

Spatial Planning and Traffic Modelling: Guidance

Introduction

This guidance note sets out expectations for traffic modelling assessments on the Strategic Road Network (SRN). The purpose of the guidance is not to be prescriptive in nature, but to direct and advise scheme promoters on resources for engagement, data sources and modelling expectations. It does not seek to advise on approaches to developing Transport Assessments or Statements (TA/TS), separate advice will be provided on these related undertakings. The guidance in its current form is a holding document, and will be updated to align with emerging future policy considerations and other parallel workstreams.

The focus of this guidance is to inform traffic impact assessments. Additionally, the guidance does not seek to replicate existing national guidance such as NH's Circular 01/2022, DfT's Transport Analysis Guidance (TAG) or the National Planning Policy Framework (NPPF).

The guidance will set out the expectations of both developers and National Highways (NH) during the pre-application process, and advise on how to avoid excessive modelling costs, delay to decisions and requests for reassessment.

This guidance does not look to amend processes, but to formalise expectations for traffic modelling on the SRN; both in terms of what NH expects from developers and their consultants and what can be expected from NH.

Traffic models are tools to estimate potential traffic impacts and should be used with a clear understanding of their purpose and the specific decision they are informing. Throughout the assessment process, it is important to remain focused on what the modelling is intended to support, rather than assuming that greater technical complexity automatically provides better evidence.

1. What are the common causes of holding recommendations?

NH have conducted a review of the key reasons holding recommendations are typically made. This guidance has been developed based on these key reasons, with an aim to reduce the number of holding recommendations and the length of time for which holding recommendations remain in place.

The typical reasons for holding recommendations highlighted in this review are summarised in Table 1. The relevant sections of this guidance, which look to address each reason, are also detailed.

Table 1

Issue	Cause for holding recommendation	Addressed in Section
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Inadequate engagement and scoping	Limited or no upfront and ongoing agreement with NH on modelling scope, methodology, and required outputs.	3 – The guidance sets out a staged approach to engagement with NH.
	Unclear submission programmes restricting NH's ability to resource and review effectively.	3 – The guidance requests that submission programmes are supplied to support NH to allocate appropriate and timely resource.
	Lack of agreement on assumptions and approach leading to unsuitable forecasts.	3/4 – Assumptions and approach should be agreed throughout scoping process. 6-12 – Whilst specific requirements have to be considered on a case-by-case basis, the guidance sets out broad principles for expected approaches.
Insufficient or poor-quality supporting information	Modelling submissions lacking full input and output data (traffic model, raw survey data, model calibration, validation and convergence files, development trip generation and distribution calculations, model outputs, reporting).	13 – All analysis and model files should be supplied to NH for review.
	Insufficient scenario testing (including phasing and “without development” cases).	12 – Scenario testing should be agreed with NH and the LPA on a case-by-case basis through the engagement process.
	Poor interpretation and presentation of results, limiting decision-making clarity.	13 – Outputs should be provided in a clear manner, with a focus on the question being answered.
	Ineffective management of review iterations and changes (e.g. lack of trackers or clear updates).	5 – Expectations from NH and the applicant are set out, including the use of trackers.
Weak model inputs and methodology	Incorrect or inappropriate traffic modelling tool being used for assessment.	10 – Decision process is detailed to determine a suitable modelling tool. This should be agreed with NH prior to commencement of modelling.

	Use of non-representative or unsuitable traffic survey data. Lack of engagement around any required neutral period survey adjustments.	8 – Guidance around survey data and modelled periods is provided, which should be agreed with NH.
Insufficient evidence of model performance	Poor calibration/validation or limited reporting of model performance.	11 – Model calibration and validation guidance is provided, in line with TAG guidance.
	Lack of clarity around model assumptions, uncertainties around model demands or coding, specific locations of poorer model validation and any limitations of the tool used.	3 – Model assumptions and uncertainty should be discussed openly with NH during engagement stages to allow NH to make an informed decision.
Uncertainty around expectations from NH	Different expectations between regions.	3 – NH will provide clear expectations, in line with available information, throughout the engagement process.
	Late changes in modelling scope, requested by NH.	5 – Clear justification for any changes should be provided by NH, and communicated in advance of any submission.
	Difficulty reconciling NH requirements with local highway authority and local planning authority positions.	3 – The guidance recommends the engagement process is undertaken between the applicant, NH and relevant local authorities to understand different requirements and agree consistent approaches.
	Limited transparency around how NH reaches and records decisions.	5 – Clear justifications for decisions will be provided by NH throughout the application process, including at each engagement stage.

2. Why is development impact on the SRN considered?

The SRN forms an important part of strategic accessibility that supports economic growth and development viability. Within the wider transport system, the SRN plays a major role in access to jobs, labour, markets, and services, which collectively shape development viability and location choices. It strongly influences location decisions for major schemes (housing, logistics, business parks, regeneration), as such development and SRN performance are strongly linked.

Development proposals can interact with the SRN, with the performance of the SRN known to influence how growth can be planned and accommodated, while the scale and location of development can in turn affect SRN performance. Given these interdependencies, the importance of early and ongoing collaboration between site promoters and NH is recognised.

Any development proposals that affect the SRN must demonstrate that they do not result in severe residual cumulative impacts, in line with national policy including the DfT Circular 01/2022, most notably paragraph 51.

3. What engagement with National Highways is expected?

Engagement with NH should establish a clear, proportionate and documented understanding between the applicant, NH and the relevant local planning and highways authorities regarding the modelling scope, evidence requirements, key assumptions, assessment scenarios, review processes and decision critical issues.

The purpose of this engagement is to agree the key parameters of the assessment and provide clarity and alignment at an early stage, helping to ensure that modelling methodologies and assessment requirements are agreed by all parties. This should reduce the likelihood of holding recommendations, minimise requests for additional analysis or re-work, and support a more efficient and timely decision-making process. A staged approach to engagement should be considered, as follows:

- A. Exploratory engagement:** Early discussions to identify the nature of the proposed development, potential interactions with the SRN, known constraints, available evidence and data sources, and whether transport modelling is likely to be required.
- B. Scoping engagement:** Discussion on proposed assessment scope once sufficient information is available regarding development quantum, access arrangements and likely movement strategy.
- C. Scope confirmation:** recorded agreement on modelling approach, survey requirements, assessment scenarios, key assumptions, outputs, timescales and arrangements for managing any changes to the agreed scope change-control.
- D. Review and resolution:** structured process for reviewing the models prior to the submission of the final TA.

Trip generation assumptions for the site should be agreed during the scoping part of the confirmation of assessment scenarios to be tested. For smaller single use sites, it may be appropriate to derive trip generation from comparable sites and established evidence sources. However, where a site is located near to other complementary land uses and/or is of a size where multiple land uses are part of the development, an approach considering development proposals which are anticipated to impact trip generation (E.g. development form, land-use mix, accessibility, parking, transport provision, internalisation, trip substitution, management measures and expected movement outcomes) is likely to be a more appropriate approach to develop trip generation.

Where public transport provision forms a key component of the movement strategy, NH will have regard to the views of the relevant local transport authority, local highway authority and transport operators regarding service viability, deliverability and governance arrangements. NH recognises that approaches to forecasting the effects of sustainable travel measures continue to evolve and will work collaboratively with the development industry and relevant stakeholders to improve understanding and the evidence base in this area.

At each stage of engagement, applicants should provide a clear programme for the submission of information. This will enable NH to plan resources effectively and allocate appropriately qualified reviewers in advance, supporting a more efficient review process and reducing the risk of unnecessary delays.

It is recommended that each engagement stage is undertaken between the applicant, NH and the relevant local authority bodies to ensure requirements are consistent, where possible, between NH and local authority positions. Where requirements differ, these should be clearly documented, with clear reasons for the differences. Agreement should be made for how different requirements can be reconciled (E.g., through the use of scenario testing).

4. Why should I engage with National Highways?

As a statutory consultee within the planning process, NH is required to be consulted by Local Planning Authorities on certain planning applications before decisions are made.

Engaging with NH early in the process will allow the agreement on key elements of the assessment. Establishing these principles up front can reduce the risk of work being undertaken on assumptions that are subsequently challenged, thereby minimising abortive work and improving programme certainty.

Failure to engage early is likely to result in:

- Unclear understanding of mitigation expectations and potential infrastructure contributions;
- Delays to determination;
- Requests for additional assessments, sensitivity testing or re-assessment; and
- Increased risk of a holding recommendation or recommendation of refusal from NH.

NH also undertakes and commissions studies across the SRN, and may hold relevant traffic data, transport models and detailed operational knowledge of local network conditions that may be available to support the modelling process avoiding duplication of effort.

In locations where multiple development sites are proposed in close proximity, NH may be able to leverage existing modelling tools to collectively agree model scopes,

trip rates, distribution and assignment, as well as scenario testing, creating programme efficiencies.

There may also be opportunities for collaboration in the development or enhancement of transport models where these are required to assess cumulative impacts. This could include extending or updating existing models, with costs shared proportionately between interested parties where appropriate. Collaborative approaches can deliver efficiencies, improve consistency of evidence and support a more comprehensive understanding of future network performance.

5. What should you expect from us?

Applicants will experience a collaborative, proportionate and open approach during all stages of the planning process, with clear communication and transparency around how decisions are reached. NH will provide constructive advice early on, helping to guide proposals and address potential issues before they become more significant.

Our approach also recognises the importance of vision-led planning. Assessments should not solely focus on accommodating forecast traffic demand but should also support the delivery of wider planning, transport and sustainability objectives. This includes considering how the form and design of development, land-use mix, sustainable transport provision and placemaking principles can influence travel behaviour and contribute to achieving the intended vision for an area. Through constructive engagement and a shared understanding of objectives, applicants, local authorities and NH can work together to develop solutions that support sustainable growth while maintaining the safe and efficient operation of the SRN.

National Highways will support developers and their consultants to interpret current and future vision-led guidance.

Our planners will be available for meetings where required, and advice should be provided in a timely and practical way. Decisions will be made without unnecessary delay, with a focus on being pragmatic and proportionate to the scale and impact of the development. Concerns should be provided in a clear manner, and the feedback should explain the nature of the concern, the evidence supporting that position and, where possible, provide constructive advice on potential options for addressing or mitigating the issue.

Considerations in line with the level of detail provided by the applicant will be provided by NH at each of the engagement stages. Any changes in requirements by NH throughout the planning process should be documented, with detailed explanation for the change. For example, additional detail or changes regarding the proposed site quantum, movement strategy, land uses or developing planning situation (committed developments or schemes).

Any changes and review iterations should be documented in a comments / change tracker and shared with all parties for agreement. Trackers should be kept up to date by all parties in order to keep a clear trail of all comments, changes and their

reasonings. Trackers should record all comments and changes relating to the model coding, inputs and outputs. This includes, but isn't limited to:

- Network structure, including any mitigation coding;
- Signal coding;
- Driver behaviour;
- Link / junction capacity;
- Model convergence settings;
- Base and forecast traffic demand and routing;
- Model calibration / validation; and
- Model results analysis.

This commitment from NH aims to reduce the frequency and time of holding recommendations by reducing uncertainty around expectations from NH. Specific response times, outside statutory requirements, are not provided as these vary depending on the extent of modelling and information provided.

6. What kind of assessment should I be expected to make?

Since the withdrawal of Guidance on Transport Assessment 2007, no defined threshold has existed on expected scales of submission, and it is appropriate that any development site is assessed on a case-by-case basis. However, traffic modelling assessments will be needed to support compliance with the guidance set out in DfT Circular.

Whether a development has potential to result in severe residual impacts to the SRN should be established during the scoping stage and NH will provide clear expectations on the evidence and assessments required. This determination should consider the location of the site and proximity to the SRN, quantum of development and expected trip generation on the SRN, and the existing operational performance of the SRN in locations where development traffic is expected.

The following analysis may be presented by the applicant for discussions within NH in the engagement process to allow NH to make an informed decision regarding the scope and level of modelling required.

Providing this information at an early stage can help reduce uncertainty, support proportionate assessment requirements and ensure that scoping decisions are evidence-led.

- Details of the proposed development;
- Expected trip generation and distribution on the SRN;
- Forecast planning situation and background growth assumptions;
- Baseline analysis of SRN impact area:

- Existing delay: For example, using Google Typical Traffic data or other journey time and congestion datasets;
- Existing traffic demand: For example, utilising WebTRIS permanent traffic count sites;
- Historic collisions: STATS 19 data could be used to inform historic safety performance; and
- Existing network layout, including active travel facilities: Aerial satellite imagery or site visit observations.

This list is not exhaustive but is provided to give an indication of the information NH may request to enable an informed decision on the required assessment.

Furthermore, the applicant can expect NH to have knowledge of the SRN context in the area of interest and to provide guidance informed by its operational experience and understanding of network performance.

Where a modelling assessment of traffic impacts is considered necessary, it must:

- Assess the impact of the proposed development on the safe and efficient operation of the SRN;
- Demonstrate that the function and performance of the SRN are maintained and protected;
- Identify and assess any mitigation measures where required;
- Demonstrate that the development would not result in severe residual impacts on the safety or performance of the SRN, in line with national planning policy;
- Consider the cumulative impacts arising from the development in combination with other committed developments; and
- Assess the plausibility and implications of any proposed movement strategy associated with vision-led planning approaches, including any projected reliance on the SRN.

Scenario Testing

Scenario testing can provide valuable insight into the sensitivity of modelling results and the effectiveness of different development and transport strategies. It should support the vision-led planning principles discussed earlier in this guidance.

Depending on the nature and scale of the proposal, scenarios may include:

- Variations in active travel and public transport mode share, including higher and lower levels of uptake;
- Inclusion of committed developments, planned mitigation measures or Local Plan growth assumptions;
- Alternative development build-out rates, phasing or development quantum;
- Variance in land use composition including different development use classes; and
- Changes to trip generation, trip distribution and trip internalisation assumptions.

The scope of scenario testing should be proportionate to the scale and complexity of the development and should focus on the assumptions that are most influential in determining transport outcomes. Where undertaken, scenario testing should clearly explain the assumptions applied, the rationale for their selection, and the implications for both development performance and impacts on the SRN.

7. How do I know if my site will impact the SRN?

Early engagement with NH allows any expectations to be raised from the outset. Not all network issues are readily apparent from publicly available data sources.

For example, operational challenges such as incident-related reliability issues, recurring congestion patterns, or locations with a history of near misses may only be identifiable through NH's operational knowledge and monitoring activities.

NH Spatial Planners can provide valuable insight into:

- Successes/challenges faced by previous planning submissions in the area;
- Cumulative development impact requirements of several smaller sites;
- Existing and proposed NH improvement schemes and any interactions between these schemes and the proposed development; and
- Known network constraints and operational issues that may influence assessment requirements.

To support these discussions, applicants are encouraged to submit a Transport Scoping Note at an early stage. This can help establish a shared understanding of the development proposal and provide the basis for agreeing proportionate assessment requirements.

8. How should my analysis be specified?

The aim of this section is to provide broad requirements for traffic modelling inputs. Due to the complexity and variability of the SRN operation and interaction with the local road network, and the variation in planning situations between local authorities, decisions regarding the approach to traffic modelling have to be made on a case-by-case basis. However, this section provides broad guidance for the approach to traffic modelling inputs, assumptions and analysis, to provide expectations around the quality of modelling submissions expected by NH, which is a leading cause of holding recommendations being made by NH.

Model Coverage

The extent of the traffic model should be proportionate to the scale and potential impacts of the proposed development.

As model size increases, so too do the complexity, resource requirements, and time required for calibration, validation, and scenario testing. Applicants should therefore

seek to define a study area that is sufficient to address the key transport issues associated with the development.

In general, the model should include only those links and junctions to produce a DfT Circular compliant assessment. This may require a wider area if there is expected interaction between junctions. For example, blocking back from a local road junction to an SRN junction may require inclusion of the SRN junction. The inclusion of locations where significant effects are not anticipated, based on initial scoping and agreed with NH and other relevant highway authorities, is unlikely to be necessary. An exception may be where an existing model is being utilised and a larger study area is already established and validated.

The model extent should be no larger than necessary to address the decision-critical issues, while ensuring that operational interactions, route choice, safety risks and cumulative effects are captured.

When defining the study area, applicants should recognise that some network impacts may not become apparent until future assessment years. In particular, issues occurring at the edge of the modelled area may only emerge once background growth, committed development, network changes, or changes in travel behaviour have taken effect. Therefore, care should be taken to ensure that the study area is sufficiently robust to capture foreseeable future impacts.

It may be cost efficient to extend SRN focused models to incorporate Local Planning Authority (LPA) junctions within one model, to allow consistent assessment of model results between NH and the LPA, as well as consideration of operational issues across the two networks.

When defining the model boundary, consideration should be given to the location and length of external links (i.e. where vehicles enter the model network). Models must be designed to ensure that there is sufficient capacity for all forecast demand to be loaded into the network within the modelled time period. Failure to provide adequate link length can result in latent demand (whereby vehicles are unable to enter the modelled area and are held outside the network). This can lead to an underestimate of traffic impacts at downstream junctions.

Neutral Months

The concept of a “neutral month” has long been embedded in transport guidance including the Design Manual for Roads and Bridge (DMRB). Traditionally neutral months have been considered to be April, May, June, September and October (excluding bank holidays). Earlier versions of TAG guidance expanded on this to define neutral periods more precisely as Monday–Thursday weekdays between March and November (excluding August), avoiding school holidays, Easter, and bank holiday periods, with suitable daylight conditions. Although this definition was removed in the May 2024 TAG update, it remains a useful practical benchmark for identifying representative traffic conditions.

In practice, neutral periods can be derived more accurately using long-term SRN data (e.g. ATC/WebTRIS), allowing analysts to tailor assumptions to the specific study area. Where traffic surveys cannot be undertaken within the same neutral

period, data may need to be adjusted or normalised—for example, using long-term count data to align surveys undertaken in different months, ensuring consistency in the model base and confidence in subsequent analysis.

In some locations, traffic demand is highly seasonal (e.g. tourist areas or near airports), meaning peak months can be significantly busier than the rest of the year. Seasonal modelling can be more complex due to different driver behaviour and reliance on neutral-based forecasting data. As a rule of thumb, seasonality should be considered where peak month flows are around 20% higher than average annual conditions, supported by evidence of increased congestion, delay, queueing, reliability issues or safety concerns

Peak Period Selection

When defining traffic surveys, upfront and ongoing engagement, or the submission of a Traffic Survey specification note can be useful to ensure expectations around model hours are fully captured. Survey scoping may need to be iterative. Initial data may be required to understand baseline conditions and inform development options before the final modelling scope can be confirmed. Fundamentally, the chosen peak hours must represent the most critical conditions for capacity assessment rather than simply fixed time periods.

A 12-hour Manual Classified Count survey capturing travel patterns over several days may be a useful starting point, typically focusing on AM and PM commuter peaks when the network experiences the highest demand and greatest operational pressure. However, there may be instances where traffic counts are required outside of the traditional 0700-1900 period, such as large manufacturing facilities where shift changeovers can occur during early or late periods.

Sensitivity testing may also be required where peak spreading or atypical demand patterns are evident, ensuring that the assessment captures worst-case operational scenarios.

Applicants should ensure inclusion of:

- Junction turning counts at SRN junctions (including slip roads);
- Mainline flow data (where relevant);
- Queue length and delay data on approaches to SRN junctions;
- Automatic Number Plate Recognition (ANPR) data where route choice is present
- Journey time and reliability data where congestion is an issue.

NH may be able to supply available data for use in the assessment. This can be discussed during engagement meetings and may include:

- Traffic count data from permanent count sites or historic surveys;
- Journey time data;
- Reliability data;
- Incident data;
- Collision or safety data;
- Existing model outputs;

- Known network constraints;
- Planned schemes; and
- Route manager intelligence.

9. Can I use a pre-existing model?

NH will generally support the use of existing approved models for use in development impact assessment. However model data should always be demonstrated to be representative of typical conditions. NH retains many models that have been approved for use in the assessment of impact on the SRN. Where the expected impact of the development site is captured in its entirety by one of these models, it is almost certainly more time efficient and cost effective to utilise the approved model. The use of NH models can be discussed and agreed during scoping discussions.

Common reasons that an existing model may not be a suitable tool for the assessment of development impacts include:

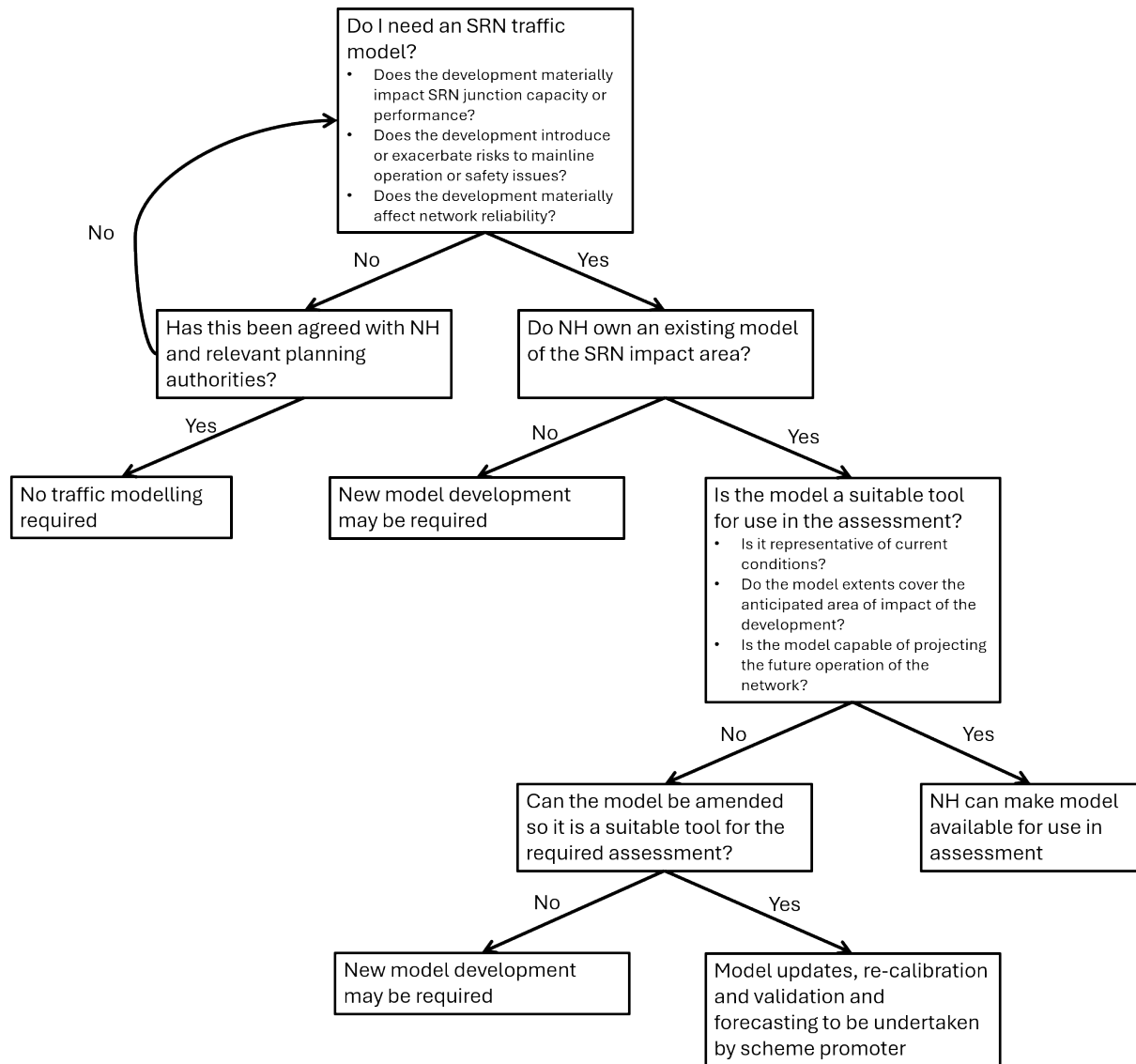
- Age of the model: traffic conditions may have changed since the base model was developed;
- Model extents: the model may not cover key junctions or locations where traffic impacts are anticipated; and
- Model type: the model software may not be capable in projecting future operation (e.g. due to anticipated future vehicle interactions, proposed changes in junction forms).

Some existing models may retain a pre-COVID base year. Such models should not be used except in the most exceptional circumstances, and a re-basing exercise should be undertaken to reflect post-COVID travel patterns.

A pre-COVID base model may be used in the instance that strong evidence is provided to demonstrate consistent traffic profiles between 2019 and 2023. In such instances, WebTRIS can be used as a reliable source of observed traffic data on the SRN, and allows the analyst to consider hourly, daily and yearly flow profile changes, changes in HGV proportions and speeds.

The flow chart in Figure 1 sets out the process to determine whether an existing model can be utilised in an assessment. This should be agreed in discussion with NH and relevant planning authorities.

Figure 1

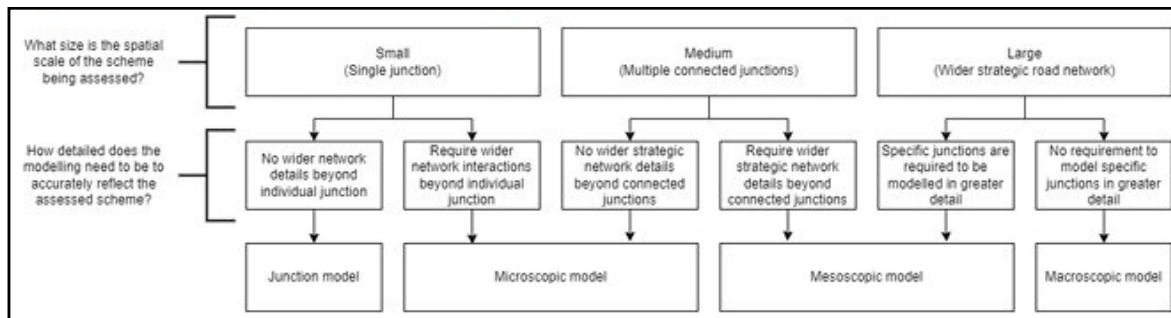


10. What type of model should I use?

The type and extent of model used should be discussed from the outset with NH, however an absence of capability in the required software package should not be a barrier to undertaking appropriate modelling assessments.

Figure 2 shows the decision process to be applied when considering which modelling approach should be adopted. Note, given the emerging nature of Mesoscopic modelling in the UK, unless an existing model fits the exact requirements of the model task proposed, it is unlikely that a new mesoscopic model will be requested by NH.

Figure 2



In addition to the above, the analyst should consider the following when selecting a model:

- Scale of impact on SRN;
- Queuing on mainline links;
- The effect and impact of variable signal operation (e.g. VA, MOVA); and
- More than one type of model may be required to assess different aspects, e.g., strategic model and junction model.

Strategic models

For developments with the potential to generate large-scale impacts, influence travel patterns across a wide area or result in significant rerouting effects, a strategic (macroscopic) equilibrium model should be used, with the option to undertake Variable Demand Modelling (VDM) if changes in travel behaviour may result from changing network conditions.

Where suitable, strategic models can be used to inform traffic forecasting, and trip distribution. The use of these models ensures alignment with agreed forecast growth assumptions, routing patterns, and committed infrastructure schemes.

The use of a full strategic model may not be proportionate to the scale or complexity of the assessment. Where this has been agreed through scoping discussions with NH and other relevant authorities, outputs, forecasts, or growth factors derived from an appropriate strategic model may be sufficient to inform the assessment while maintaining consistency with the wider strategic evidence base.

Using strategic model outputs to inform smaller-scale operational models is a well-established practice. Strategic models can provide forecasts of demand, route choice, and traffic flows that are subsequently refined within operational assessments. This allows detailed junction and corridor models to remain consistent with wider network conditions while providing a more accurate representation of local traffic operations, signal timings, queueing, and wider network interactions.

However, caution should be advised when attempting to directly replicate detailed operational model outputs within a strategic model. Such approaches can have limited impact or create excessive sensitivity, resulting in repeated iterations between modelling platforms and unstable feedback loops.

Microsimulation models

As stated in Figure 2, a key strength of microsimulation models is their ability to model individual vehicles independently, presenting a more realistic representation of observed driver behaviour and network performance. This is especially important within congested networks, where traditional tools do not accurately capture the effects of oversaturated conditions and blocking back between junctions, the effects of incidents, or complex lane-changing situations.

Microsimulation modelling may be appropriate where any of the following currently occurs or is anticipated to occur in forecast scenarios:

- Interaction between junctions is expected;
- Blocking back affects safety or operation;
- Merge, diverge or weaving behaviour is central to the issue;
- Lane discipline or signal operation is expected to affect the conclusion; and
- Simpler tools cannot answer the decision-critical question.

Where an operational assessment is required for consultation, project committee or other public meeting, the use of microsimulation can be a useful tool to articulate network improvement.

Junction models

Junction models are very localised and are most often used in the design and optimisation of T-junctions, roundabouts and traffic signals. Their use should be limited to small networks or individual junctions.

11. How can I demonstrate my model is suitable?

The DfT's TAG is considered the industry standard for calibration and validation of most traffic models in the UK, and the criteria set out in TAG Unit M3.1 should be considered as the best resource.

TAG recommends that calibration should include comparison of:

- Assigned flows and counts totalled for each screenline or cordon, as a check on the quality of the trip matrices.
- Assigned flows and counts on individual links and turning movements at junctions as a check on the quality of the assignment.

Validation checks typically include:

- Modelled and observed journey times along routes, as a check on the quality of the network and the assignment process.

Queue lengths are also an important indication of network performance, but observed queue measurement is always subject to enumerator judgement meaning they can be less reliable than flow or journey time data. As a result, NH will not generally place undue emphasis on queue length validation. If the model is demonstrably well calibrated and validated against other observed data, the modelled delays should be a good indication of network performance. Modelled

queues should, however, correlate reasonably with site observations of queuing behaviour and any significant discrepancies may indicate that areas of the model require further attention.

The purpose of calibration and validation is not to achieve a perfect match with observed data, but to demonstrate that the model provides a sufficiently accurate representation of observed network conditions to assess development impacts and support decision-making. Where targets are not fully met, the reasons should be explained, along with any implications for the assessment and justification for why the model remains fit for purpose.

12. Which forecast model years should I be using?

Appropriate model years should be selected to reflect both baseline and future assessment horizons, typically including a base year, at minimum an agreed opening year, and the requirement for any future assessment years determined based on scale/phasing of development. These years should align with planning policy expectations and account for background traffic growth, committed development, phasing and infrastructure delivery, as detailed in the DfT Circular 01/2022. To ensure assessments are consistent and comparable, the selected forecast years should align with Local Plan assumptions and NH's agreed forecasting principles.

In certain cases, however, NH may request forecast scenarios that differ from those required by the LPA. For example, to incorporate wider strategic forecasts or to ensure a vision-led approach, as set out in the DfT Circular 01/2022. The proposed forecasting should therefore be scoped with NH at an early stage to agree the appropriate set of forecast scenarios. This ensures that the assessment reflects the requirements of both NH and the LPA.

Early dialogue can benefit the developer by enabling NH and the LPA to agree a proportionate set of scenarios, potentially reducing the overall number of tests required and avoiding unnecessary modelling effort.

13. How should model outputs be presented?

Operational modelling outputs should be presented in a clear, easy to understand manner. The analysis of results should focus on the purpose of the modelling and the specific decision it is informing. The analysis should provide a clear conclusion to the modelling, including any caveats or assumptions in the modelling methodology. All reporting should note that traffic modelling is a tool and can only provide projections of potential traffic impacts.

The requirements for model outputs should be discussed and agreed with NH, as these may vary depending on the model type and issues and concerns at specific locations. However, this may include:

- Queueing on or towards the SRN, in particular, queueing towards main carriageway links;
- Journey times on key strategic routes and local roads, impacting the SRN;

- Forecast junction / link capacities; and
- Traffic demands on SRN links/junctions and interacting local road junctions.

Analysis presented in this manner should reduce NH's time to review and understand the model projection and aims to reduce delays due to NH requesting follow-up information.

Submissions of traffic modelling to NH for review should include all model files, input and output analysis and interpretation of results to allow NH to provide an informed decision based on the traffic modelling. This aims to reduce time delays caused by NH requesting additional files to support the application. The provided files should include:

- Model files, covering all scenarios tested
- Model input analysis, such as:
 - Raw survey data
 - Input demands calculations
 - Journey time analysis
 - Saturation flow calculations
 - Signal timing analysis
 - Junction geometry measurements
- Model calibration and validation files:
 - Traffic flow calibration
 - Journey time validation
 - Saturation flow calibration
 - Signal green time comparisons
 - Queue comparisons
 - Model variability t-test
- Forecast analysis
 - Traffic forecast calculations
 - Model operational outputs for all reported results.

14. What are the key modelling pitfalls (and how can collaboration avoid them)?

Pitfall	Collaborative Solution
Overly narrow study area	• Agree scope early • Ensure base model is sufficiently stress tested to consider blocking back.
Late model changes/new scenario requests	• Regular checkpoints/discussions
Black box modelling	• Transparent assumptions log • Discussion of calibration/validation performance
Insufficient sensitivity testing	• Agree scenarios upfront

15. Who should I contact to discuss?

NH has regional Spatial Planning teams, please use the most appropriate contact to discuss any forthcoming application. Note that if your site may have a network impact across multiple regions, include both planning inboxes in any correspondence.

East Region - PlanningEE@nationalhighways.co.uk

Midlands Region - PlanningM@nationalhighways.co.uk

North West Region - PlanningNW@nationalhighways.co.uk

South-East Region - PlanningSE@nationalhighways.co.uk

South-West Region - PlanningSW@nationalhighways.co.uk

Yorkshire/North-East Region - PlanningYNE@nationalhighways.co.uk