



ESSENTIAL REFERENCE PAPER 'C'

East Herts Local Plan Shortlisted Options (Summer 2012)

Transport Update November 2013

**Hertfordshire County Council
County Hall
Pegs Lane
Hertford
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1. Introduction

- 1.1 East Herts District Council is considering a number of potential housing development options as part of their Local Plan to 2031. This report, prepared by Hertfordshire County Council Highways, provides advice on the current understanding of the transport impacts of the sites in East Herts District Council's Local Plan shortlisted options (summer 2012) prior to the council proceeding to a preferred site stage.
- 1.2 The report provides an update which supersedes work previously presented in January 2013 and draws upon key technical findings from subsequent work as the basis for making further recommendations. The report is intended to give an initial indication of potential transport issues and concerns associated with the remaining options, including an indication of the locations likely to experience increased traffic flows and stress as a consequence of the proposals, in advance of defined mitigation measures.
- 1.3 The advice provided in the report and undertaken by East Herts Council to date is proportionate to the preferred options stage of plan making, as set out in HCC's "Protocol for Working with District and Boroughs during the Local Plan Process April 2013". It aims to set an agenda for issues that need to be addressed, and if possible, resolved during the continued development of the plan.
- 1.4 The potential transport impacts (particularly on the highway network) are a key consideration in the formulation of a preferred development strategy. In order to assist this process, evidence from transport modelling work has been collated and assessed. This work has come from a number of different sources which are listed below:
 - Diamond spreadsheet modelling work – used for sifting between broad initial development options (Sites tested - Appendix A, Table 1)
 - A number of tests of the Harlow Stansted Gateway Transport Model (HSTGM) to consider the implications of varying scales and locations of development in conjunction with various levels of infrastructure improvements. This was undertaken in conjunction with Essex County Council and neighbouring planning authorities. (Site and infrastructure tested – Appendix A, Tables 2 and 3)
 - Detailed Paramics modelling work undertaken by developers of the Bishop's Stortford North (ASR) site to support their planning application.
 - Study to identify existing capacity of the A414 in Hertford and understand what improvements may be possible to improve traffic flows. This is due to the existing congestion issues in peak hours and the need to understand what level of capacity can be achieved using

online mitigations identified in the Hertfordshire Inter Urban Routes Strategy and Hertford and Ware Urban Transport Plan.

2. Requirements of Infrastructure Planning

- 2.1 HCC as Local Highway Authority has developed a protocol for working with Districts and Boroughs during the Local Plan process. This outlines the evidence required at each stage (see Table 1). The modelling work undertaken to date in East Herts (both Diamond assessment and the HSGTM tests) has been feeding into this process.
- 2.2 At the pre submission consultation stage there is a requirement for outline mitigation measures to be identified including broad cost estimates, indicative delivery timescales and an identification of funding sources with the expectation that this high level feasibility review will be refined moving towards submission of the Strategy.
- 2.3 HCC will work with the district to assess the suitability, feasibility and deliverability of any schemes (including the identification of funding opportunities) and confirm whether they mitigate against harm (based on the criteria set out as part of the Local Plan protocol).
- 2.4 It is considered that the above approach would be consistent with NPPF requirements for Local Plans to assess the quality and capacity of infrastructure and consider the scope for additional capacity or improvements to meet the needs of combined development aspirations. This approach will also ensure that there is a reasonable prospect that planned infrastructure is deliverable and is also consistent with that taken by the Highways Agency in relation to the Strategic Road Network.

3. Transport modelling

- 3.1 The approach to transport modelling work undertaken to date by the planning authority in partnership with the highway authority is set out in appendix 1 of this note.

4. Implications of transport modelling work and next steps

- 4.1 Table 2 summarises the evidence currently available for the emerging preferred option sites, outlines the obvious gaps and indicates suggested next steps for assessment.

North of Harlow

- 4.2 The HSGTM tests undertaken to date (Appendix 1) indicate that even with major infrastructure improvements north of Harlow, the traffic impacts of a development of 10,000 dwellings could not be fully mitigated at the level of infrastructure tested to date. Further work is required to

understand if suitable transport mitigation can be delivered by the development to mitigate the impacts on the highway network.

- 4.3 It was not considered that a development of less than 5000 houses north of Harlow would be worthwhile testing as it is unlikely to be able to fund major new infrastructure and also the services which could be provided on site would be limited. On this basis no testing was undertaken of a smaller scale development, however, further viability work will need to be undertaken to establish the scale of development and how this relates to the delivery of the required mitigation measures.
- 4.4 Given that a high proportion of the traffic on the existing A414 and from the Harlow North development has a destination in Harlow itself the next iterative stage is to test a scheme that provides an alternative means of access from the north to the town centre. The very initial stages of the development of the HSTGM looked at the provision of a second Stort Crossing to the north west of the town. However this simply routed traffic around the south east of Harlow leading to congestion problems on Elizabeth Way and Third Avenue and additional rat running in the Roydon area, therefore it was not included in the tests reported in this note for this reason.
- 4.5 A final test was commissioned to test the implications of an additional Stort crossing further to the east (potentially with a link to Edinburgh Way). This indicates that with 5,000 dwellings north of Harlow the level of traffic congestion in the Harlow area is reduced although there are predicted to be queues and delays in the eastern part of Harlow which require further investigation to identify mitigation. It should be noted that the vehicle trip rates for Harlow North are based on the assumption of good quality sustainable transport alternatives being available and it will be crucial that high quality public transport measures such as dedicated bus lanes or trams as an alternative modes of transport to and from the site given the high demand for trips to and from Harlow. No test has been undertaken to examine the cumulative impact of growth at Harlow North combined with growth South of Bishops Stortford or North of Ware.
- 4.6 Currently it is clear that further transport work is required to identify if there is an infrastructure solution that can be delivered by the development to mitigate the high level of increased traffic predicted and its impact on the highway network. Should the planning authority wish to include the site within their plan this issue must be clearly addressed.

Bishops Stortford

- 4.7 **Bishops Stortford North** - The modelling work undertaken in association with the Bishops Stortford North application has identified capacity improvements which are required on the A120 to mitigate against the additional traffic flows. Proposed mitigation of additional traffic flows in the town centre area is limited to the application of a

smarter choices programme. Consideration should be given to the impact the traffic may have upon Air Quality by the planning authority.

- 4.8 **Bishops Stortford East** - A small scale development to the east of Bishops Stortford has been included in the HSGTM tests and no particular issues with this have been identified.
- 4.9 **Bishops Stortford South** – The initial Diamond modelling indicated that larger scale development south of Bishops Stortford is likely to require improvements to Whittington Way, London Road and key junctions along these routes. An additional test of the HSGTM (Test 5) was commissioned to examine the implications of 1000 dwellings south of Bishops Stortford
- 4.10 The modelling work indicates that compared with the reference case there are significant increases in congestion on London Road NB between Pig Lane and Thorley Hill and additional delays on the London Road / Stansted Road (north south corridor). The junctions with the greatest delays are identified as the South Street / Newton Road / Station Road junction and the Stansted Road / Parsonage Lane junction plus the Hockerill junction (where there are existing capacity problems). These junctions are all signalised so there may be potential for further signal optimisation (with the exception of the Hockerill junction which already operates under Mova control).
- 4.11 The combined impact of the development in Bishops Stortford leads to an increase of between 100- 200 vehicles travelling southbound on the A1184 towards Sawbridgeworth in the AM peak. This (combined with the impact of development in Sawbridgeworth itself) increases pressure on the A1184 / Station Road and A1184 / High Wych Road junctions. The former has already been signalised in the tests and despite the higher traffic volumes the delays are no worse than in the reference case. The High Wych Road junction however becomes more congested with large delays in the AM peak and link capacity issues on the approach from the north.
- 4.12 Although traffic volumes increase by up to 200 vehicles by direction on St James Way the modelling work does not indicate any particular problems with link or junction capacity on the section nearest the development. The approaches to the Great Hadham Road junction however become close to capacity and this junction may require further mitigation measures.
- 4.13 On the A120 corridor the combined impact of the Bishops Stortford North development and the Little Hadham bypass leads to problems with stress and congestion on the EB approach to the A1250 Dunmow Road junction. Adding in the South Bishops Stortford development traffic further increases flow and the EB section of the route to the north of the A1250 (Hadham Road) junction becomes closer to its link

capacity in the PM peak indicating that this route is reaching the capacity for a single lane carriageway section of road.

- 4.14 **Goods Yard** - The initial Diamond modelling indicated that this site is likely to result in additional strain on town centre roads. It is recommended that a master plan is revised that considers the impact of this site on the highway network and maximises the sustainable transport links to this town centre development. The site is already used as a temporary car park with 300 car parking spaces.

Ware

- 4.15 The Diamond modelling indicated that without mitigation the development north and east of Ware is likely to cause problems with junction operation on the Baldock Street / High Street corridor. There is limited scope to increase capacity on Baldock Street/High Street due to the existing congestion, historic conservation area status and high street function of the route. Ware is on the periphery of the HSGTM model and the town is modelled in limited detail, therefore this test can only be used to discern the more strategic impacts of the development and not the detailed local junction impacts within the town itself.
- 4.16 To provide further evidence a development of 1,300 dwellings (plus 500 jobs) has been modelled in the HSTGM (Test 5) with the assumption that the main access would be provided via a new direct link into the A1170 Wadesmill Road / A10 roundabout.
- 4.17 This modelling work indicates that the combined effect of this (and other developments) is an increase in flows of over 200 vehicles by direction in the peak periods on the A10 corridor. Due to the dual carriageway nature of the road this doesn't cause any particular capacity issues apart from on the southern section in the Cheshunt area where there are signalised junctions which already have capacity constraints. This will also impact upon M25 junction 25.
- 4.18 There are predicted to be increases in flow of up to 200 vehicles on the A602 Westmill Road westbound in the AM peak and up to 100 by direction in the PM peak. This is a single carriageway stretch of road which already carries large volumes of traffic and addition of development traffic leads to it becoming over capacity in the PM peak.
- 4.19 Although the model can't accurately differentiate the impacts of the development within Ware and Hertford there are increases in flow of up to 100 vehicles on A1170 Wadesmill Road / High Street and Viaduct Road SB in the AM peak. This section has existing congestion issues and is constrained limiting the potential for physical mitigation measures and additional flow would exacerbate this. Similarly there are predicted increases in flow of up to 200 vehicles on the A119 travelling towards Hertford which is already congested at the Hertford

end. Any development proposals would need to seek to minimise the additional vehicular traffic from the development into Ware and Hertford. It is clear that further transport work is required to identify if there is an infrastructure solution that can be delivered by the development to mitigate the high level of increased traffic predicted and its impact on the highway network. Should the planning authority wish to include the site within their plan this issue must be clearly addressed.

East of Welwyn Garden City

- 4.20 A development of development of around 2,000 dwellings within East Herts, to the east of Welwyn Garden City was tested in the Diamond and HSGTM modelling and caused some capacity problems on local links and the junctions on the A414. It is clear that further transport work is required to identify if there is an infrastructure solution that can be delivered by the development to mitigate the high level of increased traffic predicted and its impact on the highway network. Should the planning authority wish to include the site within their plan this issue must be clearly addressed. Due to the proximity of this site and the potential development in Welwyn Garden City it is recommended that a partnership approach is taken by East Herts Council and Welwyn Hatfield Borough Council to develop the required evidence base.

A414 Hertford

- 4.21 Following the adoption of the Inter Urban Route Strategy Hertfordshire County Council commissioned AECOM in 2013 to refine a paramics transport model of the A414 corridor through Hertford and test the cumulative impacts of growth in Hertfordshire against the suggested online interventions in the Hertford and Ware Urban Transport Plan. This document should report in mid February 2014 and should provide an indication to the level of growth that can be accommodated on the existing alignment. A clearer understanding on this issue will be required prior to submission.

5 Next Steps

- 5.1 Where further evidence is required the Planning Authority will need to lead in developing a strategy to ensure that sufficient evidence is in place to demonstrate that the plan is deliverable. The local highway authority will support East Herts through this process; however, other relevant stakeholders need to be engaged where appropriate including site promoters, neighbouring planning authorities, Highways Agency, Essex County Council, public transport providers.
- 5.2 HSGTM tests included the cumulative impact of development elsewhere in the area and therefore the resulting stress / capacity problems on the network are not solely due to the East Herts

development. It is essential that an infrastructure delivery plan is developed in partnership with neighbouring planning authorities giving consideration to this issue.

- 5.3 A number of studies are underway which will feed into this process. However there is a risk that no viable solutions may be found in relation to online improvements on the A414 in Hertford (through the A414 corridor study) or on the A10 (Broxbourne Transport Study) and that the improvements identified as part of the Welwyn Hatfield Local Plan modelling and design work may be insufficient to accommodate large scale development for both districts in the south east Welwyn Garden area. The A414 study is due to report in mid February 2014, however, it is not clear when Welwyn Hatfield and Broxbourne will have obtained the required evidence for the transport impacts associated with East Herts sites in these areas.
- 5.4 It is recommended that EHDC maintain close liaison with Hertfordshire County Council, Essex County Council, the Highways Agency, Welwyn Hatfield and Broxbourne throughout their plan development process and seek further opportunities to incorporate their preferred sites into parallel modelling work being undertaken.
- 5.5 HCC would also seek assurance that Network Rail and the train operating companies within East Herts, operating services on the West Anglia Main Line and the Great Northern Hertford Loop, have been consulted as part of the development of the plan. In particular confirmation should be sought that both station and rail infrastructure is positioned to be able to cope with likely demands placed upon it in respect to the preferred development sites.
- 5.6 In relation to bus services HCC would seek to ensure that development is situated in locations where there are already existing services or where new services could be provided long term commercially and would therefore not be reliant on HCC funding to operate and serve communities.

6. Summary

6.1 The key findings of the various strands of modelling work undertaken to date indicate the following:

- The modelling has indicated the potential capacity issues with different development locations and identified areas which are likely to require major investment in new highway infrastructure if development went ahead.
- Mitigation measures will need to be identified and costed to understand if the proposed growth strategy can be reasonably delivered. This will require a phased infrastructure delivery plan that identifies how funding will be secured. Mitigation measures required to address the cumulative impacts of a number of smaller development sites or upon key inter urban routes that are affected by development occurring in more than one authority area, would be identified as candidates for CIL funding and listed in the charging authority's Regulation 123 list. Wherever possible these schemes will be identified as strategic or local level schemes and may also be appropriate to secure other funding source. Where an existing highway capacity / congestion issue is exacerbated by growth coming forward (or existing conditions act as a barrier to development) the potential for CIL or S106 monies will also be considered along with other funding opportunities.
- Due to the cross boundary nature of a number of sites further cooperative work with the relevant local transport and planning authorities will be required. Engagement with the relevant bodies to investigate alternative funding sources should also be considered.

6.2 It is not possible at this stage to determine with any certainty what level of mitigation will be possible to manage the transport impact of the proposals. In view of this, the Update Report does not make recommendations as to whether any options should be discounted from further consideration at this stage. Table 2 summarises the evidence currently available for the shortlisted test options, outlines the obvious gaps, and indicates suggested next steps for assessment. Going forward the Highway Authority will need to be satisfied that the identified evidence gaps will be adequately addressed, otherwise it will have concerns with the impact of the strategy on its network and will request further evidence is developed prior to submission.

Table 1 Local Plan Evidence Requirements from Hertfordshire County Council Highways Local Plan Protocol Document – Current stage highlighted in blue.

Stage	Information required	Appropriate evidence	LHA role	HA Input
Issues and options consultation	Review of current network issues (infrastructure deficit) & schemes already identified	Urban Transport Plans, Congestion Hotspots, IURS HIIS, LTP	Highlight key highways issues on local road network related to proposed development locations & provide appropriate information from LTP and UTPs.	Highlight key issues wrt SRN
Preferred options	Indication of locations likely to experience increased traffic flow / stress as result of options	Diamond (or high level runs of transport model if available)	Technical client for any modelling work. Assistance with interpretation of results	Involvement in discussions of model results where SRN affected
Pre-submission consultation	Outline mitigation measures, broad cost estimates, indicative delivery timescales, identification of funding sources where known	Run of preferred option through highway model if required & if key issues identified. High level feasibility review of mitigation measures. including assessment of broad costs & deliverability ¹	Technical client for modelling work. Provide advice guidance for feasibility review	Involvement in discussions in relation to any mitigation measures affecting SRN.
Submission	Confirmation that proposed measures mitigate against severe harm. Indicative cost estimates of measures, high level feasibility assessment and identification of funding sources	Refinement of designs & costs through modelling work. Indication of likely level of CIL/S106 sought & identification of funding gaps	Identification of potential funding opportunities	

Source: Table 1 from HCC Protocol for Working with Districts and Boroughs during the Local Plan Process April 2013

¹ High level feasibility review consists of desk based exercise of proposed scheme to identify any critical showstoppers to the delivery of the scheme (e.g. environmental or physical constraints) and to establish reasonableness of identifying appropriate funding sources.

Table 2 East Herts Local Plan Testing – Transport Evidence for Key Sites (Full list of sites and tests in Appendix A)

Impact / Issues RAG Key

Red - Significant impacts on highway network requiring additional transport modelling and/or further work to determine new infrastructure required to mitigate traffic impacts

Amber - Confirmed impact on highway network. Additional work required to determine the scope of mitigation measures

Green - Limited impact on the highway network. Mitigation measures likely to be low key.

Bishop's Stortford	Number of dwellings	Testing to date	Impact / Issues	Likely mitigation measures	Evidence gaps	Suggested next steps for planning authority
ASR 1-2	700	Diamond, HSGTM & Paramics model	Detailed in Transport Assessment work.	Developer proposals for: Capacity improvements at A1250/ A120 and A120/ B1383 junctions, new bus route and application of Smarter choices /Travelsmart initiative. M11 jct 8 improvements as per Stansted G1 application.	Highway Authority response on planning application sent to EHDC on 27/10/2013. Essex CC has highlighted concerns on mitigation of impact on M11 J8.	<ul style="list-style-type: none"> Incorporate agreed mitigation measures in IDP. Clarify impact upon Essex and HA transport network (M11 Junction 8)
ASR 3-4	1500	Diamond, HSGTM & Paramics model				
ASR 5	400	Diamond, HSGTM & Paramics model				
Goods Yard	200	160 tested in Diamond, 200 in HSGTM tests	Increased stress on London Road & South Street The site currently has a permission and operates as a	None identified to date. Consider ways of increasing sustainability of site due to town centre location.	Site requires a revised master planning due to proximity to town centre and existing strained highways	Revise master plan for site with detailed consideration to transport section.

			temporary car park with 300 parking spaces		network.	
East	150	Tested in Diamond 150 scenario 2B & HSGTM 150	Little impact on highway network. Some additional vehicles on B1383 and Whittington Way.	None identified to date. Some comments proved by highways on issues to be considered.	Site will require transport assessment via the usual planning application procedure.	<ul style="list-style-type: none"> Local junction assessments via the usual planning Application procedure.
South	500-1000	800 tested in Diamond scenarios 2A & 2C. 1000 included to date in HSGTM test 5	<p>HSGTM Modelling works indicates significant increases in congestion on London road NB between Pig Lane and Thorley Hill and additional delays on London Road /Stanstead Road (north south corridor)</p> <p>Combined effect of development in Bishops Stortford leads to increase on A1184 towards Sawbridgeworth in AM peak. Increased pressure on the A1184/Station Road and A1184/High Wych Road junctions</p>	<p>Cumulative impact of this site with Bishops Stortford North to be considered. Initial comments on access suggest further improvement to A120 bypass may be required.</p> <p>Numbers of junctions are signalised, but potential for further signal optimisation. Capacity issues at Hockerill Junction which is already operating under MOVA and is classified as an AQMA.</p> <p>No test undertaken with combined growth North of Harlow to date.</p>	<p>Identification of costed mitigation measures.</p> <p>Delivery plan.</p>	<ul style="list-style-type: none"> Consideration of Air Quality at Hockerill Identify and cost mitigation measures. Identify delivery plan for transport infrastructure. Undertake test to understand impact of development with combined with growth North of Harlow.

Buntingford	Number of dwellings	Testing to date	Impact /Issues	Likely mitigation measures	Evidence gaps	Suggested next steps for planning authority
North	200	500 dwellings allowed for in Diamond scenario 2B. 500 included in HSGTM test 5	Diamond work indicated that this level of development (500) can be accommodated on the existing road network.	None identified to date A10 Southbound, south of Buntingford close to capacity. Development options should consider access off local roads than from A10 primary route.	Any additional mitigation measures are likely to be small scale and should be identified as part of any subsequent planning application process.	Any additional mitigation measures are likely to be small scale and should be identified as part of any subsequent planning application process
South	300					
Additional growth beyond 500 dwellings	Undefined	1500 tested in Diamond scenario 2A and 2000 in 2C Not tested in HSGTM to date	Test indicated significant increase in trips on High Street and B1038 Baldock Road which becomes highly stressed. Also increases congestion on A10 between Buntingford & Puckeridge & on A120 at Standon and increase in congestion on A507 to Stevenage.	None identified to date If this option to be considered detailed Master Planning is required.	Confirmation of impacts. Identification of costed mitigation measures. Delivery Plan.	Could potentially be tested in HSGTM (although network & zoning would require enhancement) Cost mitigation measures. Identify delivery plan.

Sawbridge-worth	Number of dwellings	Testing to date	Impact /Issues	Likely mitigation measures	Evidence gaps	Suggested next steps for planning authority
North - West	100	Tested in HSGTM	Not specifically identified	None identified to date		
South - West	300	Total of 300 dwellings allowed for in all Diamond scenarios. 60 allowed for in HSGTM Tests 1-4. 300 in Test 5	<p>Total of 400 additional dwellings have been modelled west of Sawbridgeworth. combined with the impact of additional traffic from Bishops Stortford South leads to capacity issues on the A1184 south of the Station Road junction and in particular long delays at the A1184 Harlow Road / High Wych Road junction indicating the need for additional mitigation here.</p> <p>The section of the A1184 Cambridge Road on the northern boundary of Harlow (between Redricks Lane and Edinburgh Way) also becomes over capacity due to the combined impact of development in</p>	<p>Signalisation of junctions Should be considered.</p> <p>Liaison with Essex required over cross boundary impacts.</p> <p>Consideration required air quality on A1184 Corridor due to previous AQMA status.</p>	<p>No evidence yet available on isolated impact of these developments from growth sites south of Bishops Stortford.</p> <p>Consideration of Air Quality Impacts required due to previous AQMA site on A1184.</p> <p>Identification of costed mitigation measures.</p> <p>Delivery plan.</p>	<p>Further work required by planning authority to identify and cost mitigation measures for development at this location. HCC will provide continued technical support.</p> <p>Identify delivery plan.</p> <p>Consideration of Air Quality Impacts</p>

		north east Harlow and further to the north in Sawbridgeworth and Bishops Stortford.			
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North Harlow	Number of dwellings	Testing to date	Impact /Issues	Likely mitigation measures	Evidence gaps	Suggested next steps for planning authority
Strategic site	Up to 10,000	8,000 allowed for in Diamond scenario 1A, 5,000 in scenario 1B. Between 0 - 10,000 allowed for in HSGTM tests to date	Further detailed transport and viability assessments is required, however, HSGTM testing to date has indicated that 10,000 dwellings traffic impacts could not be fully mitigated, with the assumed likely large scale measures such as Harlow Northern Link Road. 5,000 dwellings also highlighted a number of constraints on the highway network that need to be mitigated.	Capacity enhancements to Eastwick Roundabout, Dualling of A414 between Eastwick & Burnt Mill, Signalisation & capacity enhancements to Amwell roundabout, Signalisation of Station Road / London Road junction Sawbridgeworth, M11 jct7a & associated capacity improvements in NE Harlow, Second Stort crossing. Improvements to junctions on the A10 in Cheshunt and A414 in Hertford. High quality sustainable transport link to Harlow Town, Railway Station and beyond. Strategic access points 2 or 3 required to serve all section of the development. Needs to promote all modes of transport Mitigation measures and timing of delivery should be clearly identified junctions in	Confirmation of size of development which is enabled by an additional second Stort crossing along with mitigation measures listed to left & indicative mitigation costs. Consideration of alternative transportation modes from development to Harlow. Confirmation of impacts. Identification of costed mitigation measures. Delivery Plan.	Consideration of alternative transportation modes between Harlow and Development. Transport master plan required to fully investigate impacts and understand if mitigation of the high level of increased traffic predicted is possible. This should be led by the planning authority in partnership with other stakeholders

				Harlow are already congested which require wide range of mitigation measures.		
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Ware	Number of dwellings	Testing to date	Impact /Issues	Likely mitigation measures	Evidence gaps	Suggested next steps for planning authority
North (off High Oak Rd)	200 -1300	Allowed for in all Diamond scenarios & HSGTM tests	Diamond work suggests that with 3000 dwellings there is additional traffic and stress on A602, A1170 north & south of Ware, A119 Ware Road & Thieves Lane. Large number of additional vehicles on A10 between A602 and M25 & increase in stress on A120. Main impact of additional 1700 dwellings is on A602 plus A1170 to north and south and on A119 Ware Road. Existing congestion problems on. Large Baldock Street /High Street corridor would be exacerbated. Due to density of housing and high pedestrian usage Air Quality impacts would need to be carefully considered in urban environment. No capacity issues on A10 but A602 and local roads will have	Capacity increases likely to be required on A602 and A10 at Cheshunt.	Confirmation of impacts.	Detailed impacts within Ware would need to be determined through more detailed town based modelling.
Larger Strategic site	Undefined	1300 tested in Diamond scenario 2C, 1,700 in scenario 2A & 3,000 in scenario 1B & C HSGTM Test 5 1300.		Physical mitigation options on Baldock Street /High Street corridor are likely to be limited so development is likely to require new access to A10. No detailed modelling yet undertaken and Ware is on edge of HSGTM Remodelling of A1170/A10 roundabout with upgrading of slip roads need to be considered.	Identification of costed mitigation measures. Delivery Plan.	Consideration of Air Quality Impacts Liaison with Broxbourne Borough Council to incorporated East Herts housing figures into Broxbourne Borough Council Local Plan tests to understand impacts upon the A10 and M25 junction 25. Identify delivery plan jointly with Broxbourne Borough Council for A10 Mitigation measures for A602 capacity issues will need to be investigated. Review outputs of A414 Study

		significant capacity issues		Cost mitigation measures. Transport master plan required to fully investigate impacts and understand if mitigation of highway impacts is possible. This should be led by the planning authority in partnership with highway authority.
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Hertford	Number of dwellings	Testing to date	Impact /Issues	Likely mitigation measures	Evidence gaps	Suggested next steps for planning authority
Impact of all sites within the local plan upon A414 in Hertford		DIAMOND MODELLING – A414 Study underway and due to report on initial work in February 2014	<p>Cumulative increase in trips on A414 Gascoyne Way corridor</p> <p>A414 currently running very close to capacity during peak periods in Hertford.</p> <p>A414 through Hertford is currently designated as an AQMA due to transport emissions.</p>	Capacity enhancements at roundabouts from UTP to be investigated to identify if they provide sufficient capacity for scale of growth under consideration within Local Plan.	Confirmation of whether online junction improvements can provide required additional capacity on the A414.	<p>A study is currently being undertaken by Hertfordshire County Council to understand what improvements can be undertaken to improve capacity of the A414 through Hertford to understand how much additional traffic can be accommodated. This study is due to report in February 2013. The report will identify the scope for further growth on the corridor and constraints to further growth.</p> <p>Highway mitigation to be identified by planning authority in partnership with Highway Authority and delivery plan identified.</p>
West Welwyn Rd	300	600 allowed for in all Diamond scenarios, 550 in HSGTM tests		Should capacity not be available within the current transport corridor then consideration may need to be given to alternative solutions.	Identification of costed mitigation measures.	
West (Thieves Lane)	250					
North	150	100 allowed for in all Diamond scenarios, 150 in HSGTM tests			Delivery plan.	
National Grid	200	Allowed for in all Diamond scenarios & HSGTM tests				
South of Mead Lane	100	Allowed for in all Diamond scenarios & HSGTM tests				
South Hertford	100	Allowed for in all Diamond scenarios & HSGTM tests				

East of WGC	Number of dwellings	Testing to date	Impact /Issues	Likely mitigation measures	Evidence gaps	Suggested next steps for planning authority
Development off Birchall Lane	1700	2,000 allowed for in Diamond Scenario 2D, 1,500 -1,700 allowed for in HSGTM tests	Diamond work suggests additional traffic & stress on B195 Birchall Lane / Black Fan Road & Cole Green Lane which are likely to become highly congested. Also additional traffic and stress on A414 & A1M junctions 3-4. Access to the development should be considered via local road network than A414 primary route.	Potential capacity improvements identified for A414 and A1m junctions plus Mundells gyratory and Birchall Lane / A414 junction as part of Welwyn Hatfield Local Plan work. Capacity improvements also likely to be required for B195 corridor. Detailed modelling work has not yet been undertaken of this area.	Detailed modelling work required to confirm that proposed mitigation measures can cope with anticipated additional traffic from both Welwyn Hatfield and East Herts sites. Identification of costed mitigation measures. Delivery plan.	Transport Impacts currently undefined. Transport master plan required to fully investigate impacts and understand if mitigation of the highway impacts is possible. This should be led by the planning authorities in partnership with highway authority. Cost mitigation measures Identify delivery plan jointly with Welwyn Hatfield.

APPENDIX A Detailed summary of modelling work undertaken to date in East Herts

Summary of initial option sifting – Diamond spreadsheet model

East Herts District Council in conjunction with Hertfordshire County Council commissioned an initial assessment of the impact of various development options in the district using the Diamond model. Table 2 i lists the options which were tested at this stage. These included large development sites North of Harlow plus alternative large sites at Buntingford, Ware, East of Welwyn Garden City and west of Sawbridgeworth. Other large sites such as east of Stevenage had already been discounted by EHDC through earlier technical appraisal work.

Diamond is a spreadsheet based tool rather than full traffic model and therefore is unable to give detailed assessment of the impacts of development and associated new infrastructure. However the work did provide an indication of likely locations where there would be problems with highway capacity and delay with different development locations.

The Diamond Modelling exercise indicated that the option with the least overall highway impact across the District is to concentrate development to the north of Harlow, however, there were considerable impacts within the Harlow area indicating the need for major new infrastructure such as new crossings of the River Stort and a potential northern link road to relieve pressure around the northern Harlow and High Wych areas.

Other key findings from this initial assessment work were as follows:

There will be a need to upgrade the capacity of the A414 a Hertford whichever development scenario is chosen. Further work is required to understand how this can be achieved.

Large-scale development at Sawbridgeworth would probably require major new infrastructure (such as a new bypass)

Larger scale development south of Bishops Stortford is likely to require improvements to Whittington Way, London Road and key junctions along these routes.

Small scale development east of Bishops Stortford (150) can be accommodated without any significant highways infrastructure.

Up to 500 dwellings should be capable of being accommodated at Buntingford without significant changes to the highway.

For development east of Ware, there are likely to be problems with junction operation on the Baldock Street / High Street corridor due to limited existing capacity for further growth in high street environment. Development of around 2,000 dwellings within East Herts, to the east of Welwyn Garden causes some problems on local links and junction capacity on the A414 may be an issue.

On the basis of this initial work and other non highways considerations, options to concentrate large scale development north of Harlow were taken forward by EHDC for detailed modelling work (along with development east of Bishops Stortford and east of Welwyn Garden City). No further work was undertaken on the options for large scale development south of Bishops Stortford, at Buntingford, Ware and Sawbridgeworth, however, this has been revisited due to the need to evidence the impacts of wider sites.

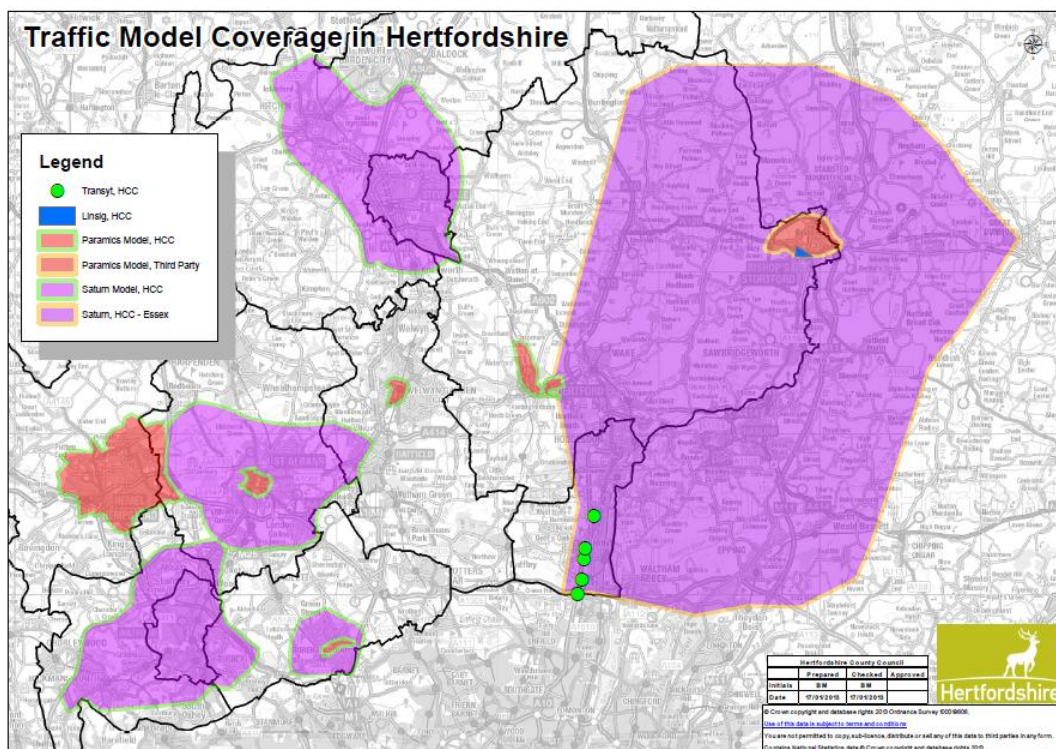
Harlow Stansted Gateway Transport Model – Impact of Harlow North Growth

ALL THE COMMENTS BELOW RELATE TO THE MODEL TEST UNDERTAKEN TO DATE, FURTHER WORK IS REQUIRED ON TRANSPORT AND VIABILITY.

The Harlow Stansted Gateway Model (HSGTM) is a sub regional Saturn model covering the Harlow, Bishop’s Stortford and Sawbridgeworth areas. Its coverage is shown on the plan below. Unlike a spreadsheet based approach it is able to take into account the impact of new infrastructure, congestion effects at junctions and also behavioural changes such as the re routing of existing traffic to avoid congestion.

Officers from Hertfordshire County Council and East Herts District Council have been liaising with officers from Essex County Council, Uttlesford District Council and Epping Forest District Council as well as the Highways Agency to develop model tests which take into account the cumulative impact of development in the various authorities.

A series of option tests were specifically commissioned to identify the detailed implications of adding a large scale development north of Harlow and to confirm the level of highway infrastructure improvements which are likely to be required.



Plan showing traffic model coverage in Hertfordshire. Large purple area in eastern part of the County shows extents of HSGTM.

As the lead authority for the HSGTM Essex County Council has undertaken modelling work which indicates that junction 7 of the M11 is a key constraint even with existing permitted development and that a new junction (7a) along with a link to Gilden Way and improvements in north east Harlow is required to enable the Harlow LEZ and New Hall developments. These improvements therefore have been included in all option tests.

Reference case 2036

A reference case test has been developed for comparative purposes. This includes committed developments within the HSGTM model area (amounting to 4,260 additional dwellings in Harlow largely around the New Hall and Gilden Way areas with associated infrastructure) plus a further 1,282 committed dwellings in East Herts). No additional highways infrastructure has been assumed in East Herts.

This leads to traffic increases across the network of between 14 – 17% in the peak periods leading to stress at a number of locations even before additional Local Plan growth. Key pinch points are as follows:

A120 Little Hadham crossroads

A1184 Station Road / West Road mini roundabouts Sawbridgeworth

A414 / Fifth Avenue to Burnt Mill roundabout Harlow

A414 / Howard Way Roundabout Harlow

Option Test 1 (10,000 dwellings North of Harlow with minimal infrastructure).

Test 1 included 10,000 houses North of Harlow (contributing to a total of around 17,000 new dwellings in East Herts) plus 2500 jobs. Preliminary testing indicated that capacity problems with the current road layout around Eastwick prevented much of the traffic being able to exit the development. Therefore in addition to the M11 junction 7a and associated improvements, signalisation of the Eastwick roundabout plus dualling of Fifth Avenue (A414) up to the Burnt Mill roundabout were also included in the test. Improvement (optimisation) of timings at existing signal junctions (such as the A10 at Rush Green) was also included after the first model runs indicated large delays at this location.

Results of the revised test (with optimisation) indicated that even with these improvements there is still predicted to be significant queuing on the rest of the network and not all traffic is able to exit from the Harlow North development because of ongoing queues and delays around the Eastwick area. This indicates that a Harlow North development of this size would require further additional highways/transportation infrastructure.

Test 2 (5,000 dwellings North of Harlow)

Test 2 was undertaken to confirm whether a smaller development of 5000 dwellings North of Harlow could be accommodated with limited infrastructure improvements. In addition to the M11 junction 7a, Eastwick Improvements and signal optimisation

included in Test 1, the following highways schemes were added (to address issues identified in Test 1):

A120 Little Hadham bypass
Bishops Stortford North direct access onto A120 plus junction improvements identified in the planning application.
Traffic signals at the A1184 London Road / Station Road junction in Sawbridgeworth
Signalisation of the Amwell Roundabout

Because of the reduced development size plus these additional schemes, queuing and delay is reduced by around 6-7% (compared to test 1). The schemes listed above resolve the delay problem at these particular junctions but a consequence of this is to attract more traffic to these routes which often causes a knock on effect elsewhere.

For example, the reduction in delay with the Little Hadham bypass attracts more vehicles to the A120 corridor and traffic flows increase. The proposed BSN improvement measures at the A120 / A1250 (Tesco's) roundabout and the A120 / B1383 junction and M11 junction 8 however do appear to be able to cope with these traffic increases although the additional traffic puts extra stress on the A120 eastbound approach to the A120/ A1250 Dunmow Road junction to the east of Bishops Stortford, indicating the need for additional improvements here to provide enough capacity for the development.

Signalisation of the junction in Sawbridgeworth attracts additional traffic on the A1184 northern arm and on Station Road, although there is a reduction in overall junction delay there are additional delays on the A1184 approaches. This site has a history of air quality issues that will require consideration. Signalisation of the Amwell Roundabout reduces delays at the junction on all approach arms except the A414 east.

In the Harlow area more traffic is able to exit the Harlow North development but the release of this traffic causes additional problems in Harlow with significant traffic congestion still apparent and delays are still forecast at the Eastwick junction and there is significant congestion along the Edinburgh Way corridor. This indicates even with a smaller development size and additional infrastructure this is not sufficient to accommodate the predicted development flows. Therefore further transport infrastructure would be required to mitigate the highway impact and on this basis was further infrastructure was included in the next test undertaken.

Option Test 3A (10,000 dwellings North of Harlow with partial Northern Link Road)

Test 3A included a new link road between the A414 at Eastwick and the A1184 Cambridge Road (along with associated online improvements between this corridor and Gilden Way). This potentially would be a lower cost option than the full link to provide an alternative route for development traffic and for through traffic trying to access the M11 from the A414.

The test did assume direct access to the northern link road via the Eastwick junction and this still acts as a constraint limiting the amount of traffic able to exit the Harlow North development.

The test results indicated that there would be problems and congestion at the junction with the A1184 and the junctions in north east Harlow were not be able to handle the additional traffic with the level of infrastructure tested. A further test was then undertaken with further infrastructure.

Option Test 3b (10,000 dwellings North of Harlow with full Northern Link Road)

This included a full northern link road between the A414 at Eastwick and M11 junction 7a. This would be a high cost option as it necessitates the provision of a viaduct over the Stort Valley east of the A1184. As in Test 3a direct access from the North of Harlow development was provided via the Eastwick junction.

A full link road connection does provide more capacity for East West movements and reduces congestion in north east Harlow as the link is being used as an alternative to Cambridge Road and Gilden Way, however there is still significant congestion at Eastwick and the A1184 junctions and within Harlow itself. Even the full link road therefore is not able to fully mitigate the Harlow North development.

The test confirmed that even with a full link road, traffic congestion problems remain in Harlow as the amount of through traffic on the existing A414 through Harlow is relatively low and a large proportion of Harlow development traffic is predicted to travel to central Harlow.

The provision of a new northern link road therefore does not fully mitigate the impact of a large development north of Harlow and widespread congestion impacts would remain within the Harlow area and would require additional mitigation measures.

Option Test 4 (5,000 dwellings North of Harlow with a second Stort Crossing to the west)

Given the limited congestion relief potential of the Northern Link Road, a further option was investigated to provide a second crossing of the River Stort. Although the scoping work undertaken by Places for People for the Harlow North site considers a second Stort crossing to the west of the development connecting with Elizabeth Way, preliminary testing using the HSGTM in December 2012 indicated this had limited potential to resolve congestion issues in central Harlow and the resulting traffic re routing caused queuing and delays in South West Harlow and did not provide additional capacity for journeys from the North Harlow development to the town centre. As an alternative a new crossing further east has been investigated connecting Eastwick Road with River Way. This provides a shorter and more direct connection into the Harlow urban area.

This results in a reassignment of traffic away from the existing Stort crossing at Eastwick and provides relief to this area and High Wych Road. Compared to Test 2 traffic is more freely able to move into Harlow and there are significant reductions in delay particularly in the PM peak.

There is however forecast to be continued network stress at a number of locations in eastern Harlow and further work is to be undertaken by Essex County Council to look at further mitigation measures.

Once these have been developed further it is the intention that these will be tested along with the second Stort crossing plus 10,000 dwellings at North Harlow.

Implications of Bishops Stortford North Development

A planning application has been submitted in relation to development of the ASR sites to the North of Bishop's Stortford (totalling 2500 homes). This has included a technical assessment of the impact of the additional vehicle trips on the highways network in the local area using a detailed traffic microsimulation model (Paramics). The transport work submitted in support of the planning application is available on the application website at www.bishopsstortfordnorth.com.

The Paramics results indicate that a development of this scale could be accommodated providing a number of key mitigation measures were in place including the following:

- Geometric improvements at the A1250 / A120 junction

- Geometric improvements at the A120 / B1383 junction

- Minor improvements at M11 junction 8 (as proposed in Stansted G1 application)

- Measures to reduce vehicle trip rates from the new development (provision of new bus service, travel plan pack for new residents and provision of local facilities – local neighbourhood centres and schools).

- Funding of a Travelsmart programme for the Bishop's Stortford urban area to encourage travel by non car modes.

The Transport Assessment does not indicate any requirement for dualling of the A120 north of Bishop's Stortford.

It is assumed that the development would be accessed via new junctions with the A1250 Hadham Road and Rye Street. It has also been tested with / without a new direct access onto the A120. Results indicate improved network performance if the new junction was provided.

The modelling work indicates that development traffic could be accommodated at M11 junction 8 with the proposed level of mitigation. Essex County Council has raised concerns that they have evidence that indicated further improvements are required.

The technical work predicts that relatively few vehicles would travel from the development towards Little Hadham. Although there would be some increases in queues and delays and the application suggests that this could be mitigated by redesign of the Little Hadham signals rather than requiring a new bypass.

It should be noted however that the HSGTM tests strengthen the case for a bypass of Little Hadham to mitigate to the cumulative impacts of development across the area plus the addition of background traffic growth. The bypass scheme has been included as a bid for the Local Transport Body funding stream and a business case is currently being prepared.

The other proposed mitigation measures relate to proposed capacity improvements at the A120 / A1250 Hadham Road and A120 / B1383 junctions. These are predicted to reduce queues and delays on the A120 and the HSGTM tests confirm that they would be able to accommodate additional traffic attracted to the corridor following completion of the Little Hadham bypass. These improvements would be funded through developer contributions.

The development does result in additional traffic impacts within the town with increases in queues and delays on the A1250 Hadham Road and Rye Street and Stansted Road corridors. Analysis is currently being finalised to quantify the additional level of delay upon these routes due to the impact upon air quality management areas and bus services which are considered as indicators of a 'severe' impact. Due to the constrained nature of the highway network the potential for physical capacity improvements is limited and the main mitigation measure proposed is to encourage mode shift away from the car within the wider Bishops Stortford area through the introduction of a Travelsmart personalised travel planning programme and sustainable transport infrastructure measures funded through developer contributions.

A test of the BSN development on the wider Bishops Stortford area was commissioned using the HSGTM model. The test assumed the access and mitigation measures associated with the development but no reduction in trips for smarter choices being applied across the wider town.

This confirms that the impacts of the development are relatively localised. Although traffic volumes increase on the A1184 St James Way between B1004 Great Hadham Road and A1250 Hadham Road relatively little development traffic travels further south (around 50 two way trips)..

Wider modelling confirms that the Hockerill junction is at capacity and therefore little additional traffic travels through this junction. There is an increase in traffic on the Haymeads Lane / Beldams Lane route although additional volumes are relatively low.

Impacts of the development in the wider town centre appear to be limited with no particular problems evident in the station area although with development there are some capacity issues at the South Street / Dane Street junction.

Alternative proposed strategic development locations Test 5

In September 2013, EHDC decided to revisit the potential for inclusion of previously discounted strategic locations in its development strategy – these being north of Ware, Buntingford and South of Bishops Stortford.

These locations require further transport assessment to understand the highways issues highlighted in the initial DIAMOND modelling run. A clearer understanding of the highways issues, mitigation measures, and likelihood of delivery is required for these sites prior to submission.

An additional test of the HSGTM has been commissioned to examine the implications of development at these sites, which included the following:

1,000 dwellings South of Bishops Stortford (additional to 2,500 at the ASR sites)
1,300 dwellings North of Ware,
400 west of Sawbridgeworth ,
500 at Buntingford and
1,700 East of Welwyn Garden City.

The total number of new dwellings tested in East Hertfordshire was 11,115. In addition Local Plan growth in Harlow, Uttlesford and Epping has been included (to allow consistency with the other HSGTM tests and to ensure that the cumulative impact of development is taken into account).

The test also allowed for infrastructure improvements including the Little Hadham Bypass, the link road, accesses and A120 junction mitigation measures associated with the Bishops Stortford North development plus signalisation of the Station Road / London Road junction in Sawbridgeworth and the Amwell roundabout (identified as pinch points in the 2036 reference case)

Impacts of Bishops Stortford South Development

- 4.6 A development of 1000 dwellings south of Bishops Stortford has been tested assuming connections with the existing road network at Obrey Way and Whittington Way.
- 4.7 The modelling work indicates that compared with the reference case there are significant increases in congestion on London Road NB between Pig Lane and Thorley Hill and additional delays on the London Road / Stansted Road (north south corridor). The junctions with the greatest delays are identified as the South Street / Newton Road / Station Road junction and the Stansted Road / Parsonage Lane junction plus the Hockerill junction (where there are existing capacity problems). These junctions are all signalised so there may be potential for further signal optimisation (with the exception of the Hockerill junction which already operates under Mova control).
- 4.8 The combined impact of the development in Bishops Stortford leads to an increase of between 100- 200 vehicles travelling southbound on the A1184 towards Sawbridgeworth in the AM peak. This (combined with the impact of development in Sawbridgeworth itself) increases pressure on the A1184 / Station Road and A1184 / High Wych Road junctions. The former has already been signalised in the tests and despite the higher traffic volumes the delays are no worse than in the reference case. The High Wych Road junction however becomes significantly more congested with large delays in the AM peak and link capacity issues on the approach from the north.
- 4.9 Although traffic volumes increase by up to 200 vehicles by direction on St James Way the modelling work does not indicate any particular problems with link or junction capacity on the section nearest the development. The approaches to the Great Hadham Road junction however become close to capacity and this junction may require further mitigation measures.
- 4.10 On the A120 corridor the combined impact of the Bishops Stortford North development and the Little Hadham bypass leads to problems with stress and

congestion on the EB approach to the A1250 Dunmow Road junction. Adding in the South Bishops Stortford development traffic further increases flow and the EB section of the route to the north of the A1250 (Hadham Road) junction becomes closer to its link capacity in the PM peak indicating that this route is reaching the capacity for a single lane carriageway section of road.

Impacts of development north of Ware

- 4.11 Ware is on the periphery of the HSGTM model and the town is modelled in limited detail, therefore this test can only be used to discern the more strategic impacts of the development and not the detailed local junction impacts within the town itself.
- 4.12 A development of 1,300 dwellings (plus 500 jobs) has been modelled with the assumption that the main access would be provided via a direct link into the A1170 / A10 roundabout.
- 4.13 The modelling work indicates that the combined effect of this (and other developments) is an increase in flows of over 200 vehicles by direction in the peak periods on the A10 corridor. Due to the dual carriageway nature of the road this doesn't cause any particular capacity issues apart from on the southern section in the Cheshunt area where there are signalised junctions which already have capacity constraints.
- 4.14 There are predicted to be increases in flow of up to 200 vehicles on the A602 Westmill Road westbound in the AM peak and up to 100 by direction in the PM peak. This is a single carriageway stretch of road which already carries large volumes of traffic and addition of development traffic leads to it becoming over capacity in the PM peak.
- 4.15 Although the model can't accurately differentiate the impacts of the development within Ware and Hertford there are increases in flow of up to 100 vehicles on A1170 Wadesmill Road / High Street and Viaduct Road SB in the AM peak. This section has existing congestion issues and is constrained limiting the potential for physical mitigation measures and additional flow would exacerbate this. Similarly there are predicted increases in flow of up to 200 vehicles on the A119 travelling towards Hertford which is already congested at the Hertford end. Any development proposals would need to seek to minimise the additional vehicular traffic from the development into Ware and Hertford.

Impacts of development west of Sawbridgeworth

- 4.16 400 additional dwellings have been modelled west of Sawbridgeworth. These combined with the impact of additional traffic from Bishops Stortford South leads to capacity issues on the A1184 south of the Station Road junction and in particular long delays at the A1184 Harlow Road / High Wych Road junction indicating the need for additional mitigation here.
- 4.17 The section of the A1184 Cambridge Road on the northern boundary of Harlow (between Redricks Lane and Edinburgh Way) also becomes over capacity due

to the combined impact of development in north east Harlow and further to the north in Sawbridgeworth and Bishops Stortford.

Impacts of development at Buntingford

- 4.18 Buntingford is outside the model area so the impacts of locating 500 dwellings here can't be fully assessed. The modelling work does however indicate that flows on the A10 north of the A120 increase by up to 200 vehicles by direction in the PM peak (less in the AM) due to the cumulative impact of this and other development. There are also increases of up to 50 vehicles by direction on the alternative north south route the B1368. The impact on the east west route (Hare Street) is however complicated by the diversion of traffic from this route due to the A120 Little Hadham bypass.
- 4.19 The impact of these flow changes is to increase stress on the A10 SB to the south of Buntingford so that it becomes close to capacity in the AM peak.

Cumulative impacts of sites included in final East Herts test

- 4.20 The test included the cumulative impact of development elsewhere in the area (including around 9,000 new dwellings in the Harlow area even though the North Harlow development was not included) and therefore the resulting stress / capacity problems on the network are not solely due to the East Herts development.
- 4.21 As a result the majority of the congestion issues are within Harlow itself including at junctions serving the town (such as Eastwick).
- 4.22 Within Hertfordshire the key congestion hotspots include the A1184 through Sawbridgeworth where additional mitigation (above signalisation of the Station Road junction) needs to be considered and the Eastwick junction (indicating further mitigation and dualling of the section to the Burnt Mill roundabout may be required even without Harlow North).
- 4.23 Further away from Harlow it is easier to discern the impact of the individual development sites (as outlined above).

Appendix A Table 1 – Development scenarios and included sites in East Herts Diamond Modelling

DIAMOND Modelling Options for East Hertfordshire District Plan					Group 1 - Harlow upto 15,000 by 2031			Group 2 - No Harlow upto 13,000 by 2031			
	Location	Sieve 1 total dwellings capacity in East Herts	2031 Reference Case	2031 Ref Case + N Bishop's Stortford	Scenario 1A 10K at Harlow North	Scenario 1B 5K at Harlow North	Scenario 1C Nothing at Harlow North	Scenario 2A	Scenario 2B	Scenario 2C	Scenario 2D - inc 2,000 in Welhat
KEY TEST VARIABLES	North of Harlow A	10,000			8,000	0	0	0	0	0	0
	North of Harlow B	5,000			0	5,000	0	0	0	0	0
	South of Bishop's Stortford	800			0	0	0	800	0	800	0
	East of Bishop's Stortford	150			0	0	0	0	150	0	0
	Sawbridgeworth West	3,000			0	0	3,000	2,000	3,000	0	2,000
	Ware North (1700) Ware East (1300)	3,000			0	3,000	3,000	1,700	0	1,300	0
	Buntingford A (2000) and B (500)	2,000			0	0	0	1,500	500	2,000	0
	East of WGC (East Herts 2000, Welhat 2000)	2,000			0	0	2,000	0	2,000	2,000	4,000
	Terlings Park	270			0	0	0	0	270	0	0
North of Bishop's Stortford	2,500	0	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	
OTHER LOCATIONS	Bishop's Stortford Goods Yard	60	60	60	60	60	60	60	60	60	60
	Bishop's Stortford Old River Lane/Causeway	100	100	100	100	100	100	100	100	100	100
	BS SLAA sites	268	268	268	268	268	268	268	268	268	268
	BS other permissions	30	30	30	30	30	30	30	30	30	30
	Buntingford SLAA Sites	30	30	30	30	30	30	30	30	30	30
	Buntingford other permissions	37	37	37	37	37	37	37	37	37	37
	Hertford West	600	600	600	600	600	600	600	600	600	600
	Hertford North	100	100	100	100	100	100	100	100	100	100
	Hertford South	100	100	100	100	100	100	100	100	100	100
	Hertford South Mead Lane	100	100	100	100	100	100	100	100	100	100
	Hertford National Grid/Norbury Woodyard	200	200	200	200	200	200	200	200	200	200
	Hertford West of Marshgate Drive	182	182	182	182	182	182	182	182	182	182
	Hertford - former police station	126	126	126	126	126	126	126	126	126	126
	Hertford SLAA Sites	190	190	190	190	190	190	190	190	190	190
	Hertford other permissions	77	77	77	77	77	77	77	77	77	77
	Sawbridgeworth - N and S of West Road	200	200	200	200	200	200	200	200	200	200
	Sawbridgeworth - Crofters	80	80	80	80	80	80	80	80	80	80
	Sawbridgeworth SLAA sites	25	25	25	25	25	25	25	25	25	25
	Sawbridgeworth other permissions	6	6	6	6	6	6	6	6	6	6
	Ware Land East of Trinity Centre	81	81	81	81	81	81	81	81	81	81
Ware (High Oak Road Area only)	200	200	200	200	200	200	200	200	200	200	
Ware SLAA Sites	34	34	34	34	34	34	34	34	34	34	
Ware Other permissions	32	32	32	32	32	32	32	32	32	32	
Villages (total only - breakdown provided separately)	900	900	900	900	900	900	900	900	900	900	
Sub-total - non-variable elements			3,758	6,258	6,258	6,258	6,258	6,258	6,528	6,258	6,258
Total - including variable elements			3,758	6,258	14,258	14,258	14,258	12,258	12,178	12,358	12,258

Source Table 5.1 East Hertfordshire Diamond Non Technical Report December 2012

Appendix A - Table 2 – Development scenarios and included sites in East Herts Harlow Stansted Gateway Modelling

East Herts Local Plan Harlow Stansted Gateway Transport Model Tests - Housing Assumptions Used

Location	Development	Status	Reference case	Test 1	Test 2	Test 3a	Test 3b	Test 4	Test 5
Hertford	Hertford West	District Plan Shortlisted Option		550	550	550	550	550	550
Hertford	Hertford North	District Plan Shortlisted Option		150	150	150	150	150	150
Hertford	Hertford, West of Marshgate	District Plan Shortlisted Option		182	182	182	182	182	182
Hertford	Hertford National Grid	District Plan Shortlisted Option		200	200	200	200	200	200
Hertford	Hertford South Mead Lane	District Plan Shortlisted Option		100	100	100	100	100	100
Hertford	Hertford , Former Police Station	District Plan Shortlisted Option		126	126	126	126	126	126
Hertford	Hertford South	District Plan Shortlisted Option		100	100	100	100	100	100
Hertford	National Grid Site/ Norbury Woodyard	SLAA Site		200	200	200	200	200	
Hertford	Fire Station & Fire Service HQ	SLAA Site		40	40	40	40	40	40
Hertford	West Street Allotments	SLAA Site		10	10	10	10	10	10
Hertford	1-14 Dicker Mill	SLAA Site		50	50	50	50	50	
Hertford	30-34 and 33-41 Chambers Street	SLAA Site		18	18	18	18	18	18
Hertford	Land at Braziers Field	SLAA Site		18	18	18	18	18	18
Hertford	Hertford Delivery Office	SLAA Site		18	18	18	18	18	18
Hertford	Land opposite 343-381 Ware Road	SLAA Site		14	14	14	14	14	14
Hertford	Land west of Marshgate Drive	SLAA Site	182	182	182	182	182	182	
Hertford	Land to south of Mead Lane	SLAA Site		100	100	100	100	100	

Hertford	Former Hertford and Ware Police Station	SLAA Site	126	126	126	126	126	126	
Hertford	Adams Yard, Bull Plain	SLAA Site		8	8	8	8	8	8
Hertford	15 Currie Street	SLAA Site		5	5	5	5	5	5
Hertford	7 & 8 Bluecoats Avenue	SLAA Site		12	12	12	12	12	12
Hertford	Former Dolphin PH Car Park	SLAA Site		14	14	14	14	14	14
Hertford	85 Railway Street	SLAA Site		8	8	8	8	8	8
Hertford	87-89 Railway Street	SLAA Site		6	6	6	6	6	6
Hertford	8, 10 & 12 Railway Street	SLAA Site		7	7	7	7	7	7
Hertford	10-12 The Wash	SLAA Site		2	2	2	2	2	2
Hertford	Former Waters Garage Site, North Rd	SLAA Site		14	14	14	14	14	14
Hertford	Beesons Yard, 72 Railway Yard	SLAA Site		8	8	8	8	8	8
Hertford	Baker Street Car Park	SLAA Site		14	14	14	14	14	14
Hertford	Bentley House, Pegs Lane	SLAA Site		24	24	24	24	24	24
Hertford	Elbert Wurlings, Pegs Lane	SLAA Site		10	10	10	10	10	10
Hertford	Grehan House, 57 Molewood Road	Committed Development	5	5	5	5	5	5	5
Hertford	Sacombe Road	Committed Development	97	97	97	97	97	97	97
Hertford	Balls Park	Committed Development	90	90	90	90	90	90	90
Hertford	Calton House	Committed Development	36	36	36	36	36	36	36
Hertford	Balls Park Mansion	Committed Development	14	14	14	14	14	14	14
Hertford	Former Dolphin P H Car Park	Committed Development	14	14	14	14	14	14	14
Hertford	Former Stenoak Tools Site	Committed Development	13	13	13	13	13	13	13
Hertford	Bircherley Court	Committed Development	12	12	12	12	12	12	12
Hertford	Garage Court	Committed Development	8	8	8	8	8	8	8
Hertford	85 Railway Street	Committed Development	8	8	8	8	8	8	8
Hertford	8, 10 & 12 Railway Street	Committed Development	7	7	7	7	7	7	7
Hertford		Sub-Total	612	2620	2620	2620	2620	2620	1962

Location	Development	Status	Reference case	Test 1	Test 2	Test 3a	Test 3b	Test 4	Test 5
Welwyn Garden City	Welwyn Garden City	LDF Option		1500	1500	1500	1500	1500	1700
Welwyn Garden City		Sub-Total	0	1500	1500	1500	1500	1500	1700

Location	Development	Status	Reference case	Test 1	Test 2	Test 3a	Test 3b	Test 4	Test 5
Ware	Ware, East of Trinity	District Plan shortlisted option		81	81	81	81	81	81
Ware	Ware North - High Oak Road area	District Plan shortlisted option		200	200	200	200	200	
Ware	Ware - Cintel Site	SLAA site		13	13	13	13	13	13
Ware	Ware - Swains Mill & land south of Crane Mead	SLAA site		80	80	80	80	80	80
Ware	Ware - 16 New Road	SLAA site		24	24	24	24	24	24
Ware	Ware - Star Street (Co-op Depot)	SLAA site		15	15	15	15	15	15
Ware	Ware - Rear of 39 High Street	SLAA site		6	6	6	6	6	6
Ware	Ware - London Road, Ware (adjacent to New River Court)	SLAA site		7	7	7	7	7	7
Ware	Ware - Former Musley Infants School	SLAA site		2	2	2	2	2	2
Ware	Ware - 49-51 Star Street	SLAA site		5	5	5	5	5	5
Ware	Ware - The Sun & Harrow PH, 34 Fanhams Road	SLAA site		6	6	6	6	6	6
Ware	Ware - Charvill Bros, Baldock Street	Committed Development	39	39	39	39	39	39	39
Ware	Strategic option north of Ware	District Plan shortlisted option							1300
Ware		Sub-Total	39	478	478	478	478	478	1578

Location	Development	Status	Reference case	Test 1	Test 2	Test 3a	Test 3b	Test 4	Test 5
Hunsdon and Widford	S of 10 Acorn Street, Hunsdon	Committed Development	16	16	16	16	16	16	16
Hunsdon and Widford	Terling Park	District Plan shortlisted option		270	270	270	270	270	270
Hunsdon and Widford	North Harlow Spatial Option Harlow A inc 30Ha Business Park	District Plan shortlisted option		10000		10000	10000		
Hunsdon and Widford	North Harlow Spatial Option Harlow B	Spatial Option Test Number 2 only			5000			5000	
Hunsdon and Widford		Sub-Total	16	10286	5286	10286	10286	5286	286

Location	Development	Status	Reference case	Test 1	Test 2	Test 3a	Test 3b	Test 4	Test 5
Much Hadham and Sawbridgeworth	Leventhorpe School	Committed Development	55	55	55	55	55	55	55
Much Hadham and Sawbridgeworth	Lawrence Avenue	Committed Development	40	40	40	40	40	40	40
Much Hadham and Sawbridgeworth	Adj 33 & 35 Crofters End	Committed Development	7	7	7	7	7	7	7
Much Hadham and Sawbridgeworth	19 Cambridge Road	Committed Development	9	9	9	9	9	9	9
Much Hadham and Sawbridgeworth	Sawbridgeworth West North	District Plan shortlisted option		100	100	100	100	100	100

Much Hadham and Sawbridgeworth	Sawbridgeworth West South	District Plan shortlisted option		60	60	60	60	60	300
Much Hadham and Sawbridgeworth		Sub-Total	111	271	271	271	271	271	511

Location	Development	Status	Reference case	Test 1	Test 2	Test 3a	Test 3b	Test 4	Test 5
South Bishop's Stortford	Former Fyfe Wilson Site	SLAA Site		42	42	42	42	42	42
South Bishop's Stortford	Part of Tanners Wharf (also known as Atkins & Cripps site)	Committed Development	76	76	76	76	76	76	76
South Bishop's Stortford	Part of BS Goods Yard (was 100)	SLAA Site		32	32	32	32	32	32
South Bishop's Stortford	2-16 Mill Street	Committed Development	6	6	6	6	6	6	6
South Bishop's Stortford	South Road Nurseries	Committed Development	6	6	6	6	6	6	6
South Bishop's Stortford	Part of BS Goods Yard (was 268)	SLAA Site		88	88	88	88	88	88
South Bishop's Stortford	38 Castle Street	Committed Development	9	9	9	9	9	9	9
South Bishop's Stortford	Part of BS Goods Yard (was 124)	SLAA Site		40	40	40	40	40	40
South Bishop's Stortford	Riverside Site (Jackson Square)	Committed	105	105	105	105	105	105	105
South Bishop's Stortford	3a South Street	Committed Development	18	18	18	18	18	18	18
South Bishop's Stortford	Part of Tanners Wharf	Committed	41	41	41	41	41	41	41
South Bishop's Stortford	Works, Southmill Road	SLAA Site		35	35	35	35	35	35

South Bishop's Stortford	110-114 South Street	SLAA Site		24	24	24	24	24	24
South Bishop's Stortford	71-77 South Street	SLAA Site		40	40	40	40	40	40
South Bishop's Stortford	Land at Jeans Lane	SLAA Site		6	6	6	6	6	6
South Bishop's Stortford	3a South Street and the Dells	SLAA Site		18	18	18	18	18	18
South Bishop's Stortford	South of Whittington Way	District Plan shortlisted option							1000
South Bishop's Stortford		Sub-Total	261	586	586	586	586	586	1586
Location	Development	Status	Reference case	Test 1	Test 2	Test 3a	Test 3b	Test 4	Test 5
East Bishop's Stortford	Part of Land East of Bishop's Stortford	District Plan Shortlisted Option		40	40	40	40	40	40
East Bishop's Stortford	Part of Land East of Bishop's Stortford	District Plan Shortlisted Option		110	110	110	110	110	110
East Bishop's Stortford		Sub-Total	0	150	150	150	150	150	150

Location	Development	Status	Reference case	Test 1	Test 2	Test 3a	Test 3b	Test 4	Test 5
North Bishop's Stortford	ASR2 and part of ASR3	District Plan Shortlisted Option		1300	1300	1300	1300	1300	1300
North Bishop's Stortford	Whitehall College	Committed Development	8	8	8	8	8	8	8
North Bishop's Stortford	Part of ASR3	District Plan Shortlisted Option		16	16	16	16	16	16
North Bishop's Stortford	Part of ASR4	District Plan Shortlisted Option		32	32	32	32	32	32

North Bishop's Stortford	Part of ASR3 and ASR4	District Plan Shortlisted Option		752	752	752	752	752	752
North Bishop's Stortford	ASR5	District Plan Shortlisted Option		400	400	400	400	400	400
North Bishop's Stortford	Part of 23 Hockerill Street	Committed Development	32	32	32	32	32	32	32
North Bishop's Stortford	Part of Hocherill Street	Committed Development	6	6	6	6	6	6	6
North Bishop's Stortford	Part of Bishop's Stortford Causeway	Committed Site	10	10	10	10	10	10	10
North Bishop's Stortford	Part of Bishop's Stortford Causeway	Committed Site	90	90	90	90	90	90	90
North Bishop's Stortford	3 Chantry Road	Committed Development	12	12	12	12	12	12	12
North Bishop's Stortford	Pearse House, Parsonage Lane	SLAA Site		25	25	25	25	25	25
North Bishop's Stortford	Playing Field Associated with Birchwood High School	SLAA Site		40	40	40	40	40	40
North Bishop's Stortford	Part of 23 Hockerill Street	SLAA Site		32	32	32	32	32	32
North Bishop's Stortford		Sub-Total	158	2755	2755	2755	2755	2755	2755

Location	Development	Status	Reference case	Test 1	Test 2	Test 3a	Test 3b	Test 4	Test 5
Buntingford	Buntingford North	District Plan Shortlisted Option							200
Buntingford	Buntingford distribution depot	New test option		0					300
Buntingford		Sub-Total	0	0	0	0	0	0	500

Location	Development	Status	Reference case	Test 1	Test 2	Test 3a	Test 3b	Test 4	Test 5
EERM2 Zone 10319 Stansted Abbots and St Margarets		Committed	87	87	87	87	87	87	87
EERM2 Zone 10319 Stansted Abbots and St Margarets		Sub-Total	87	87	87	87	87	87	87

TOTAL HOUSING NUMBERS INCLUDED IN TESTS									
East Herts	East Herts Totals	sum of numbers above	1284	18583	13583	18583	18583	13583	10965
Uttlesford	Uttlesford totals	Indicative plan numbers	5513	8501	8501	8501	8501	8501	8501
Epping	Epping totals	Indicative plan numbers	569	12243	12243	12243	12243	12243	12243
Harlow	Harlow totals	Indicative plan numbers	4260	9229	9229	9229	9229	9229	9229
Combined total new houses in model area for each test			11626	48556	43556	48556	48556	43556	40938

East Herts Local Plan Harlow Stansted Gateway Transport Model Tests - Employment Assumptions Used (Total assumed number of new jobs)

TOTAL ASSUMED NUMBERS OF NEW JOBS									
Location	Source	Status	Reference case	Test 1	Test 2	Test 3a	Test 3b	Test 4	Test 5
Uttlesford	East Herts Totals	Indicative plan numbers	9153	2179	2179	2179	2179	2179	2179
Epping	Uttlesford totals	Indicative plan numbers	0	2781	2781	2781	2781	2781	2781
Harlow	Epping totals	Indicative plan numbers	4347	10808	10808	10808	10808	10808	10808
East Herts	Harlow totals	Indicative plan numbers	324	4695	4695	4695	4695	4695	4695
Combined total new jobs in model area for each test			13824	20463	20463	20463	20463	20463	20463

Appendix A Table 3 – Infrastructure improvements tested within Harlow Stansted Gateway modelling tests

Scheme Name	Reference case test	Test 1	Include in Test 2 5000 North Harlow	Include in Test 3a 10000 North Harlow	Include in Test 3b 10000 North Harlow	Test 4	Test 5
New A1184 Cambridge Road / Riverway Signalised Junction	✓	✓	✓	✓	✓	✓	✓
A414 Edinburgh Way : River Way to A1184 Cambridge Road				✓	✓		✓
New Access A414 to London Road Enterprise Zone	✓	✓	✓	✓	✓	✓	✓
New Access to New Hall : A414 to London Road	✓	✓	✓	✓	✓	✓	✓
Closure of London Road north of Link Road	✓	✓	✓	✓	✓	✓	✓
Relocation of Mark Hall School entrance to London Road	✓	✓	✓	✓	✓	✓	✓
A414/First Avenue - Introduction of dedicated left turns		✓	✓	✓	✓	✓	✓
B183 between A414 and London Rd – Upgrade to D2		✓	✓	✓	✓	✓	✓
B183, London Road to Gildea Way Development Access Junction - Upgrade to 3L		✓	✓	✓	✓	✓	✓
A414/A1184 Junction - Introduction of dedicated left turns		✓	✓	✓	✓	✓	✓
A414, Dualling from Cambridge Rd Roundabout to First Ave Roundabout				✓	✓		✓
A414, Dualling from First Ave Roundabout to London Rd Enterprise Zone Access Junction				✓	✓		✓

A414 / Second Avenue Roundabout dedicated left turns	✓	✓	✓	✓	✓	✓	✓
A414 / Second Avenue Roundabout upgraded to North-South Hamburger			x	x	x	x	x
Goods Yard Link Road, Bishops Stortford			x	x	x	x	x
A414 M11 J7 to Southern Way Dualling	✓	✓	✓	✓	✓	✓	✓
A414 Burnt Mill Roundabout Capacity Improvement	✓	✓	✓	✓	✓	✓	✓
A414 Eastwick Junction - Signalised Capacity Improvement		✓	✓	✓	✓	✓	✓
A414 Eastwick to Burnt Mill Dualling		✓	✓	✓	✓	✓	x
New Stort Crossing west of Harlow – Dual Carriageway			x	x	x	x	x
A120 Bishop's Stortford Roundabout Improvements			✓	✓	✓	✓	✓
A120 Bishops Stortford Bypass Dualling			x	x	x	x	x
A120 Little Hadham Bypass			✓	✓	✓	✓	✓
M11 J7A and Link Road (Phase 1) [J7a, + short link to and online improvements along Gilden Way]		✓	✓	✓	✓	✓	✓
Link Road and M11 J7a (Phase 2) [Phase 1 plus dual c'way connecting A414 Eastwick to A1184 (Route C) plus at-grade rfts A414 to A1184]			x	✓	✓	x	x
Link Road and M11 J7a (Phase 3) [Phase 2 plus Option 3 link to J7a]			x	x	✓	x	x

A1184 Hart Road to New Link Rd RAB upgrade to D2			x	✓	x	x	x
B183 Gilden Way Rbt main site access to Land North of Gilden Way	✓	✓	✓	☐	☐	✓	☐
B183 Gilden Way Rbt main site access to Land North of Gilden Way	✓	✓	✓	☐	☐	✓	☐
B183 Gilden Way Rbt main site access to Land North of Gilden Way	✓	✓	✓	☐	☐	✓	☐
B183 Gilden Way Rbt main site access to Land North of Gilden Way	✓	✓	✓	☐	☐	✓	☐
B183 Gilden Way Rbt main site access to Land North of Gilden Way	✓	✓	✓	☐	☐	✓	☐
Amwell roundabout (A414. A1170) - signalisation			✓	✓	✓	✓	
BSN A120 Access			✓	✓	✓	✓	✓
A414 dualling - NE Harlow Cambridge Road to Church Langley Way			x	✓	x	x	x
A414 junctions convert to throughabout -							x
Cambridge Road / Edinburgh Way			x	✓	x	x	x
Gilden Way			x	✓	x	x	x
Gilden Way dualling from B183 / J7a junction			x	✓	x	x	x
A1184 Dualling River Way to Edinburgh Way			x	✓	x	x	x
Second Avenue additional capacity at roundabouts							x

Howard Way			x	x	x	x	x
Manston Road			x	x	x	x	x
Velizy Ave			x	x	x	x	x
A1184 Sawbridgeworth - signalling of Station Road junction			✓	✓	✓	✓	x
Epping - Capacity improvements at B1393 / B181 signal junction							x
M11 j7 - Additional flaring on A414 east approach			x	x	x	x	x
Second Stort Crossing Modified Eastern alignment						✓	
Existing Eastwick Crossing severed south of Gilston						✓	