
Transport
for London

HAM
Guidance on Model Use

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Guidance on Model Use

1. Review the models and model data provided by TfL
2. Undertake Local Base Year Model Validation
3. Develop Future Year models without developments or schemes
4. Develop Future Year models with developments or schemes
5. Adjust local signal timings
6. Carry out sensitivity Tests
7. Extract statistics and thresholds for Model Results
8. Development and Use of Cordon Models

Chapter 2 - Local Network Audit (1)

- **Introduction**
  - Requires an accurate network representation
  - Responsive enough to test development & other scenarios
- **Base Year Adequacy**
  - Local area - 2km radius of the defined development area
  - AM, PM and IP
- **Structural Issues**
  - Inclusion of all significant roads and junctions
  - Potential need to include additional minor roads and junctions
  - Adequacy of the local zoning
  - Zone loading points (centroid connectors)

Chapter 2 - Local Network Audit (2)

- **Junction detail issues**
  - Junction error reports:
    - all NFEs and Serious Warnings should be assessed and corrected
    - all warnings should be assessed for coding accuracy
  - Junction specific parameters e.g. Cycle times, Stack, Gap &Tax
  - Lane descriptions for:
    - Link lengths
    - Correct number of Lanes
    - Use of speed-flow
    - Bus lanes coded
  - Turn coding to include:
    - Banned turns
    - Lane allocations
    - Saturation flows
    - Priority markers
  - Signal timings and movements

Chapter 2 - Local Network Audit (3)

- **Usage Issues**
  - Local convergence issues – ’10 worst’
  - Realism checks for
    - Excessive delays
    - Queueing and blocking back
    - High V/C
- **Forecast Year Adequacy**
  - Pickup at early stage where network / zoning enhancements may be needed
  - Maximise the compatibility between Base and Forecast models
  - Initial assessment of development trips as a basis for determining:
    - Adequacy of existing zone sizes and boundaries
    - Adequacy of existing zone loading points and mechanisms

Chapter 3 - Local BY Model Validation (1)

- **Introduction**
  - Requires an accurate network representation
  - Responsive enough to test development & other scenarios
  - Determine level of model enhancement
- **Model Validation Procedures**
  - Subject to validation checks in the vicinity of the model
  - Validation checks will comprise:
    - Screenline count data
    - Additional available count
    - Comparison of modelled and observed journey times
  - Presented in accordance with current WebTAG Highway Assignment Modelling Guide

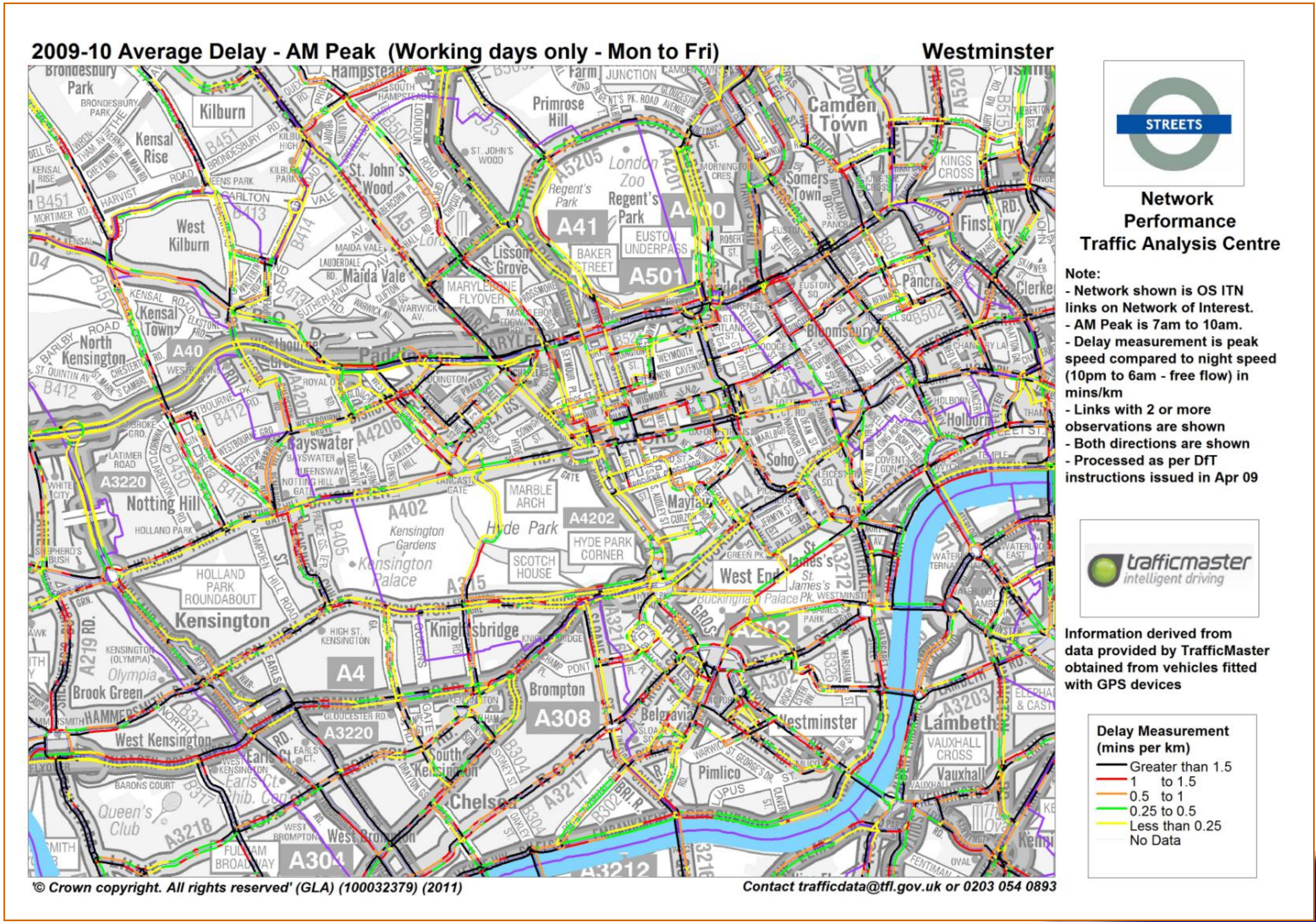
Chapter 3 - Local BY Model Validation (2)

- **Local Count Validation across Screenlines**
  - Validation / Calibration screenlines within 5km radius
  - TfL will provide the ‘dashboard’ spreadsheet together with ‘key files’
- **Additional Local Count Validation**
  - MCC (link/turn) support by ATC over 2 weeks period
- **Modelled and Observed Journey Times**
- **Local Congestion Issues**
  - TrafficMaster congestion maps

Chapter 3 - Local BY Model Validation (3)

- **Model Validation Sign-off**
  - Conforms to WebTAG Highway Assignment Modelling guidance
  - Matrix Estimation
    - Use original prior matrices to an enhanced counts for the local area
    - where possible as mini-screenlines
  - Model convergence consistent with WebTAG standards
  - No worse Count validation to original HAM screenlines
  - No worse Journey Time validation to original HAM routes
  - Local area screenline count calibration in line with WebTAG
  - Local area individual count calibration in line with WebTAG, relaxed to the equivalent of a GEH of 7.5 for turning count data presented separately
  - Local area Journey Time validation accurate to within 15% of observed.

TrafficMaster Congestion Plot



Chapter 4 - Future Year Models without Development (1)

- **Introduction**
  - Isolate the development specific impacts from the effects of wider background growth
  - Based upon future year Reference Case planning data
  - Consistent with GLA population and employment projection
  - Generate using LTS model
  - Background growth = Growth from Base to Future Year Base Minus

Chapter 4 - Future Year Models without Development (2)

- **Approach**
  - BM same as Reference Case except the Population and Employment level in the area of interest
  - In LTS, growth is make up of both a 'structural' and a 'development' component
  - LTS zones that contain the development sites should be isolated
  - For each identified zone, the proportion of the zone that is part of the development area should be established
  - For each affected zone, the development component of the growth should be removed in line with the proportion of the zone that is taken up by the development site
  - Create forecast 'Base Minus' planning data
  - No adjustment to the labour market balance sheet
  - Run LTS with the new 'Base Minus' planning data
  - GIS plot outlining the changes in trip origins' and destinations between the 'Base Year' and 'Base Minus'

Chapter 5 – Future Year Trip Generation & Distribution (1)

- **Introduction**
  - Development trip generation and distribution is done through the LTS model
  - Sense checked using other methods, TRAVL / TRICS / LUTE databases
  - In some circumstances it may be more appropriate to use TRAVL and TRICS as the core method

Chapter 5 – Future Year Trip Generation & Distribution (2)

- **Approach**
  - Amend future year planning data to reflect the proposed level of development
  - Add on top of BM but remove replaced land uses
  - Development trip generation and distribution is done through the LTS model
  - The changes in trips between BM and Scenario test represents the trips generated by development
  - GIS plots outlining the changes in Origins and Destinations
  - Review against the proposed level of car parking
  - Make adjustment if mismatch is apparent (HW <-> PT)
  - Review LTS trip generation against other source (TRAVL/TRICS/LUTE)
  - Assess the distribution of trips by mode

Chapter 6 - Local Signal Optimization (1)

- **Introduction**
  - The general use of signal optimization in future year sub-regional models is addressed in TN04
  - TN04 examines the scale of optimization that is required in order to maintain a feasible level of signal operational efficiency under changed levels of future year demand
  - This note addresses the issue of local and specifically scheme related signal optimization.
  - Define the coverage and extent of signal optimization to be undertaken for a scheme to ensure that no bias is introduced into scheme assessments.

Chapter 6 - Local Signal Optimization (2)

- **Approach**
  - The aim of local signal optimization is to achieve a realistic response to demand changes in future year scenarios in the vicinity of schemes whilst not creating unreasonable advantages over without-scheme scenarios.
  - As a consequence, optimization should be:
    - Restricted to the vicinity of the scheme
    - Applied equally to both with and without scheme scenarios
    - It is recommended that optimization should therefore:
      - Be for all junctions within a defined area of the scheme (within 1km radius)
      - Involve a review of signal cycle times, offsets and green splits
      - Allow for stage/ phase changes where necessary

Chapter 7 - Sensitivity Tests (1)

- **Introduction**
  - Sensitivity checks using variations around the central demand levels of growth.
  - Demonstrate that the model responds in a predictable and realistic way and is not critically tailored to a given level of demand.

- **Sensitivity Tests**
  - Variations in both local (development specific) and global levels of demand may be required.
  - Initial sensitivity tests should be for the 'magic wand' scenario,
    - Assuming base level demand but modified to include 'full development'
    - Use to provide an indication of the additional demand against a known benchmark.
  - Future year sensitivity tests will also be required:
    - Local Development subject to growth by a factor of 110 percent
    - Global Demand subject to growth by a factor of 105 percent

Chapter 7 - Sensitivity Tests (1)

- **Reporting**
  - Comparisons shall be required for each of AM, PM and IP periods for each forecast year,
  - Network wide and relevant core borough separately.
  - Statistics recorded shall include for each sensitivity scenario and area, absolute values and percentage changes in:
    - PCU hours
    - PCU Kms
    - Average speeds
    - Elasticities of speed change and pcu hours against demand
  - Network plots with junction hotspots highlighted by both link and junction based on differences between Reference and sensitivity tests.

Chapter 8 - HW statistics and thresholds (1)

- **Introduction**
  - Transport Analysis to report on the impacts of Traffic Study using HAMs
- **Future year scenarios to be modelled for AM, PM and IP**
  - Base year (assumed 2009);
  - 2021/2031 without the OAPF development – DN
  - 2021/2031 with the OAPF development – DSL_A, DSL_B etc.
  - 2021/2031 with the OAPF development and mitigation – DSLM_A1, DSLM_A2 etc.
- **Traffic growth should be drawn from LTS**
- **Similar Signal Optimisation for both DN and DS to avoid masking the traffic impact**

Chapter 8 - HW statistics and thresholds (2)

- **Link impacts**
  - Demand flows
  - Actual flows
  - Av Delay
  - Av Queue length
  - Queue to Stacking capacity
  - V/C – red (>90%), amber (80 – 90%), and green (<80%)
  - hot spots link with V/C>90%
  - BBF
  - Total PCU-hrs delay

Chapter 8 - HW statistics and thresholds (3)

- **Junction impacts**
  - Delay per vehicle
  - V over C – red (>90%), amber (80 – 90%), and green (<80%)
  - hot spots link with V/C>90%
  - Total PCU-hrs delay
  - Highlight junctions with any network coding changes between
    - DN and Base
    - DS and DN
- **Corridors**
  - Journey times (observed and modelled) as elapsed time graphs
  - Total flows
  - Select link analyses
  - Bus journey time changes on high frequency bus corridors

Chapter 8 - HW statistics and thresholds (4)

- **Area based statistics for study area and local boroughs**
  - Total demand (pcu/hr for cordon model)
  - Average speeds
  - Traffic flow (pcu kms or veh kms)
  - Travel time (pcu-hrs or veh hours)
  - Congestion (delay in pcu-hrs)
- **Demand changes**
  - A GIS thermal map showing the changes in demand by Origin and Destination totals (by zone/sector) between:
    - Future year OA DN vs Base Year (Future vs Base)
    - Future Year Scenario vs Future year OA DN (With Development vs Background growth)
    - Future Year Scenario vs Base Year (Full Impact vs Base)

Chapter 8 - HW statistics and thresholds (5)

- **Thresholds/Acceptable levels of service**
  - The default assumptions for acceptability are that:
    - On average junction delay, journey times and average speeds with the OAPF development in place should be no worse than in the core future year OA do nothing; and
    - V/C at individual junctions, based on TfL's junction classification system:
      - should not increase so as to cross into 'amber' or into 'red' from 'amber'; and
      - any junction classified as 'red' must be mitigated if possible to reduce V/C to acceptable levels.

Chapter 8 - HW statistics and thresholds (6)

- **Specific Impacts of Development Traffic**
  - Full traffic Impacts are often masked by displaced traffic
  - Important in locally congested areas

- **Network**
  - The following based plots will be required:
    1. Development scenario - SLA on all O & D development zones
    2. Base Minus - SLA on all O & D development zones
    3. GROSS Impact of development traffic (1 - 2)
    4. NET impact of developments - Standard plot of flow of (With development – Without development)
    5. Displacement of traffic resulting from the presence of development traffic (4 – 3)

Chapter 8 - HW statistics and thresholds (7)

- **Matrix**
  - Assess the direct local impact of development trips
  - The following cordoning and analysis processes should be undertaken:
    1. Cordon the study area for both DS and BM
    2. Sector the cordon matrices into 3 sectors
       - Development zones
       - Non development zones
       - External zones
    3. Compare the two set of sector matrices and report changes
       - The increase in trips to/from Development zones will be indicative of the demand for the developments,
       - Reductions in External-to-External trip numbers reflect the displacement traffic.

Chapter 9 - Development & Use of HAM Cordon Models (1)

- **Background**
  - OAPF requires a high level of validation in the localised area and also for key strategic movements through the area
  - Sufficiently responsive to test a range of development and network related scenarios without these effects being lost in ‘model noise’
  - The strategic nature of the HAMs means that It is often the case that a particular HAM will not validate sufficiently well in the local OAPF study area, despite a satisfactory level of validation overall
- **Model Cordoning**
  - Achieve better local area
  - A smaller, more responsive model
  - Further counts could be added to improve validation
  - Significantly reducing run times

Chapter 9 - Development & Use of HAM Cordon Models (2)

- **Risk**
  - Produce models which are significantly different but of a similar quality to that of the donor HAM model;
  - The Cordon model may not be large enough to capture all scheme effects
- **Identification of Cordon Area**
  - Plot of destinations / origins from / to study area zones in terms of ODs and paths in the base year
  - Assignment of base year demand + scheme uplift (maximum impact scenario) to base year network, then compare flows against base. Also, plot of ODs as defined for base (previous point)
  - Identify the area of influence, all significant (in terms of scale and relevance to study) movements should be captured in the cordon area.

Chapter 9 - Development & Use of HAM Cordon Models (3)

- **Process**
  - Review of network / zoning detail and sense check
  - Prior matrix + full network cordoned for the area identified above.
  - Counts for matrix estimation added for the study area as requirements dictate (where possible organised as mini-screenlines)
  - This may be iterative depending on validation results
- **Validation**
  - Dashboards
  - Trip Length Distribution
- **Conclusions and Recommendations**
  - If cordoning is required, and subject to review and refinement, that the above steps are followed.
  - Ensure that a robust modelling process is followed and that changes can be readily imported back into the full HAM model where appropriate.