider - Error)

Participant	Confidence	Did a police officer attend?
Vehicle 001	Possible	No - reported 'over the counter'
Vehicle 001	Very likely	

Accident Description

CAR2 TRAV WEST PURBROOK WAY STATIONARY AT TEMPORARY TRAFFIC SIGNAL CAR1 TRAV BEHIND FAILED TO STOP COLLIDED WITH REAR CAR2

Vehicles

1 Car	Going ahead other	No skid	Negative	E to W	Male Age 30
2 Car	Waiting to go ahead but held up	No skid	Not requested	E to W	Female Age 54

Casualties

1 Driver or Rider	Slight Vehicle no.2	Female 54
-------------------	---------------------	-----------

Purbrook Way junction

Accident Reference:080440941 Slight PURBROOK WAY JW PARK HOUSE FARM WAY HAVANT Accident 7 of 31

Friday 03/10/2008 16:32 Grid Coords 469915/107800 Daylight Daylight

Surface Dry Weather Fine without high winds

Contributory Factors

302 Disobeyed give way or stop sign markings (Driver/Rider - Injudicious)
405 Failed to look properly (Driver/Rider - Error)
406 Failed to judge other person's path/speed (Driver/Rider - Error)

Participant	Confidence	Did a police officer attend?
Vehicle 002	Very likely	Yes
Vehicle 002	Very likely	
Vehicle 002	Very likely	

Accident Description

CAR1 TRAV EAST FROM PURBROOK COLLIDED WITH CAR2 TURNING RIGHT FROM PARK HOUSE FARM WAY TO TRAV WEST DRIVER OF CAR2 FAILED TO GIVE WAY

Vehicles

Vehicle	Going ahead other	No skid	Negative	W to E	Male Age 57
1 Car	Going ahead other	No skid	Negative	W to E	Male Age 57
2 Car	Turning right	No skid	Negative	N to W	Male Age 44

Casualties

1 Passenger Slight Vehicle no.1 Male 31

Accident Reference:090158284 Slight C423 PURBROOK WAY 148M EAST OF ENTRANCE TO SUPER Accident 8 of 31

Monday 13/04/2009 11:11 Grid Coords 469529/107728 Daylight Daylight

Surface Dry Weather Fine without high winds

Contributory Factors

405 Failed to look properly (Driver/Rider - Error)
509 Distraction in vehicle (Driver/Rider - Impairment)
602 Careless/Reckless (Driver/Rider - Behaviour)

Participant	Confidence	Did a police officer attend?
Vehicle 001	Very likely	Yes
Vehicle 001	Possible	
Vehicle 001	Possible	

Accident Description

CAR1 TRAV EAST C423 PURBROOK WAY COLLIDED REAR OF CAR2 PARKED AND UNATTENDED AGAINST NORTH KERB OF PURBROOK WAY CAR1 BRAKED AND SKIDDED

Vehicles

Vehicle	Going ahead other	No skid	Negative	W to E	Female Age 36
1 Car	Going ahead other	No skid	Negative	W to E	Female Age 36
2 Car	Parked	No skid	Negative	Parked	Male Age 77

Casualties

1 Driver or Rider Slight Vehicle no.1 Female 36

Purbrook Way junction

Accident Reference:090270552 Slight PURBROOK WAY JW PARKHOUSE FARM WAY HAVANT Accident 9 of 31

Monday 22/06/2009 15:35 Grid Coords 469918/107797 Daylight Daylight
Surface Dry Weather Fine without high winds

Contributory Factors

302 Disobeyed give way or stop sign markings (Driver/Rider - Injudicious)
406 Failed to judge other person's path/speed (Driver/Rider - Error)
602 Careless/Reckless (Driver/Rider - Behaviour)

Participant	Confidence	Did a police officer attend?
Vehicle 001	Possible	Yes
Vehicle 001	Possible	
Vehicle 001	Possible	

Accident Description

CAR TRAV EAST FROM PURBROOK COLLIDED WITH VAN TURNING RIGHT FROM PARK HOUSE FARM WAY TO TRAV WEST DRIVER OF VAN FAILED TO GIVE WAY

Vehicles

1 Van/Goods < 3.5t	Turning right	No skid	Negative	N to W	Male Age 42
2 Car	Going ahead other	Skid	Negative	W to E	Female Age 40

Casualties

1 Driver or Rider	Slight	Vehicle no.2	Female 40
-------------------	--------	--------------	-----------

Accident Reference:090322103 Slight PURBROOK WAY JW PARK HOUSE FARM WAY HAVANT Accident 10 of 31

Friday 24/07/2009 16:10 Grid Coords 469922/107799 Daylight Daylight
Surface Dry Weather Fine without high winds

Contributory Factors

404 Failed to signal/misleading signal (Driver/Rider - Error)

Participant	Confidence	Did a police officer attend?
Vehicle 001	Very likely	Yes

Accident Description

CAR1 TRAV EAST FROM PURBROOK DRIVER HAD FAILED TO CANCEL LEFT INDICATOR CAR1 THEN COLLIDED WITH CAR2 TURNING RIGHT FROM PARK HOUSE FARM WAY TO TRAV WEST

Vehicles

1 Car	Going ahead other	No skid	Negative	W to E	Female Age 66
2 Car	Turning right	No skid	Negative	N to W	Male Age 22

Casualties

1 Passenger	Slight	Vehicle no.1	Female 13
-------------	--------	--------------	-----------

Purbrook Way junction

Accident Reference:090433987 Slight B2150 HULBERT RD RBT LARCHWOOD AVE APPROACH HAVANT Accident 11 of 31

Sunday 04/10/2009 13:45 Grid Coords 469740/107739 Daylight Daylight

Surface Dry Weather Fine without high winds

Contributory Factors

405 Failed to look properly (Driver/Rider - Error)
406 Failed to judge other person's path/speed (Driver/Rider - Error)
602 Careless/Reckless (Driver/Rider - Behaviour)

Participant Confidence

Vehicle 002 Possible
Vehicle 002 Possible
Vehicle 002 Possible

Did a police officer attend?
No - reported
'over the
counter'

Accident Description

BOTH CARS TRAV NORTHEAST LARCHWOOD AVE FROM ASDA SUPERSTORE CAR1 WAITING AT RBT JW B2150 HULBERT RD CAR2 FAILED TO BRAKE COLLIDED WITH REAR OF CAR1

Vehicles

1 Car	Waiting to go ahead but held up	No skid	Not contacted	SW to NE	Female Age 30
2 Car	Going ahead other	No skid	Not contacted	SW to NE	Not traced Age -1

Casualties

1 Driver or Rider Slight Vehicle no.1 Female 30

Accident Reference:090442775 Slight C423 PURBROOK WAY 130M WEST OF HUBERT RD RBT HAVANT Accident 12 of 31

Sunday 11/10/2009 13:35 Grid Coords 469603/107747 Daylight Daylight

Surface Dry Weather Fine without high winds

Contributory Factors

802 Failed to look properly (Pedestrian)

Participant Confidence

Vehicle 001 Very likely

Did a police officer attend?
Yes

Accident Description

IN HEAVY TRAFFIC CAR STOPS TO ALLOW PED TO CROSS PURBROOK WAY FROM NORTH PAVEMENT S/BOUND PED RAN INTO LANE1 AND THEN LANE 2 WITHOUT LOOKING IS STRUCK BY CAR1 TRAV EAST IN TWO LANE SECTION APPROACHING RBT

Vehicles

1 Car	Going ahead other	No skid	Negative	W to E	Female Age 26
-------	-------------------	---------	----------	--------	---------------

Casualties

1 Pedestrian Slight Vehicle no.1 Female 16

Purbrook Way junction

Accident Reference:090480990 Slight B2150 HULBERT RD PURBROOK RD RBT B2150 HULBERT RD Accident 13 of 31
NORTHWEST BOUND APPROACH HAVANT

Wednesday 04/11/2009 13:45 Grid Coords 469767/107735 Daylight Daylight

Surface Dry Weather Fine without high winds

Contributory Factors

308 Following too close (Driver/Rider - Injudicious)
406 Failed to judge other person's path/speed (Driver/Rider - Error)

Participant Confidence

Vehicle 002 Possible
Vehicle 002 Possible

Did a police officer attend?
No - reported
'over the counter'

Accident Description

CAR1 TRAV NORTHWEST B2150 HULBERT RD STOPPED AT RBT PURBROOK WAY WAS STRUCK FROM BEHIND BY
CAR2

Vehicles

1 Car	Waiting to go ahead but held up	No skid	Not contacted	SE to NW	Female Age 45
2 Car	Going ahead other	No skid	Not contacted	SE to NW	Male Age -1

Casualties

1 Driver or Rider	Slight	Vehicle no.1	Female 45
-------------------	--------	--------------	-----------

Accident Reference:090490570 Slight C423 PURBROOK WAY O/SIDE B&Q SUPER STORE HAVANT Accident 14 of 31

Thursday 12/11/2009 07:45 Grid Coords 469556/107735 Daylight Daylight

Surface Wet/Damp Weather Fine without high winds

Contributory Factors

802 Failed to look properly (Pedestrian)

Participant Confidence

Casualty 001Very likely

Did a police officer attend?
Yes

Accident Description

CAR1TRAV EAST C423 PURBROOK WAY STRUCK FEMALE CHILD PED WHO WALKED FROM N/SIDE TRAV SOUTH
WITHOUT LOOKING

Vehicles

1 Car	Going ahead other	No skid	Negative	W to E	Male Age 42
-------	-------------------	---------	----------	--------	-------------

Casualties

1 Pedestrian	Slight	Vehicle no.1	Female 14
--------------	--------	--------------	-----------

Purbrook Way junction

Accident Reference:100089611 Slight PARK HOUSE FARM WAY JW SPARSHOLT CL HAVANT Accident 15 of 31

Friday 05/03/2010 00:19 Grid Coords 469982/108024 Daylight Dark/lights lit
Surface Dry Weather Fine without high winds

Contributory Factors

501 Impaired by alcohol (Driver/Rider - Impairment)
307 Travelling too fast for conditions (Driver/Rider - Injudicious)
410 Loss of control (Driver/Rider - Error)
602 Careless/Reckless (Driver/Rider - Behaviour)

Participant	Confidence	Did a police officer attend?
Vehicle 001	Very likely	Yes
Vehicle 001	Very likely	
Vehicle 001	Very likely	
Vehicle 001	Very likely	

Accident Description

CAR1 TRAV NORTHEAST ALONG PARK HOUSE FARM WAY AROUND RIGHT HAND BEND LOST CONTROL LEFT CARRIAGEWAY TO NEAR SIDE COLLIDED WITH LAMP POST OVERTURNED AND COLLIDED WITH PARKED UNATTENDED CAR2 AND VAN3 BOTH IN LAYBY

Vehicles

Vehicle	Position	Skid & O/T	Positive	SW to NE	Male Age 29
1 Car	Going ahead right hand bend	Skid & O/T	Positive	SW to NE	Male Age 29
2 Car	Parked	No skid	Not requested	Parked	Male Age 30
3 Van/Goods < 3.5t	Parked	No skid	Not requested	Parked	Male Age 20

Casualties

1 Passenger Slight Vehicle no.1 Female 22

Accident Reference:100186610 Serious PURBROOK WAY O/S NUMBER 398 HAVANT Accident 16 of 31

Saturday 08/05/2010 09:40 Grid Coords 470013/107798 Daylight Daylight
Surface Dry Weather Fine without high winds

Contributory Factors

803 Failed to judge vehicle's path/speed (Pedestrian)
805 Dangerous action in carriageway (Pedestrian)

Participant	Confidence	Did a police officer attend?
Casualty 001	Very likely	Yes
Casualty 001	Possible	

Accident Description

GOODS VEH1 PARKS ON PURBROOK WAY DRIVER ALIGHTS VEH ROLLS FORWARD IN EAST DIR HANDBRAKE NOT ON PED TRAV SOUTH STANDS IN FRONT OF VEH1 TO STOP IT GETS TRAPPED BETWEEN A TREE & LORRY

Vehicles

Vehicle	Position	No skid	Not provided	W to E	Male Age 46
1 Goods > 7.5t	Going ahead other	No skid	Not provided	W to E	Male Age 46

Casualties

1 Pedestrian Serious Vehicle no.1 Male 46

Purbrook Way junction

Accident Reference:100295516 Slight B2150 HULBERT RD RBT JW LARCHWOOD AVE HAVANT Accident 17 of 31

Wednesday 14/07/2010 22:15 Grid Coords 469742/107745 Daylight Dark/lights lit

Surface Wet/Damp Weather Raining without high winds

Contributory Factors

405 Failed to look properly (Driver/Rider - Error)
401 Junction overshoot (Driver/Rider - Error)

Participant	Confidence	Did a police officer attend?
Vehicle 001	Very likely	Yes
Vehicle 001	Possible	

Accident Description

CAR1 TRAV NORTHEAST LARCHWOOD AVE ENTERS RBT WITH B2150 PURBROOK WAY COLLIDES INTO CAR2 TRAV WEST ON RBT

Vehicles

1 Car	Going ahead other	No skid	Negative	SW to NE	Male Age 47
2 Car	Going ahead other	Overtaken	Negative	E to W	Female Age 54

Casualties

1 Driver or Rider	Slight	Vehicle no.1	Male 47
2 Driver or Rider	Slight	Vehicle no.2	Female 54
3 Passenger	Slight	Vehicle no.1	Male 33

Accident Reference:100434429 Slight PURBROOK WAY O/S NUMBER 395 HAVANT Accident 18 of 31

Wednesday 13/10/2010 09:30 Grid Coords 470058/107783 Daylight Daylight

Surface Dry Weather Fine without high winds

Contributory Factors

410 Loss of control (Driver/Rider - Error)
101 Poor or defective road surface (Road Environment Contrib)

Participant	Confidence	Did a police officer attend?
Vehicle 001	Very likely	Yes
Vehicle 001	Very likely	

Accident Description

M/C1 TRAV WEST PURBROOK WAY RIDER TOOK HAND OFF HANDLE BARS OVER A BUMP IN ROAD CAUSING LOSS OF CONTROL AND RIDER TO FALL OFF

Vehicles

1 M/cycle 50 - 125cc	Going ahead other	No skid	Negative	SE to NW	Male Age 16
----------------------	-------------------	---------	----------	----------	-------------

Casualties

1 Driver or Rider	Slight	Vehicle no.1	Male 16
-------------------	--------	--------------	---------

Purbrook Way junction

Accident Reference:100435087 Slight PURBROOK WAY 50M EAST OF B2150 HULBERT RD HAVANT Accident 19 of 31

Wednesday 13/10/2010 15:20 Grid Coords 469826/107786 Daylight Daylight

Surface Dry Weather Fine without high winds

Contributory Factors

406 Failed to judge other person's path/speed (Driver/Rider - Error)
410 Loss of control (Driver/Rider - Error)

Participant	Confidence	Did a police officer attend?
Vehicle 001	Very likely	Yes
Vehicle 001	Very likely	

Accident Description

CAR1 TRAV EAST PURBROOK WAY IN SLOW MOVING TRAFFIC DRIVERS FOOT SLIPS OFF BRAKE COLLIDING INTO REAR CAR2 IN FRONT.

Vehicles

Vehicle	Going ahead other	No skid	Negative	W to E	Female Age 45
1 Car	Going ahead other	No skid	Negative	W to E	Female Age 45
2 Car	Stopping	No skid	Negative	W to E	Male Age 57

Casualties

Driver or Rider	Slight	Vehicle no.1	Female 45
1 Driver or Rider	Slight	Vehicle no.1	Female 45
2 Driver or Rider	Slight	Vehicle no.2	Male 57

Accident Reference:100494895 Slight PURBROOK WAY JW WINCHFIELD CRESCENT HAVANT Accident 20 of 31

Monday 22/11/2010 18:30 Grid Coords 469910/107807 Daylight Dark/lights lit

Surface Dry Weather Fine without high winds

Contributory Factors

405 Failed to look properly (Driver/Rider - Error)

Participant	Confidence	Did a police officer attend?
Vehicle 001	Possible	Yes

Accident Description

CAR1 TRAV E ALONG PURBROOK WAY APPROACHES JW WINCHFIELD CRESCENT AND TURNS LEFT AS CAR1 TURNS PED1 STARTS CROSSING E INTO PATH OF CAR1 AND COLLIDES

Vehicles

Vehicle	Turning left	No skid	Negative	W to N	Male Age 26
1 Car	Turning left	No skid	Negative	W to N	Male Age 26

Casualties

Pedestrian	Slight	Vehicle no.1	Female 20
1 Pedestrian	Slight	Vehicle no.1	Female 20

Purbrook Way junction

Accident Reference:110033456 Slight PURBROOK WAY JW PARKHOUSE FARM WAY HAVANT Accident 21 of 31

Monday 24/01/2011 08:45 Grid Coords 469913/107794 Daylight Daylight

Surface Dry Weather Fine without high winds

Contributory Factors

401 Junction overshoot (Driver/Rider - Error)
 403 Poor turn or manoeuvre (Driver/Rider - Error)
 405 Failed to look properly (Driver/Rider - Error)
 603 Nervous/Uncertain (Driver/Rider - Behaviour)
 406 Failed to judge other person's path/speed (Driver/Rider - Error)
 108 Road layout e.g. bend, hill or narrow (Road Environment Contrib)

Participant	Confidence	Did a police officer attend?
Vehicle 002	Possible	Yes
Vehicle 002	Possible	
Vehicle 002	Possible	
Vehicle 002	Possible	
Vehicle 001	Possible	
Vehicle 002	Possible	

Accident Description

CAR2 TRAV S ALONG PARKHOUSE FARM WAY TURNS RIGHT ONTO PURBROOK WAY FAILING TO GIVE WAY TO CAR1
 TRAV E ALONG PURBROOK WAY AND COLLIDES

Vehicles

1 Car	Going ahead other	No skid	Not provided	W to E	Female Age 34
2 Car	Turning right	No skid	Negative	N to W	Female Age 26

Casualties

1 Driver or Rider	Slight	Vehicle no.1	Female 34
-------------------	--------	--------------	-----------

Accident Reference:110038088 Slight PARKHOUSE FARM WAY OUTSIDE NUMBER 18 HAVANT Accident 22 of 31

Thursday 27/01/2011 08:36 Grid Coords 469935/107922 Daylight Daylight

Surface Dry Weather Fine without high winds

Contributory Factors

802 Failed to look properly (Pedestrian)
 808 Careless/Reckless (Pedestrian)

Participant	Confidence	Did a police officer attend?
Casualty 001	Very likely	Yes
Casualty 001	Very likely	

Accident Description

PEDESTRIAN TRAV SOUTH ALONG PARKHOUSE FARM WAY ON A SCOOTER ALONG THE ROAD FAILED TO LOOK
 BEHIND AND CROSSED PARKHOUSE FARM WAY INTO THE PATH OF CAR1 CAR1 UNABLE TO REACT IN TIME AND
 COLLIDED WITH PEDESTRIAN

Vehicles

1 Car	Going ahead other	No skid	Negative	N to S	Female Age 27
-------	-------------------	---------	----------	--------	---------------

Casualties

1 Pedestrian	Slight	Vehicle no.1	Male 11
--------------	--------	--------------	---------

Purbrook Way junction

Accident Reference:110072466 Slight PURBROOK WAY JW WINCHFIELD CRESCENT HAVANT Accident 23 of 31

Friday 18/02/2011 13:55 Grid Coords 469874/107792 Daylight Daylight

Surface Dry Weather Fine without high winds

Contributory Factors

405 Failed to look properly (Driver/Rider - Error)
403 Poor turn or manoeuvre (Driver/Rider - Error)

Participant	Confidence	Did a police officer attend?
Vehicle 001	Possible	Yes
Vehicle 001	Possible	

Accident Description

VAN1 STATIONERY ON PURBROOK WAY IN LAYBY FACING E PULLED OUT TO COMPLETE A U-TURN TO HEAD W ACROSS THE PATH OF M/C2 TRAV E ALONG PURBROOK WAY CAUSING COLLISION

Vehicles

1 Van/Goods < 3.5t	U Turn	No skid	Negative	W to W	Male Age 26
2 M/cycle > 500cc	Going ahead other	No skid	Negative	W to E	Male Age 22

Casualties

1 Driver or Rider	Slight	Vehicle no.2	Male 22
-------------------	--------	--------------	---------

Accident Reference:110239328 Slight B2150 HULBERT RD RBT JW HULBERT RD N/BOUND APPROACH HAVANT Accident 24 of 31

Thursday 09/06/2011 11:05 Grid Coords 469763/107734 Daylight Daylight

Surface Dry Weather Fine without high winds

Contributory Factors

505 Illness or disability, mental or physical (Driver/Rider - Impairment)

Participant	Confidence	Did a police officer attend?
Vehicle 001	Very likely	Yes

Accident Description

CAR1 TRAV WEST NEG RBT FROM PURBROOK WAY WHEN DRIVER BLACKED OUT CONTIUES AND STRUCK O/SIDE OF CAR2 FACING NW WAITING TO ENTER RBT FROM HULBERT RD PUSHING IT ONTO N/SIDE VERGE

Vehicles

1 Car	Going ahead other	No skid	Negative	NE to SW	Male Age 77
2 Car	Waiting to go ahead but held up	No skid	Negative	SE to NW	Female Age 41

Casualties

1 Driver or Rider	Slight	Vehicle no.1	Male 77
2 Driver or Rider	Slight	Vehicle no.2	Female 41
3 Passenger	Slight	Vehicle no.2	Female 12

Purbrook Way junction

Accident Reference:110275741 Slight B2150 HULBERT RD RBT JW B2150 HULBERT RD N/BOUND Accident 25 of 31
 APPROACH HAVANT

Saturday 02/07/2011 14:00 Grid Coords 469763/107740 Daylight Daylight

Surface Dry Weather Fine without high winds

Contributory Factors

405 Failed to look properly (Driver/Rider - Error)
 406 Failed to judge other person's path/speed (Driver/Rider - Error)
 302 Disobeyed give way or stop sign markings (Driver/Rider - Injudicious)
 405 Failed to look properly (Driver/Rider - Error)
 406 Failed to judge other person's path/speed (Driver/Rider - Error)
 302 Disobeyed give way or stop sign markings (Driver/Rider - Injudicious)

Participant	Confidence	Did a police officer attend?
Vehicle 002	Very likely	No - reported
Vehicle 002	Very likely	'over the counter'
Vehicle 002	Very likely	
Vehicle 003	Very likely	
Vehicle 003	Very likely	
Vehicle 003	Very likely	

Accident Description

CAR3 TRAV NORTH B2150 HULBERT RD FAILED TO GIVE WAY PULLED ONTO RBT CAUSING CAR1 TRAV WEST NEG RBT TO BRAKE AND STOP ON RBT CAR2 ALSO TRAV NORTH B2150 HULBERT RD PULLED OUT CAR1

Vehicles

Vehicle	Stopping	No skid	Not contacted	NE to SW	Female Age 30
1 Car	Stopping	No skid	Not contacted	NE to SW	Female Age 30
2 Car	Starting	No skid	Not contacted	SE to NW	Not traced Age -1
3 Car	Starting	No skid	Not contacted	SE to NW	Not traced Age -1

Casualties

1 Driver or Rider Slight Vehicle no.1 Female 30

Accident Reference:110398992 Slight PARK HOUSE FARM WAY JW PURBROOK WAY HAVANT Accident 26 of 31

Monday 19/09/2011 15:20 Grid Coords 469909/107806 Daylight Daylight

Surface Dry Weather Fine without high winds

Contributory Factors

405 Failed to look properly (Driver/Rider - Error)

Participant	Confidence	Did a police officer attend?
Vehicle 002	Very likely	Yes

Accident Description

P/C2 TRAV EAST ON NORTH PAVEMENT PURBROOK WAY CROSSED PARK HOUSE FARM WAY INTO PATH OF CAR1 TURNING LEFT FROM PURBROOK WAY

Vehicles

Vehicle	Turning left	No skid	Negative	W to N	Female Age 25
1 Car	Turning left	No skid	Negative	W to N	Female Age 25
2 Pedal Cycle	Going ahead other	No skid	Not applicable	W to E	Male Age 13

Casualties

1 Driver or Rider Slight Vehicle no.2 Male 13

Purbrook Way junction

Accident Reference:110507587 Slight B2150 HULBERT RD RBT JW PURBROOK WAY HAVANT Accident 27 of 31

Monday 28/11/2011 00:01 Grid Coords 469766/107736 Daylight Dark/lights lit
Surface Dry Weather Fine without high winds

Contributory Factors

307 Travelling too fast for conditions (Driver/Rider - Injudicious)
405 Failed to look properly (Driver/Rider - Error)

Participant Confidence

Vehicle 001 Possible
Vehicle 001 Possible

Did a police officer attend?
No - reported
'over the counter'

Accident Description

TAXI TRAV WEST PURBROOK WAY BRAKES HARD ON APPROACH TO RBT DUE TO ONCOMING TRAFFIC, FORCING DRIVER TO SWERVE ONTO FOOTPATH REAR SEAT PASSENGER THROWN FORWARD INTO DRIVERS SEAT

Vehicles

1 Taxi Stopping No skid Not contacted E to W Male Age -1

Casualties

1 Passenger Slight Vehicle no.1 Female 21

Accident Reference:110523152 Slight B2150 HULBERT RD RBT JW PURBROOK WAY HAVANT Accident 28 of 31

Monday 12/12/2011 13:45 Grid Coords 469759/107741 Daylight Daylight
Surface Wet/Damp Weather Fine without high winds

Contributory Factors

308 Following too close (Driver/Rider - Injudicious)
406 Failed to judge other person's path/speed (Driver/Rider - Error)
602 Careless/Reckless (Driver/Rider - Behaviour)

Participant Confidence

Vehicle 002 Very likely
Vehicle 002 Possible
Vehicle 002 Possible

Did a police officer attend?
No - reported
'over the counter'

Accident Description

CAR1 TRAVELLING NW B2150 HULBERT RD ENTERED RBT FROM PURBROOK WAY AND STOPPED ON RBT FOR TRAFFIC AHEAD VAN2 COLLIDED WITH REAR OF CAR1

Vehicles

1 Car Waiting to go ahead but held up No skid Not contacted E to W Female Age 28
2 Van/Goods < 3.5t Going ahead other No skid Not contacted E to W Male Age -1

Casualties

1 Driver or Rider Slight Vehicle no.1 Female 28

Purbrook Way junction

Accident Reference:120044700 Serious PURBROOK WAY JUST WEST OF WINCHFIELD CRES HAVANT Accident 29 of 31

Wednesday 01/02/2012 09:25 Grid Coords 469856/107790 Daylight Daylight

Surface Dry Weather Fine without high winds

Contributory Factors

403 Poor turn or manoeuvre (Driver/Rider - Error)
405 Failed to look properly (Driver/Rider - Error)

Participant	Confidence	Did a police officer attend?
Vehicle 001	Possible	Yes
Vehicle 001	Possible	

Accident Description

CAR1 TRAV EAST ALONG PURBROOK WAY PULLED INTO BUS STOP AGAINST NORTH KERB BEFORE RETURNING BACK ONTO MAIN CARRIAGEWAY WITHOUT LOOKING COLLIDED WITH MC2 TRAV EAST ALONG PURBROOK WAY

Vehicles

1 Car	Changing lane to right	No skid	Negative	W to E	Male Age 52
2 M/cycle > 500cc	Going ahead other	No skid	Not provided	W to E	Male Age 49

Casualties

1 Driver or Rider Serious Vehicle no.2 Male 49

Accident Reference:120099852 Slight PURBROOK WAY JW PARK HOUSE FARM WAY HAVANT Accident 30 of 31

Monday 12/03/2012 09:00 Grid Coords 469920/107797 Daylight Daylight

Surface Dry Weather Fine without high winds

Contributory Factors

404 Failed to signal/misleading signal (Driver/Rider - Error)
405 Failed to look properly (Driver/Rider - Error)

Participant	Confidence	Did a police officer attend?
Vehicle 002	Very likely	Yes
Vehicle 002	Very likely	

Accident Description

CAR2 TRAV EAST ALONG PURBROOK WAY LEFT INDICATOR STILL ACTIVATED AFTER EXITING ROUNDABOUT FAILED TO CANCEL SIGNAL ON APPROACH TO PARK HOUSE FARM WAY MC1 TRAV SOUTH ALONG PARK HOUSE FARM WAY TURNED RIGHT ONTO PURBROOK WAY VEHICLES COLLIDED

Vehicles

1 M/cycle <= 50cc	Turning right	No skid	Negative	N to W	Male Age 17
2 Car	Going ahead other	No skid	Negative	W to E	Female Age 41

Casualties

1 Driver or Rider Slight Vehicle no.1 Male 17

Purbrook Way junction

Accident Reference:120121460 Serious LARCHWOOD AVE JW PURBROOK WAY HAVANT ? Accident 31 of 31

Tuesday 27/03/2012 12:30 Grid Coords 469741/107733 Daylight Daylight
Surface Dry Weather Fine without high winds

Contributory Factors

802 Failed to look properly (Pedestrian)

Participant Confidence
Casualty 001Very likely

Did a police officer attend?
Yes

Accident Description

PEDESTRIAN TRAV EAST ACROSS LARCHWOOD AVENUE CROSSED LANE 1 OF STATIONARY TRAFFIC BUT FAILED TO LOOK IN LANE 2 STEPPED OUT ACROSS THE PATH OF CAR1 TRAV NORTHEAST ALONG PURBROOK WAY IN LANE 2 AND COLLIDED ?

Vehicles

1 Car Starting No skid Negative SW to NE Female Age 66

Casualties

1 Pedestrian Serious Vehicle no.1 Female 51

Appendix C. Junction Modelling Technical Note

Technical note

Project:	ASDA Roundabout, Havant	To:	Portsmouth City Council & Hampshire County Council
Subject:	Junction Modelling Assessment	From:	Yogesh Patel/Nii Dodoo
Date:	15 January 2013	cc:	

1. Introduction

Atkins has been commissioned jointly by Hampshire County Council (HCC) and Portsmouth City Council (PCC) to investigate options to improve the operation of the Asda Roundabout and the Park House Farm Way junction in Havant, Hampshire.

The 'Asda' roundabout is a five arm roundabout forming the junction of Hulbert Road/Purbrook Way/Asda Access. HCC have identified that there is currently congestion and operational issues at the junction and have programmed to investigate measures to improve the junction performance.

As part of the proposed Dunsbury Hill Farm development the traffic modelling has indicated that the traffic flows generated by the development would further exacerbate peak hour congestion on some arms at this junction. In addition, the proposed McDonalds development adjacent to the junction will contribute further to the existing and future congestion and operational issues.

At a meeting on 13th February 2012 between HCC and PCC, as land owner of Dunsbury Hill Farm, it was agreed that measures are to be investigated to resolve the current and future congestion at the roundabout. The objective of the study is to develop a scheme at the Asda Roundabout to accommodate the 2026 background traffic flows plus the additional development traffic directly associated with Dunsbury Hill Farm proposal.

It has also been identified by HCC that there are currently delays to buses exiting Park House Farm Way onto Purbrook Way, and a general perception that there is a higher than average number of accidents at this location. As such, the adjacent Park House Farm Way junction has also been included within the study.

The purpose of this note is to present the options assessed and the results of the assessments which have evolved as part of this study and as such should be read in conjunction with the Asda Roundabout Improvement Study Preliminary Design Report.

1.1. Report Structure

In this context presented above, the assessment has been taken forward and is reported in this technical note as follows:

- **Section 2** describes the assessment methodology and outlines the traffic flows used in the assessment;
- **Section 3** reports on the proposed design options evolution and presents the junction assessments performance based on key indicators including Degrees of Saturation (DoS), delays and queue lengths; and;
- **Section 4** outlines the conclusions of the report.

Technical note

2. Junction Modelling Evaluation

The following junction modelling software packages were used in this assessment as follows:

- LinSig (Version 3); and
- ARCADY (Version 8).

2.1. Key Performance Indicators

The LinSig and ARCADY models were developed to evaluate the queue lengths, delays, Degree of Saturation (DoS) and Ratio of Flow to Capacity (RFC) for the 2026 flows with Phase 1 and 2 of the Dunsbury Hill Farm development.

DoS and RFC are quantitative values for the level of congestion on the network and are used as the primary indicators of the operational performance of the junction. Generally, when a junction reaches 90 percent DoS/RFC it is considered to be at practical capacity, and at 100 percent theoretical capacity.

As stated in Transport for London's (TfL) Traffic Directorate (TD) Modelling Guidelines V3.0, the relationship between delay and DoS suggests that delay begins to increase exponentially at high DoS (>85%). At junctions operating close to zero practical reserve capacity, even small reductions in capacity can result in a significant increase in delay. Un-signalised junctions typically have a lower practical capacity limit, with DoS in the range 80-85%. Therefore to achieve a robust assessment an 85 percent DoS threshold is considered for un-signalised design assessment and 90 percent for signal controlled isolated junction assessments.

2.2. Baseline Conditions

The 2026 baseline ARCADY output for Asda Roundabout has been presented in Table 1.

Table 1. 2026 Baseline with McDonald's

Approach	AM Peak Hour			PM Peak Hour		
	RFC (%)	Delays (seconds)	Queue Length (pcu)	RFC (%)	Delays (seconds)	Queue Length (pcu)
B2150 Hulbert Road (North)	0.34	8.88	0.57	1.07	170.68	39.99
Purbrook Way (East)	1.42	874.65	341.66	1.20	399.30	143.81
B2150 Hulbert Road (South)	0.62	12.25	1.79	0.76	18.81	3.36
ASDA Access	0.53	12.09	1.23	1.09	189.77	37.79
Purbrook Way (West)	1.00	71.99	28.71	1.22	396.61	135.51

The modelling results indicate that in 2026 the Asda Roundabout will be congested even without the Dunsbury Hill Farm development. The largest queue lengths are generally predicted in the PM Peak, with a queue length of 40 pcus on Hulbert Road North; 144 pcus on Purbrook Way East; and 136 pcus on Purbrook Way West. The largest queues in the AM Peak are predicted on Purbrook Way East, with a queue length of 342 pcus..

2.3. Traffic Flows

As discussed and agreed with HCC, two sets of traffic data were used in the assessment as detailed below:

Technical note

2.3.1. Sub Regional Transport Model 2026

The Sub-Regional Transport Model (SRTM) is a model suite that provides the evidence base for the South Hampshire transport strategy development process and includes a demand. The model was developed to forecast travel demand overtime to 2036 in response to forecast transport improvements and interventions, and changes in land-use and general economic conditions.

The traffic demand for this assessment has been derived from the SRTM's 2026 with Dunsbury Hill Development (Phase 1 and 2) scenario. These flows are presented in Table 1.

Table 1. 2026 SRTM Traffic Flows (with DHF Phase 1 and 2)

From Approach	To Approach	AM Peak Hour	PM Peak Hour
B2150 Hulbert Road (North)	Purbrook Way (East)	101	550
	B2150 Hulbert Road (South)	47	163
	ASDA Access	58	83
	Purbrook Way (West)	59	222
Purbrook Way (East)	B2150 Hulbert Road (South)	3	3
	ASDA Access	85	47
	Purbrook Way (West)	963	749
	B2150 Hulbert Road (North)	637	580
B2150 Hulbert Road (South)	ASDA Access	0	0
	Purbrook Way (West)	131	79
	B2150 Hulbert Road (North)	225	233
	Purbrook Way (East)	3	3
ASDA Access	Purbrook Way (West)	123	214
	B2150 Hulbert Road (North)	62	120
	Purbrook Way (East)	52	87
	B2150 Hulbert Road (North)	0	0
Purbrook Way (West)	B2150 Hulbert Road (North)	279	97
	Purbrook Way (East)	757	1,027
	B2150 Hulbert Road (North)	117	73
	ASDA Access	221	163
Total Junction Flow		3,923	4,493

Traffic flows for both the AM and PM Peak Hours have been derived from the SRTM model and assessed in LinSig and ARCADY models to deduce the predicted delays, queue lengths and degree of saturations (junction capacity). However, it should be noted that these flows are significantly higher than the VISSIM assignment and may therefore represent unrealistic traffic conditions. This is mainly because of the fact that Asda Roundabout is operating significantly over capacity therefore it is more likely that drivers avoid using Asda Roundabout to access the Dunsbury Hill development site. It is also worth noting that the SRTM model has no traffic travelling between the B2150 Hulbert Road (South) and the ASDA Access in both the AM and PM Peak Hours.

Technical note

2.3.2. 2011 Traffic Counts Growthed using Low Growth from TEMPRO

Following discussions with the client team it was agreed that the SRTM background forecast flows for 2026 appeared to be relatively high for some of the movements at the ASDA Roundabout and represented unrealistic conditions. As such, in order to assess the junctions more realistically an alternative scenario was considered. Following discussions with HCC, it was agreed that 2011 baseline traffic counts growthed using Low Growth from TEMPRO should be used in place of the baseline SRTM flows to test the options with more realistic conditions.

A comparison of the SRTM and TEMPRO Low growth forecast flows (including all development flows) are presented in Figures 1 and 2. While the total flows passing through the junctions are reasonably comparable, the results show significant differences in the approach flows at the ASDA Roundabout. It was considered that the TEMPRO LOW growth forecast flows would provide a more realistic basis for assessing options at the junction. Tests have therefore been undertaken using the TEMPRO LOW growth forecast flows.

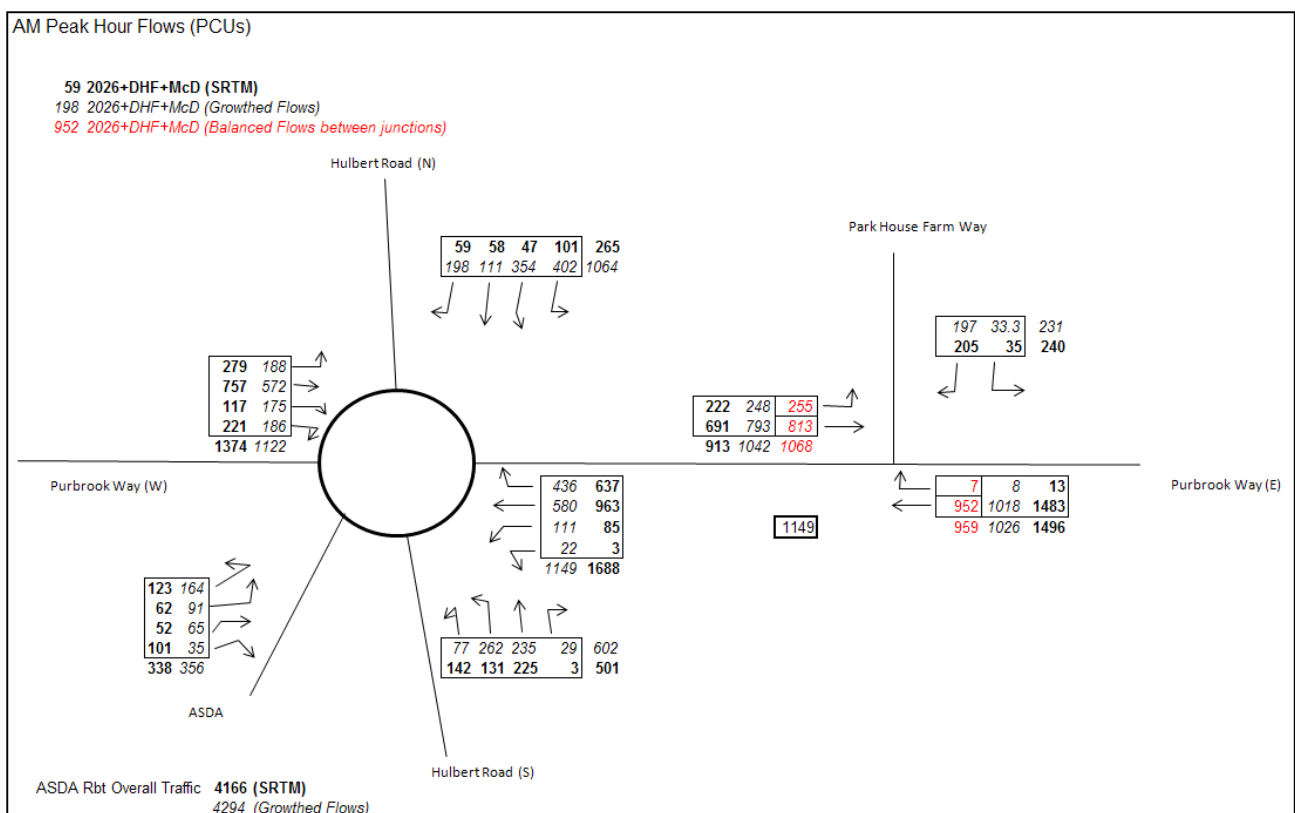


Figure 1 – AM Peak comparison of SRTM and TEMPRO growth 2026 flows

Technical note

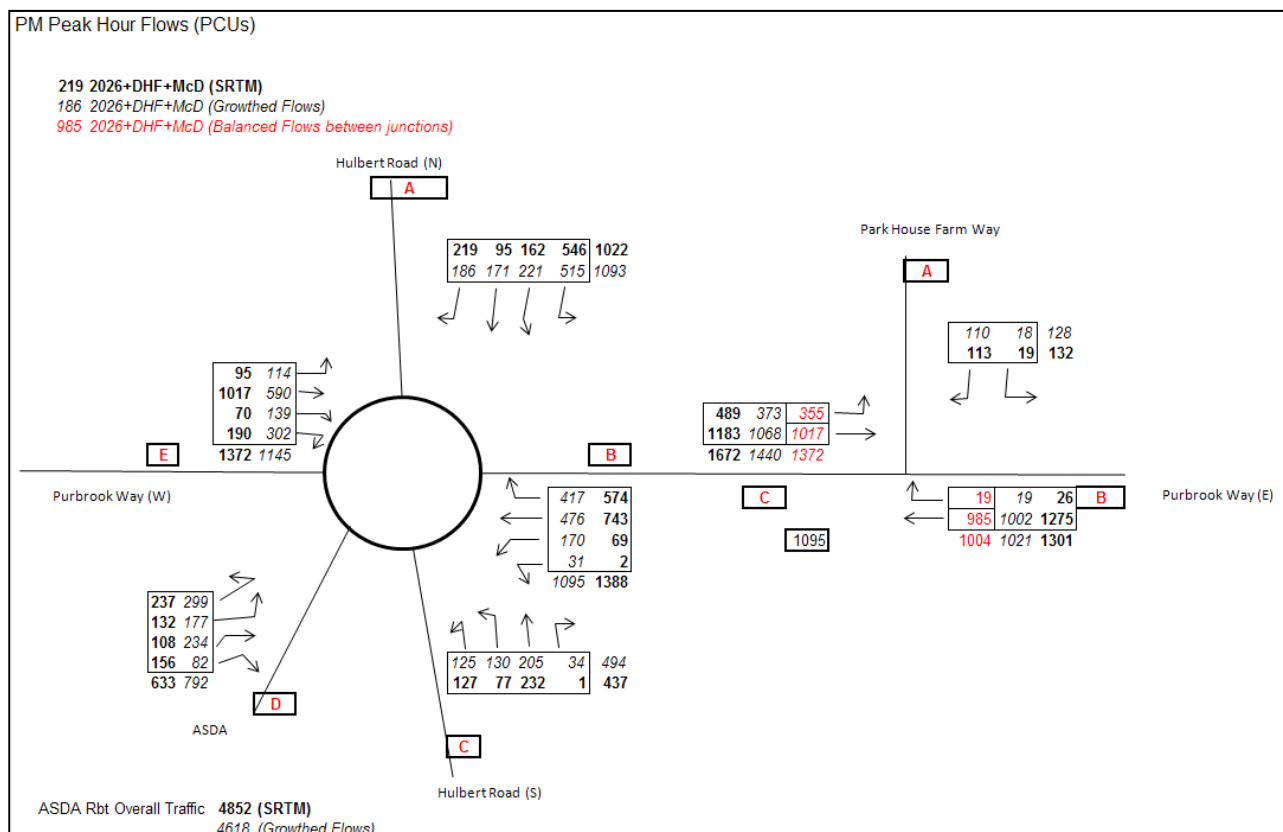


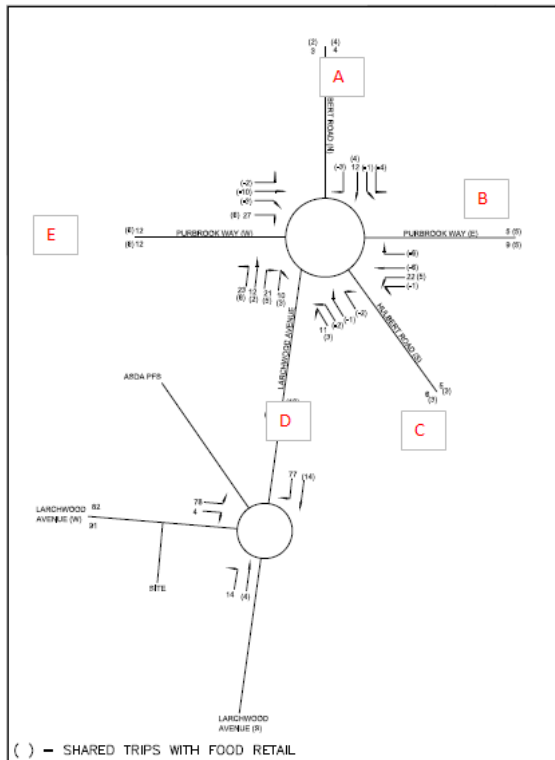
Figure 2 – PM Peak comparison of SRTM and TEMPRO growth 2026 flows

2.3.3. McDonalds Development Trips

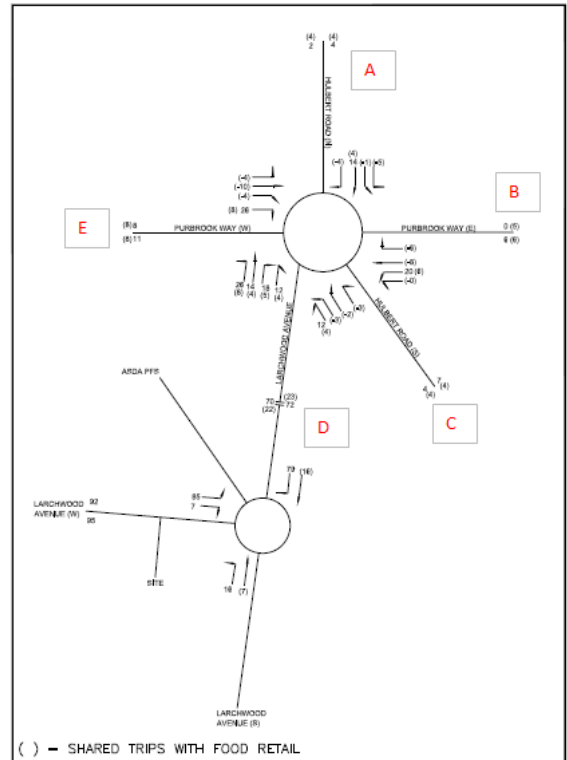
McDonalds development trips have been extracted from ADL Traffic Engineering Ltd's Transport Assessment and Travel Plan Report (Volume 2) dated February 2011. New trips generated as a result of this development have been provided for the PM and Saturday Peak Hours only. As there are no development trips provided for the AM Peak, Atkins has not considered any additional AM trips in the assessment. A summary of the trip generation associated with the McDonalds development is presented in Table 2. The associated development trips have been added to the SRTM flows (Table 1). The McDonalds development trips are not significant and are included only in the most pertinent elongated roundabout design appraisal tests.

Technical note

Table 2. McDonalds Development Trips



APPENDIX 17.7
TOTAL PROPOSED GENERATION
FRIDAY PM PEAK 5-6PM



APPENDIX 17.8
TOTAL PROPOSED GENERATION
SATURDAY PEAK 12-1PM

Friday PM Peak Additional Traffic						
	A	B	C	D	E	
A		-4	-1	12	-3	4
B	-6		-1	22	-6	9
C	-1	-2		11	-2	6
D	12	21	10		23	66
E	-2	-10	-3	27		12
	3	5	5	72	12	97

Saturday Peak Additional Traffic						
	A	B	C	D	E	
A		-5	-1	14	-4	4
B	-6		0	20	-8	6
C	-2	-3		12	-3	4
D	14	18	12		26	70
E	-4	-10	-4	26		8
	2	0	7	72	11	92

Technical note

3. Design Evolution and Appraisal

3.1. Options Tested Using SRTM Scenario

The initial proposed Asda Roundabout design schemes focused mainly on the following two conventional junction types:

- Roundabout with improved geometry; and
- Signalisation of the junction.

Based on the above concepts a variety of design options evolved and were appraised utilising isolated junction assessment software. The design options were developed with an aim to resolve the future congestion at the Asda Roundabout.

Based on the agreed design evolution approach with the Client team, Atkins developed a variety of scheme options which aim to reduce the delays and queue lengths at the Asda Roundabout. Furthermore, the junction modelling assessments have been carried out following design comments received from the Client team using LinSig and ARCADY software. The isolated junction assessment results for each of the design options considered are presented in this section. Initially the junction assessment has been carried out separately for Asda Roundabout and Park House Farm Way junction. This is mainly to deduce the best operational cycle times for each junction and increase the ability to carry out signal optimisation. However, signal coordination has been further evaluated later by merging both junctions' preferred design in a single model.

3.1.1. Larger Conventional Roundabout

This design option includes a larger roundabout compared to the existing roundabout to provide more gap seeking opportunity hence reducing the delays and queues at the critical approaches such as Purbrook Way (East), Hulbert Road (North) and Purbrook Way (West). The junction geometry considered for this design option is summarised in Table 3.

Table 3. Larger Roundabout Geometry (ARCADY)

Approach	V - Approach road half-width (m)	E - Entry width (m)	I' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)
B2150 Hulbert Road (North)	6.00	7.50	5.00	20.00	70.00	35.00
Purbrook Way (East)	4.00	7.50	15.00	25.00	70.00	40.00
B2150 Hulbert Road (South)	4.50	7.50	5.00	15.00	70.00	18.00
ASDA Access	5.50	7.50	5.00	19.00	70.00	40.00
Purbrook Way (West)	7.50	7.50	0.00	30.00	70.00	28.00

The queue lengths, delays and (RFC) comparisons are summarised in Table 4 below for the AM and PM Peaks. The arms which are predicted to operate above the practical capacity of the junction are highlighted in red.

Technical note

Table 4. Larger Roundabout Assessment 2026 with DHF (P1&P2)

Approach	AM Peak Hour			PM Peak Hour		
	RFC (%)	Delays (seconds)	Queue Length (pcu)	RFC (%)	Delays (seconds)	Queue Length (pcu)
B2150 Hulbert Road (North)	21	4	0	82	18	5
Purbrook Way (East)	121	384	175	100	114	43
B2150 Hulbert Road (South)	57	13	1	50	13	1
ASDA Access	30	7	1	50	9	1
Purbrook Way (West)	82	12	5	76	9	3

The ARCADY results demonstrate that in both Peak Hours of the assessment, Purbrook Way (East) approach experiences high queues and delays. The model predicts an RFC of 121 percent with queues of 175 pcus in the AM Peak Hour. The issue with this approach is that vehicles are unable to find suitable gaps because of the heavy circulatory traffic. Therefore the larger roundabout design option cannot accommodate the anticipated traffic flows at the junction.

3.1.2. Signalised Crossroads

The signalisation of the junction to create a crossroads and adjacent signal controlled T-junction to access Asda superstore has been designed as a proposed junction design layout. The proposed signal controlled layout includes:

- Three lanes and a flare lane on the Purbrook Way (West) approach;
- Three lanes and a flare lane on the Purbrook Way (East) approach;
- Two lanes and two flare lanes on the Hulbert Road (North) approach; and
- Three lanes on the Hulbert Road (South) approach.

The 2026 with Dunsbury Hill Development traffic LinSig results showing the DoS, average delays and queue lengths are presented in Table 5 for both the AM and PM Peak Hour. Results for the approaches operating above practical capacity of the signal controlled junction are shown in red.

Technical note

Table 5. Signal Controlled Crossroads Assessment 2026 with DHF (P1&P2)

Approach	AM Peak Hour			PM Peak Hour		
	DoS (%)	Avg. Delays (s/pcus)	Queue Length (pcu)	DoS (%)	Avg. Delays (s/pcus)	Queue Length (pcu)
B2150 Hulbert Road (North)	31	36	2	125	423	56
Purbrook Way (East)	105	163	34	87	62	13
B2150 Hulbert Road (South)	75	46	10	66	26	5
ASDA Access	18	7	2	32	9	5
Purbrook Way (West)	94	69	19	119	367	67

The LinSig assessment predicts that three out of the five approaches would operate within capacity in both the AM and PM Peak Hours. The maximum DoS predicted is on the Hulbert Road (North) approach, being 125 percent with an associated queue length of 56 pcus in the PM Peak Hour. The AM Peak Hour model predicts a maximum DoS of 105 percent at Purbrook Way (East) approach with 34 pcus queue length.

Whilst the above junction design option has offered additional capacity in the both AM and PM Peak Hours, HCC noted that the footprint of the scheme was considered too large compared to the expected duration of the congestion i.e. the design was based on peak flows and the large junction may not be warranted in the off peak periods. Furthermore, Atkins noted HCC's desire to retain the existing roundabout to ensure the junction is sympathetic to the surrounding area and vegetation/trees on the central island are retained.

Based on these discussions, Atkins investigated further potential design options which were evaluated in LinSig and are described in the following sections.

3.1.3. Signalised Crossroads (Reduced Footprint)

The proposed signalised crossroads with reduced footprint layout includes:

- Two lanes and a flare lane on the Purbrook Way West approach;
- Two lanes and a flare lane on the Purbrook Way East approach;
- Two lanes and a flare lane on the Hulbert Road North approach; and
- Two lanes on the Hulbert Road South approach.

The LinSig model results for the above design option for both the AM and PM Peak Hours are presented in Table 6.

Technical note

Table 6. Signal Controlled Crossroads (reduced footprint) 2026 with DHF (P1&P2)

Approach	AM Peak Hour			PM Peak Hour		
	DoS (%)	Avg. Delays (s/pcus)	Queue Length (pcu)	DoS (%)	Avg. Delays (s/pcus)	Queue Length (pcu)
B2150 Hulbert Road (North)	66	59	5	118	353	53
Purbrook Way (East)	108	209	42	127	468	77
B2150 Hulbert Road (South)	110	249	30	64	29	11
ASDA Access	16	5	2	36	13	6
Purbrook Way (West)	97	61	28	126	442	146

The AM Peak Hour results indicate that the Purbrook Way (East) and Hulbert Road (South) arms are predicted to operate well above capacity with the DoS in excess of 100 percent. The PM Peak Hour model predicts three out of the five approaches would be over capacity with a maximum DoS and queue of 126 percent and 146 pcus respectively at Purbrook Way (West).

3.1.4. Signalised Conventional Roundabout

This design option included a combination of different approaches being signalised and different signal strategies applied. The LinSig model runs included:

1. Only Purbrook Way (East) approach signal controlled with single lane exit on all arms;
2. Only Purbrook Way (East) approach signal controlled with two lane exit on all arms;
3. Purbrook Way (East), Purbrook Way (West) and Hulbert Road (North) approaches signalised with a two stage timing plan;
4. Purbrook Way (East), Purbrook Way (West) and Hulbert Road (North) approaches signalised with a three stage timing plan; and
5. All approaches of the roundabout signalised.

Number 3 from the above list predicted the best operational performance from the options assessed. The results of this assessment are presented in Table 7.

Technical note

Table 7. Signalised Roundabout 2026 with DHF (P1&P2)

Approach	AM Peak Hour			PM Peak Hour		
	DoS (%)	Avg. Delays (s/pcus)	Queue Length (pcu)	DoS (%)	Avg. Delays (s/pcus)	Queue Length (pcu)
Purbrook Way (West)	99	76	22	99	75	22
B2150 Hulbert Road (North)	32	26	2	81	33	10
Purbrook Way (East)	85	18	16	80	20	13
Northern Circulatory Capacity	97	50	25	99	61	28
B2150 Hulbert Road (South)	76	26	5	59	15	3
ASDA Access	49	12	2	88	39	8
Southern Circulatory Capacity	73	4	1	69	3	1

The results for the conventional roundabout assessment indicated that the northern circulatory would operate above capacity and develop queues which would block back to the exit of the Purbrook Way (West) approach.

The LinSig results all indicated that there was insufficient queuing capacity on the circulatory carriageway and this would consequently result in congestion with queues blocking back to the approaches of the junction. This would result in further congestion developing at the junction approaches. Therefore, an alternative method of signal control was considered with each approach plus the circulatory having exclusive right of way. However, this did not resolve congestion on the approaches due to the heavy traffic demand at the junction.

3.1.5. Signalised Elongated Roundabout

3.1.5.1. Asda Roundabout

Following discussions with the Client team, Atkins developed a signalised elongated roundabout design option in order to optimise stacking capacity on the circulatory carriageway. The design included signals at the Purbrook Way East and West approaches to the roundabout only, with the remaining approaches operating on a give-way. The Hulbert Road North approach consists of single lane and an offside flare lane. The nearside lane is designated as a left turn lane only exiting onto Purbrook Way East.

Two alternative design options were tested for the elongated roundabout design. The first option included a single lane exiting onto Purbrook Way East while the second option included a two lane exit onto Purbrook Way East.

The LinSig model assessment for the AM and PM Peak Hour is summarised in Table 8 and Table 9 for the single and two lane options respectively.

Technical note

Table 8. Signal Controlled Elongated Roundabout 2026 with DHF (P1&P2) single lane exit

Approach	AM Peak Hour			PM Peak Hour		
	DoS (%)	Avg. Delays (s/pcus)	Queue Length (pcu)	DoS (%)	Avg. Delays (s/pcus)	Queue Length (pcu)
B2150 Hulbert Road (North)	32	4	1	111	214	77
Purbrook Way (East)	98	39	30	91	23	13
B2150 Hulbert Road (South)	72	16	4	56	9	3
ASDA Access	58	16	5	93	43	15
Purbrook Way (West)	92	28	18	111	212	90
JUNCTION PRACTICAL RESERVE CAPACITY	-9.1			-23.5		

Table 9. Signal Controlled Elongated Roundabout 2026 with DHF (P1&P2) two lane exit

Approach	AM Peak Hour			PM Peak Hour		
	DoS (%)	Avg. Delays (s/pcus)	Queue Length (pcu)	DoS (%)	Avg. Delays (s/pcus)	Queue Length (pcu)
B2150 Hulbert Road (North)	31	5	1	107	156	59
Purbrook Way (East)	98	39	30	106	146	66
B2150 Hulbert Road (South)	72	16	4	53	9	7
ASDA Access	58	16	5	87	28	12
Purbrook Way (West)	76	18	17	104	136	60
JUNCTION PRACTICAL RESERVE CAPACITY	-9.1			-18.8		

The results indicate that for both options the junction is predicted to operate well above the practical capacity in both peaks, but especially during the PM Peak Hours. Degrees of saturation in excess of 100% are predicted in the PM Peak for both options which would result in high levels of queues and delays reported in the results. The two lane option provides some marginal benefits compared with the single lane option as it allows better operation of the circulatory carriageway due to shorter queues, especially at the circulatory carriageway adjacent to the Purbrook Way west approach. However, the results indicate that the both options would not have sufficient capacity to accommodate the forecast traffic demand at the junction.

Technical note

Nonetheless the two lane exit option provides the best operational performance over the other design options. However, HCC do not consider it acceptable to provide two lanes on the exit from Asda Roundabout and through the Park House Farm Way junction as traffic would be merging in close proximity to the well used parking bays. Therefore this option has been discounted.

3.1.6. Park House Farm Way

3.1.6.1. Signalised Junction

A LinSig model was developed to assess the signalisation of the Park House Farm Way / Purbrook Way junction which is located to the east of the ASDA roundabout. The junction layout included:

- Purbrook Way West - two lanes;
- Purbrook Way East – single lane; and
- Park House Farm Way – single lane

The layout included staggered signal controlled pedestrian crossings across the Purbrook Way West and the Park House Farm Way approaches. The junction operates in three stages with the pedestrian crossings operating with non-conflicting traffic streams. The model was run with a cycle time of 120 seconds and it was assumed that the pedestrian phase is demanded every cycle. Results for the LinSig assessment are presented in Table 10.

Table 10. Signal Controlled Elongated Roundabout 2026 with DHF (P1&P2) two lane exit

Approach	AM Peak Hour			PM Peak Hour		
	DoS (%)	Avg. Delays (s/pcus)	Queue Length (pcu)	DoS (%)	Avg. Delays (s/pcus)	Queue Length (pcu)
Purbrook Way (East)	120	366	188	98	56	55
Purbrook Way (West)	33	6.6	10	57	7.3	21
Park House Farm Way	116	365	29	99	202	10
JUNCTION PRACTICAL RESERVE CAPACITY	-33.7			-9.8		

The results show the junction is predicted to operate well above practical capacity during the AM and PM Peak Hours.

3.2. Options Tested Using 2011 Plus Low Growth Scenario

3.2.1. Combined model

Due to the proximity of the ASDA roundabout and the Park House Farm Way junction, a combined model comprising the two junctions was developed in LinSig to assess the interaction and the performance of the two signalised junctions. The key design features for the junctions are listed below:

Technical note

- ASDA roundabout
 - Purbrook Way west has two lanes and flare designated as follows:
 - Nearside lane would be used by left turners to Hulbert Road north and left turners to Park House Farm Way
 - Middle lane would be used by traffic travelling straight ahead at the Purbrook Way/Park House Farm Way junction
 - Offside lane for circulatory traffic
 - Three lanes circulatory provided between the Hulbert Road north exit and entry arms
- Park House Farm Way
 - Two exit lanes provided on Purbrook Way east with the nearside lane dedicated for vehicles turning left into Park House Farm Way only.
 - Single lane on Purbrook Way west and on Park House Farm Way

The TEMPRO LOW growth forecast flows were applied in the combined LinSig model for the PM Peak only which is considered the busiest peak period. Results for the LinSig assessment are presented in Table 11.

Table 11. Combined model with 2026 with DHF (P1&P2) TEMPRO low growth forecast flows

Junction	Approach	PM Peak Hour		
		DoS (%)	Avg. Delays (s/pcus)	Queue Length (pcu)
ASDA roundabout	B2150 Hulbert Road (North)	179	921	340
	Purbrook Way (East)	82	16	26
	B2150 Hulbert Road (South)	55	6	3
	ASDA Access	94	35	18
	Purbrook Way (West)	85	34	19
Park House Farm Way/Purbrook Way	Purbrook Way (East)	77	20	24
	Purbrook Way (West)	55	6	10
	Park House Farm Way	79	20	24

The results indicate that the majority of approaches are predicted to operate within capacity with the exception of the Hulbert Road North and ASDA approaches. The Hulbert Road North approach is predicted to operate significantly over capacity with a predicted degree of saturation and queue length of 179% and 340 pcus respectively. This is mainly because the Hulbert Road North approach operates as a give-way and there are insufficient gap seeking opportunities within the opposing traffic streams for traffic to exit.

In addition to the capacity issues, there were concerns regarding the appropriateness of the intended lane designation at the Purbrook Way West approach and whether this could operate safely. As vehicles travelled towards the Park House Farm Way junction there was potential for vehicles to make unsafe merging manoeuvres to arrive at their desired lane destination. Due to these concerns, this design option was not progressed.

3.2.2. Signalised Elongated Roundabout (PREFERRED SCHEME)

Following further discussions with the Client team, it was agreed that it would not be appropriate to provide a two lane exit on Purbrook Way East at the ASDA roundabout due to safety concerns with vehicles merging

Technical note

close to the Park House Farm Way junction. It was also agreed that the Park House Farm Way junction would be retained in its present form as a priority junction. On this basis, the Signalised Elongated Roundabout was assessed using the low growth forecast flows.

The lane markings on Hulbert Road North were amended to allow ahead vehicles in the nearside lane. Previously, this was designated for vehicles turning left only. Results for the LinSig assessment are presented in Table 12.

Table 12. Signal Controlled Elongated Roundabout 2026 with DHF (P1&P2)

Approach	AM Peak Hour			PM Peak Hour		
	DoS (%)	Avg. Delays (s/pcus)	Queue Length (pcu)	DoS (%)	Avg. Delays (s/pcus)	Queue Length (pcu)
B2150 Hulbert Road (North)	94	30	15	115	276	99
Purbrook Way (East)	86	24	11	89	29	12
B2150 Hulbert Road (South)	68	10	4	60	9	3
ASDA Access	51	9	3	101	80	57
Purbrook Way (West)	80	19	12	92	32	17
JUNCTION PRACTICAL RESERVE CAPACITY	-4.8			-28.4		

The results for the AM Peak indicate that all the approaches are predicted to operate below practical capacity with the exception of the Hulbert Road North approach, which operates approaching practical capacity with a 94% degree of saturation. The forecast queues on the approaches are not significant and can be accommodated within the respective links.

For the PM Peak, the results indicate that two of the priority approaches at the junction, namely Hulbert Road North and Asda, are predicted to operate above practical capacity resulting in high degrees of saturation and queues on these approaches. As was highlighted earlier in the report, the key reason for the levels of saturation on these two approaches is the lack of sufficient gap seeking opportunities within the opposing traffic stream for traffic to exit these approaches. Driver behaviour at priority junctions can have a significant influence on the performance of a junction and LinSig may not be the most appropriate tool to provide a definitive conclusion. Furthermore due to land restrictions to the north of Purbrook Way West approach there is limited stacking capacity on the circulatory carriageway at this approach. As a result of this and heavy circulatory traffic demand the results indicate that queues would exceed the stacking capacity of the circulatory lane. It would therefore be necessary to confirm the LinSig results in a VISSIM model which is a more capable tool for assessing and confirming capacities at the priority approaches.

Based on these results this option has been selected as the preferred scheme and will be tested in VISSIM as part of the Dunsbury Hill Farm TA Addendum to confirm the operational performance of the network with the proposed scheme in place.

Technical note

4. Conclusion

Atkins has been commissioned jointly by Hampshire County Council (HCC) and Portsmouth City Council (PCC) to investigate options to improve the operation of the Asda Roundabout and the Park House Farm Way junction in Havant, Hampshire. HCC have identified that there is currently congestion and operational issues at the junction and have programmed to investigate measures to improve the junction performance.

As part of the proposed Dunsbury Hill Farm development the traffic modelling has indicated that the traffic flows generated by the development would further exacerbate peak hour congestion on some arms at this junction. In addition, the proposed McDonalds development adjacent to the junction will contribute further to the existing and future congestion and operational issues.

The objective of the study is to develop a scheme at the Asda Roundabout to accommodate the 2026 background traffic flows plus the additional development traffic directly associated with Dunsbury Hill Farm proposal. At a meeting on 13th February 2012 between HCC and PCC, as land owner of Dunsbury Hill Farm, it was agreed that measures are to be investigated to resolve the current and future congestion at the roundabout.

Atkins has developed and assessed a number of options to address the issues identified at the Asda Roundabout. The design process has been an iterative process which has involved the Client Team throughout the various stages. The technical note has summarised the key features of the options assessed and the results of the assessment which has been undertaken using ARCADY and LinSig.

Based on the results of the assessment and feedback received from the Client Team, the Signalised Elongated Roundabout design has been selected as the preferred scheme. The proposed scheme operates satisfactorily during the AM Peak Hour. In the PM Peak Hour, there are some issues with queuing on the Hulbert Road North and Asda approaches. In addition, due to the limited stacking space available on the western circulatory carriageway the queues are predicted to extend beyond the available space.

It is recommended that the option is taken forward and assessed in VISSIM to confirm the operational performance of the junction, especially the level of queuing predicted on the Hulbert Road North and Asda approaches during the PM Peak Hour.

Appendix D. Land Ownership Plan

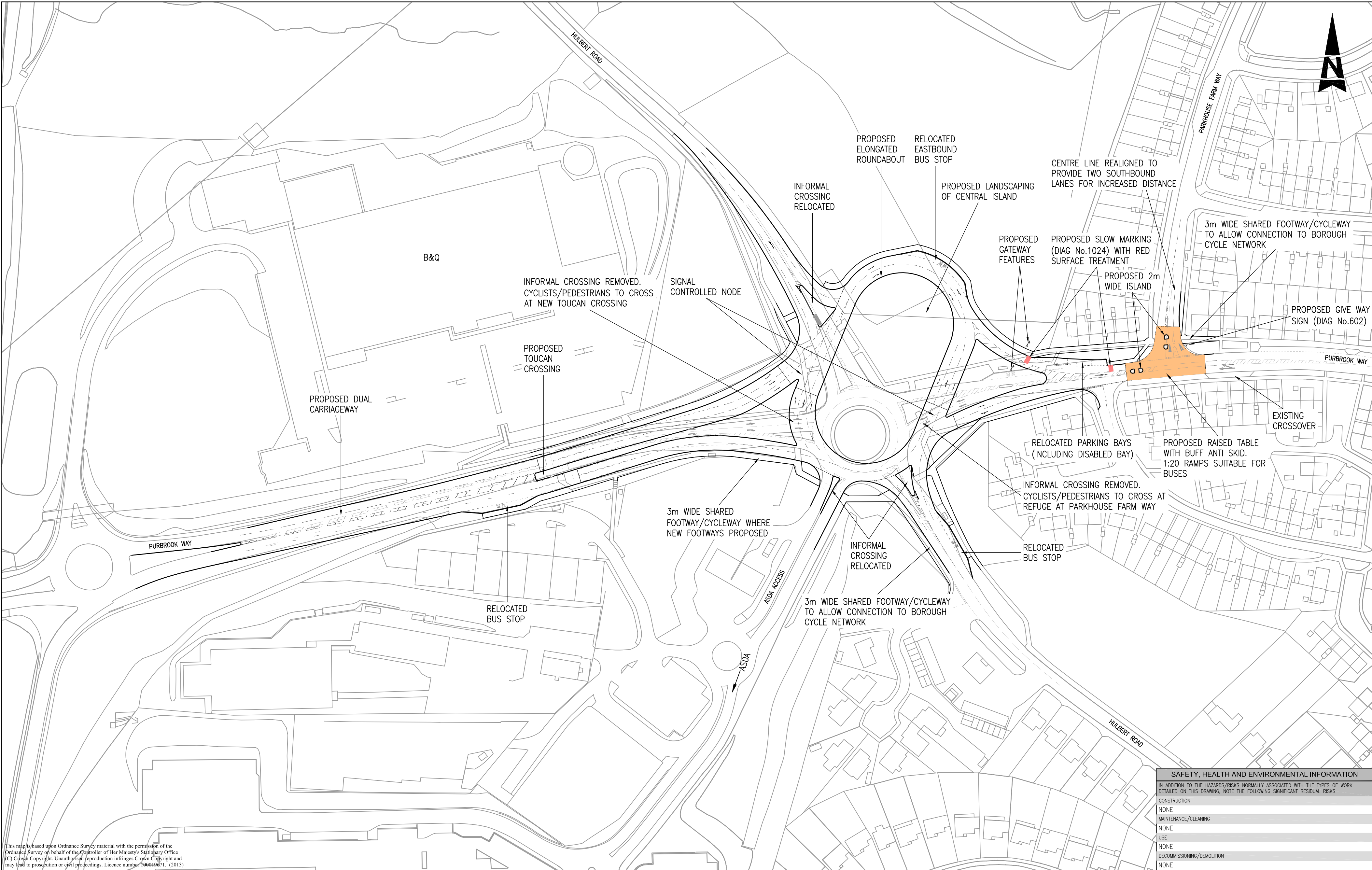
This map is based upon Ordnance Survey material with the permission of the Ordnance Survey on behalf of the Controller of Her Majesty's Stationary Office (C) Crown Copyright. Unauthorised reproduction infringes Crown Copyright and may lead to prosecution or civil proceedings. Licence number 100019671. (2013)

PROPRIETOR: SOUTHERN ELECTRIC
POWER DISTRIBUTION
TITLE No: SH26110

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION			
IN ADDITION TO THE HAZARDS/RISKS NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING SIGNIFICANT RESIDUAL RISKS			
CONSTRUCTION			
NONE			
MAINTENANCE/CLEANING			
NONE			
USE			
NONE			
DECOMMISSIONING/DEMOLITION			
NONE			
Title			
EXISTING LAND OWNERSHIP PLAN			
Sheet Size	Original Scale	Designed/Drawn MBW	Checked JM
A3	1:1000	Date 07.12	Date 10.01.13
Authorised SS		Date 11.01.13	
Status	Drawing Number	Rev	
P	5113005/TP/LO/001	A	

Appendix E. Preferred Option Preliminary Design Drawings

DO NOT SCALE



This map is based upon Ordnance Survey material with the permission of the Ordnance Survey on behalf of the Controller of Her Majesty's Stationary Office (C) Crown Copyright. Unauthorised reproduction infringes Crown Copyright and may lead to prosecution or civil proceedings. Licence number 1000410671. (2013)

KEY:									
PROPOSED RAISED JUNCTION									
PROPOSED RED SURFACE TREATMENT									

Stat	Purpose of Issue	Date	Auth	Rev	Description	By	Date	Chk'd	Auth
P	FOR INFORMATION	15.01.13	SS	C	PROPOSED SIGN RELOCATION	MBW	15.01.13	JM	SS
P	FOR INFORMATION	11.01.13	SS	B	MINOR JUNCTION AMENDMENTS	MBW	11.01.13	JM	SS
P	FOR INFORMATION	-	-	A	ORIGINAL ISSUE	PS	08.01.13	JM	-

ATKINSTM

Atkins Limited

Consulting Engineers,
Woodcote Grove
Ashley Road
Epsom, Surrey, England,
KT18 5BW

Tel: (01372) 726140
Fax: (01372) 740055
www.atkinsglobal.com

Client

Project

ASDA ROUNDABOUT

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION				
IN ADDITION TO THE HAZARDS/RISKS NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING SIGNIFICANT RESIDUAL RISKS				
CONSTRUCTION				
NONE				
MAINTENANCE/CLEANING				
NONE				
USE				
NONE				
DECOMMISSIONING/DEMOLITION				
NONE				
Title				
PROPOSED LAYOUT PREFERRED OPTION PRELIMINARY DESIGN				
Sheet Size	Original Scale	Designed/Drawn SD / PS	Checked JM	Authorised SS
A2	1:1250	Date 11.12	Date 08.01.13	Date 11.01.13
Status	Drawing Number			Rev
P	5113005/TP/PD/004			C

Appendix F. Preliminary Construction Cost Estimate

PCC and HCC
Asda Roundabout
Drawing No. 5103005/TP/PD/104 Rev A
COST ESTIMATE

Note:

The estimate assumes new carriageway construction 800mm thick, new footway 210mm thick

Series		Unit	Quantity	Rate	Cost
200	Site Clearance				
	General site clearance	Item	1.00	20000	20000.00
500	Drainage and Service Ducts				
	Ducting	m	250.00	80	20000.00
	Gulley incl 5m pipe, excavation and backfill	no	115.00	1500	172500.00
	Main drainage pipes	m	300.00	200	60000.00
	Manholes	no	10.00	5000	50000.00
600	Earthworks				
	Excavate and dispose	cu m	7500.00	60	450000.00
	Capping material - assume 350mm thick	cu m	2520.00	30	75600.00
700	Pavements				
	<u>New Highway Construction</u>				
	Sub Base Type 1 in carriageway (250mm)	cu m	1800.00	40	72000.00
	Base Course DBM (200mm)	sq m	7200.00	20	144000.00
	Binder Course DBM (60mm)	sq m	7200.00	15	108000.00
	Surface Course SMA (40mm)	sq m	12500.00	10	125000.00
	Antiskid Surfacing	sq m	1200.00	20	24000.00
	Cold milling up to 40mm	sq m	5300.00	5	26500.00
	Regulating material under resurfacing	tonne	100.00	50	5000.00
	<u>New Footway Construction</u>				
	Sub Base Type 1 (150mm)	cu m	700.00	40	28000.00
	Binder Course DBM (40mm)	sq m	4680.00	10	46800.00
	Surface Course DBM (20mm)	sq m	4680.00	5	23400.00
1100	Kerbs, Footways and Paved Areas				
	PCC kerbing	m	1910.00	20	38200.00
	PCC edging	m	1300.00	10	13000.00
	Lamp Columns incl cabling etc	no	40.00	3500	140000.00
1200	Signs and Road Markings				
	Signs and Markings	Item			20000.00
*	Additional Items				
	Traffic Signals Infrastructure per arm	no	4	35000	140000.00
	Pedestrian Guardrailing	m	0.00	130	0.00
	Landscaping excavate and dispose	cu m	1400.00	60	84000.00
	Landscaping	sq m	1400.00	100	140000.00
SUB TOTAL					2026000.00
	Preliminaries (including traffic & ped TM)	25%			506500.00
	Contingency	10%			202600.00
	Design Fees	19%			384940.00
	Site Supervision	8%			162080.00
	Project Management	6%			121560.00
	Statutory Undertakers' Diversion (if known)				
	BT				204146.00
	Cable & Wireless				UNKNOWN
	Portsmouth Water				UNKNOWN
	Redstone				80500.00
	SSE Telecoms				UNKNOWN
	Scotia Gas Networks				UNKNOWN
	Virgin				100000.00
SUB TOTAL					3788326.00
	Optimism Bias	40%			1515330.40
TOTAL					5303656.40

Appendix G. Stage 1 Road Safety Audit

To follow.

Atkins

Woodcote Grove,
Ashley Road,
Epsom,
Surrey.
KT18 5BW

© Atkins Ltd except where stated otherwise.

The Atkins logo, 'Carbon Critical Design' and the strapline
'Plan Design Enable' are trademarks of Atkins Ltd.