

Transport Model For Scotland 2005 Rebase : TMfS:05 Audit - Executive Summary

SIAS and WSP acting as the Traffic and Transport Advisor and Auditor (TTAA) to Transport Scotland were, requested to undertake an audit of the transport model development for the Transport Model for Scotland (TMfS). The latest development phase for TMfS involved a rebase from the original Base year of 2002 (TMfS:02) to a more up to date Base year of 2005 (TMfS:05).

The audit concentrated on examining the main components of the model that were altered during the rebase to 2005 namely the Highway and Public Transport (PT) networks, the Highway and PT model calibration/validation and the Demand Model calibration/validation. During the rebase some selected model enhancements were also incorporated into TMfS:05 and these were reviewed during the audit process. The process for examining the Transport/Economic/Land-Use Model of Scotland (TELMoS) was also instigated during the TMfS:05 audit, although the detailed findings of the TELMoS audit will be published at a later date.

The audit relied heavily on information supplied by MVA, which was generally in the form of the Draft Model Development, Calibration and Validation Reports for the Highway, PT and demand models. The TMfS:05 networks were also supplied along with other supporting information to enable a review by the TTAA. The audit largely concentrated on examining the differences between TMfS:02 and TMfS:05.

Highway Network Coding

The review of the Highway network generally demonstrated that it was appropriately coded. The TTAA examined the zoning system, node positioning, link lengths, link types, jurisdiction codes, capacity indicators and some junction coding. The updated zoning system included separate zones to represent Edinburgh, Prestwick and Dyce Airports and the Royal Bank of Scotland Headquarters at Gogar and is an improvement over the TMfS:02 zoning.

The review of the highway network coding did identify some errors, however, these would generally not have a significant impact on the TMfS operation as a whole. Nevertheless users of the model should bear these errors in mind when examining outputs in a local context. In particular the inclusion of the A9/M876 Glenberrie slip roads and the M8 Junction 21 Seaward Street motorway loop scheme in the TMfS:05 Base network should be noted as these schemes have not been constructed to date.

Highway Assignment Model Development, Calibration and Validation

In reviewing the Highway Assignment Model the trip matrix development, recalibration and revalidation were reviewed along with the assignment model parameters. This process generally demonstrated that the changes to the trip matrices between 2002 and 2005, whilst significant on some sectors, were explainable due to a combination of the changes in observed flows between 2002 and 2005 and the adopted methodology for producing the prior trip matrix. Overall, the TTAA is content that the changes in the trip matrices between 2002 and 2005 are acceptable.

The recalibration to traffic counts demonstrates that TMfS:05 achieves a similar level of global calibration to TMfS:02 with 60% or more GEH values less than 5 in all time periods. This does not conform to the DMRB guidelines which state that 85% or more GEH values should ideally be less than 5. Nevertheless, this level of calibration is not unusual for a model of the scale, nature and spatial variability of TMfS. Overall, whilst not ideal, this level of calibration is considered acceptable, particularly at a strategic level. However, users are advised to review the calibration in their local area of interest prior to any model application or use of TMfS outputs due to regional and local variability in the quality of calibration.

The revalidation to independent counts, journey times, trip length distribution and Census data were all considered acceptable for a model of this scale. The TTAA would recommend that improved reporting procedures could be adopted for future TMfS calibration/validation, particularly with respect to graphical presentation, calibration by local area and with respect to journey times.

Public Transport Network Coding

The PT network and services audit examined the coding of new rail schemes and stations, the extent of the network, the coding of selected services and the PT operators included. Generally, the coding of the new schemes and the overall network coverage was acceptable. Users should note the curtailment of the



rail network at the boundary of the internal model area. The service coding identified some potential minor errors in the coding of individual services, however, these are unlikely to significantly affect the operation of TMfS. The PT operators included are acceptable, however, there are some notable bus operator omissions including First Aberdeen, Strathclyde Scottish and some Borders services due to reasons of lower network detail and lack of travel demand information in these areas.

Public Transport Assignment Model Development, Calibration and Validation

The PT Assignment Model development included new LENNON ticketing data, crowding for AM and PM peak rail services and an updated fares model. The model was recalibrated and validated to available data. The LENNON data was subject to a series of processes to incorporate this within the origin-destination matrices. These processes were reliant on various assumptions to enable the data to be converted to the appropriate form for use in TMfS. Overall, the TTAA is content that the assumptions made are logical and these were necessary to make the best use of the available data. It must be borne in mind, however, that sufficient data was not available to ascertain whether these assumptions hold true.

The crowding model was invoked for AM and PM peak rail services only, which is an enhancement over TMfS:02. In most cases this will be adequate, however, users should take care to ensure that the sub-mode share (between bus and rail) conforms to expectations in corridors where there is strong competition between rail and bus services. This comment applies equally to the Base and any future year model applications. The fares model was updated to reflect varying fares between the peak and off-peak and this is considered to be an enhancement in TMfS:05.

The rail model validation compared modelled flows with the LENNON data and generally demonstrated an acceptable match between the modelled and observed values. As expected, the level of validation is more variable on an individual link by link basis. Rail passenger boarding and alighting comparisons generally demonstrate a good match between modelled and observed values. It should be noted that the match is better at a city-wide level rather than individual station level within central Glasgow.

Bus validation to historic passenger flow data showed a significant degree of variability. This can be attributed to a number of factors including limited data availability for both trip matrix development (no new bus data in TMfS:05) and model validation and the variable quality of available observed data. The TTAA considers that this element of the TMfS development is one which would benefit significantly from additional data collection for future versions of the model.

Demand Model Development, Calibration and Validation

The TMfS:05 Demand Model remained largely the same as its 2002 predecessor with the exceptions that the Park and Ride adjustment process is now integrated rather than being a supplementary add-on and the effects of rail crowding are reflected in the demand modelling process. Overall, the TTAA is content that the TMfS:05 Demand Model structure, coefficients, and method of operation are acceptable. It should be noted that a detailed assessment of the demand model outputs in forecast mode was not undertaken during this audit process. The TTAA considers that some elements of the demand model could be considered for refinement and enhancement in future versions of TMfS and has commented on these in the main report.

Transport/Economic/Land-Use Model of Scotland (TELMoS)

An audit process for TELMoS was instigated during the audit of TMfS:05, the first time such a review has been undertaken. Due to the scale and complexity of TELMoS in its own right, the complete audit process cannot run entirely in tandem with that of TMfS:05. A higher level, superficial review of available documentation was therefore undertaken for TELMoS as part of the TMfS:05 audit.

This review indicated that the model structure of TELMoS is well designed, with sensible definition and segmentation of land use and economic activities, and linkages between the activities. The TTAA considers that the model design and structure are consistent with the good practice of land use activity and travel demand modelling.

The ongoing audit process, which will be reported at a later date, will seek to provide audit findings and further details on the empirical underpinnings of the model mechanisms, calibration strategy, sensitivity testing and general model validation.



Overall Summary

The TTAA considers that the TMfS:05 rebase has been undertaken with due skill and care and making best use of the available data sources. In view of this, TMfS:05 is considered to be suitable for its intended application although users should take cognisance of the findings and recommendations in this audit.

