HERTFORD AND WARE URBAN TRANSPORT PLAN

November 2010

Appendix D - Bengeo

Hertfordshire Highways
www.hertsdirect.org/highways

Hertfordshire

Appendix D Bengeo Traffic Modelling Study

Contents

GLOSSARY OF TERMS

ANPR	Automatic Number Plate Recogniation
CPZ	Controlled Parking Zone
DMRB	Design Manual for Roads and Bridges
EHC	East Herts Council
GEH	Goodness of Fit Statistic to gauge the level of calibration and validation achieved between the observed data and the modelled data
GIS	Geographic Information System
GTP	Green Travel Plan
HCC	Hertfordshire County Council
HGV	Heavy goods Vehicle
LDF	Local Development Framework
LGV	Light Goods Vehicle
LMVR	Local Model Validation Report
LTP	Local Transport Plan
Modal Shift	Change in use of one mode of transport to another (such as car to bus)
Paramics	Micro-simulation traffic modelling software package
TRICS	Database of observed trip generation survey data by land use type
TRO	Traffic Regulation Order
UTC	Urban Traffic Control
VMS	Variable Message Sign
85th Percentile	The amount which is not exceeded (such as 85% of queue lengths recorded across a given time period do not exceed a certain length)

1 Introduction

1.1 BACKGROUND

1.1.1 The main purpose of the Bengeo Transport model is to assess whether the surrounding strategic road network can accommodate the traffic that is currently avoiding the town centre congestion. The traffic avoiding the town centre at Old Cross is using the secondary routes along the Victorian residential streets of Lower Bengeo.

1.1.2 Descriptions used in the report relate to the following:

- **Upper Bengeo** – the area west of Port Hill/Bengeo Street and north of Church Road/Westfield Road;
- **Bengeo East** – the area east of Port Hill/Bengeo Street; and
- **Lower Bengeo** – the area west of Port Hill and south of Church Road/Westfield Road

1.1.3 It has been raised that rat-running represents an ongoing problem for the residents in this area. Various studies, consultations and initiatives have already been considered with the most recent being the access and parking restrictions that were implemented in 2008. However, whilst the closure of Byde Street would improve the environment in Lower Bengeo for pedestrians and cyclists as well as preventing through traffic, it would also remove route choice for residents of Upper Bengeo and Bengeo East. These appeared to make up a large proportion of trips in the Bengeo Traffic Feasibility Study.

1.1.4 The implications of closing Byde Street, in terms of the resulting traffic impact on the surrounding junctions, has therefore been investigated. Potential options for mitigation measures to accommodate the diverted traffic have also been identified.

1.1.5 A Paramics Micro-simulation model has been developed to test proposals, in particular the closure of Byde Street, and to consider accommodating the additional traffic at the already congested Old Cross junction in Hertford town centre. Paramics is an assessment package with sophisticated routing algorithms that can accurately model the impact of the proposals.

1.1.6 The Paramics software has significant visualisation capabilities which allow the test results to be clearly demonstrated in real-time simulations. The resulting Paramics Micro-simulation model will therefore be invaluable for demonstrating the scenario results and will be used directly during the public consultation.

1.2 PREVIOUS SITE HISTORY

1.2.1 The County Council carried out an extensive feasibility study in 2006 to consider what options there were to reduce the number of vehicles travelling through the Bengeo residential area via Byde Street. The history of this issue before the 2006 study is summarised as follows in that report:

> *"The main issue that has been considered previously is how to ease the congestion without encouraging vehicles to speed on these roads. The Highway Authority (Hertfordshire County Council (HCC)), East Herts Council (EHC) and the Highways Partnership have considered this dilemma on many occasions since the 1970's, and have offered various "solutions" in the past.*

There is an existing "no vehicles except for access" traffic regulation order on Upper and Lower Bengeo. This was implemented in 1997 to prevent through traffic rat-running from outside this area. However, it has proved difficult to assess whether a vehicle is legitimately accessing the area or rat-running. The restricted area also consists of numerous entry and exit points which again make enforcement difficult.

In 2005 the rat-running issues were again raised and Hertfordshire Highways consulted with residents to suggest a more co-ordinated approach in conjunction with the setting up of a Residents' Association, in an attempt to examine what measures could be implemented to improve the situation."

1.2.2 The 2006 study presented six options to reduce traffic flow through the area. These together with the outcome for each are shown in Table 1.1 below.

Measure	Implemented?	Reasons
Width Restrictions at entry points	No	Received negative feed back during the consultation; Isn't feasible as access for delivery and servicing vehicles needs to be maintained.
Chicane and Traffic Priority	No	Strong objection during consultation; Loss of parking; Space Constraints.
One way traffic system	No	Extremely strong objection during consultation; Potential for increased speeds; Limitation of cycling facilities
Clear signing at entry points to indicate a residential area possibly combined with a 20mph zone	No	Lack of precedent in Hertfordshire; Lack of impact on the problem; Negative impact on streetscape; Footway constraints for signage; 20mph zones must be self enforcing requiring the introduction of speed reduction measures in the area, these may not be compatible with the conservation status of the area; Traffic speeds in the area are generally low; This scheme would not have a significant impact on traffic volumes without additional measures.
Road Closure	Possible, but not considered reasonable response to the issue so not implemented	Restriction to access for residents in Bengeo; Impact on Old Cross Further modelling required
Restricted Turning Movements	Yes	

Table 1.1: Summary of 2006 Study Measures and Recommendations

1.2.3 A 'No Right Turn' into Cross Road, Monday to Friday, 7:30 to 9:30am was trialled and then made permanent. This achieved a 16% decrease in southbound traffic through Byde Street during the morning peak and corresponded with a 247% increase in traffic using The Avenue (albeit baseline traffic levels on this route were previously quite low). These results were obtained from surveys. The long term benefits of the 'No Right Turn' may well have reduced, with a reduction in Police enforcement. Consideration was given to an experimental closure of Byde Street. However, it was felt that without modelling of the various scenarios a closure should not take place.

1.2.4 It was therefore agreed that modelling should take place as part of the Hertford & Ware Urban Transport Plan. This has now been completed.

1.2.5 Since the decision was made to undertake the modelling work, the Sainsbury's proposals for the McMullen Brewery Site have advanced and were granted planning permission in January 2010 following a public inquiry. A decision was therefore taken to include the potential affects of the Sainsbury's development in terms of changes to traffic flow within the modelling work undertaken.

1.2.6 The modelling undertaken looked at the following:

- Existing situation;
- Existing situation plus Sainsbury's; and
- Existing situation with Sainsbury's plus Byde Street closure.

2 Bengeo Transport Modelling

2.1 The model has been built using traffic data collected on the 2nd July 2009 from the areas of interest and historic relevant traffic data. Figure 2.1 illustrates the location of Bengeo and the extent of the Paramics model.

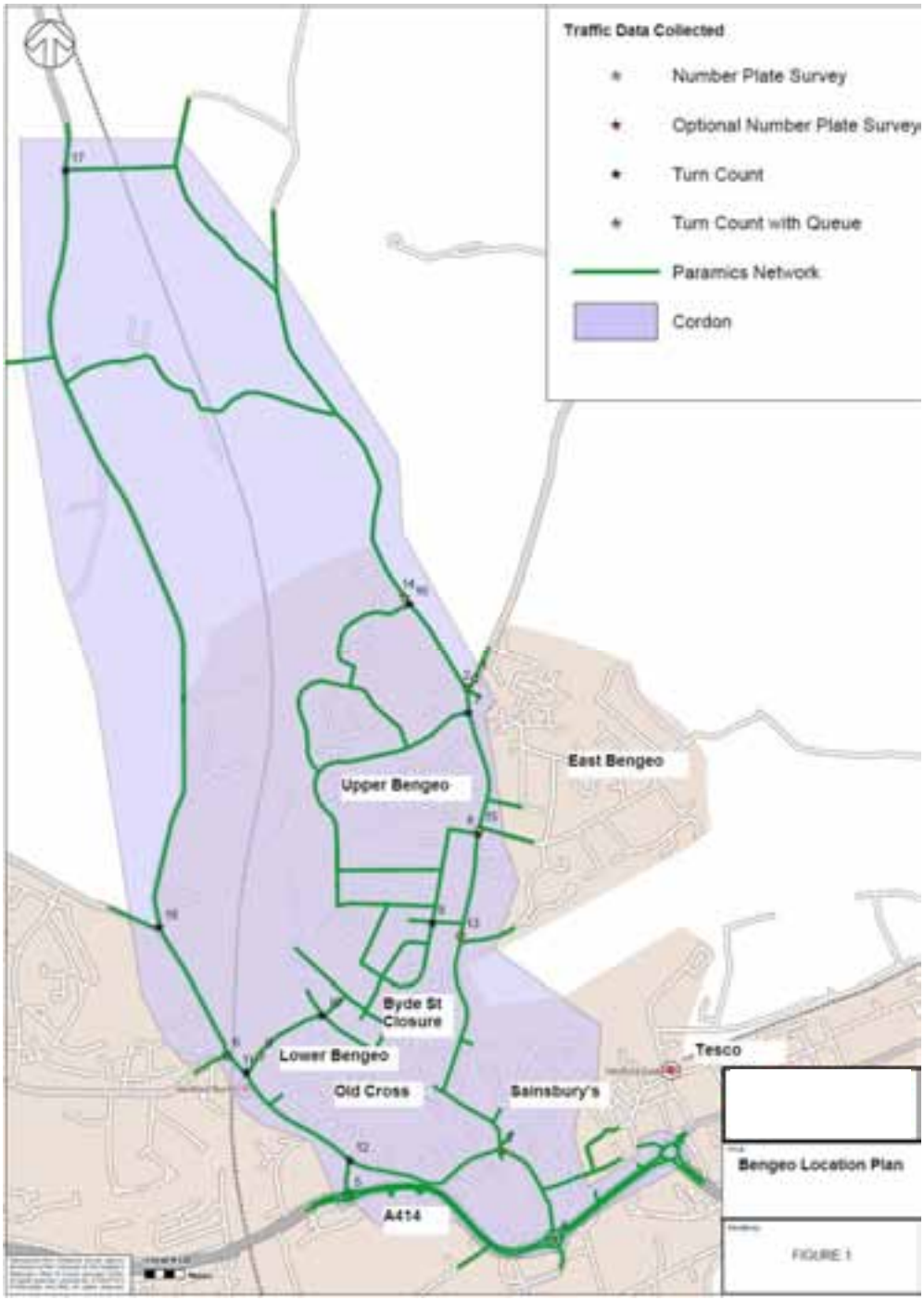


Figure 2.1: Location Plan of Bengeo Modelling Area

2.2 The model has been developed specifically with a view to testing the impact of the closure of Byde Street on the road network of Hertford and also to test the impact of the proposed superstore development (Sainsbury's) at the McMullen's brewery site. Whilst the testing primarily focuses on car traffic there will also be implications for bus services.

2.3 This report sets out the findings of the modelling work and considers the impacts of the new superstore and the closure of Byde Street.

2.1 MODEL DESCRIPTION

2.1.1 The Paramics model area, shown in Figure 2.1, includes the A414 to the south between the junction of Hertingfordbury Road with Cross Lane in the West and the junction of Ware Road, London Road and Fore Street in the East (Bluecoats). To the north west the model extends to include the junction of High Road with Bullsmill Road and to the north east the model extends to include Sacombe Road and Wades Mill Road.

2.1.2 The model has been developed for two assessment periods, namely the morning and evening weekday peak periods. For the morning peak period the model has been developed for the time period 0700-1000, with 0800-0900 representing the peak hour. In the evening peak period the time period 1600-1900 has been modelled with 1700-1800 representing the peak period.

2.2 OPTIONS TESTING

2.2.1 The scenarios tested were as below. These were undertaken using the existing situation model.

- Implementation of proposed Sainsbury's superstore; and
- Implementation of proposed Sainsbury's superstore and the introduction of the closure of Byde Street.

2.2.2 All of the scenarios were tested for the AM and PM peak periods (7-10am and 4-7pm).

2.2.3 No adjustments have been made to the model in terms of signal timing at the Old Cross junction. For example no testing has been done to assess the impact of increasing green time for the Old Cross southbound movement. However, as this junction is close to capacity, increasing green time to the southbound towards Old Cross from Port Hill will generate additional delay to the other two arms which is likely to have more significant impacts on the A414.

2.2.4 It should also be noted that the Sainsbury's traffic flows are based on the "Addendum Transport Statement of Common Ground between Hertfordshire County Council and Savell Bird & Axon" produced in September 2009 in preparation for the Sainsbury's Planning Public Inquiry. These are single peak hour flows so TRICS has been used to estimate 3-hour flows to cover the model periods.

3 Model Validation

3.1 MODEL CALIBRATION AND VALIDATION

3.1.1 A full Local Model Validation Report (LMVR) has been produced as part of the model development process and this has been agreed with Hertfordshire County Council. However, an overview of the calibration and validation processes and key validation statistics based on DMRB guidance are provided below.

3.1.2 The model has been calibrated in accordance with the guidance on model validation provided within the DMRB (Design Manual for Roads and Bridges), using observed turning count data for calibration, and journey time and queue surveys for validation. The DMRB acceptance criteria for model validation is shown in Figure 3.1 below

Criteria and Measures	Acceptability Guideline
Assigned Hourly flows * compared with observed flows	
1. Individual flows within 15% for flows 700 - 2,700 vph	)
2. Individual flows within 100 vph for flows < 700 vph	) > 85% of cases
3. Individual flows within 400 vph for flows > 2,700 vph	)
4. Total screenline flows (normally >5 links) to be within 5%	All (or nearly all) screenlines
5. GEH statistic:	
i) individual flows : GEH < 5	> 85% of cases
ii) screenline (+) totals: GEH < 4	All (or nearly all) screenlines
Notes	
+ Screenlines containing high flow routes such as Motorways should be presented both including and excluding such routes	
* links or turning movements (but see Paragraph 4.4.37).	

Figure 3.1 DMRB Acceptance Criteria

3.1.3 The trip matrix has been constructed from a range of surveys carried out on the 2nd July 2009 and also utilising some existing turning count information. This data has been combined with a visual inspection of the network and matrix estimation.

3.1.4 For the matrix estimation process all available turning count data has been used. In the development of a trip matrix this ensures the best possible trip matrix is obtained by using all available data. The queue and journey time data are not used in the matrix estimation process and therefore are considered as independent data which have been used for validation purposes.

3.1.5 The AM peak hour of the model achieves a 97.1% pass rate in <700 flow category and a 100% pass rate within the (700-2700) range and therefore exceeds the DMRB criteria.

3.1.6 DMRB criteria for all categories is satisfied by the evening peak model and provides confidence in both the network and matrix for the model.

3.1.7 DMRB also specifies that 85% of modelled movements should obtain a GEH score of less than 5 when compared to observed values. A GEH value of 0 reflects a perfect fit, values up to and including 5 reflect a good fit, a value between 5 and 10 represents an acceptable fit and values over 10 represent a poor fit. The GEH statistic is a summary statistic used as a measure of the goodness of fit of observed to modelled data.

3.1.8 The morning peak model well exceeds DMRB criteria with 97.4% of links with a GEH score of less than 5 and 97.4% with a value of less than 6. The average value across all movements is 1.60. The evening peak model exceeds DMRB criteria with 95.9% of links with a GEH score of less than 5 and 98.6% with a value of less than 6. The average value across all counts is 1.60.

3.1.9 This illustrates that in terms of vehicle flow the model provides an accurate representation of the observed data.

3.2 QUEUE LENGTH VALIDATION

3.2.1 The Paramics model validation has been undertaken against the surveyed queue and journey time data. Registration plate data has also been used to check the correct magnitude of trips are routing through lower Bengeo.

3.2.2 The DMRB does not provide a definition for the validation of queue data, but practice over recent years has been to demonstrate that the modelled queue is of the same order as the observed. When observing a junction the queue will fluctuate significantly both through the period and from day to day. It is never therefore expected, or required to exactly replicate observed queues within the model

3.2.3 However, queues are typically very sensitive to fluctuations in demand and even if the same people traversed the network everyday, queue patterns and peaks would vary significantly.

3.2.4 The Paramics queue output compared with the observed has been assessed on the basis of a 95% confidence limit, which allows for the variation in queue within the Paramics model to be assessed against the observed values. The junctions included in the queue validation are as follows:

- A414 Hertingfordbury Road / Cross Lane;
- A414 Gascoyne Way / Parliament Square / Hale Road;
- A414 London Road / A414 Gascoyne Way / Fore Street / Ware Road (Bluecoats Roundabout);
- Old Cross / Mill Bridge / St Andrew Street;
- North Road / Welwyn Road / Beane Road; and
- Bengeo Street / Sacombe Road / Wades Mill Road.

A414 HERTINGFORDBURY ROAD / CROSS LANE

3.2.5 The queues observed at this junction provide a reasonable representation of observed, however typically overestimate queues slightly at the junction. In the morning peak period, the majority of approaches are observed to have very limited queuing with queues below 50m for the majority of the peak period. This is reflected in the model. In the PM peak period there are slight discrepancies between the modelled and observed queue lengths. However, the journey time for this arm validates in both peak periods.

A414 GASCOYNE WAY / PARLIAMENT SQUARE / HALE ROAD

3.2.6 The queues observed at this junction are typically of the same order of magnitude as the modelled queues. However a couple of approach arms have more significant queuing modelled than observed. The journey times for the A414 in both directions from this junction validate in both peak periods.

A414 LONDON RD / GASCOYNE WAY / FORE STREET / WARE ROAD

3.2.7 The queues observed at Bluecoats roundabout were generally of the same magnitude and profile of those observed on site.

OLD CROSS / MILL BRIDGE / ST ANDREW STREET

3.2.8 The profile of queues is well represented by the model in both AM and PM peak periods at this junction for all approach arms.

NORTH ROAD / WELWYN ROAD / BEANE ROAD

3.2.9 The queues modelled at this junction match those observed very closely. The only queue which does not match the observed queue is that along Welwyn Road in the PM peak period, where during the second half of the period the queue extends further in the model than the length observed.

3.2.10 This queuing discrepancy has been reviewed in the model and it has confirmed that the correct number of vehicles are travelling along the link. Furthermore, unrealistic changes would have to be made to model coding to further increase capacity at this junction. The current modelling is therefore deemed appropriate.

BENGEO STREET / SACOMBE ROAD / WADES MILL ROAD

3.2.11 The queuing modelled at this junction is very similar to that observed, with all arms at all times showing a similar profile and magnitude of queue in the model to that observed.

3.3 JOURNEY TIME VALIDATION

3.3.1 This section outlines a comparison between the modelled and observed journey times and provides validation statistics indicating a goodness of fit to observed data. The observed journey times were recorded between 08:00 and 09:00, and 17:00 and 18:00 for each of the AM and PM peak hours respectively; during each hour a minimum of 6 journey times were carried out for each route in each direction.

3.3.2 Modelled journey times were recorded using the 'paths' feature in Paramics, which records every vehicle trip along a specified route. All trips in the periods 08:00 to 09:00 and 17:00 to 18:00 for each of the AM and PM peaks have been used for analysis averaged across 5 model runs.

3.3.3 Journey time routes have been chosen to represent the main routes through the network in order to validate the length of trips through the model. Four routes have been chosen for this model:

- Route 1 From the A414 roundabout junction with Campfield Road to the west, along the A414, to the A414 roundabout junction with Ware Road (Bluecoats roundabout) to the east;
- Route 2 From The Wick / Sacombe Road T-junction to the north, along the A158, to the A158 roundabout junction with Pegs Lane to the south;
- Route 3 From B1000 Welwyn Road / Fordwich Rise T-junction at the west, via Nelson Street and Byde Street, to the Bengeo Street / Cross Road junction; and

- Route 4 From A119 North Road / Bramfield Road T-junction in the west, to the A119, St Andrew St and the A158 junction (Old Cross signalised junction) in the east.

3.3.4 A 95% confidence interval has been used for the purpose of journey time validation and this is standard practice when validating journey times in micro-simulation models. This is also a more stringent test than the DMRB requirement for an 85% confidence interval.

3.3.5 To compare modelled times to the observed times, 5 runs of the Paramics model were completed for both the morning and evening peak periods. This provided a large sample of vehicle journeys between two points for comparison with the observed data, with the mean value being used.

3.3.6 The average modelled value was then plotted against the average observed value. Graphs illustrating the validation criteria for the modelled journey times plotted against the observed journey times for the routes are included in the LMVR.

3.3.7 The journey time results show sections grouped by direction. 77% of journey time results in the AM peak hour pass the journey time test. The analysis demonstrates that where the modelled journey lengths do not fall within the confidence interval the model typically has longer journey times, which is robust.

4 Model Results

4.1 NETWORK JOURNEY TIME STATISTICS

4.1.1 The results are considered for the three 3 scenarios:

- Existing situation (current traffic conditions);
- Scenario A – Sainsbury's in place; and
- Scenario B – Sainsbury's in place and Byde Street closure.

Time Period	Scenario	Total Network Journey Time (seconds)	Vehicles	Average Journey Time per Vehicle (seconds)
AM (0700 to 1000)	Existing Situation	2794452	8402	333
	A – Sainsbury's	2824936	8509	332
	B – Sainsbury's plus Byde Street Closure	3181262	8490	375
PM (1600 to 1900)	Existing Situation	2204700	7623	289
	A – Sainsbury's	2015728	7843	257
	B – Sainsbury's plus Byde Street Closure	3061705	7838	391

Table 4.1 – Network Journey Time Statistics (across the whole model network)

4.1.2 Table 4.1 shows the numbers across the whole modelled area, as shown in Figure 2.1, rather than at any specific location on the network. The total network journey time is a sum of all vehicles on the network and their modelled journey times. The number of vehicles shows the modelled vehicle movements across the model network area. The average journey time per vehicle shows the average time for each vehicle to undertake its journey within the model network area.

4.1.3 Scenario A involves significant re-routing of a number of trips from their normal route to the proposed Sainsbury's development. This will increase the overall number of vehicle trips as one trip through the model becomes two trips - one from the origin zone to the Sainsbury's zone, and a second from there to the destination zone. However the overall average journey time remains approximately the same depending on exactly where queues are in the model.

4.1.4 Scenario B includes both the closure of Byde Street and the introduction of the Sainsbury's development, putting more pressure on the route parallel to the A414 in the east-west direction. The number of vehicles on the network remains approximately the same as for Scenario A, however the routing is significantly different and hence the additional delays.

4.1.5 The results in Table 4.1 show that Sainsbury's does not have a significant effect on network operation and, whilst this is based on future estimated flows and not actual flows, the model provides the most robust prediction available. However, until Sainsbury's is open it is not possible to fully understand the implications of the new superstore in terms of the highway network operation.

4.1.6 It can be seen that with Sainsbury's and the closure of Byde Street, there is significant detriment to the operation of the local road network on the primary routes. Despite this the secondary residential routes of lower Bengeo no longer have any through traffic. The primary routes through Bengeo into Hertford, where there are already queues, have additional traffic in the order of some 200-300 extra vehicles over the 3-hour peak period. This traffic would normally route through the Bengeo residential area.

4.1.7 It should be noted that the additional congestion at the Old Cross junction will also cause delays to bus services.

4.2 QUEUE LENGTHS

4.2.1 Queue length graphs for the AM peak period at Old Cross are shown in Figure 4.1 below with corresponding queue lengths for Old Cross Southbound only shown in Table 4.2.

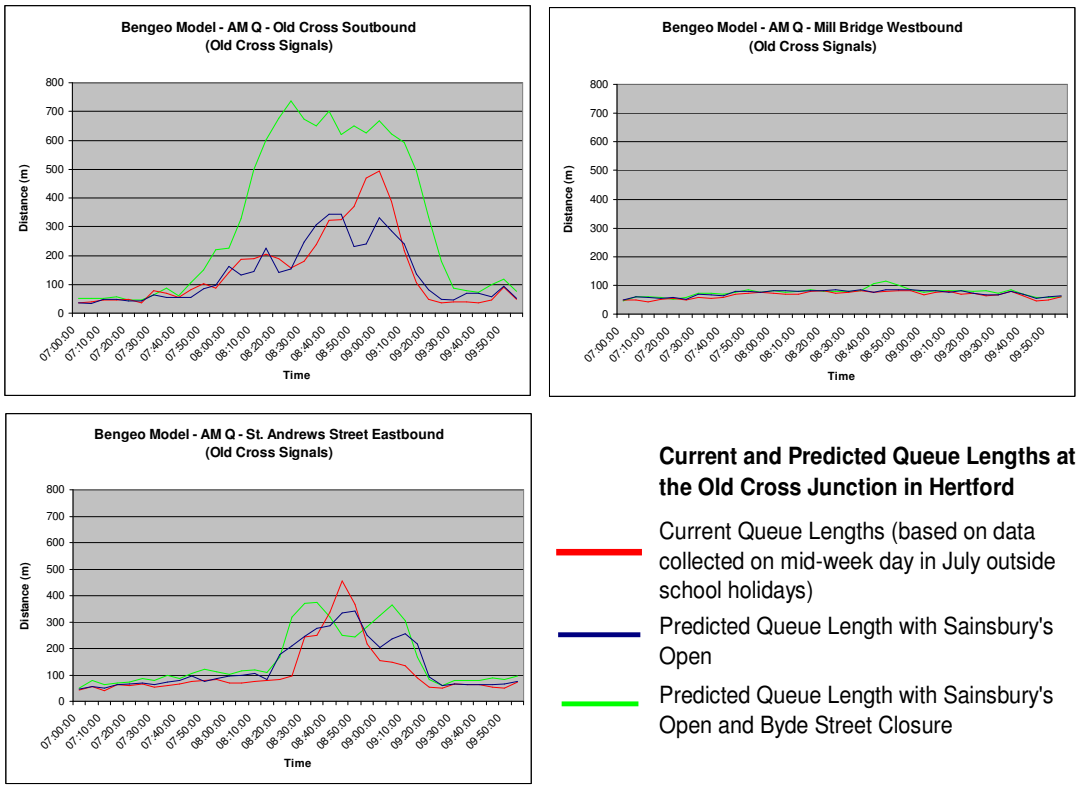


Figure 4.1: Queue Lengths for the AM peak period at Old Cross

Average Queue Length (m) at Old Cross Junction (AM Peak Period) Old Cross Southbound Only					
Time	**Existing Situation Queue Length (m)**	**Scenario A**	**Difference Existing vs. Scenario A**	**Scenario B**	**Difference Existing vs. Scenario B**
07:00	36	36	0	50	14
07:05	38	34	-4	50	12
07:10	44	47	3	52	8
07:15	44	49	5	56	12
07:20	49	43	-6	44	-5
07:25	37	43	6	45	8
07:30	78	64	-14	64	-14
07:35	69	55	-14	86	17
07:40	55	55	0	61	6
07:45	80	54	-26	105	25
07:50	102	85	-17	152	50
07:55	88	95	7	221	133
08:00	140	162	22	225	85
08:05	186	131	-55	329	143
08:10	191	145	-46	498	307
08:15	203	227	24	601	398
08:20	188	142	-46	677	489
08:25	157	153	-4	736	579
08:30	180	247	67	674	494
08:35	239	307	68	651	412
08:40	322	344	22	700	378
08:45	324	343	19	619	295
08:50	370	233	-137	648	278
08:55	468	241	-227	626	158
09:00	493	329	-164	667	174
09:05	387	285	-102	624	237
09:10	217	240	23	593	376
09:15	105	134	29	493	388
09:20	48	80	32	334	286
09:25	37	49	12	179	142
09:30	38	45	7	87	49
09:35	38	69	31	77	39
09:40	37	68	31	73	36
09:45	44	58	14	99	55
09:50	89	94	5	118	29
09:55	47	52	5	74	27

Table 4.2: Average Queue Lengths Southbound at Old Cross (AM Peak)

4.2.2 Queue length graphs for the PM peak period at Old Cross are shown in Figure 4.2 below with corresponding queue lengths for St Andrew Street Eastbound only shown in Table 4.3.

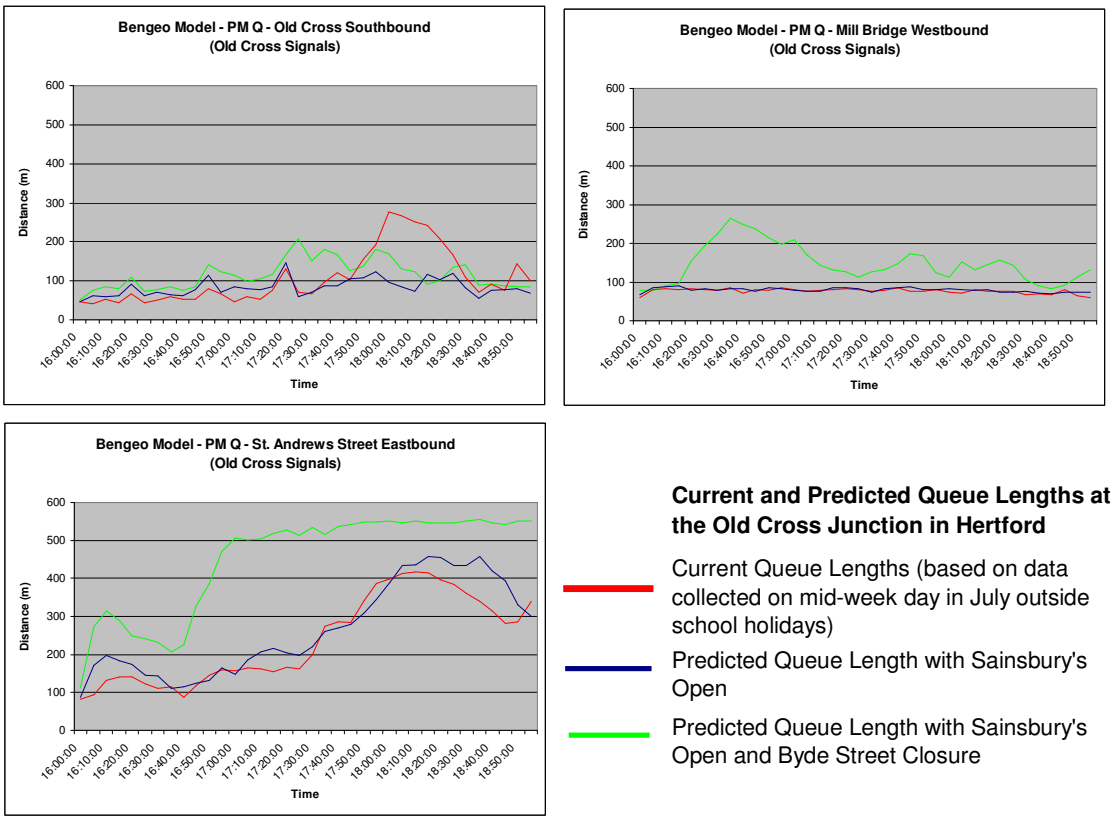


Figure 4.2: Queue Lengths for the PM peak period at Old Cross

Average Queue Length at Old Cross Junction (PM Peak Period) – St Andrew Street Eastbound					
Time	**Existing Situation Queue Length (m)**	**Scenario A**	**Difference Existing vs. Scenario A**	**Scenario B**	**Difference Existing vs. Scenario B**
16:00	82	86	4	111	29
16:05	94	170	76	272	178
16:10	132	196	64	315	183
16:15	140	183	43	288	148
16:20	140	172	32	248	108
16:25	122	144	22	241	119
16:30	110	143	33	231	121
16:35	115	111	-4	206	91
16:40	88	115	27	225	137
16:45	118	123	5	326	208
16:50	145	131	-14	387	242
16:55	160	164	4	472	312
17:00	157	148	-9	507	350
17:05	164	184	20	501	337
17:10	162	207	45	505	343
17:15	154	215	61	519	365
17:20	167	204	37	527	360
17:25	161	197	36	514	353
17:30	200	221	21	535	335
17:35	274	259	-15	517	243
17:40	285	270	-15	536	251
17:45	283	278	-5	541	258
17:50	341	309	-32	548	207
17:55	388	346	-42	550	162
18:00	398	389	-9	551	153
18:05	412	434	22	545	133
18:10	417	436	19	550	133
18:15	415	457	42	545	130
18:20	395	454	59	545	150
18:25	385	433	48	547	162
18:30	362	433	71	550	188
18:35	340	458	118	555	215
18:40	313	419	106	547	234
18:45	282	394	112	542	260
18:50	287	332	45	550	263
18:55	341	301	-40	551	210

Table 4.3: Average Queue Lengths at Old Cross St Andrew Street Eastbound (PM Peak)

4.2.3 The above table 4.3 shows a direct comparison between the existing situation model and the two modelled scenarios. It is important to focus on the differences in the queue lengths between the different scenarios and the existing situation.

4.2.4 The queue lengths with Sainsbury's in place do not change significantly, with similar profiles to the existing situation across both AM and PM peak periods. As would be expected with a superstore, the PM peak exhibits some extension of queue lengths at the Old Cross junction.

4.2.5 The reasons for the small change when Sainsbury's opens are set out below:

- The number of new trips in the model, based on the Sainsbury's Agreed Transport Statement, indicates only 12 additional vehicles in the AM peak (08:00 – 09:00) and 55 additional vehicles in the evening peak (17:00 – 18:00). All the rest are pass by or diverted trips (i.e. journeys already travelling on the local road network);
- A number of vehicles remained queued on the Sainsbury's exit arm, especially in the evening peak period therefore not reaching the Old Cross junction. The queue analysis does not provide details of the queue internal to the Sainsbury's site (however it extends up to almost 100 vehicles);
- The Sainsbury's development results in the removal of trips on the A414 and hence queues on a delayed part of the network. As a result strategic traffic from North Road previously avoiding the A414 through Old Cross can now replace the trips that have been removed. The diversion of trips to Sainsbury's therefore has wider network distribution effects, reducing the flow of some vehicles through the Old Cross junction;
- Performance of other junctions in the network are affected by the redistribution of trips and this has an impact on the routing of vehicles through the network;
- Variability in model runs can account for a difference. Queue length is particularly volatile on a day to day basis i.e. the length of the queue can change a lot from one day to the next. Therefore, there are differences in queue length between the modelled options as a result of this variability and volatility. For this reason it is important to focus on the difference trend across the whole time period rather than specific intervals;
- During the AM peak there are not many trips to the Sainsbury's store. Therefore a proportion of trips will divert to avoid the Old Cross junction as drivers expect there to be an increase in queuing time caused by the opening of the new store. This behaviour is not mirrored in the PM peak as during this period there is a high occurrence of people going to Sainsbury's on their way home. Therefore they have no choice in route and must queue at Old Cross.

4.2.6 The reasons for a larger change when Sainsbury's is open and Byde Street is closed are set out below

- With both Sainsbury's and the Byde Street closure, the queues at the Old Cross junction heading southbound from Bengeo Street and Port Hill do extend significantly from between 200m to 400m in the AM peak period in the existing situation to over 700m. This is on the southbound approach to the Old Cross junction as would be expected with traffic forced to re-route via Bengeo Street/Port Hill and Old Cross due to the Byde Street closure. The other approaches have similar queue profiles between the existing situation and the two scenarios.
- In the PM peak the queues increase on the St Andrew Street and Mill Bridge approaches to Old Cross but not as significantly as experienced in the AM peak southbound towards the Old Cross junction. St Andrew Street shows increases in queue lengths from around 400m currently to around 550m in the PM Peak and this is largely as a result of northbound traffic having to re-route via Old Cross as routes via Byde Street in Lower Bengeo are no longer available.

- In both AM and PM peaks there will be significant reductions in car journeys through the residential streets of Lower Bengeo of around 250 vehicles and 350-400 vehicles respectively.

4.2.7 It should be noted that the model does not take account of any wider effects of the Sainsbury's and/or Byde Street closure, such as displacement of traffic to other routes, changes in mode of travel or times drivers undertake their journeys.

5 Bengeo Area Proposals

5.1 SUMMARY OF MODELLING RESULTS

5.1.1 The conclusions show that, with the scenarios tested there is little change to the highway network with the opening of the Sainsbury's superstore. However, there is a detriment to network operation and queuing with the option of closing Byde Street. This is due to journeys diverting onto Bengeo Street, Port Hill and St Andrew Street.

5.1.2 The conclusions of the modelling work show that:

- The network is already congested in the study area in the peak hours;
- There is a slight increase in queuing along Port Hill and Bengeo Street in the am peak when Sainsbury's opens. The effect is more noticeable in the PM peak with increased queuing along St Andrew Street towards Old Cross. (Predicted traffic to Sainsbury's taken from HCC Development Control);
- There is large increase in queuing along Port Hill and Bengeo Street in the AM peak when Sainsbury's is open and Byde Street is closed as well as along St Andrew Street in the PM peak; and
- There is a slight benefit on the network due to the switch of shoppers between Tesco and Sainsbury's once it opens. Trips diverted off A414 for example.

5.1.3 It should also be noted that the additional delays and queuing will significantly impact on the reliability of bus services.

5.1.4 The model presents the most robust means of predicting the likely impacts of any closure. The model also represents the worst case that would be likely to be experienced. However, the localised Paramics model does not take account of any wider network implications, i.e. where drivers alter their travel habits due to the increased congestion.

5.2 HIGHWAY CHANGES

5.2.1 As noted in the second key stakeholder workshop, 90% of stakeholders would prefer to reduce 'rat-running' on the secondary routes through residential areas, even if this has the affect of increasing congestion on primary routes. 100% of stakeholders wanted to encourage the use of sustainable transport, rather than increase road capacity.

5.2.2 In the Consultation Questionnaire, question 13 asked respondents to tell us about their level of support for measures to reduce rat-running in specific residential areas. In response to this question 60% of respondents gave a positive answer with 25% giving a negative response and 15% having no view.

5.2.3 There is also a significant history of considering the local traffic issues in Bengeo with previous studies undertaken in 2006 when it was decided not to proceed with any closure due to likely congestion issues.

5.2.4 The recent modelling, described in this report, provides the most comprehensive means of predicting the future impacts of any closure. While this modelling has estimated that the congestion may significantly worsen, there is already congestion in the vicinity of Old Cross. Furthermore the recent Sainsbury's decision has found that local wider benefits may outweigh congestion impacts.

5.2.5 It is recommended that congestion impacts in the vicinity of the Old Cross junction are reduced by providing an improved road layout. This would encourage a safer environment for pedestrians and cyclists whilst still accommodating vehicular traffic. Further detail is included in Appendix A.

5.2.6 Whilst it is acknowledged that the closure of Byde Street would improve the residential amenity in Bengeo, any such closure is subject to further consideration and therefore the consultation sought views on two possible options:

- **Option 1:** Byde Street closure is implemented, initially for a temporary period, to monitor the impacts. The temporary closure would only be put in place once the Sainsbury's superstore has opened and the full traffic impacts are known. If the benefits outweigh any localised and wider implications the decision could be made to make the closure permanent. More detail is given in the pro-forma BEN1a at Appendix A.

5.2.7 It is estimated that the cost of this option would be:

- Installation of temporary bollard, signage and minor highway works £20, 000
- Design Fee including experimental traffic regulation order £5, 000
- Traffic Counts (manual junction counts & automatic traffic counts – pre-Sainsbury's, post Sainsbury's and during trial) £75, 000. See section on monitoring trial closure for further information.

5.2.8 Table 5.1 shows the strengths and weaknesses of Option 1 Byde Street Closure.

Strengths	Weaknesses
Keeps through traffic on the primary route network	Potential impact on Waterford with more traffic seeking an alternative route
	Restricts access for local residents
Protect residents in Bengeo	Amenity for residents at Old Cross area and main routes will be reduced
Encourages sustainable travel through walking and cycling for short journeys and travel to school	Detriment to highway network (noting existing congestion)
	Reduces on street parking in the vicinity of the trial closure
Temporary closure allows impacts to be quantified and a final decision to be made	Possible delay to bus services
Decisions made once Sainsbury's traffic impacts are known.	Delays decision until after Sainsbury's opens
Agreed strategy for tackling on-going issue.	Wider impacts likely, such as on A414 or A119 as drivers seek alternative routes.
UTP consultation sought views across Hertford of closure	Not all local residents support closure
	Congestion on Primary Routes

Table 5.1 Strengths and Weaknesses of Byde Street Closure

5.2.9 The Urban Transport Plan proposes schemes and projects to encourage more journeys by foot, bicycle and public transport to lessen the impact of a closure if this option is included in the final plan.

5.2.10 Alternatively the following option could be selected:

- **Option 2:** No closure of Byde Street and therefore no changes are made to the road network.

5.3 MONITORING ANY TRIAL CLOSURE

5.3.1 As outlined above any permanent closure would be subject to monitoring the outcomes of the Byde Street trial closure. However, the trial closure would only be implemented once the traffic impacts of the Sainsbury's superstore are known. The monitoring would cover the following:

- Changes in traffic flows around this part of the town;
- Changes in queue lengths in the town (including other main routes into Hertford) and particularly at the Old Cross junction;
- Changes in journey times and delays (including impacts on bus services) at the Old Cross junction; and
- Consideration of any modal shift from car to cycling and walking.

5.3.2 Exact criteria based on the monitoring to assist any decisions on whether to make the closure have been determined as set out in section 7.3.6 The "base" situation would also only be determined once the Sainsbury's store has opened. The criteria are related to the increases in delay, journey times and queues at Old Cross junction as a result of the Sainsbury's development.

5.4 MODE SHIFT REQUIRED TO SUPPORT THE PROPOSED CLOSURE

5.4.1 Consideration has also been given to the amount of modal shift required from car to other means of travel, such as walking and cycling. This would be to achieve a situation where the Old Cross part of town would be no worse than prior to any closure being implemented. It is possible that some modal shift would be achieved through the UTP proposals.

5.4.2 Based on the Paramics modelling of the Bengeo area of Hertford, the proposed closure of Byde Street within the Bengeo area would cause re-routing of approximately 250 southbound vehicles per hour in the AM peak period and 350-400 northbound vehicles per hour in the PM Peak period. These would largely be re-directed via Port Hill and the Old Cross junction, which is already near or at capacity.

5.4.3 Therefore consideration has been given to identify the level of switch from car to cycling and walking in this part of Hertford around Bengeo to enable the traffic to be re-routed via Old Cross junction without significant additional impact on the junction operation. Therefore this section estimates the level of modal shift required for the proposed closure of Byde Street to operate with tolerable queuing levels.

5.4.4 Taking the worst case of the PM Peak hour, the existing situation model indicates that approximately 530 vehicles per hour currently use Port Hill travelling north. Similar traffic levels of northbound PM peak traffic are also evident at the Old Cross junction.

5.4.5 Given that the junction is already reaching capacity in the peak hours, a comparison of 85th percentile average peak period queue lengths at Old Cross junction for the scenario "Base + Sainsbury's without closure of Byde Street" from the model results has been used as a guide to tolerable queuing levels. This has been taken for all queues on all approaches to the Old Cross junction in both AM and PM peak periods. A comparison of results for this with the "Base + Sainsbury's + closure of Byde Street" shows that the difference in 85th percentile average queue lengths is 330m. Based on an average distance of 6m per vehicle this suggests that the queuing tolerance criteria would be exceeded by approximately 55 vehicles at the Old Cross junction with the proposed closure in place.

5.4.6 Therefore in order to prevent a situation of queue lengths exceeding the level of baseline queuing anticipated for the base + Sainsbury's scenario, a reduction of 10% of journeys through this junction by car would need to be achieved to enable a "no-worse" situation to be achieved with the proposed closure of Byde Street.

5.4.7 For a robust estimate, the full average queue lengths have also been compared which suggests that in the worst situation with Sainsbury's and Byde Street closed, the tolerance criteria would be exceeded by 65 vehicles (a maximum average queue difference of 392m based on vehicles using 6m of road space on average) which would require a **12% reduction in traffic to compensate for the closure of Byde Street**.

5.4.8 This mode shift could be achieved through improved walking and cycling measures and smarter choices, such as personalised travel planning for local Bengeo residents. These are included within the UTP. However, a mode shift of 10-12% is at the higher end of what might be achieved.

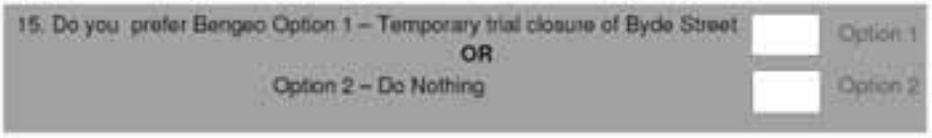
6 Consultation on Byde Street Options

6.1 PUBLIC CONSULTATION

6.1.1 Taking into account the findings from the transport model, the public consultation on the UTP provided specific options for Bengeo. Question 15 of the consultation questionnaire sought views on combining the improved road layout at the Old Cross junction with one of the following options:

- **Option 1** Temporary closure of Byde Street to alleviate through-traffic movements in Bengeo; OR
- **Option 2** No closure of Byde Street.

6.1.2 To allow respondents to make an informed decision, a summary UTP leaflet was distributed to all residents and businesses in the study area (approximately 24,500 households and businesses). The agreed draft Bengeo recommendations were listed in the leaflet which included a return questionnaire. These are outlined below:



6.1.3 The temporary closure would only be put in place once the Sainsbury's superstore has opened and the full traffic impacts are known. If the benefits outweigh any localised and wider implications the decision could be made to make the closure permanent.

6.1.4 The results of the consultation were very mixed, with similar levels of support and opposition for the proposal to close Byde Street across the study area. 1,252 responses to the consultation were received, of which 1,048 provided a response to question 15 above.

6.1.5 A GIS-based postcode analysis was used to identify the location of residences and businesses for responses to question 15. The results by geographic area are summarised in Table 6.1 below and shown on a map in Appendix B.

Area	All Responses			''No View' Not Counted	
	Option 1 Close	Option 2 Do nothing	No View	Option 1 Close	Option 2 Do Nothing
Hertford & Ware	36% (442)	48% (606)	16% (204)	42% (442)	58% (606)
Hertford	36% (305)	51% (435)	13% (117)	41% (305)	59% (435)
Bengeo	35% (157)	60% (275)	5% (21)	36% (157)	64% (275)
Lower Bengeo	57% (92)	40% (64)	3% (6)	59% (92)	41% (64)

** Figures in brackets are the actual number of responses received*

Table 6.1: Consultation Responses to Question 15 by Geographical Area

6.1.6 The classification of the Lower Bengeo area was based on streets within the remit of the Lower Bengeo Resident's Association. Postcodes for the streets in Lower Bengeo were cross checked with Royal Mail.

6.1.7 It should be noted that 178 surveys were received without a postcode. These survey results are not included in the Hertford, Bengeo and Lower Bengeo summary of results lines.

6.1.8 As shown above, there were mixed responses to the options for Byde Street within the overall study area, with a slight overall majority in favour of Option 2. Results for Hertford only and the wider Bengeo area were consistent with those for the overall study area. However, for Lower Bengeo residents (those living closest to Byde Street) there was a slight majority in favour of closing Byde Street.

6.1.9 A number of comments were received in connection with the Bengeo proposals. These are summarised below with an appropriate response.

Consultation Comment	Response
Scheme Suggestions	
Implement a 20 mph zone	A 20mph zone could assist in reducing vehicle speeds – although speeds recorded in Lower Bengeo are already low, particularly in peak periods. It is unlikely that such a scheme would significantly reduce the flow of traffic through this area. Physical features may not be compatible with the conservation area. Suggested in the 2006 study and rejected as it was unpopular with residents and stakeholders. See table 1.1
Speed calming measures in Byde Street	Traffic speeds in the area are already low. The impact of traffic calming on traffic volumes wouldn't be significant enough in isolation to solve the underlying problem. Chicanes and traffic priority were considered as part of the 2006 study and were rejected due to lack of support during consultation. There were concerns over loss of parking and space constraints in the area. See table 1.1.
Congestion charge or permit style scheme to restrict access to Byde Street or Bengeo as a whole	Extensive research would be required to implement this option with special dispensation from the Department for Transport required. This would be extremely costly and isn't feasible for a scheme of this size. Although, subsequent to the public consultation another technological solution has been investigated. See section 6.3.
Enforcement by camera of existing restrictions to improve compliance	This option is being considered further please see section 6.3 for more details.
Improve late night and weekend bus services to Bengeo	This would be covered by the area wide bus service review which forms scheme PTM26 of the UTP and would require the support and agreement of the Bus Operators.
Improve the traffic flow at Old Cross to reduce the need to use Benego routes	The traffic signals at Old Cross facilitate pedestrian a crossing point on this very busy road, To remove the pedestrian crossing would create major severance issues for pedestrians especially vulnerable road users such as elderly and disabled people with limited mobility. During the access and parking restrictions trial which took place in 2006, the signals were altered slightly. This gave as much ‘green time’ to vehicles travelling through Old Cross from Port Hill as possible.
Increase in enforcement of existing Access and Parking Restrictions	Enforcement of parking restrictions is the responsibility of East Herts Council whilst the access restrictions are enforced by the Police. The County Council will work with these authorities to provide as much as enforcement as possible given the resources available.
Increase in hours of operation of existing restrictions	Through traffic issues are more prevalent in peak hours than during the day. This coupled with limited enforcement resources would preclude an increase of hours.
One Way Operation in Bengeo	One way operation was considered and discounted in the 2006 study (see table 1.1) due to lack of support during the consultation. There were also concerns that speeds would increase and the limitations this would place on cyclists.

Consultation Comment	Response
Reopen Port Vale if Byde Street is closed	If Byde St is closed on a trial basis re-opening Port Vale would provide another through route through Lower Bengeo.
Trial traffic lights at Nelson Street/ Port Vale and Byde Street/ Farquhar Street	This has previously been suggested but was, considered to simply regulate the rat run flow through this section of Byde St. This could potentially make the route more attractive as it would remove the conflict on this narrow stretch of road.
Impose width restrictions to limit traffic	This was considered in the 2006 Study (see table 1.1), at the time the scheme was considered to be unfeasible as the streets are already very narrow and access for Deliveries and servicing would have to be maintained.
Use a CPZ to restrict parking to residents and exclude commuters	Scheme CPK3 proposes to implement parking bays in Bengeo where possible, as part of the delivery of this scheme a parking study would be carried out. CPK1 also provides a car parking review for the entire study area of Hertford and Ware.
More organised parking on Byde Street to allow better access through narrow streets	
Provide a park and walk facility for residents on the 'rat-run' and remove parking to make the route safer.	
Remove parking from Bengeo to allow traffic easier passage through the area	
Problems with the Current Situation	
Sainsbury's will make the situation in Byde Street worse	The decision to approve the Sainsbury's development was made after a call-in inquiry. The agreed statement of common ground on transport indicated that trips to the store would, for the most part, be diverted from other local stores. The modelling has included Sainsbury's traffic and the UTP recommendation for Bengeo will only be made once the store is open and the traffic situation can be properly assessed.
Parking by commuters exacerbates the problem	Scheme CPK3 proposes to implement parking bays in Bengeo where possible.

Problems with Closure Scheme	
Increased congestion on Port Hill caused by closure of Byde Stet	It is accepted that increased congestion on Port Hill and inconvenience for some residents will be inevitable by-products of the closure of Byde Street. However the relative advantages and disadvantages of the scheme will be carefully considered before a permanent solution is identified. A technological solution has also been put forward which would alleviate severance and access issues for Bengeo residents. See section 6.3. However, at the present time this option is not viable.
Access needs to be maintained for residents of Bengeo	
Increase in journey times for residents in Bengeo if closure goes ahead	
Closing Byde Street would cause severance issues in Bengeo	

Other Comments	
Closure was rejected in the 2006 study	The 2006 Study concluded that closure was feasible, but that given the circumstances at the time it wasn't a reasonable response. It was agreed that a modelling exercise would be undertaken to ascertain the likely impact on Port Hill and the surrounding area – hence this piece of work. This is detailed earlier in this report (see sections 2-4).
A bypass is required to reduce the general level of congestion in Hertford	The UTP has stated that a bypass will not be included due to priority being given to other large schemes in the County, funding, and wider impacts of the scheme.
Every driver should have access to the Highway	Current policy seeks wherever possible to keep the majority of traffic on the primary routes through the area and off residential streets.
Please do not use speed bumps in Bengeo	Traffic calming measures are not currently under consideration for Bengeo.
Some residents want something done – just not a closure	A number of other possible options have been looked at previously and discounted. Taking into account these comments, a technological solution has been considered – but is currently not viable.

Table 6.2: Summary of Consultation Comments about Bengeo

6.2 OTHER OPTIONS

6.2.1 A number of comments were received during the public consultation whereby respondents did not support a road closure trial or the 'do nothing' option. As outlined in section 1.2, a number of other options have been considered and consulted on. This included the following in 2006:

- width restrictions at entry points
- chicanes and traffic priority
- a one way traffic system
- signing at entry points to indicate a residential area
- 20mph zone accompanied by appropriate traffic management measures

6.2.2 The above options were not taken forward due to the 2006 consultation results, feasibility concerns, or because they would not alleviate the through traffic issue.

6.2.3 However, a six month access and parking restrictions trial was recommended in the study. It provided some benefits and was made permanent. The trial included:

- A 'No Right Turn' into Cross Road from Bengeo Street
- Making Tower Street one way in an eastbound direction; and
- Part time parking restrictions in Byde Street and Balfour Street.

6.2.4 The options listed above were not consulted on during this consultation as they had been considered previously.

6.3 TECHNOLOGICAL OPTIONS

6.3.1 Taking into account the comments outlined in 6.2.1 further investigative work was carried out on the possibility of providing a technological solution using automatic number plate recognition cameras (ANPR) and variable message signs. At this time such a solution is not viable for enforcement and legal reasons, although the technology is available. Therefore this option did not form part of the consultation.

SCHEME PROPOSAL

6.3.2 The cameras would be used to enforce an 'Access Only' restriction. When in operation, the variable message signs would be illuminated. If a vehicle is caught by the two cameras within a set time period this will be deemed an access contravention. This option would not require a physical bollard or restraint in Byde Street. This option could be used in peak hours only and thereby would not affect the network at other times of the day.

6.3.3 The ANPR cameras would be located at the two locations below, with each site requiring 2 cameras, so 4 in total:

- Wades Mill Road north of its junction with Sacombe Road
- Beane Road at its junction with the A119 (near to Hertford North station)

Four variable message signs would be required to be illuminated when access restrictions were operational at the following locations:

- Bengeo Street junction with The Avenue
- Bengeo Street junction with Cross Road
- Sacombe Road junction with The Wick
- Beane Road junction with the A119 (near to Hertford North station)

6.3.4 A sign would not be required on Bengeo Street at its junction with Tower Street as this is one way in an eastbound direction. See Ben 1b In appendix A for more information..

ENFORCEMENT ISSUES

6.3.5 As stated there are a number of enforcement issues which do not make this option viable at present. These are summarised below:

- It is unlikely that Hertfordshire Constabulary can take on the enforcement role of such a system at the current time. If such a scheme was to move forward further discussions would be required with the Police.
- Further investigations could be carried out in respect of using a private company to enforce the scheme. There would obviously be a financial implication in employing a private company. Therefore the costs vs benefits will need to be carefully considered.

- Further consideration needs to be given to how the information collected is managed and shared. This would involve liaising with the Information Sharing Commissioner to provide clarity around the legal aspects of data sharing and retention.

LEGAL ISSUES

6.3.6 There are also some legal issues which will need resolving / confirming should such a scheme move forward.

- Preliminary discussions suggest that the existing 'Except for Access' restriction could be utilised for this option, although confirmation will be required with further investigations.
- If a third party was to enforce this option, rather than the Police a 'Special Enforcement declaration' would be required. The process can be lengthy and expensive

COSTS

6.3.7 It is difficult at this stage to provide robust cost estimates for this option. The initial estimate listed below do not include the cost of any 'back office' and enforcement functions, maintenance costs or data collection costs if the scheme moves forward.

- Installation costs £75,000 (£55,000 ANPR / £20,000 VMS).
- Maintenance costs - ANPR Unknown / VMS £200 per year per sign under current Maintenance Contract (likely to be different at time of implementation).
- Design/Implementation fees £10,000
- Enforcement costs *(unknown at present)*

ADVANTAGES & DISADVANTAGES

6.3.8 The main advantage of this solution is that residents living within all of Bengeo would not contravene the restriction. However, congestion in peak periods will be similar to that of the road closure option and the scheme's viability can not be confirmed at this stage. Table 6.3 shows the strengths and weaknesses of the technological option.

Strengths	Weaknesses
No permanent fixed bollard required in Byde Street	Potential impact on Waterford village with more traffic seeking an alternative route when restrictions are in operation
Access restrictions could be used for limited periods (eg. peak hours only)	Restricts access for residents living in Bengeo East
Access restrictions could be 'switched off' if there was a major incident on the highway network	Amenity for residents at Old Cross area and main routes will be reduced when restrictions are in operation
Does not exclude residents in Upper Bengeo and Bengeo East from using Byde Street when the restriction is in operation	Possible delay to bus services when restrictions are in operation
Agreed strategy for tackling on-going issue	Delays decision until after Sainsbury's opens
Decision made once Sainsbury's traffic impacts are known	Wider impacts likely, such as on A414 or A119 as drivers seek alternative routes
	Enforcement and legal issues prevent this option being taken forward at present
	Traffic entering Bengeo off Sacombe Road from the Waterford direction would not contravene the restriction
	Fairly high set up costs
	Potential visual impacts upon a conservation area. Permanent signs will be required as well as the variable message signs in case they fail, therefore increasing sign clutter.
	If chosen, consultation will be required

Table 6.3: Strengths and weaknesses of Technological Enforcement Measures

6.3.9 A technological solution does form part of the recommendations in section 7. A decision will be made on whether to take forward either a trial road closure or consideration of a technological solution once the impacts of Sainsbury's are known.

7 Conclusions and Recommendations

7.1 SUMMARY

7.1.1 Based on the scenarios tested the conclusions of this study show that there is little change with the opening of the Sainsbury's superstore. However, there is a detriment to network operation and queuing with the option of closing Byde Street. This is due to journeys diverting onto Bengeo Street, Port Hill and St Andrew Street.

7.1.2 The conclusions of the modelling work show that:

- The network is already congested in the study area in the peak hours;
- There is a slight increase in queuing along Port Hill and Bengeo Street in the AM peak when Sainsbury's opens. The effect is more noticeable in the PM peak with increased queuing along St Andrew Street towards Old Cross. (Predicted traffic to Sainsbury's taken from HCC Development Control);
- There is a large increase in queuing along Port Hill and Bengeo Street in the AM peak when Sainsbury's is open and Byde Street is closed as well as along St Andrew Street in the PM peak; and
- There is a slight benefit on the network due to the switch of shoppers between Tesco and Sainsbury's once it opens. Trips diverted off A414 for example.

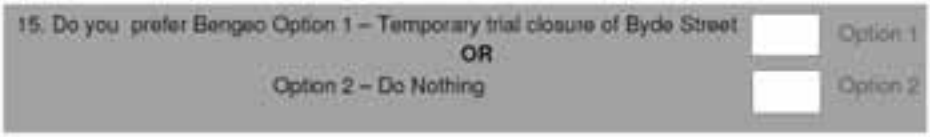
7.1.3 It should also be noted that the additional delays and queuing will significantly impact on the reliability of bus services.

7.1.4 The model presents the most robust means of predicting the likely impacts of any closure. The model also represents the worst case that is likely to be experienced. However, the localised Paramics model does not take account of any wider network implications, i.e. where drivers alter their travel habits due to the increased congestion.

PUBLIC CONSULTATION FEEDBACK

7.1.5 The consultation sought views on combining a scheme to provide an improved road layout at the Old Cross with one of the following options:

- **Option 1** Byde Street closure is implemented, initially for a temporary period, to monitor the impacts. The temporary closure would only be put in place once the Sainsbury's superstore has opened and the full traffic impacts are known. If the benefits outweigh any localised and wider implications the decision could be made to make the closure permanent; OR
- **Option 2** Do Nothing - No closure of Byde Street and therefore no changes are made to the road network.



7.1.6 It is recommended that congestion impacts in the vicinity of the Old Cross junction are reduced by providing an improved road layout. This would encourage a safer environment for pedestrians and cyclists whilst still accommodating vehicular traffic. This would be implemented in conjunction with the Sainsbury's improvements. In addition, such a scheme would also be implemented irrespective of whether Option1 or Option 2 is taken forward.

7.1.7 The consultation closed on 30th April 2010 and the outcome of the consultation is as follows:

Area	All Responses			'No View' Not Counted	
	Option 1 Close	Option 2 Do nothing	No View	Option 1 Close	Option 2 Do Nothing
Hertford & Ware	36% (442)	48% (606)	16% (204)	42% (442)	58% (606)
Hertford	36% (305)	51% (435)	13% (117)	41% (305)	59% (435)
Bengeo	35% (157)	60% (275)	5% (21)	36% (157)	64% (275)
Lower Bengeo	57% (92)	40% (64)	3% (6)	59% (92)	41% (64)

Table 7.1: Consultation responses on Bengeo options by geographical area

7.1.8 1,252 questionnaire responses were received, with 1,048 responding to Question 15 regarding the Bengeo Options. If those who have not responded are excluded from the split the overall result for the entire study area is 42% for Option 1 and 58% for Option 2. If the "no-responses" were included within the do-nothing responses then there would only be 36% for the closure and 48% either for doing nothing or with no response.

7.1.9 The postcode split is shown in Appendix B. The definition of the Lower Bengeo area is based on the streets within the remit of the Lower Bengeo Residents Association.

7.1.10 As can be seen from the postcode analysis only the localised area of Lower Bengeo have a majority support for Option 1. In addition, there is a strong level of support for Option 2 (do-nothing) from other areas of Bengeo.

7.1.11 The strengths and weaknesses of any closure are summarised below.

Strengths	Weaknesses
Keeps through traffic on the primary route network	Potential impact on Waterford with more traffic seeking an alternative route
	Restricts access for local residents
Protect residents in Bengeo	Amenity for residents at Old Cross area and main routes will be reduced
Encourages sustainable travel through walking and cycling for short journeys and travel to school	Detriment to highway network (noting existing congestion)
	Reduces on street parking in the vicinity of the trial closure
Temporary closure allows impacts to be quantified and a final decision to be made	Possible delay to bus services
Decisions made once Sainsbury's traffic impacts are known.	Delays decision until after Sainsbury's opens
Agreed strategy for tackling on-going issue.	Wider impacts likely, such as on A414 or A119 as drivers seek alternative routes.
UTP consultation sought views across Hertford of closure	Not all local residents support closure
	Congestion on Primary Routes

Table 7.2: Strengths and Weaknesses on a closure

7.2 TECHNOLOGICAL OPTION

7.2.1 Taking into account the consultation comments outlined in 6.2.1 further investigative work was carried out on the possibility of providing a technological solution. This option did not form part of the consultation as it is not viable at this time.

7.2.2 Under a technological option, there would be four variable message signs which would be located on the boundary of the restriction. Two sets of automatic number plate recognition (ANPR) cameras would be installed in Wades Mill Road and Beane Road.

7.2.3 The technology would be used to enforce an 'Access Only' restriction. When in operation the variable message signs would be illuminated. If a vehicle is caught by two cameras within a set time period this will be deemed an access contravention. This option would not require a physical bollard or restraint in Byde Street. This option could be used in peak hours only and thereby not affect the network at other times of the day.

7.2.4 There are a number of enforcement and legal issues which would need to be resolved if this scheme was to be taken forward. These issues do not make this scheme viable at present. .

7.2.5 Table 7.3 shows the strengths and weaknesses of a technological option.

Strengths	Weaknesses
No permanent fixed bollard required in Byde Street	Potential impact on Waterford with more traffic seeking an alternative route when restrictions are in operation
Access restrictions could be used for limited periods (e.g. peak hours only)	Restricts access for residents living in Bengeo East
Access restrictions could be 'switched off' if there was a major incident on the highway network	Amenity for residents at Old Cross area and main routes will be reduced when restrictions are in operation
Does not exclude residents in Upper Bengeo and Benego East from using Byde Street when the restriction is in operation	Possible delay to bus services when restrictions are in operation
Agreed strategy for tackling on-going issue	Delays decision until after Sainsbury's opens
Decision made once Sainsbury's traffic impacts are known	Wider impacts likely, such as on A414 or A119 as drivers seek alternative routes
	Enforcement and legal issues prevent this option being taken forward at present
	Traffic entering Bengeo off Sacombe Road from the Waterford direction would not contravene the restriction
	Fairly high set up costs
	Permanent signs will be required as well as the variable message signs in case they fail, therefore increasing sign clutter.
	If chosen, consultation will be required.

Table 7.3: Summary of the Strengths and Weaknesses of a Technological Option

7.3 RECOMMENDATIONS

7.3.1 Based on the consultation there is not overwhelming support for either of the two options presented – to close Byde Street or to do nothing in Bengeo.

7.3.2 It is therefore recommended that a decision should be made on the way forward once the actual traffic impacts of the new Sainsbury's store are known. It is proposed that before and after monitoring should be undertaken in the form of traffic surveys in particular assessing queue length to ascertain the impact of the Sainsbury's store.

7.3.3 A threshold criteria has been specified for determining whether the traffic impact of Sainsbury's is unacceptable for a closure or technological option to proceed (ie. an increase in traffic queues greater than 20% of the before Sainsbury's counts). In the event that the criteria threshold is not exceeded, a 3-month temporary trial closure could be implemented or technological option taken forward or considered. It should be noted that the additional traffic generated by Sainsbury's is expected to be below this level.

7.3.4 As outlined above any closure or technological option would be subject to monitoring as well as understanding the pre-Sainsbury's and post Sainsbury's traffic situation. Therefore the decision will only be made once the traffic impacts of the Sainsbury's superstore are known.

7.3.5 The monitoring of the closure or the technological option would cover the following:

- Changes in traffic flows around this part of the town;
- Changes in queue lengths in the town (including other main routes into Hertford) and particularly at the Old Cross junction;
- Changes in journey times and delays (including impacts on bus services) at the Old Cross junction – using the data from the surveys; and
- Consideration of any modal shift from car to cycling and walking.

7.3.5 To determine the full impacts, the closure or technological option would need to be in place for at least 3-months. This is essential to enable changes in travel behaviour and patterns to be determined.

7.3.6 Exact criteria based on the monitoring would need to be established once the pre-Sainsbury's traffic counts have been completed. This is because the "base" situation would only be able to be determined once the Sainsbury's store has opened. Such criteria are likely to be related to the increases in delay, journey times and amount of modal shift and draft criteria (specific percentage figures still to be determined) are outlined below:

- Queue lengths increasing by more than 20% and/or journey time delay affected with flows significantly exceeding capacity at the Old Cross Junction;
- Traffic flows increasing by more than 5% through other residential areas/secondary routes, such as via Waterford;
- Bus Journey times increasing by more than 10%; and
- Modal Shift of 2.5% away from car to walking and cycling for local residents in Bengeo.

7.3.7 The costs of the road closure and technological trial options are outlined below:

TRIAL OPTION:	Road Closure	Technological
Installation	£ 20,000	£ 75,000
Design Fee including TROs	£ 5,000	£25,000
Traffic Data Counts	£75,000	£ 50,000
TOTAL	**£100,000**	**£ 155,000**

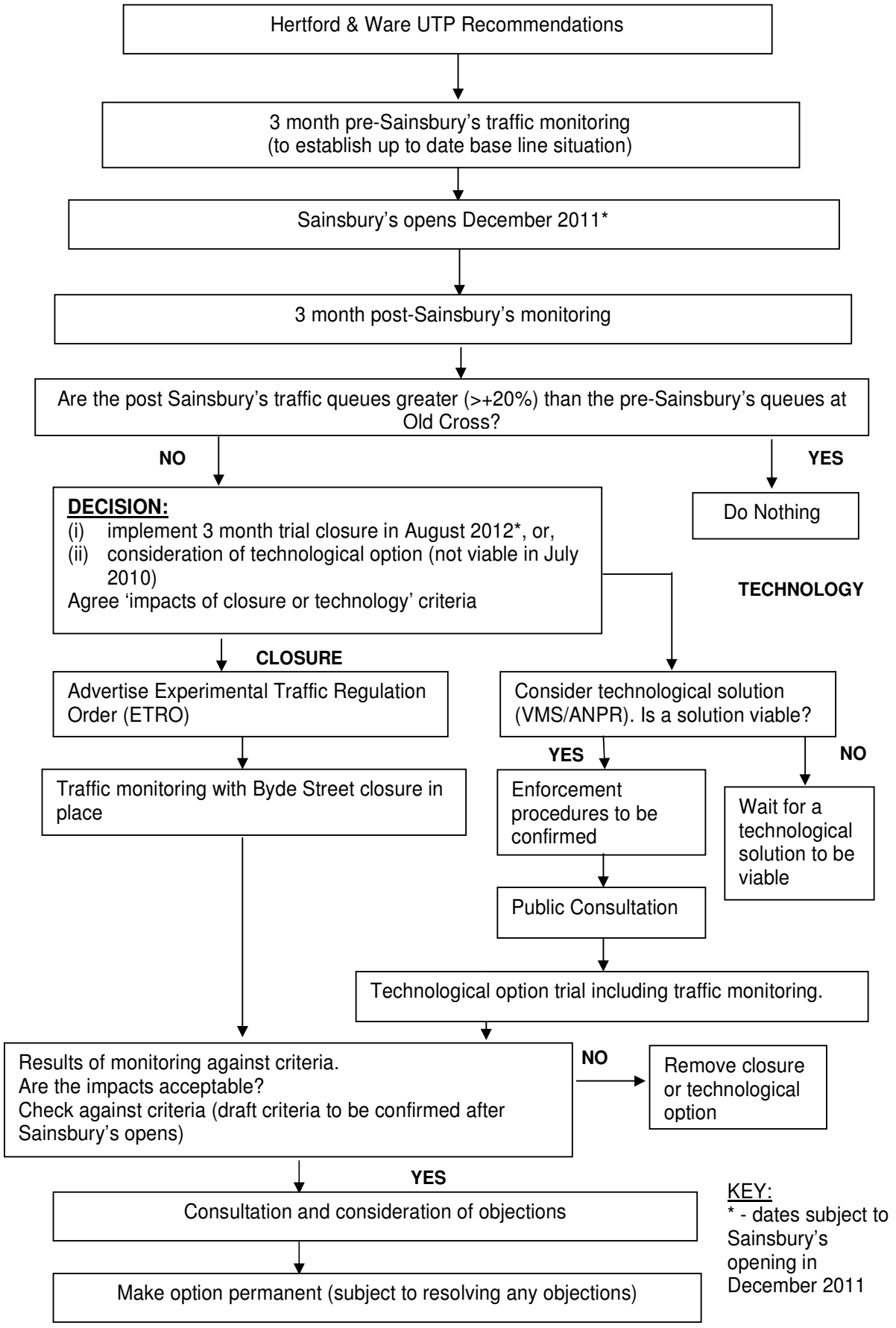
Table 7.3: Summary of outline costs

7.3.8 Maintenance and enforcement costs have not been included, but would need to be taken into account if either of these options was made permanent.

7.3.9 It has been established through the modelling that a 12% reduction in traffic to compensate for the closure of Byde Street would be required to achieve a situation where traffic is no worse than currently experienced. This could be achieved through a mode shift from car by improvements to walking and cycling measures and using smarter choices, such as personalised travel planning for local Bengeo residents. These are included within the UTP. However, a mode shift of 10-12% is at the higher end of what might be achieved.

7.3.10 The process for taking forward the recommendations outlined are shown in the flow chart on the following page.

BENGEO RECOMMENDATIONS FLOW CHART



7.4 OTHER SCHEMES

7.4.1 It is also noted that the following schemes could be implemented irrespective of the Byde Street closure or technological option moving forward or not.

- Improvements to parking across Bengeo on key junctions and near schools (Pro-forma CPK3), albeit it is noted that often parking acts as a natural traffic calming and may reduce the attractiveness of the through route;
- Old Cross Junction Improvements to retain signalised junction and provide shared surface (minimal kerb upstand) to encourage pedestrian crossing/movement, slow traffic and follow DfT Mixed Priority route treatment to make part of extended town centre with links to Sainsbury's (Pro-forma PED25); and
- Pedestrian and cycle improvements across Bengeo (including Pro-forma CPM18 and PED25).

7.5 NEXT STEPS

7.5.1 Following the recommendations in this report as part of the Hertford and Ware Urban Transport Plan, the next steps are to undertake pre-Sainsbury's monitoring. This will be undertaken once the UTP is endorsed by members in advance of Winter 2011 when Sainsbury's is due to open.

7.5.2 During this time further investigation will be undertaken into using ANPR technology rather than fixed types of closure.

7.5.3 Only once the post-Sainsbury's traffic situation is known will a decision be made on a way forward.

Appendix A Bengeo Scheme Pro-Formas

Hertford & Ware UTP Medium Term Scheme Feasibility Assessment

Scheme Name:	**Byde Street, Lower Bengeo – Temporary Trial Closure** (Timescale dependent upon completion and opening of Sainsbury's)

Scheme ID Number:	**BEN1a**

Scheme Summary: Option to close Byde Street to vehicular traffic to remove through traffic from the Victorian Residential Streets.

The proposal is an Option (Option 1) subject to the outcomes of public consultation. The alternative option (Option 2) is to do nothing (BEN3).

Byde Street closure would be implemented, initially for a temporary period, to monitor the impacts. The temporary closure would only be put in place once the Sainsbury's superstore has opened and the full traffic impacts are known. If the benefits outweigh any localised and wider implications the decision could be made to make the closure permanent.

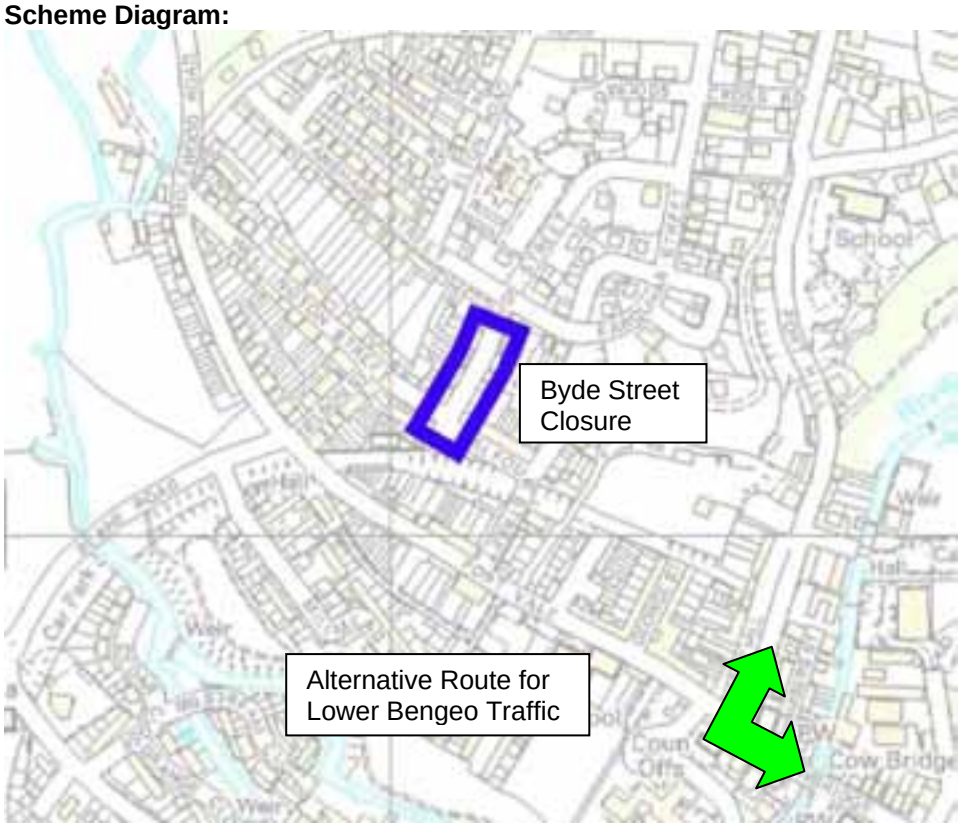
The closure point would be formed by suitable bollards to allow access by pedestrians and cyclists and would need to be at a location to ensure suitable arrangements for turning (seeking to avoid long sections of highway without any means of turning)

Any permanent closure would be subject to monitoring of:

- Changes in traffic flows around this part of the town;
- Changes in queue lengths in the town (including other main routes into Hertford) and particularly at the Old Cross junction (Old Cross mixed use priority junction improvements also covered in PED25);
- Changes in journey times and delays (including impacts on bus services) at the Old Cross junction; and
- Consideration of any modal shift from car to cycling and walking.

Rat Run, Lower Bengeo, 2009

Scheme Diagram:



Links to Other UTP/LTP Schemes: PED25 – Improvements to Old Cross to create a new road layout that creates a safer environment for pedestrians. This will be important to mitigate any traffic impacts of the existing situation, the Sainsbury's store and any Byde Street Closure

Estimated Delivery Cost (provide breakdown for works element where appropriate/possible):
Implementation of road closure (bollards or similar and kerb changes as appropriate) = £7,500
Alterations to on-street parking arrangements (TRO and bay markings as appropriate) = £7,500
Cost of monitoring and any TRO = £5,000

TOTAL COST: £20,000

Estimated Maintenance/Operating Costs: n/a

User Mode Benefits:

Scale of Benefit	Pedestrian	Cycle	Bus	Rail	Car
High	✓	✓			
Medium					
Low			✓	✓	✓

Design Considerations:

Design Considerations	**Proposed Solutions**	**Sufficient to tackle issues? (Y/N)**
Appropriate closure of Byde St	Location of bollards to still allow appropriate area for turning of vehicles and maintain suitable property access	Y
	Parking layout amended to allow suitable closure	Y
	Include measures to encourage cycling and walking	Y

Deliverability Constraints:

Can the scheme be delivered without third party involvement?	Y	
Is third party land required to deliver the scheme? (i.e. within the Highway Boundary)		N
Are there any likely utilities constraints?		N
Do all elements of the scheme involve standard work processes?	Y	
Can the scheme be delivered in the short term?		N
Are there any accessibility constraints that impact on building the scheme? (e.g. limited road access)		N

Links to Other UTP/LTP Indicators: LTP 16 and LTP17
UTP Objectives 5 and 6

Programme/Delivery Risks (include brief description for overcoming where possible):
Timescale of delivery dependent upon Sainsbury's opening and review of traffic affects associated with Sainsbury's
Design of suitable closure point – need to consult more locally
Impact on bus services at Old Cross junction due to delays – liaise with operators
Outcomes of public consultation – likely to be varying range of views on closure
Delivery dependent upon successful outcomes of monitoring – need to set and agreed criteria to determine whether proposal for closure is made permanent

Further Actions Required:
Review outcomes of public consultation
Set criteria for determining outcomes of monitoring following results of public consultation

Other Information / Additional Notes: Await results of UTP consultation and the trial if selected will be funded through S106 financial contribution(s).

Hertford & Ware UTP Medium Term Scheme Feasibility Assessment

Scheme Name:	**Byde Street, Lower Bengeo – ANPR Enforced Access Restrictions**

Scheme ID Number: **BEN1b**

Scheme Summary: Option to remove through traffic from the Victorian Residential streets of Bengeo using a camera-based enforcement system relying on automatic number plate recognition (ANPR), rather than a fixed bollard.

This proposal is an alternative to BEN1a, and could be implemented if the fixed bollard scheme proves not to be feasible and the legislative and enforcement issues associated with BEN1b are resolved prior to implementation.

The ANPR system offers a flexible approach which allows the access restrictions to be imposed for the appropriate time period (eg peak hours only or all day) as required.

Under this technological option, there would be four Variable Message Signs which would be located on the boundary of the restriction. Two sets of automatic number plate recognition (ANPR) cameras would be installed in Wades mill Road and Beane Road.

The technology would be used to enforce an 'Access Only' restriction. When in operation the Variable Message Signs (VMS) would be illuminated. Standard signs would also be required in the event that the VMS fail.

Access would be maintained at all times for:

- Cyclists and pedestrians; and
- Emergency vehicles.

Rat Run, Lower Bengeo, 2009

Links to Other UTP/LTP Schemes:
PED25 – Improvements to Old Cross to create a new road layout that creates a safer environment for pedestrians. This will be important to mitigate any traffic impacts of the existing situation, the Sainsbury's store and any Byde Street Closure.

CPM3 cycle and pedestrian route through Bengeo area.

BEN1a – If BEN1a is implemented, BEN1b is not required.

Estimated Delivery Cost (provide breakdown for works element where appropriate/possible):
Implementation of access restrictions (signage and kerb changes as appropriate) = £7,500
Alterations to on-street parking arrangements (TRO and bay markings as appropriate) = £7,500
Any TRO = £5,000
Design costs = £10,000
Cost of ANPR/ CCTV equipment and installation=£75,000
Cost of traffic surveys £50,000

TOTAL ESTIMATED COST: £155,000

Estimated Maintenance/Operating Costs: £2,000pa

User Mode Benefits:

Scale of Benefit	Pedestrian	Cycle	Bus	Rail	Car
High	✓	✓			
Medium					
Low			✓	✓	✓

Design Considerations:

Design Considerations	**Proposed Solutions**	**Sufficient to tackle issues? (Y/N)**
Appropriate Limitation of Access to Byde St	Design of restriction scheme to still allow appropriate area for turning of vehicles and maintain suitable property access	Y
	Time restriction to be identified	Y
	Include measures to encourage cycling and walking	Y
	Selection of appropriate method of enforcement of access restrictions	Y
	Time limit for identification of through traffic and application of penalties to be determined (eg 15 mins)	

Deliverability Constraints:

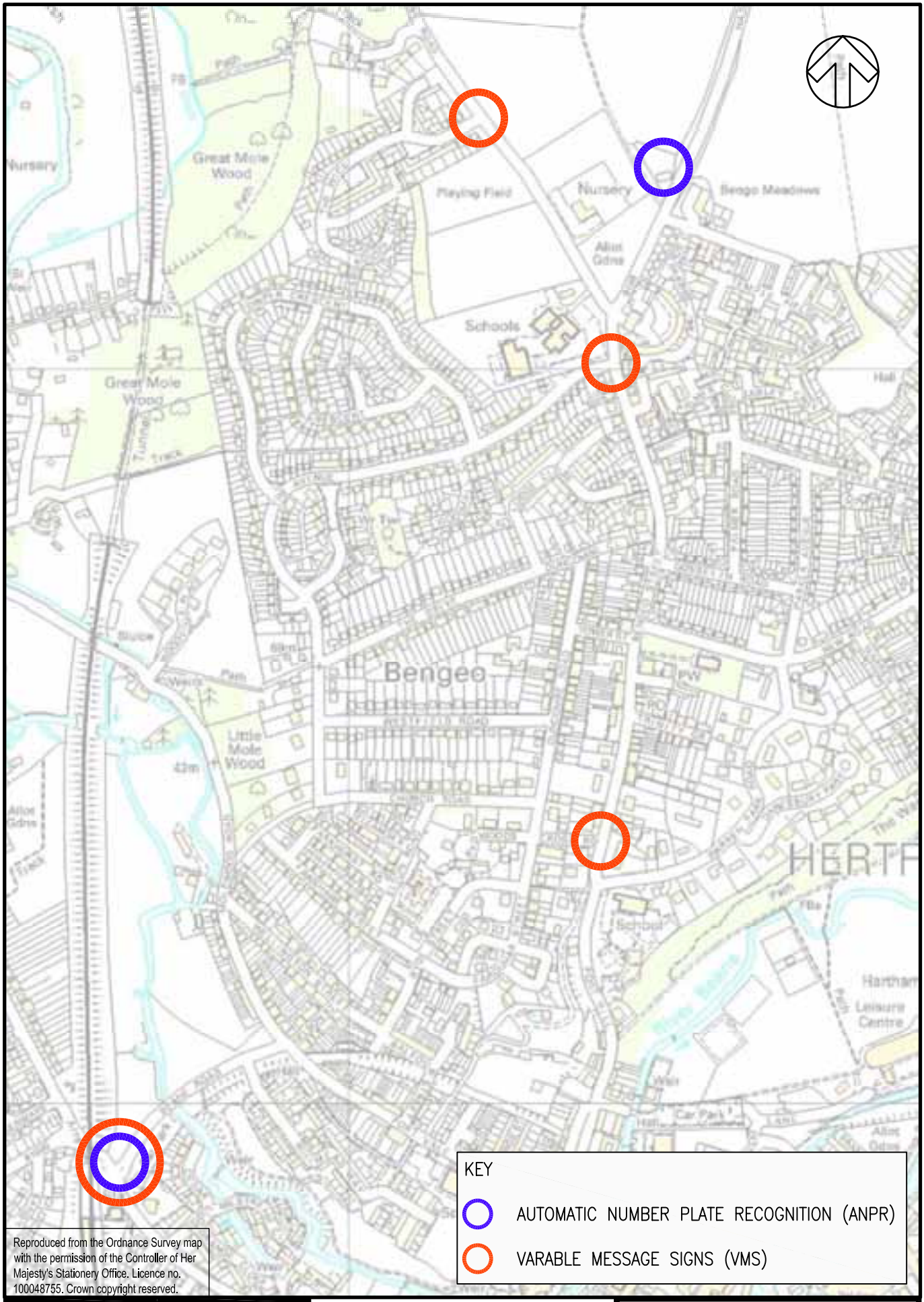
Can the scheme be delivered without third party involvement?		N
Is third party land required to deliver the scheme? (i.e. within the Highway Boundary)		N
Are there any likely utilities constraints?	Y	
Do all elements of the scheme involve standard work processes?		N
Can the scheme be delivered in the short term?		N
Are there any accessibility constraints that impact on building the scheme? (e.g. limited road access)	Y	

Links to Other UTP/LTP Indicators: LTP 16 and LTP17
UTP Objectives 5 and 6

Programme/Delivery Risks (include brief description for overcoming where possible):
Design of Access Restrictions – need to consult more locally on physical design and operation
Impact on bus services at Old Cross junction due to delays – liaise with operators
Outcomes of public consultation – likely to be varying range of views on closure
Delivery dependent improvement in ANPR/ CCTV enforcement technology and the acceptance of these methods by the DfT.
Consultation with Police required

Further Actions Required:
Review outcomes of public consultation
Monitor the progress of camera based enforcement technology
Discuss the application of ANPR/ CCTV enforcement in principle with DfT
Utility searches in the vicinity of proposed VMS locations and camera
Consult with EHC on visual impact issues of new signage and cameras in Conservation area

Other Information / Additional Notes:



TITLE:

HERTFORD AND WARE

N.T.S

FIGURE No:

BEN 1b

V:\DEVELOPMENTCAM2003\11501189 HERTFORD AND WARE UTP\DRAWINGS\AUTOCAD\SCHEME MEASURES 2.DWG 24/06/2010 09:45:00 Martin, Danny

Hertford & Ware UTP Medium Term Scheme Feasibility Assessment

Scheme Name: **Formal Parking Bays – Bengeo Street and surrounding roads**

Scheme ID Number: **CPK3**

Scheme Summary:

- To formalise the parking arrangements within the Bengeo area. This would create identifiable parking bays and help traffic flow more smoothly. Formalised bays would also reduce access issues and minimise conflicts with cycle route proposals.
- It should be acknowledged that the parking issues are very different in Upper, Lower and East Bengeo. In Lower Bengeo the streets are narrow and some properties do not have off street parking. In Upper and East Bengeo the parking issues are linked to school parking around Bengeo and Duncombe schools
- Measures would be primarily aimed at junctions and areas of narrow carriageway where access is restricted

Links to Other UTP/LTP Schemes:

CPK1, CPM3, CPM18, PED25, BEN1

Estimated Delivery Cost (provide breakdown for works element where appropriate/possible):

ESTIMATED TOTAL COST: £50,000

Estimated Operating Costs:

- £200 per annum for lines and signs
- Additional operating costs if parking meters required.

User Mode Benefits:

Scale of Benefit	Pedestrian	Cycle	Bus	Rail	Car
High		✓			✓
Medium			✓		
Low	✓			✓	

Design Considerations:

Design Considerations	**Proposed Solutions**	**Sufficient to tackle issues? (Y/N)**
Access to properties	Parking bays should not prevent access to properties	Y
Cars parking elsewhere on Streets in Bengeo	TROs would be required to prevent cars parking elsewhere	Y
School Parking	Introduce time restricted waiting in the vicinity of schools in conjunction with Safer Routes to Schools schemes to encourage walking and cycling to schools	Y

Links to LTP and UTP Targets and Objectives:

LTP16
UTP2 & 3

Programme/Delivery Risks (include brief description for overcoming where possible):

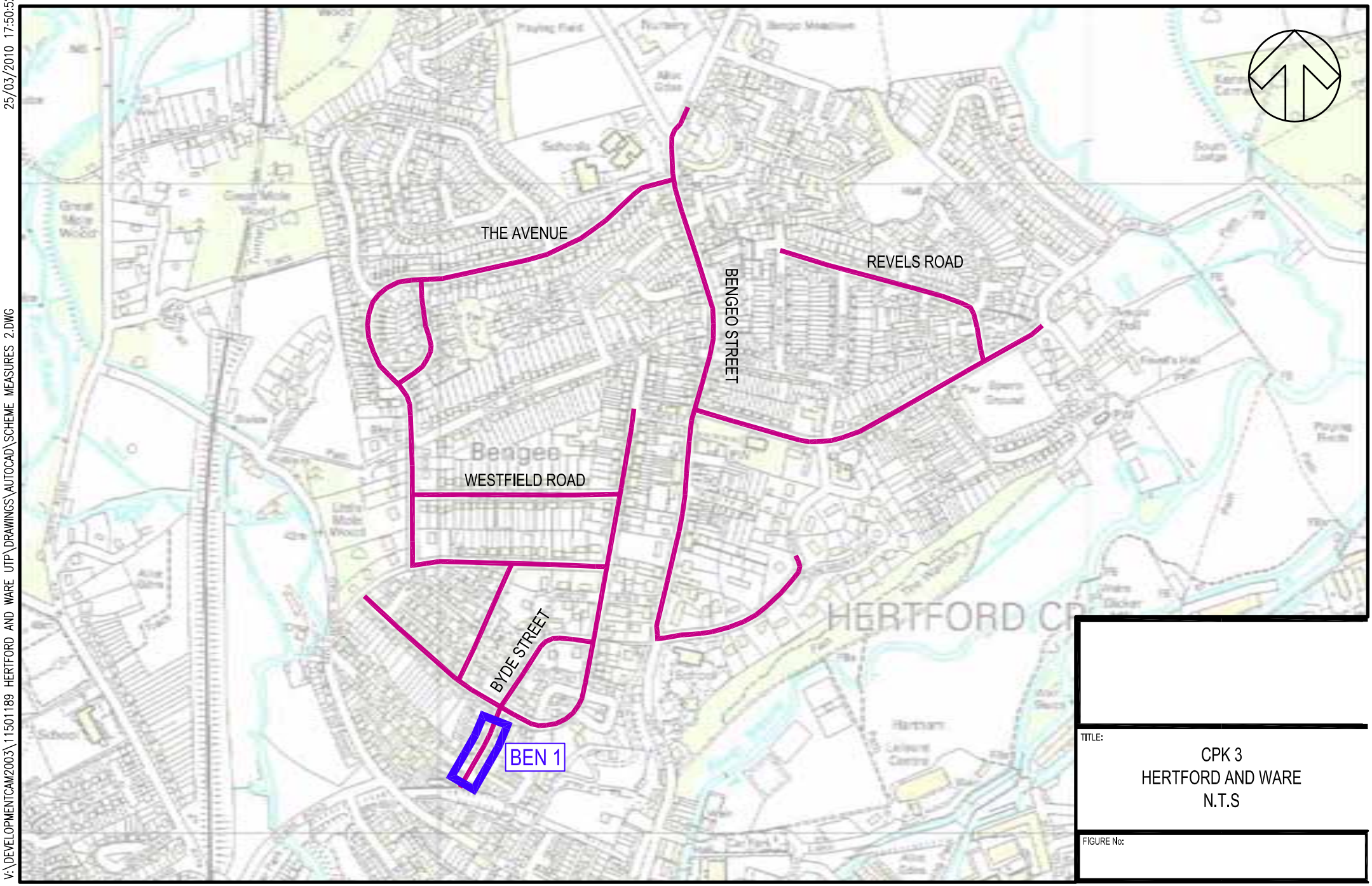
- Linked to cycle route through Bengeo.
- Also linked to area-wide parking review of long and short stay parking – final scheme details, such as requirement for metering and any parking time restrictions need to take into account recommendations from this study.
- TROs need to be put in place and any objections to the TRO consultation may cause delay.
- The scheme may cause disruption to the road network – diversion routes and traffic management would be required.

Further Actions Required:

Determine number of spaces to be provided and consider if metering would be required or time restrictions to parking based on findings of Parking study.

Other Information / Additional Notes

None



TITLE:

CPK 3
HERTFORD AND WARE
N.T.S

FIGURE No:

Hertford & Ware UTP Short Term Scheme Feasibility Assessment

Scheme Name: **Cycle and Pedestrian Route 18**

Scheme ID Number: **CPM18**

Scheme Summary: Bengeo – Mead Lane

Provides connections between Bengeo residential areas towards Mead Lane employment areas across Hartham Common, including:

- New cycle bridge between Mead Lane and Hartham Common to remove existing stepped facility.
- 3.0m shared use paths where possible across Hartham Common and widening towpath between Mead Lane and Hertford Lock where possible.
- This scheme compliments the recent upgrade to the Right of Way from St Leonards Road into Hartham Common and connects existing walking/cycling routes across Hartham Common.

Links to Other UTP/LTP Schemes:

CYC24, PED23, CPM16, MDL1, MDL2, MDL3, MDL4, MDL5

Estimated Delivery Cost (provide breakdown for works element where appropriate/possible):

- 3.0m wide shared use paths where possible
- Upgrade of bridges

ESTIMATED TOTAL COST: £200,000-500,000 (depending upon bridge upgrade requirements)

Estimated Operating Costs:

None

User Mode Benefits:

Scale of Benefit	Pedestrian	Cycle	Bus	Rail	Car
High	✓	✓			
Medium					
Low			✓	✓	✓

Design Considerations:

Design Considerations	Proposed Solutions	Sufficient to tackle issues? (Y/N)
After dark cycling / walking	Provide lighting where acceptable	Y
River crossings	Replace/upgrade existing bridges to remove steps and allow cycling where possible	Y

Deliverability Constraints:

Can the scheme be delivered without third party involvement?		N
Is third party land required to deliver the scheme? (i.e. within the Highway Boundary)	Y	
Are there any likely utilities constraints?		N
Do all elements of the scheme involve standard work processes?		N
Can the scheme be delivered in the short term?	Y	
Are there any accessibility constraints that impact on building the scheme? (e.g. limited road access)	Y	

Links to LTP and UTP Targets and Objectives:

LTP13 and LTP14
UTP objectives 3, 4 and 5

Programme/Delivery Risks (include brief description for overcoming where possible):

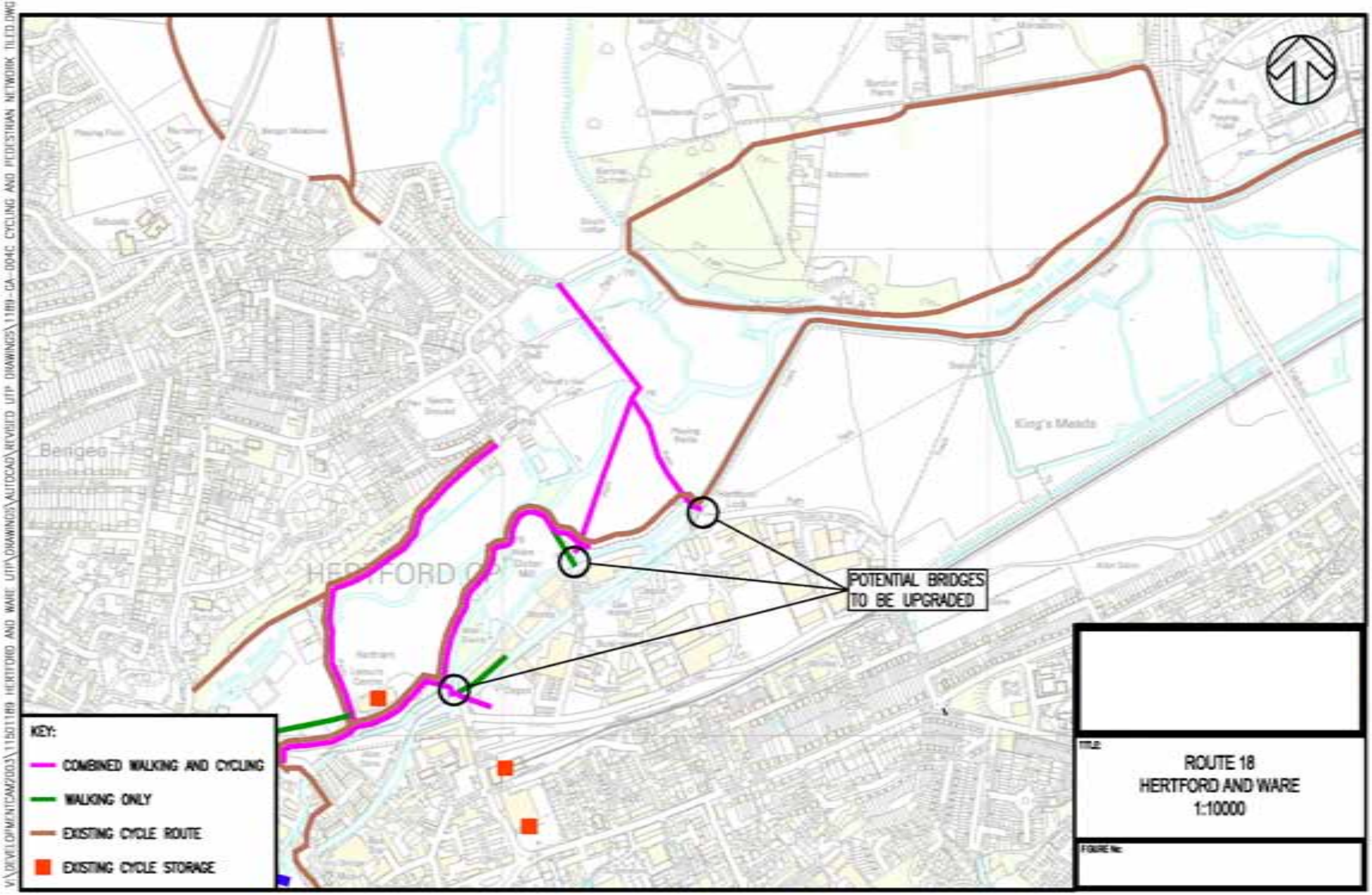
- Land ownership – speak to landowner
- Possible constraints on lighting across Hartham Common (Policy ENV23 Light Pollution and Floodlighting of the East Herts Local Plan, 2007 needs to be taken into consideration to ensure there is no conflict with its provisions).
- Bridge upgrades – liaise with British Waterways and consider through Mead Lane development brief and consultation with landowners

Further Actions Required:

Liaise with landowners and British Waterways re bridge structures
Consult with EHC on lighting proposals

Other Information / Additional Notes

Key to sustainability of Mead Lane development


POTENTIAL BRIDGES TO BE UPGRADED
KEY:
COMBINED WALKING AND CYCLING
WALKING ONLY
EXISTING CYCLE ROUTE
EXISTING CYCLE STORAGE
ROUTE 18
HERTFORD AND WARE
1:10000

Hertford & Ware UTP Medium Term Scheme Feasibility Assessment

Scheme Name: **Improved Pedestrian Priority at Old Cross Junction**

Scheme ID Number: **PED25**

Scheme Summary: Part of Old Cross junction improvements to retain signalised junction and provide shared surface to encourage pedestrian crossing/ movement, slow traffic and follow DfT Mixed Priority route treatment.

The scheme would set the broad parameters for the design competition set through the S106 for the Sainsbury's development with the objectives as follows:

- Create a pedestrian friendly streetscape that promotes 'ad-hoc' crossings for pedestrians
- Enables extension of the town centre towards Sainsbury's
- Slows traffic and reduces traffic priority
- Reduces the impact of congestion
- Should follow DfT guidance on 'mixed priority' and latest best practice on shared spaces

Links to Other UTP/LTP Schemes:

CPM3, CPM7 CPM8

Estimated Delivery Cost (provide breakdown for works element where appropriate/possible):

Final scheme to be determined through Design competition

ESTIMATED TOTAL COST: £350,000

Estimated Operating Costs:

Not applicable

User Mode Benefits:

Scale of Benefit	Pedestrian	Cycle	Bus	Rail	Car
High	✓	✓			
Medium			✓		✓
Low				✓	

Design Considerations:

Design Considerations	Proposed Solutions	Sufficient to tackle issues? (Y/N)
Promote mixed priority	Shared space retaining signals	Y

Deliverability Constraints:

			Comments
Can the scheme be delivered without third party involvement?		N	Design competition depends upon S106
Is third party land required to deliver the scheme? (i.e. within the Highway Boundary)		N	
Are there any likely utilities constraints?	Y		
Do all elements of the scheme involve standard work processes?		N	
Can the scheme be delivered in the medium term?		N	
Are there any accessibility constraints that impact on building the scheme? (e.g. limited road access)		N	

Links to LTP and UTP Targets and Objectives:

LTP14
UTP objectives 3 and 4

Programme/Delivery Risks (include brief description for overcoming where possible):

- Timing of S106 and Design competition
- Relationship to Bengeo closure decision

Further Actions Required:

Keep up to date with S106 and design competition

Other Information / Additional Notes

Main objective of the scheme is to mitigate the impacts of congestion and provide improved connections to Sainsbury's from town centre

B158

POSSIBLE EXTENSION

SHARED AREA WITH MINIMAL KERB UPSTAND

POSSIBLE EXTENSION

POSSIBLE EXTENSION

ST. ANDREW STREET

TITLE:

PED 25
HERTFORD AND WARE
N.T.S

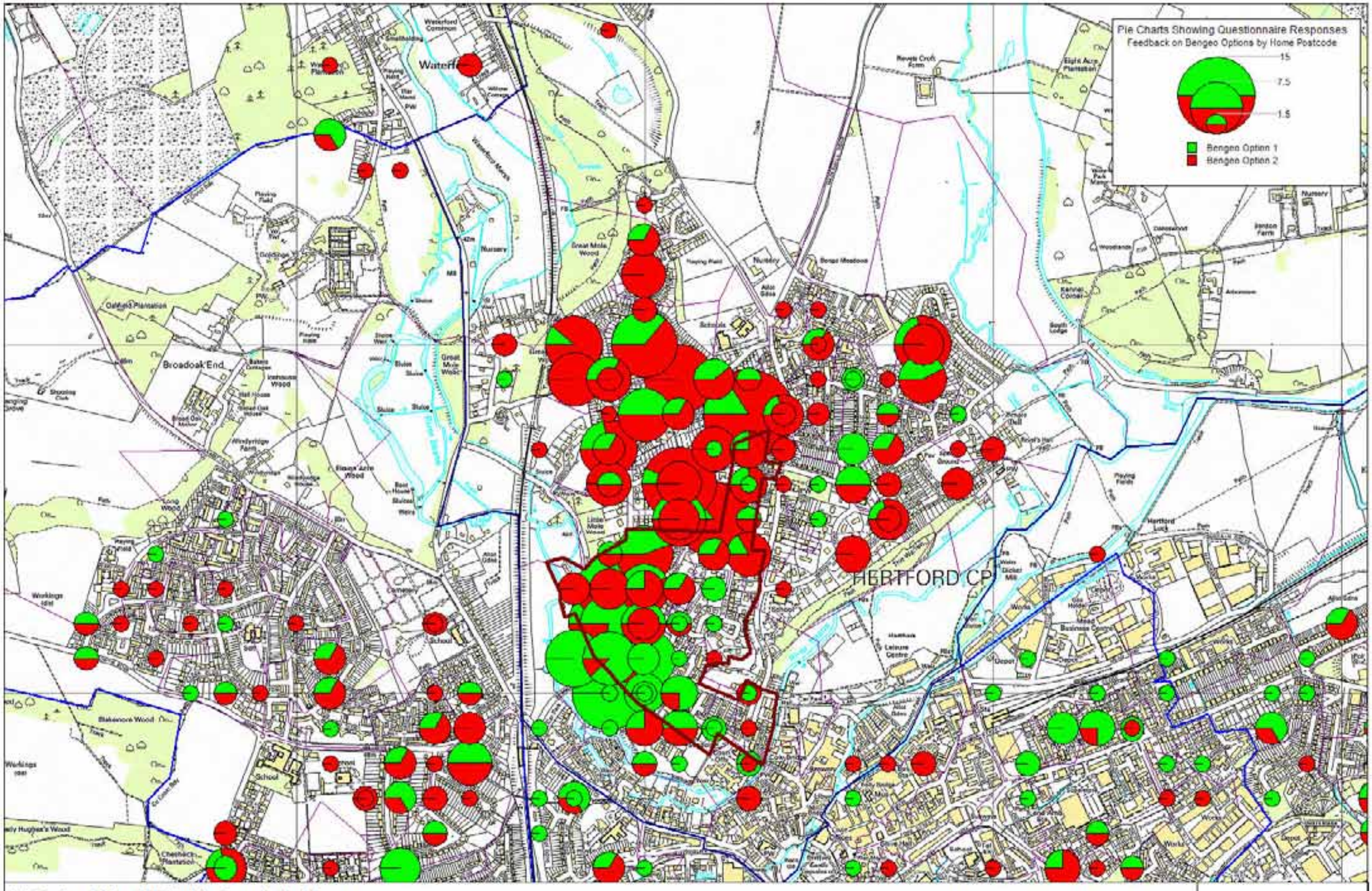
FIGURE No:

25/03/2010 17:06:45

V:\DEVELOPMENTCAM2003\11501189 HERTFORD AND WARE UTP\DRAWINGS\AUTOCAD\SCHEME MEASURES.DWG

Appendix B Postcode Analysis of Bengeo Consultation Responses

Please note that the following GIS analysis of responses to Question 15 of the public consultation questionnaire in which respondents were asked to identify their preference for Bengeo Option 1 or Option 2. Although the majority of respondents provided a postcode, 178 responses were received which did not include a home postcode which have therefore been excluded from the GIS analysis of the results.



Hertford and Ware UTP Public Consultation Responses
Bengeo Option 1 and 2 Postcode Analysis
11501189-PT2

Hertfordshire County Council - making Hertfordshire an even better place to live by providing:

Care for older people
Support for schools, pre-school children, pupils and parents
Support for carers
Fire and rescue
Fostering and adoption
Support for people with disabilities
Libraries
Admission to schools
Road maintenance and safety
Services to safeguard and promote the welfare of children and adults
Trading standards and consumer protection
Household waste recycling centres

These are only some of our services.

Find out more at www.hertsdirect.org
or email us at hertsdirect@hertscc.gov.uk

Every Hertfordshire library has internet access for the public

Printed on recycled paper with a minimum of 75% made from de-inked post consumer waste Design ref: 060xxx

Highways House
41-45 Broadwater Road
Welwyn Garden City AL7 3SP

TRAVELWISE