Information Note No TMfS2_3.1

Subject:	TMfS:05 Enhancements – Information for Prospective Tenderers
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1.1 Introduction

1.1.1 During the Term Commission for TMfS, a number of potential enhancements were highlighted and discussed during the Steering Group meetings of 4 May 2005 and 23 June 2005. The range of enhancements discussed covered aspects of improving the model output, updating secondary analysis reporting packages (to be in line with current economic and environmental guidance) and increasing the capabilities of the model. The potential enhancements were then prioritised against current Scottish Executive objectives.

1.1.2 On 6 December 2005, a subset of prioritised enhancement items were authorised to proceed by the Steering Group. This Information Note provides a background to each of these items and the current status of their development.

1.1.3 A list of the Enhancement Items is as follows:

- Environmental Appraisal
- 2005 Model rebase
- Collection of Local Authority Planning Data
- Macro Time of Day Choice
- Web Based Local Authority Data
- Use of the Transport and Land Use Model Interaction
- Economic Analysis
- Multiple Occupancy Vehicle Modelling

1.2 Environmental Appraisal

Status: Complete

1.2.1 MVA's environmental evaluation software, ENEVAL, can be used to undertaken Environmental Assessment large transport models such as TMfS. A significant advantage of this process is the run time efficiency over (for example) the DMRB spreadsheet method. As part of this enhancement, ENEVAL has been updated to be compliant with the most recent updates to DMRB (at the time) for the calculation of emissions (of CO2, CO, HC, PM10 and NOx).

1.2.2 In addition to the update of the emissions calculations, a Graphical User Interface has also been prepared for ENEVAL (similar to that for TMfS itself) to improve the ease of use of ENEVAL for model users.

1.3 2005 Model Rebase

Status: Current

1.3.1 The original TMfS Commission model has a base year of 2002. It was proposed that the model would be updated to a 2005 base year (TMfS:05). The rebase does not include any restructuring of the model itself, but does include a recalibration and revalidation of the Highways, Public Transport and Demand models. The model makes use of the following additional data that has come available since the completion of TMfS:02 as follows:

- Census Travel to Work origin\destination information – to provide additional comparisons of the In-Work travel matrices;
- SRTDB 2005 dataset – to bring trunk road count information up to 2005 levels;
- 2005 LENNON ticket-based rail data – to provide more robust levels of rail patronage in the Base Year and consequently Forecast Years;
- Various 2005 count\journey time data; and
- 2005 collected Local Authority Planning data.

1.4 Collection of Local Authority Planning Data

Status: Current

1.4.1 The original process of collecting Local Authority planning data for Land Use (TELMoS) planning policy inputs was carried out through consultation with Local Authorities during the summer and autumn of 2003. The assembly and processing of the resulting information continued into the Spring of 2004.

1.4.2 When TMfS was presented to all Local Authorities in March 2004, there was a general consensus between the Local Authorities that the planning policy data used to prepare forecasts should be reviewed at regular intervals of no more than 18 months.

1.4.3 Throughout the TMfS Commission, a number of Local Authorities have updated their own planning policy information as a consequence of using TMfS for their own application. In order to ensure consistency across all Local Authorities and consistency in the timescale of providing information, the process of gathering and processing this information from a common Base Year of 2005 has been undertaken as part of this Enhancement Item.

1.5 Macro Time of Day Choice

Status: Re-positioning complete, reporting outstanding

1.5.1 Investigation has been undertaken during the development of TMfS into the inclusion of a Macro Time of Day choice module. This allocates traffic to time periods according to relative changes in generalised cost. This is in contrast to peak spreading which allocates traffic to the peak hour within the peak period. The process has been programmed into TMfS and a subset of example test model runs has been undertaken.

1.5.2 Other studies on-going elsewhere in the UK suggested that Macro Time of Day Choice should be placed elsewhere in the model hierarchy than that which was originally proposed within TMfS.

1.5.3 This work has focussed on moving Macro Time of Day Choice within the model hierarchy and reporting on the findings.

1.6 Web Based Local Authority Data

Status: Complete

1.6.1 During the preparation of CSTM3, a programme of Do Minimum model runs were undertaken for each forecast year of 2001, 2006, 2011 and 2021 and for a range of economic scenarios. Key data from the model output (such as demand matrices, vehicle kilometers and hours, modelled flow data) were provided back to each Local Authority to provide a series of CSTM3 data within their area.

1.6.2 For TMfS it was agreed that similar information for the Base Year would be provided to each Local Authority. The information was prepared and is available on the TMfS web site as follows:

- goto www.tmfs.org.uk
- select Model Data from the left hand toolbar
- in the Base Year (2002) Data there are two sections relating to "All Local Authorities" and "Individual Local Authorities" which can be viewed.

1.7 Use of the Transport and Land Use Model Interaction

Status: Model runs complete, reporting outstanding

1.7.1 At the start of 2005, forecast runs of TMfS and TELMoS had been undertaken for a Do Nothing scenario. During that process, the performance of each model (Transport and Land Use) has been gauged to ensure that acceptable levels of sensitivity and model performance were demonstrated.

1.7.2 In order to inform further applications of the Land Use\Transport interaction, a series of sensitivity test runs were defined and undertaken using both the Land Use model and Transport model.

1.7.3 The sensitivity tests focus on the impact on the future year demand forecasts and the traveller responses to changes in travel costs.

1.7.4 This work will also feed into advice to model users on both the input planning data and performance of TELMoS and the interaction with TELMoS and may also assist in updating the relevant sections of STAG (Chapter 9, Integration) to cater for a modelling process such as TMfS and TELMoS.

Further background on TELMoS\TMfS interaction

1.7.5 The land use model (TELMoS) is a DELTA model linked to TMfS. The DELTA model provides car ownership and planning data inputs to the trip end model and TMfS supplies the generalised cost skims as input to DELTA.

1.7.6 Trip end modelling in TMfS is based upon the DfT National Trip End Model (NTEM) structure and parameters. The model takes detailed planning data projections, including household car ownership, and generates trip ends through the use of trip rates applied to the planning data. The household/person category structure and the trip rates are derived from NTEM.

1.7.7 The land use model was not designed to be fully integrated with the transport model. Rather, the intention was that the Reference or Do Minimum case for forecasts years could be developed using the Transport/Land Use model. The resulting outputs would then form an acceptable set of planning data for transport work as well as the basis of comparisons for other land use/transport model runs.

1.7.8 This is how the land use model was used up to the start of 2005. Forecasts for the Do Nothing case were prepared and the resulting trip ends used as the basis for the nominal amount of scheme/policy testing to date.

1.7.9 This Enhancement Item sensitivity work looks at the wider requirements (and potential application) for the Land Use/Transport interaction model, particularly in the context of providing information for scheme appraisal which includes the assessment of the land use/transport integration implications as described in STAG.

1.7.10 The general principles of land–use modelling were included in Section 5.3 of GOMMMS. Consideration of the relationship between land-use and transport is important for three reasons;

- land using activities and the interactions between them generate the demands for transport;
- those activities and interactions are to a greater or lesser extent influenced by the availability of transport; and
- the linkages between transport and activities may be important to the appraisal of transport strategies, especially when trying to consider whether the transport system is providing the kind of accessibility to activities that people and businesses require, rather than simply providing mobility for people and businesses.

1.7.11 The Appraisal Summary Tables which are required by STAG need two specific inputs where land-use transport interaction will have an impact;

- Transport and land use integration; and
- Transport Economic Efficiency (TEE) table.

1.7.12 The Land Use Transport integration is covered in Section 9.3 of STAG. A preliminary appraisal of a proposal with respect to established land use policy should be carried out in Part 1 of the appraisal. This assessment will be largely a judgemental basis made on information available at the time. A more detailed assessment may be needed in Part 2 of the appraisal. A land use/transport interaction model will provide useful information for this. The impacts of transport schemes on the developing patterns of land use would be shown by comparison of, for example Do Minimum or Reference Case planning data with the planning data forecast as a result of a particular scheme or policy proposal.

1.7.13 The transport data required for the cost benefit appraisal, which forms a major quantitative input to the TEE table, will be produced by the transport model. The quality of this data will be enhanced by the linkage with the land use model. However the cost benefit analysis will need to take account of the land use changes between the Reference Case and any Variant Case (or 'scheme option'). Neither STAG nor GOMMMS guidance caters for this analysis. Furthermore, within the DfT and the profession in general, there does not (as yet) appear to be a consensus agreement on how this is undertaken.

1.8 Economic Analysis

Status: Current

1.8.1 Within CSTM3 and CSTCS, Economic Assessment was undertaken using the following software, namely:

- TREVAL – Highway Economic Analysis; and
- PTEVAL – Public Transport Economic Analysis.

1.8.2 TREVAL and PTEVAL were prepared by MVA to analyse Cube models (such as TMfS) for economic output and to be compliant (with respect to values of time and vehicle operating costs) with the DfTs Transport Economics Note (TEN). Since then DfT has released its own economic evaluation software, TUBA.

1.8.3 In June 2004, DfT released an updated version of TEN, entitled WebTAG. TUBA was updated in accordance with these changes, but TREVAL\PTEVAL were not.

1.8.4 The principal drawback of using TUBA for economic analysis with TMfS is that TUBA run times and data preparation times are considerably higher than those experienced with TREVAL.

1.8.5 TREVAL is being updated to be able to read in TUBAs parameter file and undertaken economic analysis using standard outputs of TMfS that is equivalent in calculation to that of TUBA. (Note: It is also still possible for model users to use TUBA with TMfS).

1.9 Multiple Occupancy Vehicle Modelling

Status: Current

1.9.1 The original TMfS Enhancement programme proposed the inclusion of a module to undertake an assessment of multiple occupancy vehicle modelling. Although this was not included in the 2002 Enhancement Programme, more recently, there has been Ministerial interest in the use of Multiple Occupancy Vehicle (MOV) lanes, particularly in respect of the major bridges.

1.9.2 A methodology for the modelling of MOV lanes was proposed and this is now being implemented and tested within the TMfS model structure. The testing is being undertaken using the Forth Estuary as a Case Study.

Further background on Multiple Occupancy Vehicle Modelling

1.9.3 The experience of modelling MOV is in its infancy. The methodology proposed for TMfS refers to single occupancy vehicles and multiple occupancy vehicles as the two categories of vehicle to be considered.

1.9.4 The general model applied to TMfS is based on that developed by MVA for South West Yorkshire Multi Modal Study (SWYMMS). Within SWYMMS, this was added as part of a matrix reduction process. A logit model has replaced the use of a fixed factor so that conversion of persons to vehicles was responsive to the difference in cost between single occupancy and multiple occupancy (eg through dedicated parts of the network for multiple occupancy vehicles).

1.9.5 Because car sharing exists already and multiple occupancy vehicles could use parts of the network banned to single occupancy vehicles, separate user classes are required for single and multiple occupancy vehicles in the highway assignment process. Therefore, the choice process between single and multiple occupancy vehicles is included prior to assignment in each of the model outer loops.

1.9.6 This process is carried out for each time period using O/D assignment matrices for all Non-Work purposes combined. It is carried out for car trips only – any transfer of Public Transport trips to car sharing will arise through the Demand Model process as the generalised cost of travel by car changes.

1.9.7 There are some limitations to the process:

- the effects of freeing up household cars for use in another (or even the same) time period will not be taken into account;
- the assumption that the average occupancy in the multiple occupancy user class will remain constant;
- there is no explicit disaggregation of travellers into those who pay full parking charges and those who do not – this is all covered through average parking costs; and
- there is no allowance for increased urban congestion caused by pick up and set down mileage.

1.9.8 Within the structure of the Highways network, MOV lanes are required to be implemented. In the TMfS CUBE highway model we have:

- motorway links all represented using link based speed flow relationships. The appropriate parts of the network require duplication and capacities specified such that MOV can use all of the network but single cannot use the multiple occupancy lanes;
- implementation of tolls on the MOV lanes (if required);
- transfer of highway speeds to the public transport network to represent changes in congestion by single\MOV lane. This will also be relevant and have effect on the public transport network if buses are allowed to use the MOV lanes;
- for MOV lanes in urban areas or where there is junction modelling there are a number of possibilities for allowing lane priority at signalised junctions.

1.10 Completion of Enhancement Items

1.10.1 All of the above noted Enhancement Items will be completed prior to the end of the current TMfS Commission on 16 August 2006.