Technical Note

AECOM

Project:	**Peel Hall Development Site, Warrington**	Job No:	**60487959**
Subject:	**Model Scoping Report**		
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1. Introduction

A package of models is required to support the planning application for the Peel Hall development site in Warrington. This Technical Note has been prepared to inform all parties concerned in this project, of the decisions made, concerning the scope and depth of the network model analysis. The note will consider, in particular, the appropriateness of the tool selected, to assess the impact of this particular development site, upon the surrounding highway network. The aim of this note is to ensure communication between all parties, as well as transparency concerning the approach taken, as a record that can be held throughout the life of the project.

This note is intended for distribution among the following individuals / organisations:

SATNAM Development Group
Colin Griffiths

Highgate Transportation
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Warrington Borough Council
Alan Dickin
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2. Consideration of the Appropriate Modelling Package / Tool

a. VISSIM

VISSIM is a commonly used package for microscopic traffic simulation, and allows exact simulation of traffic patterns, and displays all road users, and their interactions, in one motion model. Links and connectors are implemented to provide flexible input of model geometries, with any level of complexity. Driver and vehicle characteristics can be applied individually. In addition route choice within VISSIM can be further calibrated utilising the cost and surcharge facilities which directly influences driver decisions within the model.

Interfaces can provide seamless integration, with other systems for signal controllers, traffic management or emissions models. It has also been considered appropriate for this project, given its abilities to provide detailed results, coupled with 3D animation, as required, to present to both members of the public and key decision makers, within the local authority.

There is an existing VISSIM model available for Junction 9 of the M62, which was original developed by AECOM, on behalf of Highways England, and in agreement with both Highways England and Warrington Borough Council (WBC). The existing model covers most of the network required to be

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assessed for the purpose of the planning application for Peel Hall, and can be easily extended to cover the rest of the required network.

b. SATURN

SATURN is a detailed highway traffic assignment suite, however it is considered more suitable to strategic county or district wide studies, as well as detailed city models. It does have facilities for matrix manipulation, and demand estimation, from counts. SATURN can be used in several different roles including:

- As a conventional assignment model for regional or national models;
- As a pure junction simulation model to support the detailed design process;
- or more usually, as a combined simulation, and assignment model for the analysis of either large or small network changes, such as the introduction of one-way streets, changes to junction controls, bus-only streets, etc. and whose evaluation requires a detailed analysis of traffic behaviour at junctions.

Whilst SATURN provides a detailed traffic assignment suite, it is considered that it is more suited to more strategic studies, and that the outputs provided from the results, are in a format which is not necessarily conducive to our anticipated audience.

c. Dynameq

Dynameq provides a mesoscopic approach to modelling, providing both traffic simulation and dynamic traffic assignment, which can be used in evaluating congestion, relief strategies, corridor and lane management, construction mitigation, transit design, traffic impact studies, emissions modelling, and event planning. Both route choice and traffic patterns can be run under congested conditions.

As a mesoscopic tool, the level of detail is between that of a microscopic (e.g. VISSIM) and a macroscopic (e.g. SATURN) model. Queuing and blocking back is represented but the visualisation of queue lengths is not as detailed as microsimulation and it is not possible, for example, to see queue lengths by lane to the same detail.

The modelling is particularly targeted at larger networks and so it does not deal with the situation when the front of the queue dissipates first.

Summary

Based on the above synopsis of the various modelling tools available, it has been concluded that, given the network characteristics, availability of an existing model, the ability to calibrate / limit route choice to avoid a "grid locked" network scenario were appropriate, VISSIM is the most suitable tool, to model this network in, and obtain an appropriate assessment of the impacts of the development, upon the highway network.

3. VISSIM Model

a. Model Scenarios

The existing M62 J9 Model (Originally developed by AECOM for Highways England) will be extended, in accordance with the attached plan, and as agreed with WBC.

The following suite of model scenarios, (10 models), will be prepared. The AM and PM peak periods will be aligned with the existing M62 Junction 9 model, which has flows for 07:00 to 09:30 (Data recorded 08:00 to 09:00) and 16:00 to 18:30 (Data recorded 17:00 to 18:00):

1) Base Models (AM & PM) (2015)

2) Do Minimum (AM & PM) (Opening Year tbc) – 'full' build out of proposed development, internal network, and planned access arrangements, no mitigation works.

3) Do Minimum (AM & PM) (Design Year tbc) - As above (without mitigation), plus ten years. These models will be presented at a workshop, where mitigation will be agreed. The agreed mitigation requirements will then be tested (as the Do Something models).

4) Do Something (AM & PM) (Opening Year tbc) – 'full' build out of proposed development, internal network, and planned access arrangements. Mitigation included.

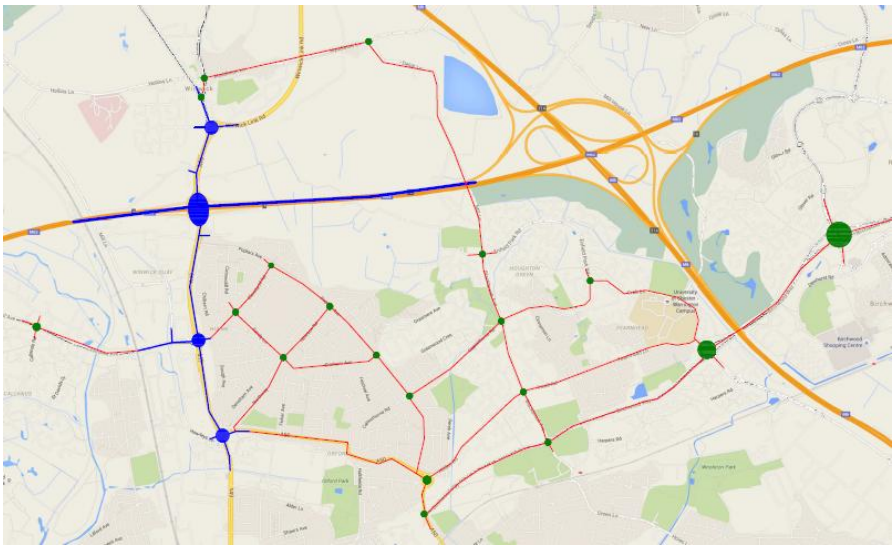
5) Do Something (AM & PM) (Design Year tbc) – As above, (including agreed mitigation), plus ten years.
All above models will be developed using a consistent version of VISSIM.

The models will be run multiple times in order to achieve route-decision convergence, and with random seeds 5, 10, 15, 20 and 25.
Given the size of the network within the model, traffic flows will be applied incrementally in order to achieve optimum route-decision convergence.
All lane coding / assignments at the junction intersections will be checked for appropriate driver behaviour.

b. Model Area

The area of the model that will be covered within this analysis is indicated within the figure following:

Figure 1 – Peel Hall Development VISSIM model area



c. Model Validation

To ensure the robustness of the base model, validation will be completed for the periods 08:00 to 09:00 and 17:00 to 18:00. The models will be appropriately checked against the required DMRB

Criteria, in terms of traffic flows, and journey time criteria (GEH statistic test, flow differences, journey times). This information will be presented within the Model Development Report.
Maximum and average queue length data will be collected and tabulated, and a model development report will be prepared, which will describe the development of the model, and validation.

4. Traffic Data

a. Count Data

It has been agreed that all count data required, to develop the models, will be provided by Highgate Transportation. Appropriate liaison will be undertaken with Highgate, to ensure that all required links, and junctions are covered, in order to satisfy the extent of the model, as indicated within the above figure.

There was limited ANPR data available from WBC, however data for both the A49 and Crab Lane, has now been extracted, this information will be used to supplement / validate the wider data sets.

Journey time data will be extracted from the Traffic Master database. A sub-user agreement has been signed, between WBC and AECOM, to extract Warrington' Traffic Master data using the BaseMap platform. Journey time route data will be extracted for average week day peak hour periods of 0800-0900 and 1700-1800s for the neutral month of May 2015 ($12^{th} – 14^{th}$).

The count data does not provide any information on trip patterns (origins and destinations (OD)) so another source is needed for this. Although it is older than maybe considered ideal, we would propose asking WBC to use the Warrington Multi Modal Transport Model (WMMTM) as a source of this OD data. If they are in agreement, then we would produce a cordon model covering our area of interest. We would then refine the zone system and add additional links so as to match the detail required within the VISSIM model. Matrix estimation techniques would then be run within VISUM using the turning counts you have provided to obtain a best estimate of trip patterns and volumes. This process will be undertaken both for the AM & PM. The trip matrices would then be passed from VISUM to VISSIM. As part of this process, there are likely to be some differences in the level of congestion and routings, as is always the case when taking demand matrices from a strategic model to a micro-sim model. The VISSIM model would therefore need to be calibrated accordingly using the count data, as before, supplemented by the journey time data from Traffic Master. If WBC is not content with the use for the WMMTM to provide an initial estimate of trip patterns, then a bespoke gravity model would need to be developed.

b. Development and Committed Development Traffic Data

Highgate will provide trip generations, for the following development mix, subsequent to completion of the final masterplan option:

- 7500 m sq. employment;
- 1200 houses;
- 100 bed care home;
- 2,000 sq. m foodstore;
- 600 sq. m local centre (small shops, healthcare, pharmacy);
- 1600 sq. m family restaurant; and

- 2 form entry primary school.

Highgate transport are responsible for defining the development traffic which should be forecast using the industry standard TRICS database, using the same parameters, as applied in the Trip Generation assessment, undertaken for the nearby OMEGA development.
The model will need to include traffic associated to local, committed developments, within the relevant modelling scenarios. Highgate Transportation would be responsible for confirming these with Mike Davies (WBC Planning). AECOM will be responsible for applying them to the assessments accordingly.

c. Traffic Growth.

Traffic growth will be applied to the assessments in accordance with the methodology applied to the assessments undertaken for the nearby OMEGA development. It is possible that the traffic 'growth' forecasts applied, to the future models, will initially result in exponential congestion, which will cause the models to lock-up. The growth forecasts may therefore need to be re-visited using an alternate tool. Highgate Transportation will hold discussions with WBC regarding appropriate traffic growth factors, and calculations.

5. Signal Specifications

Highgate Transportation is responsible for obtaining the required signal specifications from WBC. The following junctions require signal information to support the model development:

- A574 Cromwell Avenue / Calver Road
- A49 / Cromwell Avenue / Sandy Lane West including the Pedestrians crossing to the south of the junction
- Delph Lane / A49 Newton Road
- A49 Newton Road / Winwick Park Avenue / Winwick Link Road
- A49 Winwick Road / Hawleys Lane / A50
- A50 Orford Green / Hallfields Road
- A50 Orford Road / Birchwood Way
- Hilden Road / Insall Road / Blackbrook Avenue

Summary and Conclusion

This note sets out how the existing M62 J9 VISSIM model (Originally developed by AECOM for Highways England), will be extended, to include the area illustrated in Figure 1. The model will be used to assess the impacts, and any mitigation requirements, resulting from the proposed Peel Hall residential led development. It also provides a critique of the modelling tools available, and considers why VISSIM has been selected as the most appropriate tool for this assessment. This note will be distributed, to all concerned parties, (including the developer Satnam, the developers consultant Highgate Transportation, and the Local Authority WBC), in order to provide transparency over the above approach. The aim of this approach is to capture any subsequent comments, at an early stage in the modelling process, in order to avoid any abortive work being undertaken.