

# HEMPTON B1146 /C550 JUNCTION IMPROVEMENT SCHEME

## **Feasibility Study**

**22/11/2018**

Prepared by Highways Group

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## Feasibility Study

26 October 2018

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# HEMPTON B1146 / C550 JUNCTION IMPROVEMENT SCHEME

## Feasibility Report

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File Reference: HP/PKA012

Issue Status: issued

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## Appendices

### **A Figures / Pictures**

### **B Location Plan: Dwg. No: PKA012-HP-0100-001**

### **C Preliminary Scheme Layout: Dwg. No's:**

- **Option 1:** *PKA012-HP-001 - 4 Arm Normal Roundabout*
- **Option 2:** *PKA012-HP-002 - 4 Arm Compact Roundabout*
- **Option 3:** *PKA012-HP-003 – 3 Arm Normal Roundabout*
- **Option 4:** *PKA012-HP-004 – 3 Arm Compact Roundabout*

### **D Photograph Location Plan: Dwg. No: PKA012-HP-0100-002**

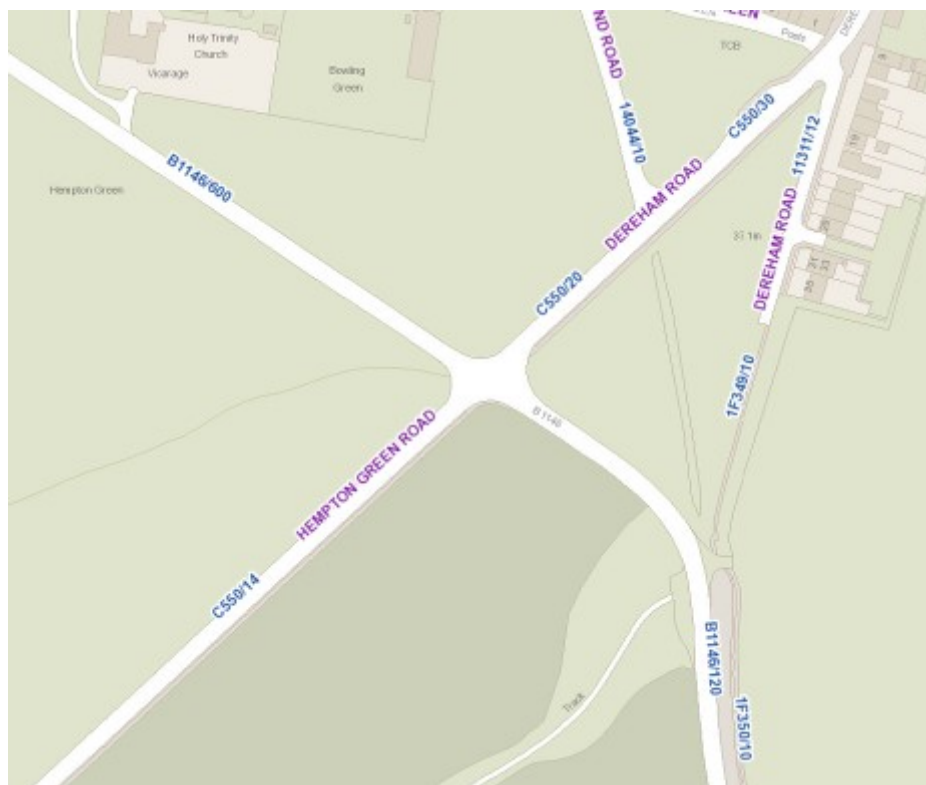
### **E Scheme Cost Estimates**

### **F Safety Audit Stage 1**

### **G Project Brief**

## 1. Background

- 1.1 *Accident Investigation & Prevention (AIP) Study July 2003, (TMB 3111)* Dereham Rd Crossroads (B1146/C550/U14008) identified abrupt rise in accidents in latest year compared to previously low but persistent record, failure to give way main cause. Recommended low cost measures to improve conspicuity of junction, with accident record monitored with view to more comprehensive junction measures if recent accident rise persisted.
- 1.2 *Pedestrian Crossing Assessment May 2004 (TMB3164)* – A1065 Hempton, identified main crossing point as near junctions with U14008 Hempton Green Rd and U14007 Shereford Rd. Refuge most appropriate measure but recommended further investigation of AIP junction proposals before location of refuge is decided.
- 1.3 *Hempton Parish Council consultations – Dec 2004.* Following a continuing increase in accidents, the parish asked for ‘something to be done’. The parish carried out their own local consultation asking residents to identify areas of concern in the village. Results indicated that speed and difficulties in crossing A1067 Raynham Rd, and the Dereham Rd crossroads were the main causes for concern.



## **2. Proposals**

- 2.1 Four arm roundabout:
  - 2.1.1 Normal
  - 2.1.2 Compact
- 2.2 Three arm roundabout (Closure of C550/14 Hempton Green Road):
  - 2.2.1 Normal
  - 2.2.2 Compact
- 2.3 Right turn: From C550/20 to B1146. Closure of C550/14 Hempton Green Road.

### 3. Existing Situation

#### 3.1.1 Route hierarchy:

Junction arms: C550/14 Hempton Green Road  
 C550/20 Dereham Road  
 B1146/600 Hempton Green Road  
 B1146/120 Dereham Road

#### 3.1.2 Speed limit:

Both roads 40 mph (see figure 1).

#### 3.1.3 Traffic Sensitivity:

C550/14 Hempton Green Road – C550/20 Dereham Road

■ Band 10 - Local Strategic Importance. Works can take place once traffic management agreed - Mon to Fri All Year

B1146/600 Hempton Green Road – B1146/120 Dereham Road

■ Band 4 - 07:30 to 09:00 and 16:00 to 19:00 Mon to Fri All Year

#### 3.1.4 Accident Data:

From the brief previous information: 10 Personal Injury Accident record in latest 3 years (01 Jan 2002 – 31 Dec 2004), 8 slight 2 serious. Dominant type failure to give way, mostly from B1146 Dereham Rd (approaching from Pudding Norton). Current data report location figure 2 in appendix A. There have only been three accidents in five years, all of them have has a slight accident and casualty severities. Common accident cause is due to vehicles not respecting the give way lines coming from either sides of B1146 (see diagram 1 for accident characteristics).

#### 3.1.5 Conservation Area and environment

As the picture shows (figure 3) most of the area affected by the proposal within the limits of a conservation area. Only the southwestern arm is not within the conservation boundary. In terms of environment there is not Norfolk Trails nor IDB. The southern corner is a county wildlife site (see figures 4 and 5). This area is composed large hedges and Trees on the southern corner, they might be affected by the land purchase required to build a roundabout. The other three corners are mainly verges.

### 3.1.6 Bus Routes

Travel and transport confirmed that there are no bus stops or bus services in the junction. However Norfolk Mapping Browser shows (see figure 6) several bus stops in the vicinity of the junction, this suggests a bus route along B1146 Dereham Road towards Fakenham or alternatively it runs along Raynham Road and then passes by the junction via B1146 Hempton Green Road.

### 3.1.7 Utilities

Running parallel to C550 (see figure 7) there are BT utility apparatus (in purple). There are two BT chambers in both sides of the northeastern arm which are very likely to be affected by a roundabout layout. This will obviously imply a cost to relocate these two covers and depending on the option (roundabout size and location) the chamber in the eastern side of the southwestern arm. In regards to Anglian Water there is a decommissioned pipeline (navy blue). There is a high pressure gas pipe (in yellow in picture 1) going across the south-eastern arm, this would need to be addressed as the alignment might change.

### 3.1.8 Properties, Land ownership & Development

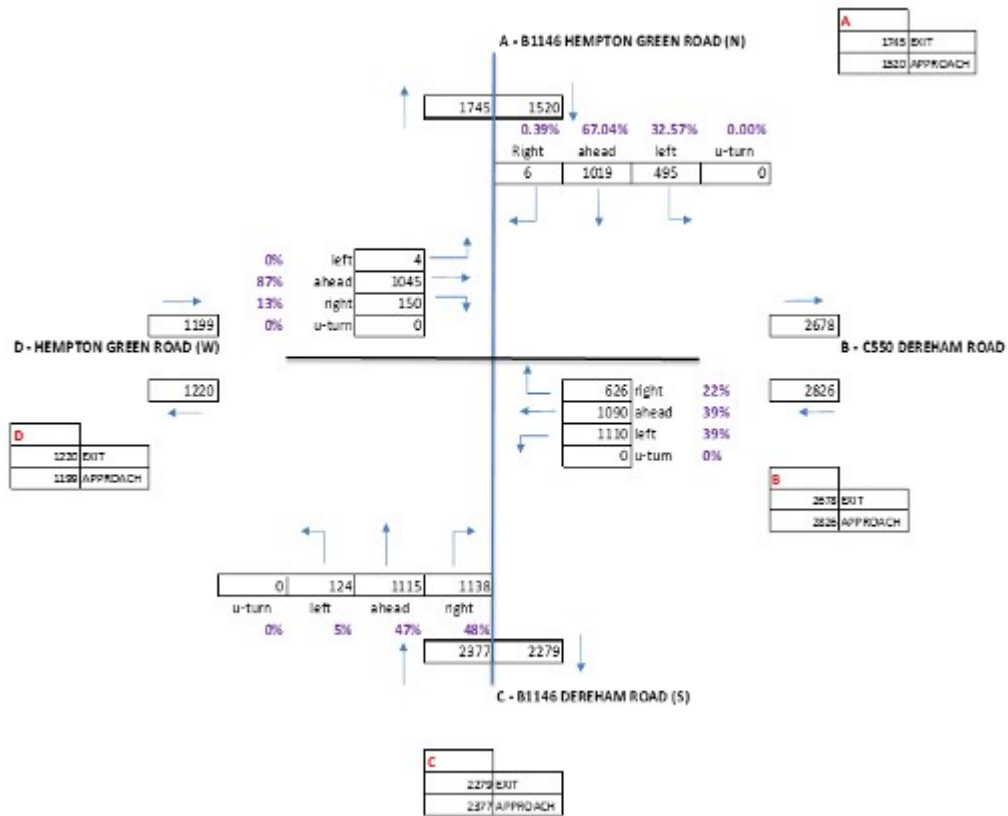
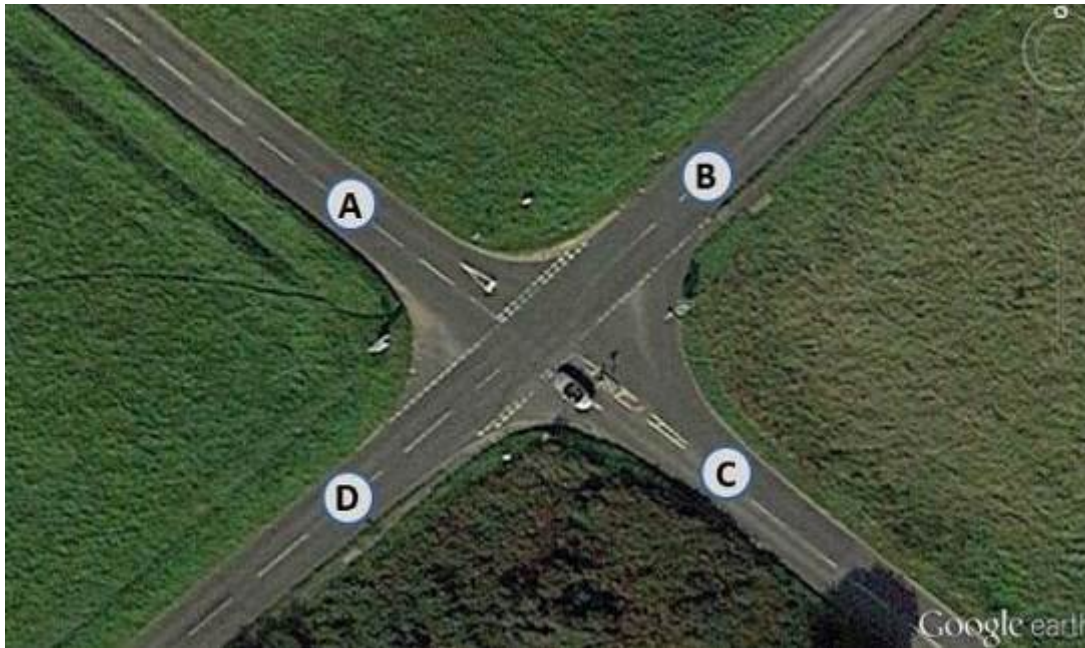
There are not buildings close to the junction. The four corners are owned by the same proprietor (same tile numbers, see figure 8), who has in principle agreed to sell the land.

*RAYNHAM TRUST COMPANY NUMBER ONE LIMITED (Co. Regn. No. 08572677) and RAYNHAM TRUST COMPANY NUMBER TWO LIMITED (Co. Regn. No. 08572682) care of Raynham Farm Co. Ltd, Estate Office, Hall Farm House, East Raynham, Fakenham NR21 7EE*

In regards to future developments, Development and Planning have confirmed that there is nothing planned the nearest future (next five years) in the area or adjacent, that will have impact on the junction.



3.1.9 Traffic Data



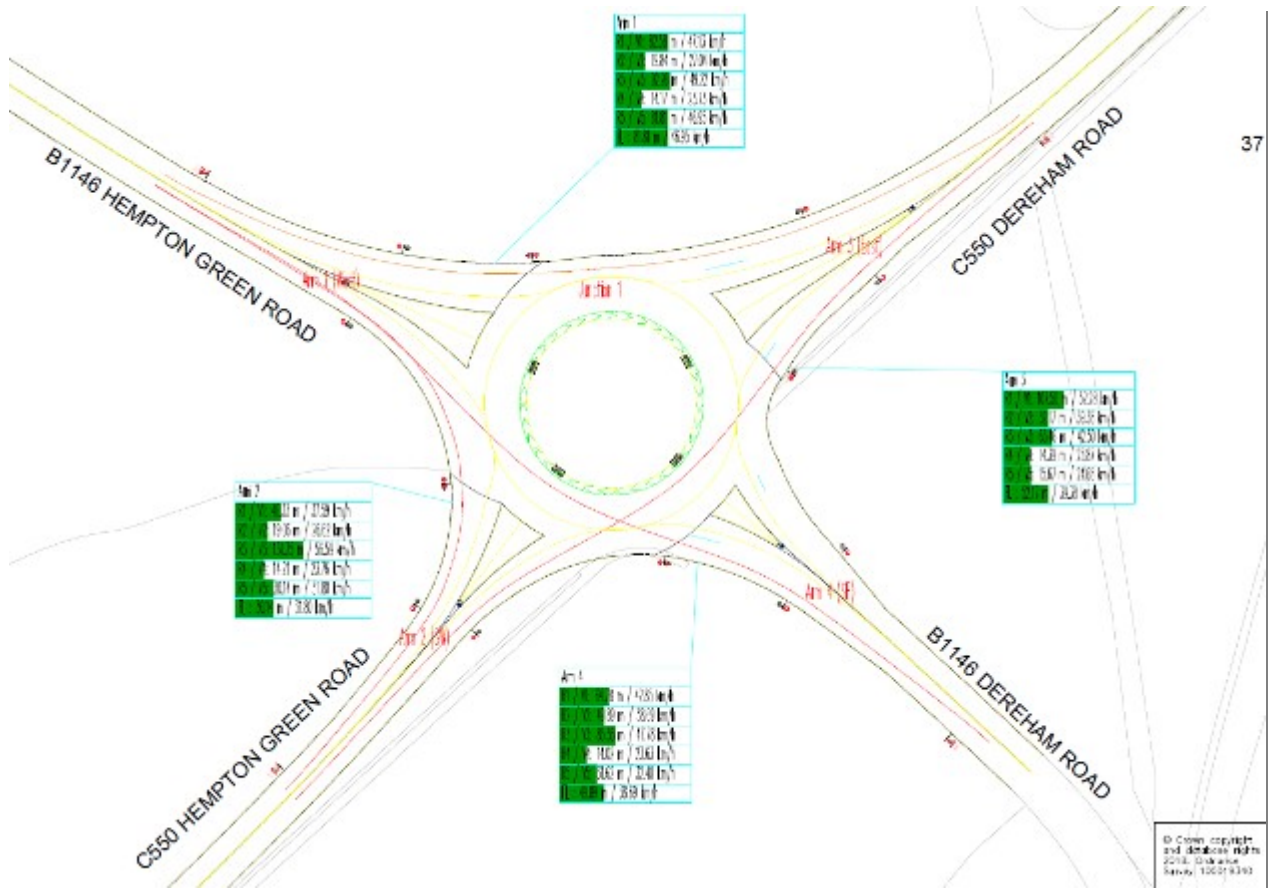
From the traffic data above the main movement is driving to/from Fakenham through C550 Dereham Road which is the northeastern arm of the proposed roundabout. In addition to this, coming from B1146 Dereham Road and then turning right seems to be most common route used, followed by driving along both B1146 road.

## Types of vehicles considering all movements

Type	No Veh.	%
CAR	6182	78.0
LGV	1239	15.6
OGV1	216	2.7
OGV2	109	1.4
BUS	1	0
COACH	27	0.3
MCY	95	1.3
PCY	53	0.7

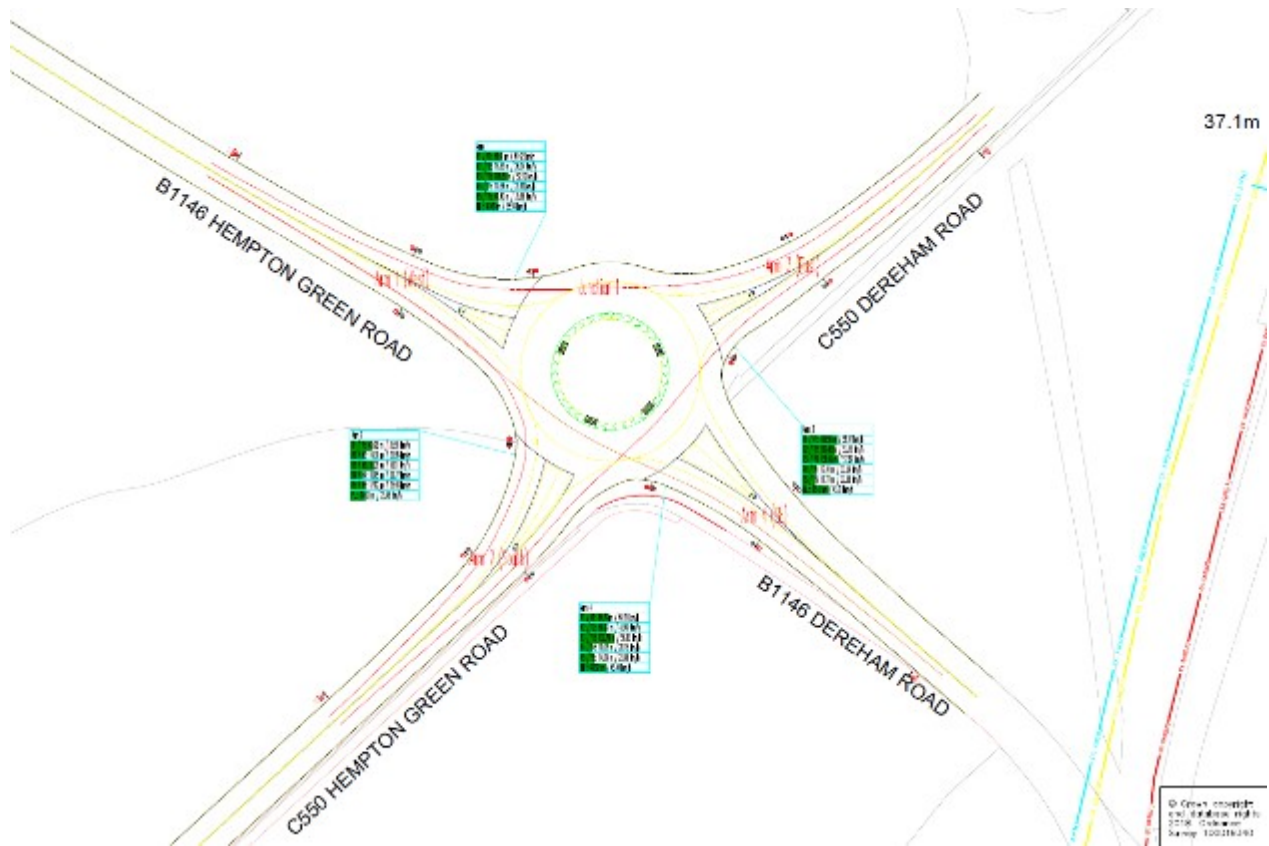
## 4. Options Considered

### 4.1 Normal Roundabout – 4 arms.



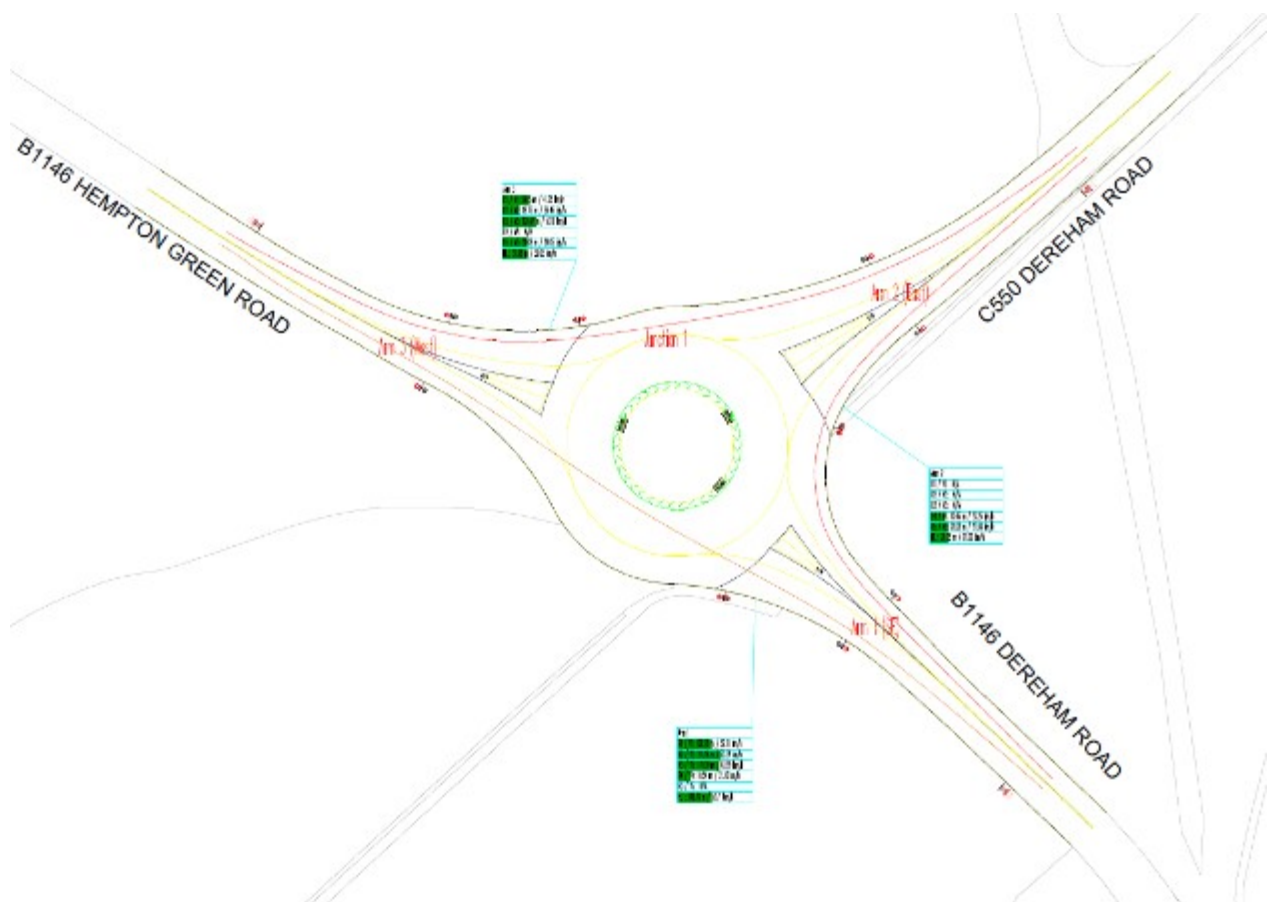
This option would have an ICD of 42 (*PKA012-HP-001 Option 1*), the major arms would be B1146 Dereham Road and C550 Dereham Road including (see figure above) in this two arms there would be two entry lanes and two exit lanes. This option is not recommended due to the traffic flow levels being not high enough, and also the high amount of land to be purchased. These two considerations would make the scheme not feasible. Additionally, the BT diversion will need to consider this size, which will increase the price as the diversion would increase. In terms of drainage further investigation is required the usage of a lagoon/standing pond would imply an increase of the price of the land.

## 4.2 Compact Roundabout – 4 arms



Due to the amount of traffic and the relevance of the accidents during the last five years (no fatalities) the best option to address this junction improvement is a compact roundabout. In addition to this, the amount of money to be spent for the land purchase will be less than having a normal roundabout. As mentioned previously, the southern corner is classified as wildlife site, this condition restricts the location of the roundabout centre as it would have to be offset to the north. In terms of layout, a four arm roundabout (*PKA012-HP-002 Option 2*) would keep the traffic in the area balanced and not overload Raymham Road and cause potential delays entering/leaving Fakenham via C500 Dereham Road. The ICD of this roundabout is 33, entry/exit 4.5m, one lane for both entry and exit, four splitter islands, one of which (the southeastern one) will allow pedestrians to cross, in order to provide continuity between C550 Dereham Road and C550 Hempton Green Road

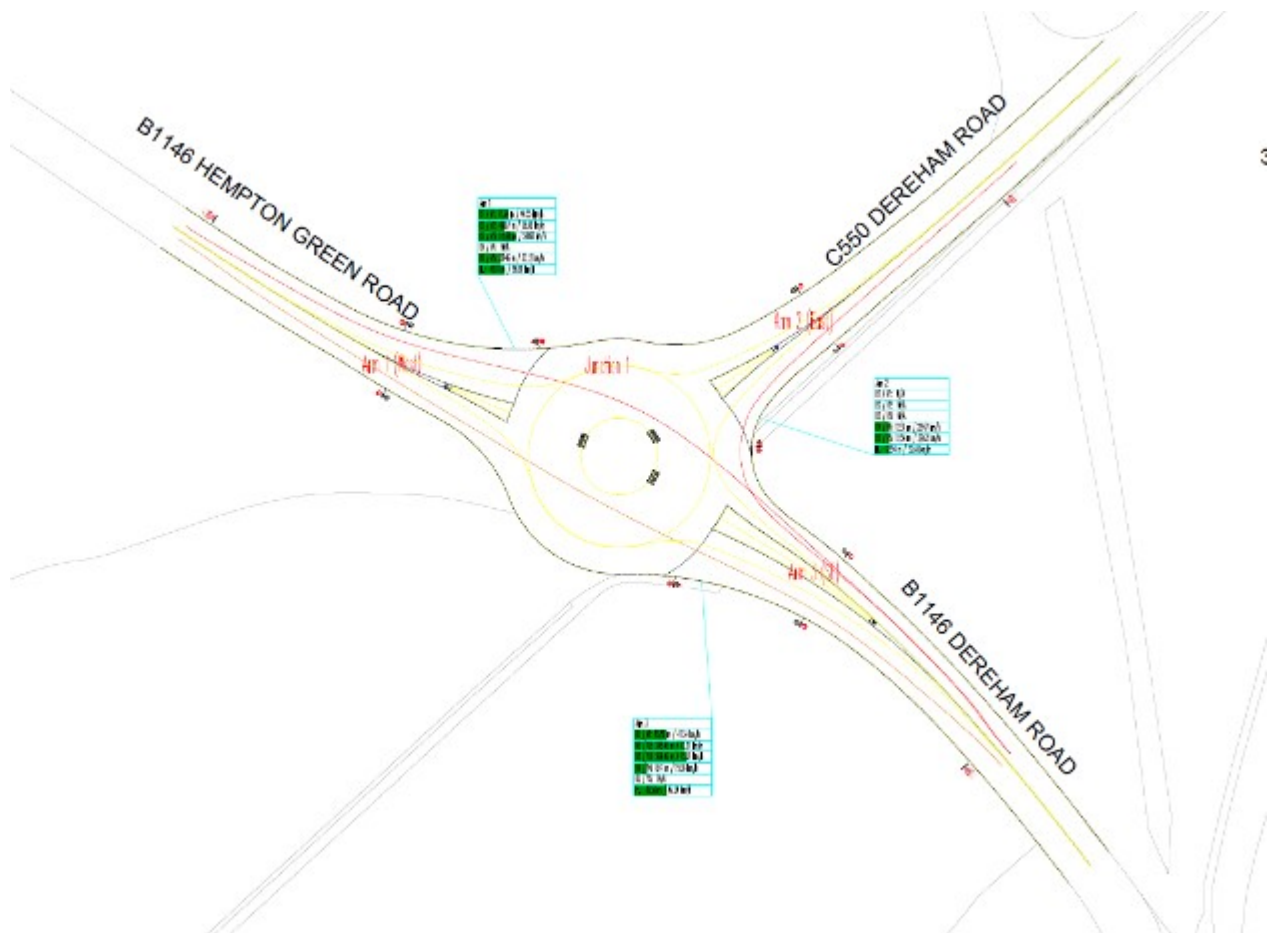
### 4.3 Normal Roundabout – 3 Arm Roundabout



With an ICD of 39 this option (*PKA012-HP-003 Option 3*) would consist of closing C550 Hempton Green Road and including C550 Dereham Road and B1146 Dereham Road as major arms. These two would take the majority of the traffic flow. In the long term, the closure of C550 Hempton Green would have an impact on future development in the area, the traffic flows would dramatically increase creating delays in the western access to Fakenham, as mentioned before, and traffic from A1065 Raynham Road to B1146 Hempton Green Road will dramatically increase. At the same time the size of the roundabout and the condition of the southern corner will make the land purchase costs not to take forward this option.



#### 4.4 Compact Roundabout – 3 Arm Roundabout



This option would be feasible from an economical point of view however, as for option 3, this one will have an impact in the traffic flow of the area if the development progress in the following years. The fact of minimising the amount of land to be purchased due to an ICD 32 (PKA012-HP-004 Option 4) makes this proposal attractive but the possible delays in entering or leaving Fakenham weigh more in this previous analysis than the technical and economical point of view. The situation of the junction of A1065 Raynham Road with B1146 Hempton Green Road would need to be improved by either widening the junction itself or including a roundabout. Additionally B1146 Hempton Green Road would need to be widened.

#### 4.5 Right Turn – From C550 Dereham Road to B1146 Hempton Green Road (closure of C550 Hempton Green Road)

The closure of C550 Hempton Green Road would imply increasing the traffic flow on A1065 Raynham Road and more vehicles utilising the staggered junction with U14007 Shereford Road and B1146 Dereham Road. As mentioned in 4.4, this junction would need to be upgraded to cope with the amount of traffic, as it is not aligned the possibility of including a roundabout would involve purchasing land. This land would be rural and residential, these costs do not recommend the taking forward this option. At the same time the section of the road B1146/600 Hempton Green Road will need to be widened possibly allocating an additional lane. From a road safety point of view right turns are not the best alternative as visibility and delays coming from Fakenham will have to be addressed.



## 5. Consultations

5.1 Area Highways & Street Works: The closure of B1146 will have implications for bus services, transport links and the nearby race course and other business' in the vicinity. The area is really busy while this last event is ongoing. The approach is very fast, coming across from C550 Hempton Green Road to C550 Dereham Road.

It is more recommended to have a road closure on C550 Hempton Green Road/ Dereham Road as the traffic will be redirected to A1065 Raynham Road, from their point of view this option is more manageable.

5.2 Travel & Transport Services: No bus stops in the vicinity of the works, although there are bus routes going to/coming from Fakenham and throughout B1146 Dereham Road.

5.3 Network Analysis & Safety: As mentioned previously, there have only been three slight accidents and the cost of them considering slight and non built-up is £72,084. For further information please see *Safety Audit Stage 1* in the appendix E.

Accident severity	Road Class			
	Built-up <sup>1</sup>	Non Built-up <sup>2</sup>	Motorway	All
Fatal	1,658,033	1,787,398	1,745,423	1,726,822
Serious	191,825	216,962	223,066	199,710
Slight	19,771	24,028	28,858	20,946
All injury	57,110	117,679	80,994	70,537
Damage only	1,760	2,572	2,472	1,859
Average cost per personal injury accident (PIA) <sup>3</sup>	88,258	137,744	99,779	98,912

## 6. Accommodation Works

There is not any 3<sup>rd</sup> party land involved nor have field accesses affected by the proposed compact roundabout, therefore no accommodation works been identified.



## 7. Drainage

There are mainly two options to address the drainage issues in the area: via infiltration or via outfalling into an adjacent lagoon or standing pond. The preferable option would be infiltrating the water into soakage features in the centre of the roundabout, as long as the ground permeability and the space allows to do it. This option would allow to reduce the costs of land purchase.

Although from a maintenance point of view the soakage features are more complicated to maintain, they would not suppose an impact on the landscape or a future issue in case there is further housing development in the area.

The existing situation of the drainage in the area is based on nature fall towards the channels of the carriageway, the main fall is from B1146 Hempton Green Road to B1146 Dereham Road. There are also gullies along C550 Hempton Green Road on the southern channel outfalling into the field classified as wildlife site.



## 8. Street lighting

Network and Safety Analysis teams has recommended to provide street lighting in the approaches and at the roundabout as it is quite close to Fakenham town centre. Additionally there are existing street lamps close to the junction along C550 Dereham Road. As shown on the picture below, the first lamp is only 120m away from the junction.



## 9. Design & Construction Issues

Regarding design on of the main issues during the detailed design stage would be locating the centre of the roundabout so the land purchase can be minimised. It has been proposed to be offset to the north to avoid the environmental restriction. The alignment of the arms would not practically vary along B1146/C550 Hempton Green whereas for C550/B1146 Dereham Road some adjustments would need to be made.



As for C550 Dereham Road alignment, this would imply modifying the access to U14044 Pond Road (see picture below). The second arm that might need to be realigned and considered into a further analysis is B1146 Dereham Road as the bend towards the junction is accentuated.

From a construction point of view, the main challenge would be minimising the delays towards/from Fakenham and managing the increasing traffic flow along A1065 Raynham Road.

#### **10. Maintenance Issues**

Once the roundabout had been built it would be subjected to routine maintenance as any other asset within the highway boundary. Standard maintenance for signs, kerbs asphalt and lining. Special consideration with the drainage features and vegetation around southern corner to provide enough visibility.

## 11. Roundtable

Held on 28<sup>th</sup> September 2018, attendees were Phill Moulson, Phil Reilly and Kevin Townly.

The presentation highlighted:

- The existing problems in the crossing
- Elements that might prevent the scheme from going ahead such as land purchase or utility diversion.
- Explanation of the decision-making process behind the chosen option
- Cost estimate.

## 12. Photographs

Also see photographs plan, *PKA012-HP-002*.



*Junction approach from B1146 Dereham Road (proposed southeastern arm)*





*From B1146 Dereham Road, busiest approach (taken about 2pm) main movements were straight and towards Fakenham town centre.*



*Junction, from B1146 Dereham Road, right hand side.*



*Junction views*



*Junction exit from C550 Dereham Road*



*Junction approach from B1146 Hempton Green Road*





*Junction approach, C550 Hempton Green Road*



*Approach of C550 Hempton Green Road.*





*Junction approach from C550 Dereham Road*

### 13. Estimated Costs and BCR

In terms of utilities there are two main apparatus overlapping with the new layout Anglian Water and BT. As for AW no cost would be associated as it is decommissioned and usually runs around 0.90 m. However, BT runs parallel to B1146 would need to be diverted as there would be a cover in the roundabout. The maximum estimated cost for this is £150,000.

As mentioned above, the existing land within the highway boundary do not allow to build a roundabout, therefore land will need to be purchased. Assuming that the drainage is going to be done via infiltration the area of land required will be around 1400m<sup>2</sup> (0.363 acre). The approximate cost of agricultural land is £11,000 per acre therefore the cost of land purchase would be £4,000. Additional fees should be allocated to this figure Agent (£4,000), Legal (£1,500), NPS (£4,000) and nplaw (£1,500), this fees might change as the reference taken was only based on a land acquisition of 350m<sup>2</sup>. The total cost for land purchase considering these fees £15,000.

With no accurate information about the roundabout layout and topographical survey either I have based the construction costs on its resemblance to similar roundabouts already completed. Given that there is no significant level difference and a necessity of providing accommodation works or minimising disruption to adjacent houses of businesses I have estimated the roundabout tender works to be around £660,000. Design fees would be around 4% of total work costs and ECI costs 2% of total work costs.

These costs along with the surveys and site supervision among others make up to £1,121,785.00 (table below for detail) which is how much it would cost to deliver the scheme.

After having completed the traffic modelling a Cost-Benefit Analysis was requested utilising 2010 values, it gave a value of 0.94

#### 14. Conclusion

There are several points to consider in this scheme that will decide its feasibility. One of them will be the amount of traffic affected, it would improve the situation of the current fast approach towards Fakenham, however the survey data suggests that not many vehicles are passing by this junction in comparison to other sites (subjected to this feasibility exercise) where the maximum number of vehicles per day are above 4000.

In addition to this, there have only been three accidents in the last five years, all of them with no serious injuries, classified as slight and no casualties. The value of preventing the three slight collisions in the last five years will cost £72,084. The amount of land to be purchased due to the environmental restrictions of the southern corner increases the price and it is subjected to the collaboration and willingness of the land owner. Regarding utilities, the need of diverting BT apparatus increases the total cost quite considerably.

Finally the BCR value shows that the scheme might not be really viable along with the reasons mentioned before.

# APPENDICES

APPENDIX 1: FIGURES, PHOTOS AND DIAGRAMS

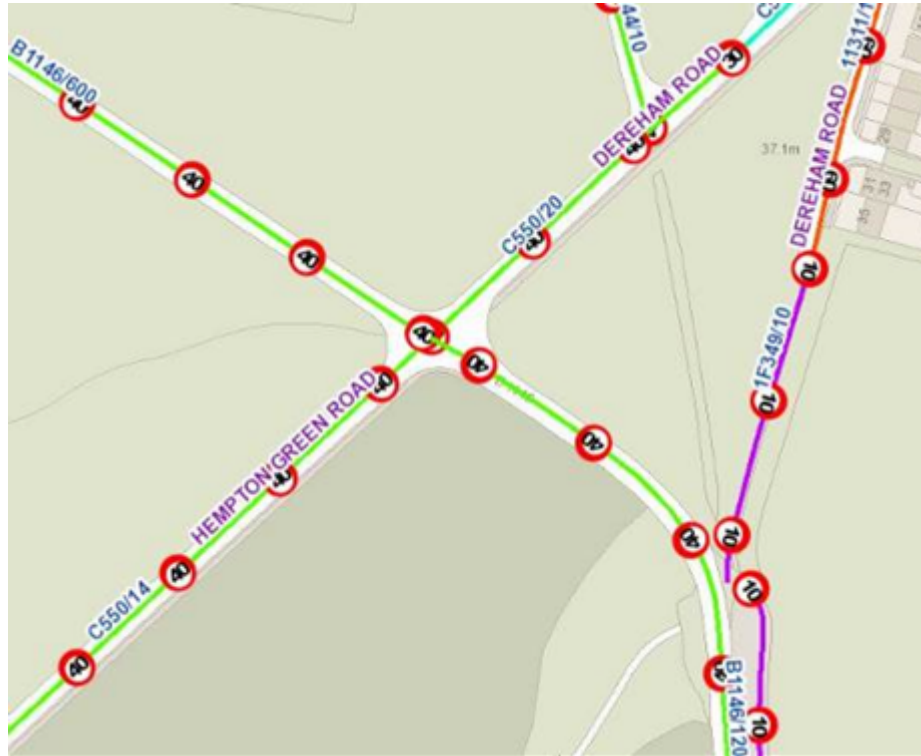


Figure 1: Speed Limits

Five years to end February 2018



Figure 2: Accident location






















	1	2	3
Reference Number	0071 943	0073 906	2758 19
Date / Day	We 05	Sa 31	Fr 05
Month	Jun	Aug	Jan
Year	2013	2013	2018
Time	1055	1725	1125
Severity	SI	SI	SI
Dark  / Lit 			
Weather Conditions			
Road Surface			
Special Conditions			
Carriageway Hazards			
Vehicle Manoeuvres			
Vehicle 1 5 e			
Vehicle 2 6 t			
Vehicle 3 7 c			
Vehicle 4 8			
Casualty /age	19 43 	72 32 	65 
Failed to Give-Way 			
Signal Ignored 			
Loss of Control 			
Hit Object <u>IN</u> C'way			
Hit Object <u>OFF</u> C'way			
Vehicle Left C'way			
Breath Test			
Contributory Factors 1/2	V1 ** 405	V1 ** 706	V1 ** 405
3/4			
* possible, ** very likely 5/6			
School No./Ref.			
User fields: 1	49	48	
2			
3			
4			

Diagram 1. Accident specifications



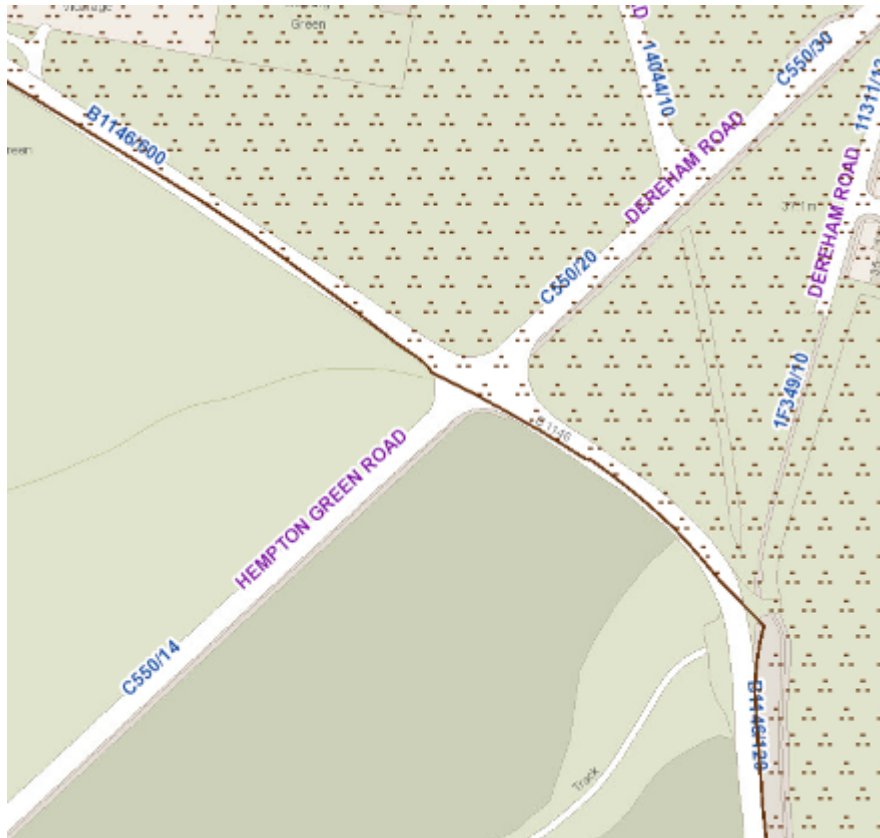


Figure 3. Conservation area

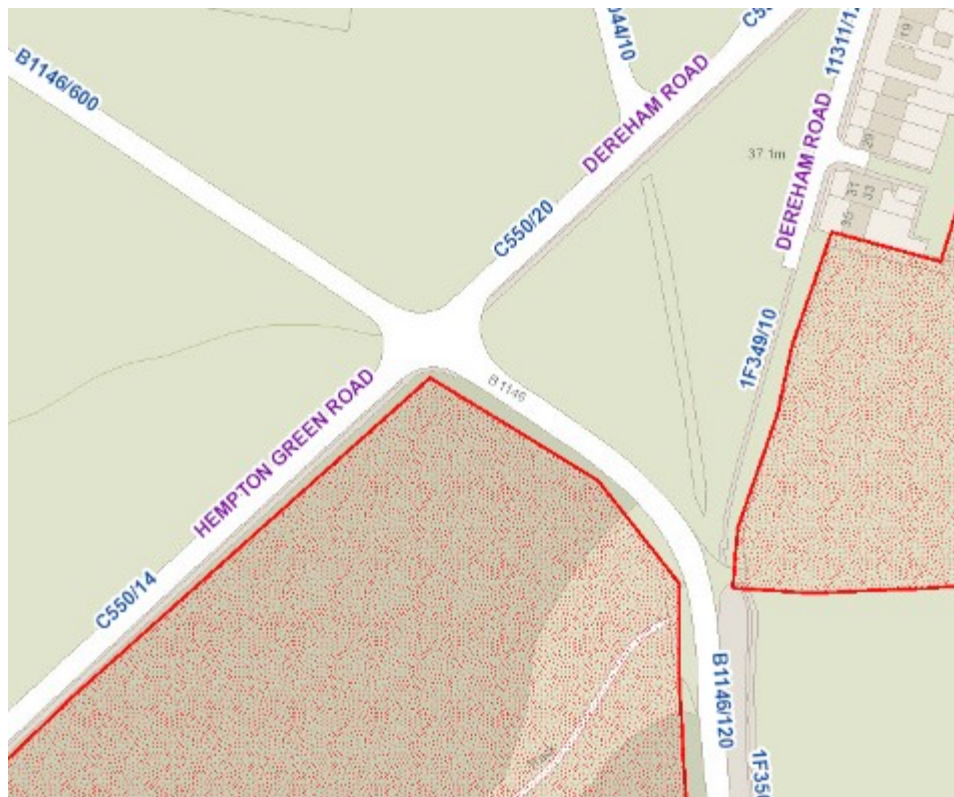


Figure 4. Wildlife sites.





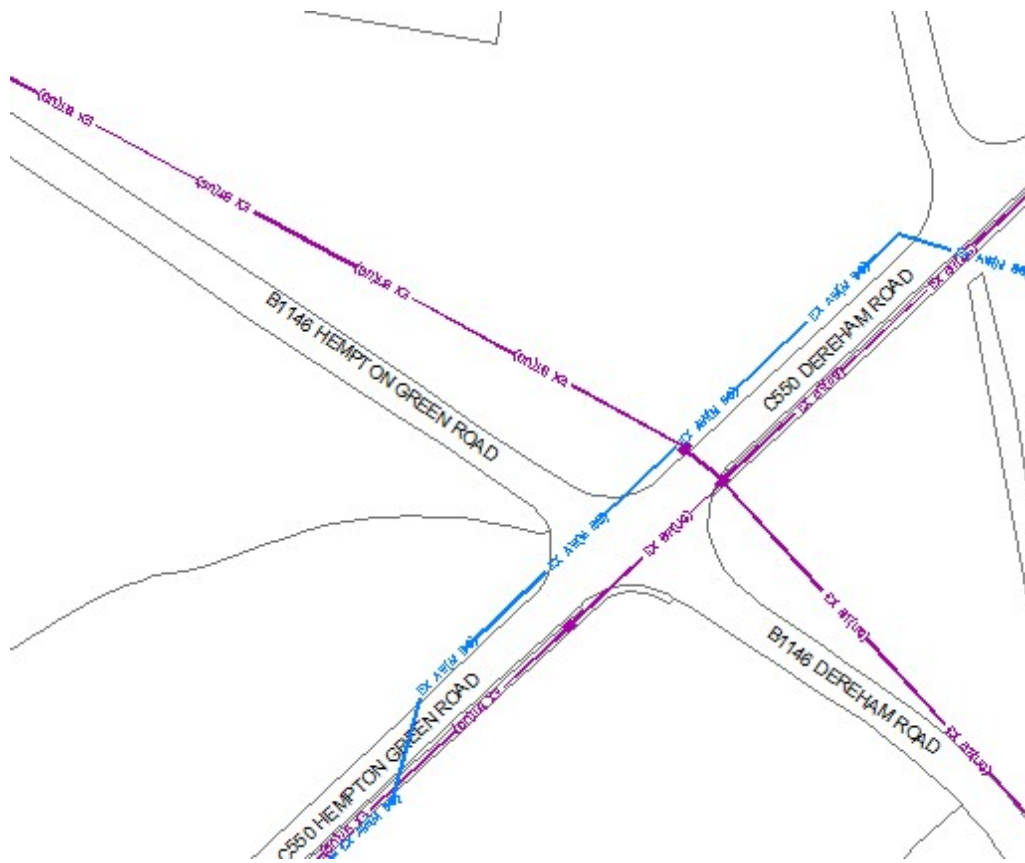


Figure 7. Existing utilities



Photo 1. Location of high pressure gas point.



Figure 8. The tile shows the same land owner.