Document Control Sheet

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Darren Cook	14/09/17

Distribution

Organisation	Contact	Number of Copies
ECC	David Sprunt	1
Jacobs	Jenny Jones	1

1 Project identification and objectives

Essex County Council (ECC) has requested a preliminary investigation of the highway implications of relocating the Princess Alexandra Hospital using the Harlow transport model. This investigation has been requested through the Harlow and Gilston Garden Towns Steering Group and is expected to be funded from district council budgets.

The study objective is:

- To identify how options under consideration for the relocation of the hospital may impact on the highway network in 2033

The hospital, which serves west Essex and east and north Hertfordshire, is currently situated in Harlow, close to the border with Hertfordshire. Options are under consideration for replacing the hospital with:

A. A new build hospital of c.14ha with c.400 beds; or
B. A health and well-being campus of c.14ha with c.400 beds but which will also incorporate existing out-patient and diagnostic services from St Margaret's Hospital in Epping, include a private hospital of c.50 beds, and include undefined facilities for education, leisure and community use.

While the number of beds is comparable to that provided by the current hospital, the site area is larger. For both options A and B two sites are under consideration at:

1. East Harlow
2. Gilston Park

Although not specified in the scope, it is expected that the current hospital site will be replaced with residential housing. The number of new homes will be estimated and discussed as part of the study but could be in the order of 600 homes.

Information on trip distribution to and from the current hospital is not available and travel surveys, or other methods for collecting trip distribution patterns, are not part of the scope of the work.

2 Approach and limitations of the study

It should be recognised that since travel surveys at the existing hospital are not being undertaken, broad assumptions will need to be made on generation and distribution of trips to and from the new hospital. Furthermore, option B includes uses as yet undefined. Therefore the model results should not be relied on as a sole source of evidence on which to consider the traffic impact of relocation options.

Given these limitations it is proposed that only a single new build option based on option A will be modelled. The single option though will still be modelled in the two locations at East Harlow and Gilston.

It is proposed that the generation of trips to and from the hospital (that is the number of trips with an origin or destination at the hospital) is estimated with reference to:

- Comparator hospitals similar to that proposed – planners have provisionally identified Cherwell Hospital in Oxford
- TRICS database
- Current strategic model OD matrix – by summing the trips to and from model zone 4, in which PAH is the main land use

In order to identify approximate trip distribution, we will combine information:

- Extracted from the current strategic model OD matrix on the distribution of trips to and from model zone 4
- From comparator hospitals including Cherwell Hospital and Broomfield Hospital near Chelmsford (which will provide information on the distance travelled, not the origin or destination of trips)

It should be recognised that each of the sources of information has weaknesses. Hence an important part of the study will be to explain these weaknesses and address the limitations by comparing more than one source before making assumptions on generation and distribution of trips for the proposed hospital.

The modelling process must also consider generation and distribution of trips for new homes replacing the current hospital in model zone 4. This will be based on using trip rates applied in the current Harlow Local Plan modelling project using TRICS and applying the distribution from a suitable adjacent residential zone.

In addition, the modelling approach should consider whether the number of new homes at East Harlow or Gilston will be reduced when the hospital is relocated to one of these sites. ECC has advised that at Gilston there is to be no reduction in the number of new homes because the site is sufficiently large. However, at East Harlow:

- If the hospital is located north of the J7a link road there is to be no reduction in new homes; but
- If the hospital is located south of the J7a link road there is to be a reduction of 600 new homes.

Based on the above approach there will be four relocation options including a do nothing scenario:

- Hospital at existing site (do nothing)
- Hospital relocated to East Harlow (north)
- Hospital relocated to East Harlow (south)
- Hospital relocated to Gilston

The latest Local Plan modelling for the wider Harlow area (due to be reported in Technical Note 7) has developed scenarios based on using standard and intermediate assumptions for sustainable travel, with and without the Second Stort Crossing. In order to ensure that the hospital relocation modelling is comparable, the relocation options will be tested in these model scenarios in both the AM and PM peaks. The model is a VISUM transport model (v.15) using a fixed trip matrix and forecast year of 2033.

		Standard sustainable travel assumptions		Intermediate sustainable travel assumptions
Site	**Time of day**	**Network without Second Stort Crossing**	**Network with Second Stort Crossing**	**Network with Second Stort Crossing and Sustainable Travel Corridors**
Hospital at existing site	AM	×	×	×
	PM	×	×	×
New hospital at East Harlow (north)	AM	✓	✓	✓
	PM	✓	✓	✓
New hospital at East Harlow (south)	AM	✓	✓	✓
	PM	✓	✓	✓
New hospital at Gilston	AM	✓	✓	✓
	PM	✓	✓	✓

× Model not to be run – findings available from TN7; ✓ Model to be run

The model outputs will then be compared and contrasted in order to identify how the options for relocating the hospital impact on the highway network. In particular, this will identify corridors with significant changes in traffic and whether this eases or worsens traffic issues.

It is understood that this modelling is being carried out to enable a high level comparison of very broad brush assumptions in relation to the possible highway impacts of a 'proxy' hospital development in different locations in the wider Harlow area, with the existing site replaced by housing. As such the outputs should not be relied upon to support hospital development proposals at a later date, which will need to be accompanied by a full transport assessment, incorporating extensive existing site-specific information and a clearer indication of the type and extent of development proposed.

3 Tasks

The study has been divided into the following tasks:

Task 1	**Task 1.1**	Derive trip generation estimates for the new hospital
	Task 1.2	Estimate trip distribution for the new hospital
	Task 1.3	Trip generation and distribution for new homes replacing PAH
	Task 1.4	Produce revised OD matrices for each of the scenarios to be tested
Outcome 1: Interim report on assumptions and how the OD matrices have been changed		

Stage 3	**Task 2.1**	Run models for each scenario
	Task 2.2	Produce comparison plots and compare network statistics
Outcome 2: Interim report showing impact of the options for relocating the hospital		

Stage 3	**Task 3.1**	Interpretation and discussion of preliminary findings
	Task 3.2	Compile and issue report
Outcome 3: Technical note		

4 Methodology

This methodology section complements and adds to approach described in Section 2.

4.1 Task 1

Task 1.1

Assumptions will be made for the number of trips to and from a new hospital, based on the description of option A. A key part of this task will be involving and discussing assumptions with planners. Hence timely input and provision of information from ECC and the districts will be required to stay on the project plan.

The following information will be obtained:

- Trip rates at comparator hospitals (including Cherwell Hospital) – obtained from transport assessments
- Trip rates from TRICS database
- Number of trips to and from model zone 4 – in which PAH is the main land use

Based on the information obtained, assumptions for the number of trips to and from the proposed hospital in the AM and PM peaks will be made and justified, including identifying limitations of the data sources used.

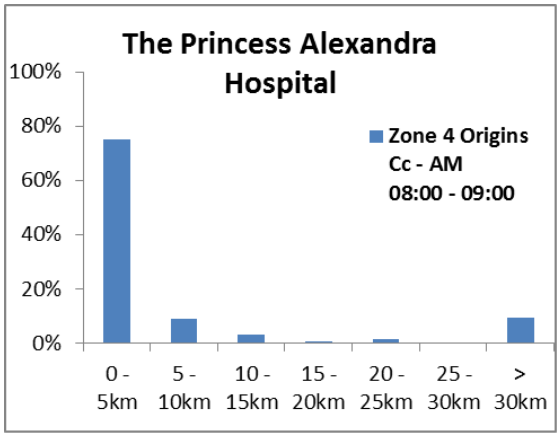
This task will also estimate the number of trips to be removed from zone 4, when the current hospital is relocated. This will involve using GIS and census data to identify other land uses in this model zone 4. In particular, how many homes there are in the zone and what proportion of trips can be associated to homes or other uses; leaving a proportion of trips associated with the hospital.

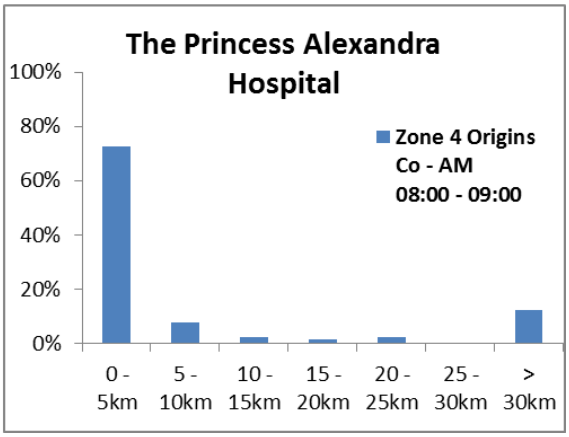
Task 1.2

This task will estimate and justify, as far as practicable using the data sources available, the trip distributions to be applied in the model for trips to and from the proposed hospital when relocated in East Harlow and Gilston.

The distribution of trips from zone 4 will be extracted and then investigated by comparing with information on the geographic spread of trips from comparable hospitals, which are expected to include Cherwell Hospital in Oxfordshire and Broomfield Hospital near Chelmsford. In particular, it can be checked that the pattern of trips by distance is sensible and matches the expected geographic catchment area of the proposed hospital.

Initial analysis has already been carried out, indicating that the current distribution pattern seems sensible, as shown below for car commuting (cc) and other car trips (co).





It should be noted that there will be slightly different distributions depending on whether the hospital is in East Harlow or Gilston. This reflects that different numbers of people will travel to the hospital from each of these locations.

Task 1.3

When the hospital is relocated from model zone 4, it is expected that the PAH site will be developed by constructing new homes. Using the TRICS database and with the advice of planners, an estimate will be made for the number and type of new homes which could be built on the PAH site. It is expected this would be in the order of 600 homes. Based on the number of homes the number of trips can be generated. When carrying out this step, TEMPro will be re-run in order to re-estimate the background growth for this model zone.

Next a parent zone for model zone 4 will be chosen which will determine the pattern for distributing the trips across the other zones in the OD matrix. It is expected that this zone will be one of the nearest zones with predominantly residential land use.

Task 1.4

Using the information from tasks 1.1, 1.2 and 1.3 new OD matrices will be produced which provide the input to the transport model. This will involve taking the OD matrix based on the current version of the Uncertainty Log and:

- Removing hospital trips from model zone 4 and adding in residential trips
- Adding in hospital trips to East Harlow or Gilston
- Reducing the number of trips to reflect a reduction in the number of new homes in the East Harlow (south) option

It should also be noted that consideration needs to be given to adjusting any background growth from TEMPro for when the hospital is relocated to Gilston and East Harlow – since the relocation of the hospital will limit opportunity for any background development growth.

Following these steps, six new OD matrices will have been produced:

EHN-AM	Hospital at East Harlow (north) in the AM peak
EHN-PM	Hospital at East Harlow (north) in the AM peak
EHS-AM	Hospital at East Harlow (south) in the AM peak
EHS-PM	Hospital at East Harlow (south) in the AM peak
G-AM	Hospital at Gilston in the AM peak
G-PM	Hospital at Gilston in the PM peak

The new OD matrices will show trips between zones based on standard assumptions for sustainable travel.

We will take these matrices and produce six additional matrices based on an intermediate assumption for a greater level of sustainable travel using the methodology established in Technical Note 7 (See Task 2.1 for explanation.)

Hence at the end of this task we will have twelve OD input matrices which will allow the relocation of the hospital to be tested in the VISUM transport model.

4.2 Task 2

Task 2.1

The current Harlow transport model uses a fixed trip VISUM model (v15). The fixed trip approach is being used as it allows scenarios to be run considerably quicker than using a variable demand model. This suits the current stage of planning in WEEH districts in which development options and planning for the future transport system are still emerging. The fixed trip approach adequately helps to choose between high level options. However, this does not replace the greater accuracy of a variable demand model and junction models once options have been narrowed down.

In order to accommodate the level of growth expected in WEEH districts it should also be noted that a greater than typical investment in sustainable transport measures are being considered in the wider Harlow area which would increase sustainable travel above standard assumptions used to generate trips rates on key transport corridors in Harlow.

In current work on Technical Note 7 we have introduced the terminology 'standard' sustainable travel assumptions and 'intermediate' travel assumptions, for the which the latter reflects a greater level of sustainable travel. Work has also identified that the intermediate sustainable travel assumptions are most like to be realised if the Second Stort Crossing is constructed and a bus lane introduced on a dualled Fifth Avenue.

In order that the hospital is modelled against options that are currently under consideration it is proposed that the model is run in the scenarios set out in the following table.

		Standard sustainable travel assumptions		**Intermediate sustainable travel assumptions**
Site	**Time of day**	**Network without Second Stort Crossing**	**Network with Second Stort Crossing**	**Network with Second Stort Crossing and Sustainable Travel Corridors**
Hospital at existing site	AM	×	×	×
	PM	×	×	×
New hospital at East Harlow (north)	AM	✓	✓	✓
	PM	✓	✓	✓
New hospital at East Harlow (south)	AM	✓	✓	✓
	PM	✓	✓	✓
New	AM	✓	✓	✓

hospital at Gilston	PM	✓	✓	✓

Note that the model does not need to be re-run with the hospital in its current location as these runs are available from work on Technical Note 7.

It should also be noted that when the model is set up, consideration needs to be given to where trips are loaded onto the network. In both East Harlow and Gilston there is a choice of connectors onto which trips can be loaded. In the case of East Harlow (north) the northern facing connectors will be considered; and in the case of East Harlow (south) the southern facing connectors will be considered.

Task 2.2

This task will compare the options of:

- Keeping the hospital at the current site
- A new hospital at East Harlow (north)
- A new hospital at East Harlow (south)
- A new hospital at Gilston

These choices will be compared in the different scenarios in both the AM and PM peaks shown in the above table. By using these different scenarios we will be able to ascertain if one of the options is preferred in all scenarios or only some.

The following data will be extracted and compared for the scenarios:

- Overall network statistics using the TN7 cordon (total trips, vehicle distance, time and speed)
- Flow on links (shown as flow plots)
- Journey time (using one route used in TN7 along the A414)

4.3 Task 3

Task 3.1

Once the models have been run and comparative data obtained, it is proposed that findings are shared and discussed with ECC and districts. This will assist with interpreting the findings and identifying how the data can be further interrogated in order identify possible impacts.

Accordingly, this task has factored in time to re-analyse data of up to one week in time.

It should though be remembered that modelling results will have been based on initial high-level assumptions around the trip generation and distribution of the new hospital.

Therefore this stage might equally identify questions which can only be answered with further research on trip patterns.

Hence this is an important step as it will help set the context for others in how the findings should be interpreted and to caveat the level of certainty.

Task 3.2

The final stage will compile the outputs and findings from the previous stages into a formal technical note. The price is based on producing the three draft versions before the final technical note is issued, as follows:

- Informal draft to be circulated to ECC
- Informal draft to the circulated to ECC and districts
- Draft technical note to be issued
- Final technical note to be issued

Further iterations of reports may incur additional cost.

5 Project team

Jacobs Manager of Projects: Darren Cook

Jacobs Project Principal: Catherine Jameson

Jacobs Project Manager: Laura Gardner

Jacobs Task Manager: Martin Whittles

Key Technical Team Members:

Simon Jones – Technical Director – co-ordinating with Epping and advising on trip rate assumptions

Melanie Tobias – Senior consultant -VISUM

Theofili Apostola – Consultant – VISUM

ECC Project Manager: David Sprunt / Mary Young

6 CRA-V strategy

Task Name	Task Deliverable	Originator	Checker	Reviewer	Approver
1	Interim report on assumptions and how the OD matrices have been changed	Theofili Apostola	Martin Whittles	Simon Jones	Martin Whittles
2	Interim report showing impact of the options for relocating the hospital (including model checks)	Theofili Apostola	Mel Tobias	Martin Whittles	Martin Whittles
3	Technical note	Theofili Apostola	Mel Tobias	Simon Jones	Martin Whittles

Verification will be by Simon Jones.

7 Risk assessment

Risk Number	Risk Detail	Start Date	End Date	Risk Rating (High, Medium, Low)	Mitigation	Risk Owner
1	Initial deliverables being required at the East Herts DC Local Plan examination (October with end-September deadline for reports)	04/09/17	29/10/17	L	ECC has been made aware that the full hospital project with appropriate comparison and reporting cannot be completed before the end of September 2017. Nor will any initial results be available due to time needed to derive assumptions on trip rates.	Jacobs
2	Extra, non-planned model runs and analysis impacting on project timings and budget	10/07/17	22/12/17	M	Jacobs and ECC spending time in the brief making stage to define quantity of outputs and allowing time during the project to review outputs to be produced. In particular, the project plan has factored in client involvement in the interpretation task 3.2 and extra time for further analysis. Also Jacobs to keep the change control log up to date and advise on programme implications of variations.	Jacobs
3	Report production	10/04/17	22/12/17	M	Since this project involve the Harlow and Gilston Towns Steering Group both ECC and districts need to be consulted on the report. Hence Task 3.2 has set out the versions of the report which will be produced for comment	Jacobs

4	Assumptions on hospital trip generation and distribution	10/04/17	22/12/17	M	In the absence of travel surveys to provide reliable information on trip distribution and detailed information on trip generation and distribution for the options under consideration, broad assumptions are being made. The reporting and sharing of findings will place extra emphasis on caveating findings in the context of the limitations of the assumptions	Jacobs

8 Deliverables, programme and cost

Assuming the project commences in the week ending 13 October 2017 the delivery dates for the stages of the work are as follows.

Stage		Deliverable	Delivery Date
0	Scoping and brief development	Project brief response	15/09/2017
1	Generation and distribution	Interim report on assumptions and how the OD matrices have been changed	27/10/2017
2	Assignment and analysis	Interim report showing impact of the options for relocating the hospital	17/11/2017
3	Further analysis and reporting	Technical note	22/12/2017

The cost of the project stages will be provided to ECC separately in the week ending 15/9/2017.