Model Auditing Process (MAP) v4 Update

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Introduction

The Traffic Management Act (TMA) 2004, places a Network Management Duty (NMD) on all Local Traffic Authorities (LTAs) in England and Wales, including TfL and the London boroughs. As London's strategic traffic authority, TfL has both a local and strategic NMD. The NMD requires each LTA to:

- Ensure the expeditious movement of traffic on its own road network; and
- Facilitate the expeditious movement of traffic on the networks of others.

Modelling can be a powerful tool to understand the potential traffic impacts of proposals in order to operate the road network efficiently and help fulfil the NMD. It can also enable strategies to be developed to mitigate adverse impacts.

Traffic scheme developers usually commission external experts to undertake traffic modelling assessments. There is therefore a need to audit such models to confirm they are fit for their intended purpose. Traffic model development is however a complex task that can be completed in a variety of ways, and the process of auditing a model can also therefore be challenging.

TfL have developed the following documents to advocate tried and tested practical modelling techniques and best practice:

- Traffic Modelling Guidelines; and
- Model Auditing Process (MAP)

The TfL Traffic Modelling Guidelines and MAP are designed to be complementary. As illustrated within **Figure 1** they provide a framework to help deliver the modelling quality required by TfL for both base and proposed models from scheme consideration through to a detailed design.

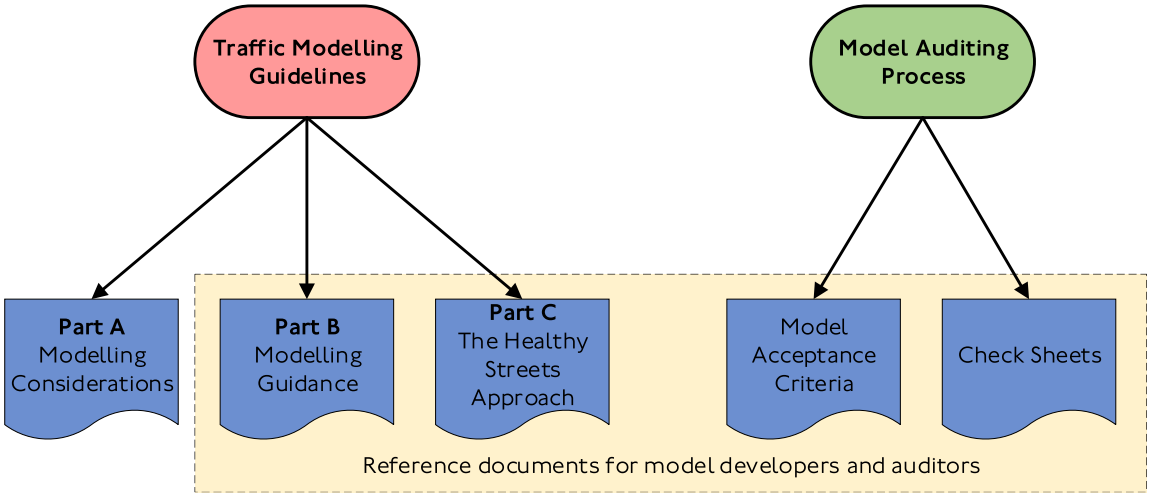


Figure 1: The relationship between the Traffic Modelling Guidelines and MAP

The TfL Traffic Modelling Guidelines indicate recommended 'Best Practice' relating to the approach and methodology for model development. MAP defines the standards expected for all scheme modelling submitted to TfL and provides a structural procedure for auditing models against software-specific modelling standards during model development. The TfL Traffic Modelling Guidelines provide overarching guidance on approaches which may be adopted to help meet the standards defined by MAP.

Model Auditing Process (MAP)

MAP has been developed by TfL in order to ensure a consistent approach to both the development and auditing of traffic modelling. From April 2008 MAP has applied to all scheme modelling submitted to TfL and audited by the Network Performance (NP) department. The pre-existing version of MAP was version 3.5, which was published in 2017. MAP sets out the following six stages which should be followed when submitting traffic models for auditing:

- Stage 1 – Base Scoping Meeting;
- Stage 2 – Calibrated Base Model Submission;
- Stage 3 – Validated Base Model Submission;
- Stage 4 – Proposal Scoping Meeting;
- Stage 5 – Future Base / Proposed Model Submission; and
- Stage 6 – Submission of Scheme Impact Report (SIR) to Promoter.

MAP defines a protocol for communication during model development, submission and auditing. This is designed to facilitate communication between all parties and ensuring models are developed to a consistent and high standard, while any issues are addressed at the earliest possible stage, rather than later in the process when changes may be more costly in terms of time and effort.

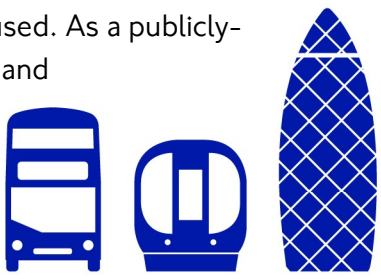
One of the ways MAP facilitates effective communication is through the definition of specific roles and responsibilities within the modelling project. These are defined in **Table 1** below:

Table 1: Task description for the different parties involved in MAP

Role	Title	Description
Promoter	P	The person responsible for delivering and project managing the proposal.
Design Engineer	DE	The modeller or engineer responsible for creating the modelling for the Promoter.
Checking Engineer	CE	The modeller or engineer responsible for checking and signing off the Design Engineer's work as fit-for-purpose for the Promoter.
TfL Signals Appraising Engineer	SAE	The engineer from TfL Engineering and Asset Strategy, responsible for providing early design comments on the Proposal in the terms of safety and compliance to TfL Engineering standards.
TfL Model Auditing Engineer	MAE	The TfL modeller responsible for auditing the modelling and communicating the network impact of the scheme.
TfL Network Assurance Engineer	NAE	The TfL operations engineer responsible for assessment, then approval / rejection of the Promoter's proposal (under the TMA).

In summary, the P engages a DE to develop traffic modelling for their proposed scheme. The traffic modelling is internally assessed by a CE, before being submitted to the MAE for auditing.

MAP is designed to give a common structure for the development of all modelling projects. However, since different software each have specific requirements, distinct criteria are established at MAP Stages 2, 3 and 5 that relate to the traffic modelling software being used. As a publicly-funded body, the software used by TfL has to meet published requirements and undergo a competitive evaluation and procurement process. MAP v3.5 therefore included the following software-specific chapters, representing four predominant traffic modelling



packages used for scheme assessment at TfL:

- Aimsun Next Model Auditing Process (AMAP);
- LinSig Model Auditing Process (LMAP);
- TRANSYT Model Auditing Process (TMAP); and
- Vissim Model Auditing Process (VMAP).

Standardised check sheets are used for formal communication between all parties during MAP Stages 1 to 5. Informal communication between the DE and MAE is also encouraged between MAP Stages to progress the development of the models. The SIR provides a summary of the likely scheme impacts identified during the modelling assessment.

Since MAP v3.5 was published TfL's Traffic Modelling Guidelines has been updated to version 4, which was published in 2021. This has therefore resulted in a need to update MAP to better align with the newly updated guidance, and to better reflect modelling methodologies and software used by TfL in 2023.

MAP v4

The key updates contained in the MAP v4 update include:

- **Holistic Approach – Three Stage Modelling Process:** TfL's Three Stage Modelling Process has been developed to capture the interaction between different traffic models and to better understand network-wide impacts due to traffic reassignment from neighbouring schemes. The process ensures that both isolated impacts of individual schemes and the overall future state of the network are considered, enabling more complex assessment, focusing on the impact on every journey. The three stages of this process are outlined in **Figure 2**. The Three Stage Modelling Process has been incorporated into MAP v4 via the following amendments:
    - MAP Stages 1 and 4 cover all modelling levels required for a scheme assessment rather than being conducted separately for individual software types;
    - MAP Stage 5 (previously the Proposed Model audit in MAP v3.5), is separated out into Stage 5a covering Future Base Models and Stage 5b covering Proposed Models. Both stages are accompanied by their own MAP check sheet; and
    - The interaction between different modelling levels is included within the software-specific MAP checks, where inputs or outputs are passed between different modelling levels.

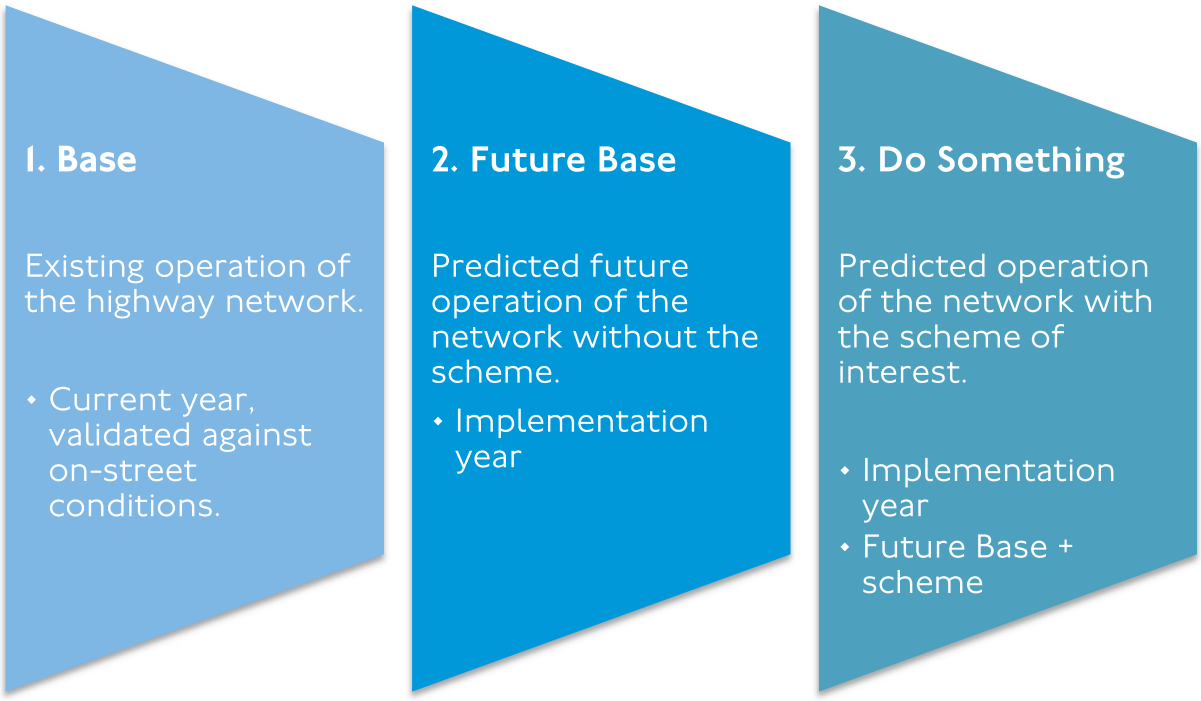


Figure 2: The TfL Three Stage Modelling Process

- **Healthy Streets:** Where appropriate, specific cycling and pedestrian checks have been added to the software-specific MAP checks to give greater prominence to these active travel modes. This aligns with TfL's Healthy Streets Approach for more active, inclusive and safer travel, and corresponds with similar content included in Part C of Traffic Modelling Guidelines v4.

- **New MAP for Junctions (JMAP):** JMAP has been introduced to cover model audits using TRL's Junctions software. Although primarily concerned with modelling signalised junctions, TfL also needs to model priority junctions and this update was requested in a user feedback survey following the publication of Traffic Modelling Guidelines v4.

- **New MAP for TfL's ONE Model (IMAP):** IMAP has been introduced to cover use of TfL's Operational Network Evaluator (ONE) Model, based on PTV's Visum software. The ONE Model is now being used by external consultants, therefore it was necessary to introduce checks to confirm resulting modelling assessments are fit for purpose. This was also requested in a user feedback survey following the publication of the Traffic Modelling Guidelines v4.

- **New MAP for pedestrian models (PMAP):** PMAP has been included to cover the audit of pedestrian models built using LEGION and Viswalk, aligning with TfL's Healthy Streets Approach and the inclusion of the Pedestrian Modelling chapter in

Traffic Modelling Guidelines v4. Pedestrian modelling content was also requested in the recent user feedback survey following the publication of Modelling Guidelines v4.

- **Revised MAP for LinSig (LMAP):** LMAP has been updated to allow for expanded acceptance of matrix-based flows, together with specific checks covering the interaction with tactical models in future year scenarios.

- **Revised MAP for Vissim (VMAP):** VMAP checks have been streamlined to more efficiently combine Stages 2a and 2b into a single Stage 2 Calibrated Model stage. The content has also been updated to correspond with more recent Vissim versions.

- **MAP updates for Aimsun Next (AMAP) and TRANSYT (TMAP):** Minor updates have been made to the AMAP and TMAP chapters to correspond with process changes across all chapters.

- **Document Structure:** MAP was previously separated into an Overview document for a non-technical audience and an Engineers Guide providing detailed content for a technical audience covering all MAP stages. In MAP v4, these documents are unified within a single document to better align with TfL's Traffic Modelling Guidelines. The new single MAP document brings together Part A for a non-technical audience and Part B covering technical content.

- **Revised MAP Check Sheets:** The format of the MAP check sheets has been updated following user feedback, mainly to provide more room for the MAE to provide detailed audit comments for the DE.

The new version of MAP v4 is available at: https://www.tfl.gov.uk/trafficmodelling.

Future MAP Updates

Following publication of MAP v4, further planned updates to MAP include:

- TRANSYT MAP (TMAP) will be updated to incorporate TRANSYT 16, following recent updates to the software. The update is scheduled for delivery by the end of the financial year.

- More regular updates to the MAP and Traffic Modelling Guidelines documents are planned to capture evolving changes in software functionality, best practice and TfL's modelling processes.

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