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Transport Professionals Association

Transport for NSW's Transport Modelling Guidelines

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NSW GOVERNMENT

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Acknowledgement of Country

Transport pays respect to Elders past and present, and recognise and celebrate the diversity of Aboriginal peoples and their ongoing cultures and connections to the land and waters of NSW.

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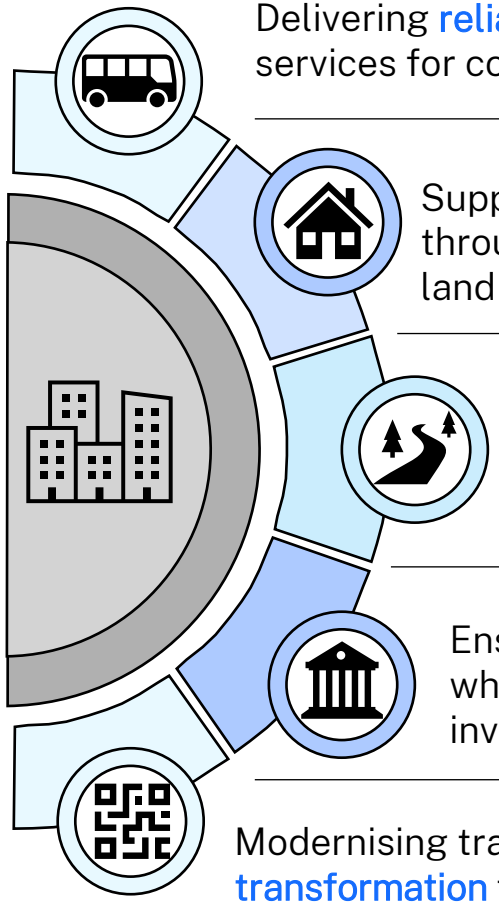
Introduction to the Transport Modelling Guidelines

Simon Hunter | Chief Transport Planner

Introduction to the Transport Modelling Guidelines

The Guidelines are designed to support key NSW Government priorities



Delivering reliable, high-quality essential services for communities

Supporting housing growth through integrated transport and land use planning

Building resilient, sustainable, and climate-ready transport networks

Ensuring financial sustainability while targeting transport investment where it matters most

Modernising transport through digital transformation to improve traveller and community outcomes

- Strengthening essential services relies on connected, accessible transport networks that enable people and services to move efficiently. Evidence based analytical techniques outlined in the Guidelines will support investment in transport corridors, designing improved public transport reliability, and planning for better links between homes, jobs, and essential services.
- Housing supply and planning reform is a key priority where the Guidelines present tool selection and data analysis methods to accelerate rezoning and development assessments, ensuring new homes are built near transport, infrastructure, and employment hubs, reducing congestion and improving community outcomes.
- Climate, energy, and disaster-recovery priorities translate directly into expectations for transport to improve resilience, reduce emissions, and support community safety. The Guidelines provide strategic assessment methodology to evaluate network-wide resiliency planning.
- Focusing investment on projects that deliver the highest social, economic, and community outcomes, the Guidelines support Treasury and Planning gateway processes to maximise social and economic utility of transport infrastructure.
- Digital transformation is a core NSW priority, enabling better services, smarter infrastructure, and streamlined planning systems. The Guidelines provide a range of high and low technical modelling techniques to forecast future state conditions, with a detailed discussion of the NSW transition to activity-based modelling.

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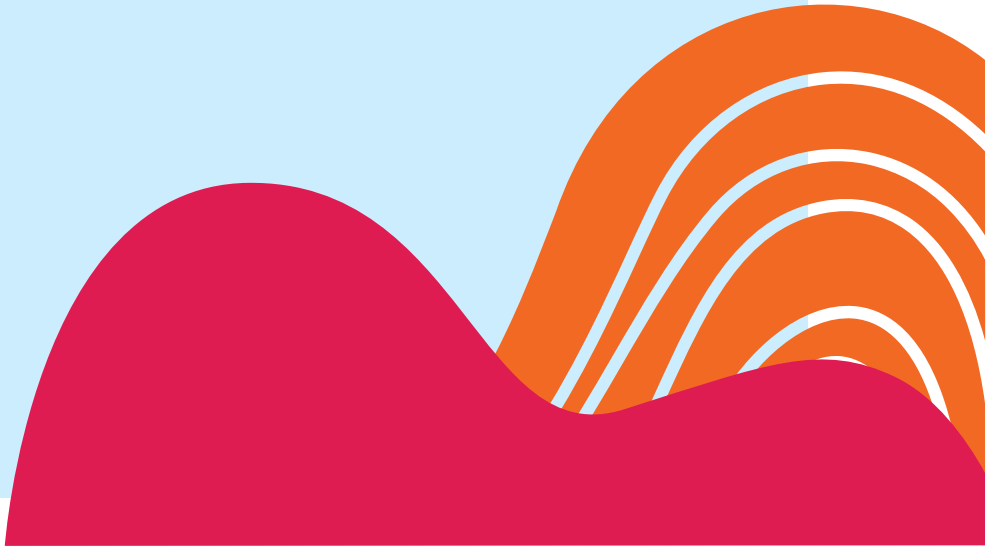
Industry Drivers for the Guidelines Update

Karen Willetts | Director Transport Modelling



Industry Drivers for the Guidelines Update

Need for Updated Guidelines

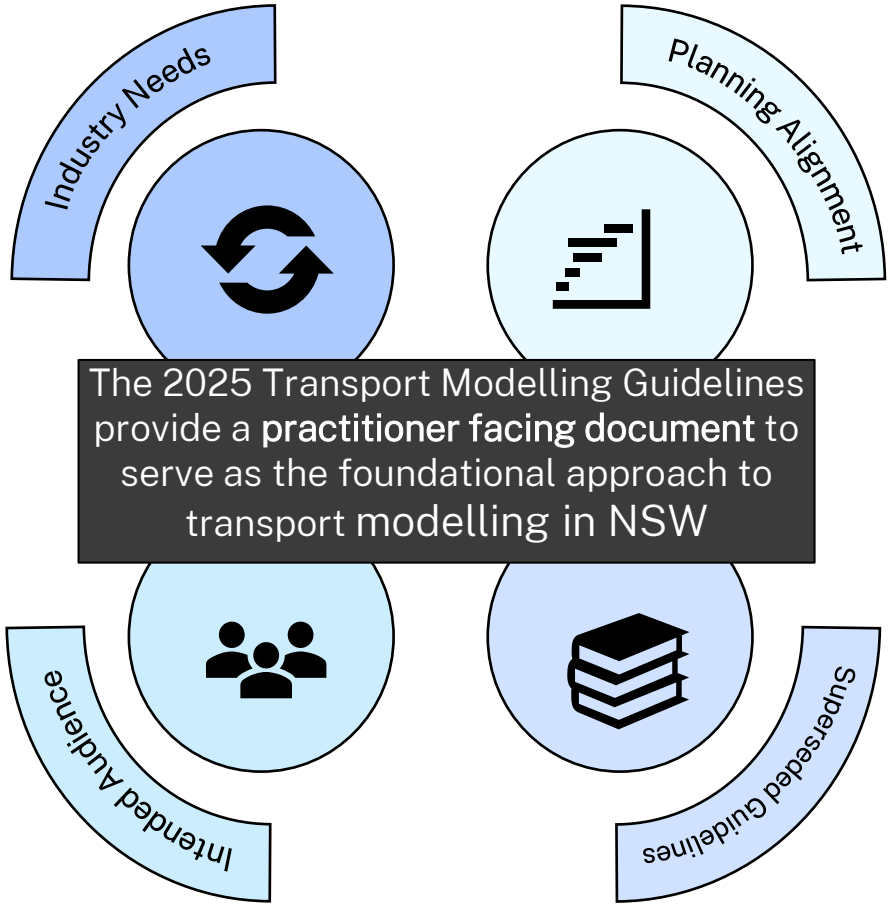
Industry Needs

Previous TfNSW Modelling Guidelines

- Focus on operational modelling, did not discuss multi-modal approaches and model selection.
- Are geared towards technical modelling practitioners.
- Do not account for contemporary planning and economic challenges.

Intended Audiences

- Project managers utilising modelling on their projects.
- Modelling practitioners influencing planning, investment, design, or infrastructure delivery.
- Stakeholders and recipients of modelling data, leveraging it to inform decisions.



Strong Alignment with broader planning tools

These Guidelines complement planning frameworks (Guide to Traffic Impact Assessment, Transport Management & Accessibility Plan, Movement & Place) by:

- Reinforcing the message of vision-led planning,
- outlining the processes for selecting the right tool for the right job,
- outlining appropriate modelling practices and criteria once a tool is chosen.

Superseded Guidelines

- 2013 TfNSW Operational Modelling Guidelines
- 2017 TfNSW Technical Direction on Operational Modelling Reporting Structure
- 2018 TfNSW Traffic Signals in Microsimulation Modelling

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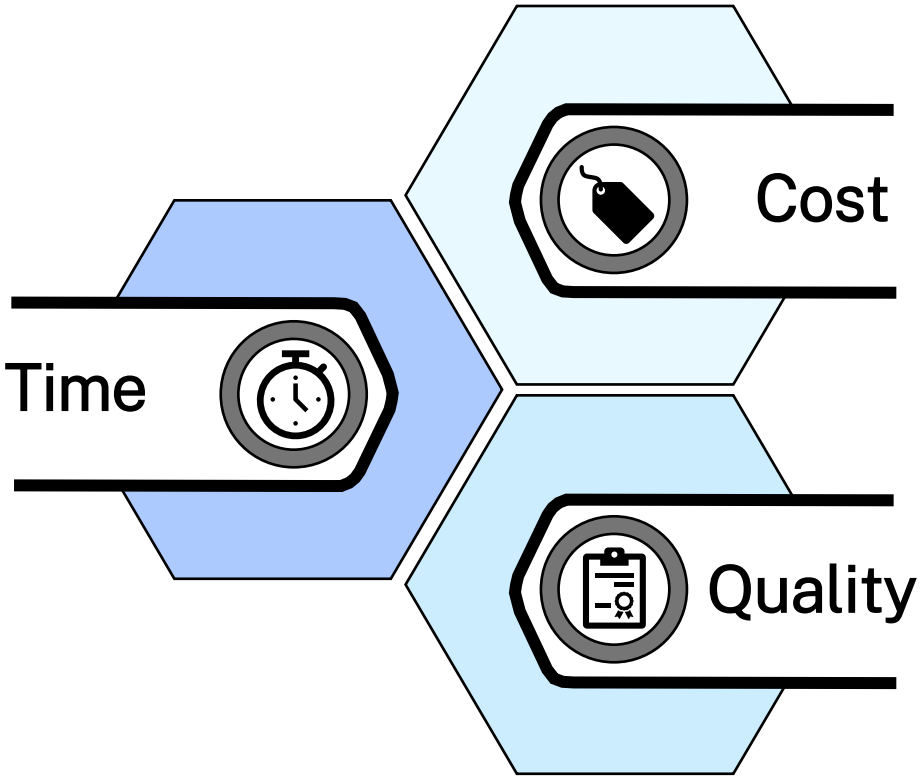
Industry Drivers for the Guidelines Update

Process Improvements Resulting from the Guidelines

Time (Model Selection Process)

The Model Selection Process is designed to ensure stakeholder alignment prior to commencing modelling, saving considerable time in modelling activities. The Selection Process guides stakeholders through:

- Clearly defining the project objectives, what does the project intend to investigate, what quantitative metrics could support decision making.
- Identifying the, limitations strengths, and considerations of different modelling approaches on meeting project objectives.
- Achieving an informed agreement between stakeholders to avoid rework from poor analytical outcomes.



Cost (Optimised and Fit-for-Purpose Modelling)

The Guidelines provide detailed structured protocols to optimise modelling scope and minimise costs through:

- Clearly defining modelling scopes and objectives.
- Critically evaluating data and inputs to avoid rework.
- Thorough development guidelines and documentation to support peer reviews and endorsement processes.

Quality (Documentation to Promote Reusability)

The Guidelines outline documentation needed to support modelling, including selection process, methodology, development, application, assumptions, and handover. Documentation

- Improves clear endorsement of assumptions.
- Promotes future model reusability.
- Speaks to the technical robustness of modelling to support planning and investment decisions

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Guidelines Development Process and Application

Navreet Virdi | Senior Manager Model Planning

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Guidelines Development Process and Application

Development and Consultation Process

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Guidelines Development Process and Application

Chapter 1 – Introduction to the Guidelines

Chapter Overview

This chapter provides an introduction to the Guidelines, including:

- Guidelines structure.
- Exclusions and acknowledged topic gaps.
- Ethical conduct in transport modelling.
- Literature review informing these Guidelines.

Chapter Intended Audience

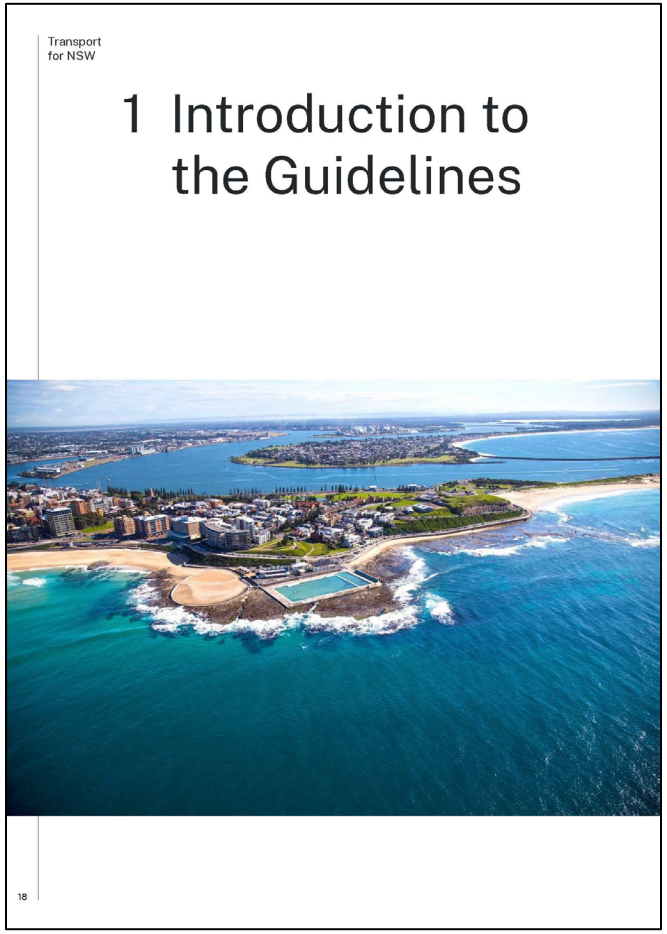
This chapter is intended for:

- Transport planners, modellers, and economists seeking to understand their ethical obligations when using transport modelling to inform transport planning direction and investment decisions.

Chapter Intended Use

This chapter provides non-prescriptive guidance regarding the purpose and structure of these Guidelines. This chapter should be referred to when:

- Seeking key contacts within TfNSW including the Transport Modelling Function, Strategy, Insights, and Customer Experience Branch Data Analytics team, SCATS team, and Development Services Transport Planning team.
- Seeking an abridged summary of the full literature review contained in the Guidelines appendix. The Guidelines appendices also contain:
  - 1-page detailed summaries of the TfNSW modelling tools and ecosystem.
  - Demand elasticities useful for benchmarking strategic modelling results.
  - Model Selection Process template forms.



Guidelines Development Process and Application

Chapter 2 – Model Selection Practitioner Guidance

Chapter Overview

This chapter discusses many of the activities that precede any modelling activities including:

- Understanding the NSW treasury gateway and planning processes, with modelling alignment to GTIA, TMAP, and Movement and Place.
- Clearly defining the project objectives, and selection of a suitable modelling tools.
- Transport data sources, seasonality checks, and transport modelling report requirements.

Chapter Intended Audience

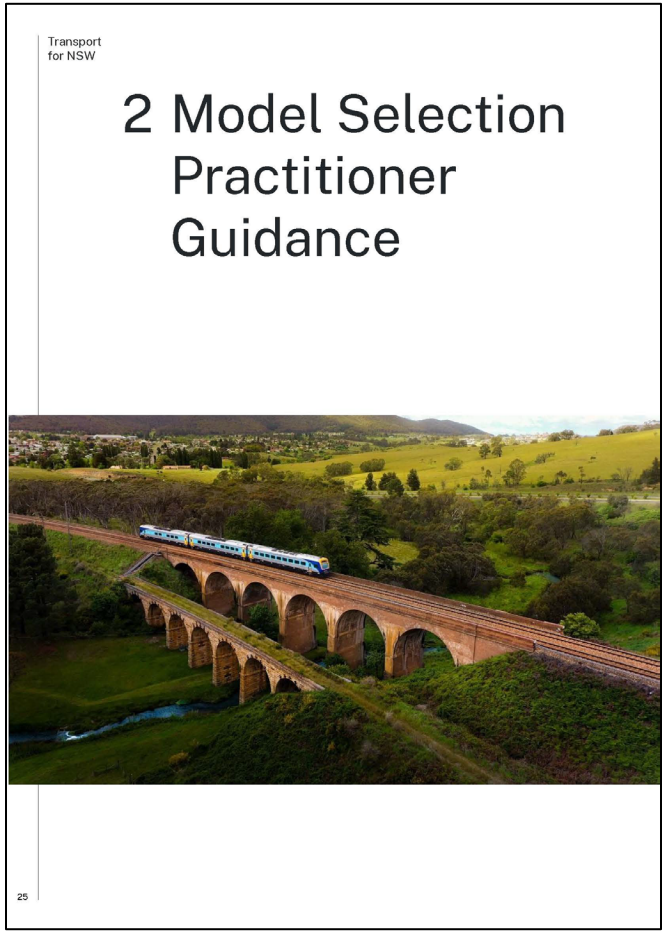
This chapter is intended for:

- Transport planners seeking to understand suitable modelling tools to support their project by following the Transport Model Selection Process.
- Transport modellers seeking to understand the NSW treasury and planning gateway processes, and seeking to identify documentation needed to accompany modelling in NSW.

Chapter Intended Use

This chapter provides prescriptive guidance to support selection of an appropriate modelling tool to evaluate project-specific objectives. This chapter should be referred to when:

- Initiating a project, by following the Model Selection Process to clearly define project objectives and then matching a suitable modelling tool.
- Seeking to understand how modelling supports Vision and Validate Planning
- Seeking to understand differences between modelling tools, software packages, and suitability to different project types.
- Identifying critical model reporting requirements
- Understanding various project roles and responsibilities associated with modelling



Guidelines Development Process and Application

Chapter 3 – Place Forecasting

Chapter Overview

This chapter discusses the core socio-demographic input to the TfNSW strategic models (Travel Zone Projections), including:

- Overview of the Travel Zone Projections and population synthesiser.
- Differences between open city and closed city modelling for economic appraisal.
- Modelling supply side land use and demand side transport infrastructure covariant impacts.

Chapter Intended Audience

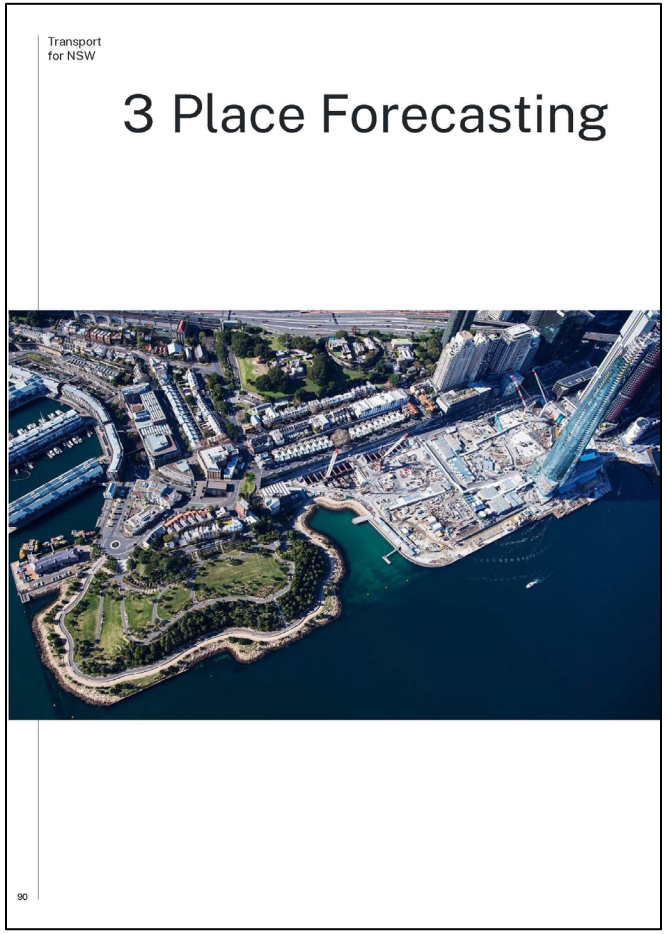
This chapter is intended for:

- Transport planners seeking the inputs to the travel zone projections and population synthesiser, a key input to TfNSW modelling tools.
- Transport modellers seeking to modify population, employment, and sociodemographic profiles for input to strategic transport models.

Chapter Intended Use

This chapter provides prescriptive guidance to support development of a project specific custom land use scenario for input to strategic modelling. This chapter should be referred to when:

- Seeking to learn about the NSW Travel Zone Projections (TZP).
- Understanding how demographic profiles can be altered using the TfNSW population synthesiser.
- Considerations of closed city modelling and open city modelling are required, such as considering control totals and developing custom land use scenarios.
- Seeking to understand the modelling framework for place-based and transport-infrastructure initiatives.
- Applying the supply and demand modelling in economic analysis.



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Chapter 4 – Strategic Modelling

Chapter Overview

This chapter discusses strategic modelling of multi-model transport systems using the TfNSW modelling ecosystem, including:

- An overview of the TfNSW modelling ecosystem.
- Fitness for purpose checks when applying foundation models, understanding model limitations.
- Strategic modelling capabilities and outputs to support planning and economic appraisal.

Chapter Intended Audience

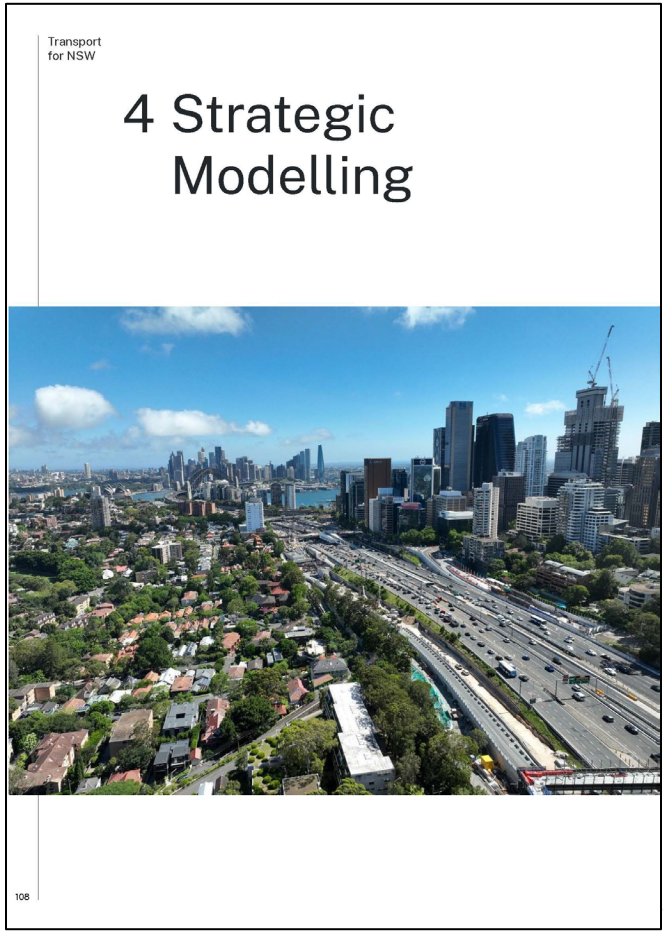
This chapter is intended for:

- Transport planners seeking to understand the differences between various TfNSW strategic models, and a selection of accessible strategic modelling outputs.
- Transport modellers seeking to review calibration, validation, and fitness-for-purpose checks when applying strategic models for local area projects.

Chapter Intended Use

This chapter provides prescriptive guidance to support the strategic modelling of multi-modal transport systems. This chapter should be referred to when:

- Seeking to understand the nuances, strengths and limitations of the various models within the TfNSW strategic modelling ecosystem.
- Identifying project-specific model application activities that should be performed when using foundation models.
- Establishing model calibration and validation targets, responsiveness tests, sensitivity tests, and demand elasticity tests.
- Identifying strategic modelling limitations and suggested mediations for projects.
- Understanding usefulness of different modelling outputs, reporting requirements, and application checklists.



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Chapter 5 – Operational Modelling

Chapter Overview

This chapter discusses operational modelling of road-vehicles, including:

- Operational model scoping, study area characterisation, development and calibration.
- Detailed analytical and SCATS signal modelling.
- Statistical toolkit for modelling results significance identification.

Chapter Intended Audience

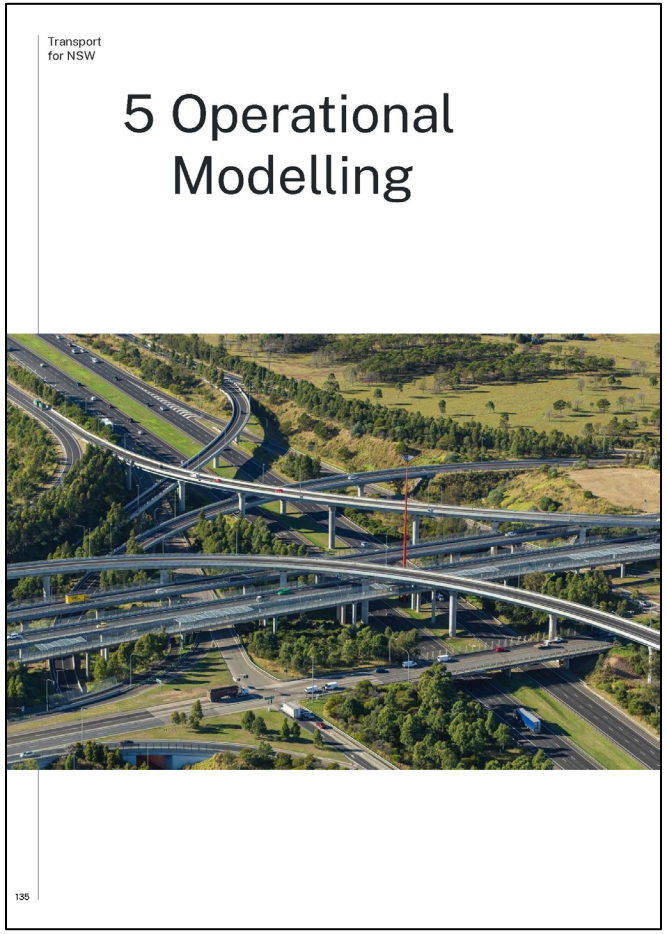
This chapter is intended for:

- Transport planners seeking to understand the differences, strengths, and limitations of analytical, microsimulation, hybrid, and mesoscopic modelling.
- Transport modellers seeking to identify suitable calibration and validation targets based on model size and use cases.

Chapter Intended Use

This chapter provides prescriptive guidance to support operational modelling of road-based transport. This chapter should be referred to when:

- Seeking a prescriptive step-by-step guide to operational model development, including starting with site visits.
- Identifying calibration and validation targets.
- Defining buffer zones around operational models to account for boundary conditions.
- Seeking detailed SCATS coding logic including VAP coding examples for ramp metering.
- Using operational modelling to support quantitative surrogate safety assessments.
- Requiring a detailed statistical toolkit with step-by-step instructions to quantify the confidence intervals of modelling results.



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Chapter 6 – Active Transport Modelling

Chapter Overview

This chapter discusses both the demand and operational modelling of active transport including:

- Walking and cycling mode characteristics.
- Useful walking and cycling volume sources, to support active transport planning and modelling.
- Modelling tools, analytical methods, and visual outputs to support compelling story telling.

Chapter Intended Audience

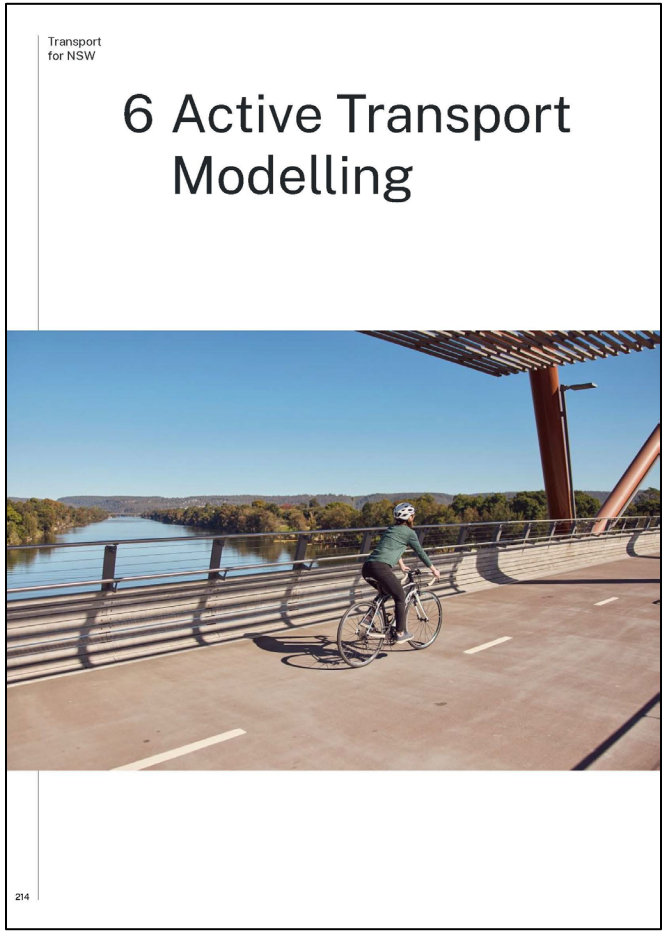
This chapter is intended for:

- Transport planners seeking to identify suitable data sources for walking and cycling volumes, and seeking to understand the analytical and story-telling capabilities of active transport modelling.
- Transport modellers seeking to calibrate, validate, and operate active transport models, identifying suitable data sources, analytical methodologies, modelling tools, and calibration methods.

Chapter Intended Use

This chapter provides prescriptive guidance to support modelling the demand and operational response of walking and cycling to infrastructure change. This chapter should be referred to when:

- Seeking data sources for walking and cycling volumes and understanding limitations
- Identifying suitable methodologies for deterministic analysis with practical worked examples to support walking and cycling demand assessments.
- Developing operational models for pedestrians and cyclists.
- Sourcing walking and cycling mode parameters and elasticities to support various modelling techniques and tools.
- Identifying suitable outputs to form compelling stories and visually communicate sophisticated modelling data.



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Chapter 7 – Emerging Techniques and Trends

Chapter Overview

This chapter discusses topics that TfNSW does not yet have long-standing experience with, including:

- Use of "Big Data" in model calibration, including data quality checks.
- Activity Based Modelling, outlining TfNSW ABM model development approach.
- Impact of emerging mobility trends on travel demand including EVs, CAVs, MaaS.

Chapter Intended Audience

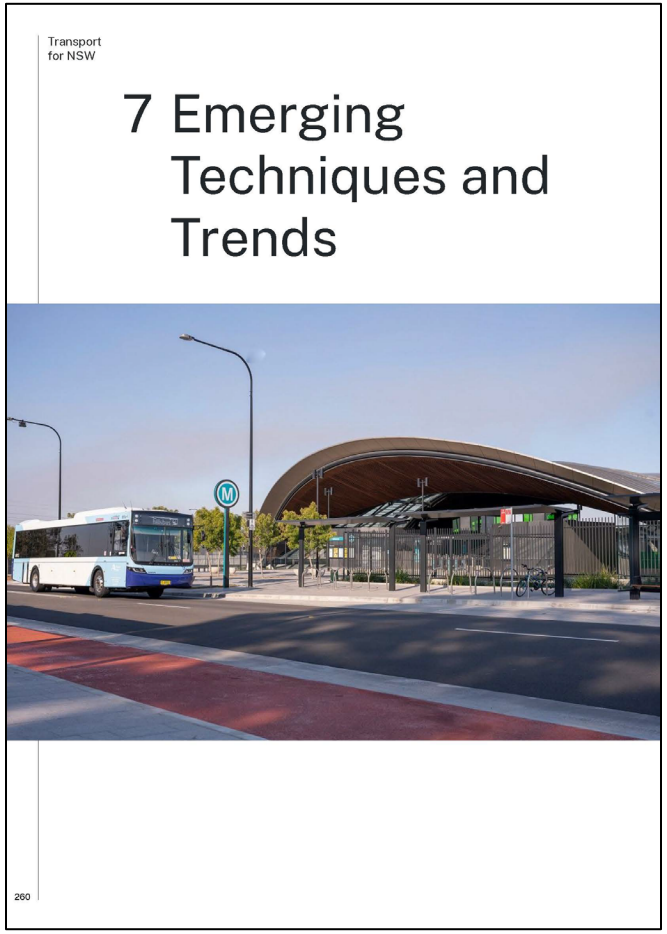
This chapter is intended for:

- Transport planners, modellers, and economists, seeking to understand potential demand and operational impacts of emerging technologies through industry research.
- Transport researchers seeking to understand contemporary challenges and focus areas for industry analytical tool development.

Chapter Intended Use

While not providing prescriptive guidance, this chapter provides useful information to support the use of emerging tools and consideration of emerging step-changes in transportation. This chapter should be referred to when:

- Considering the use of "Big Data", this chapter outlines sensibility checks to adequately consider the embedded bias of big data sources.
- Preparing modelling practitioners for the development and use of activity-based modelling in NSW, by providing an outline of TfNSW's ABM development approach.
- Seeking to perform model input sensitivities or model output post-processing scenario testing to assess the impact of emerging transport technology, including aspects such as:
  - Mobility as a Service,
  - Connected and Autonomous Vehicles
  - Electric Vehicles.



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Known Limitations and Future Updates

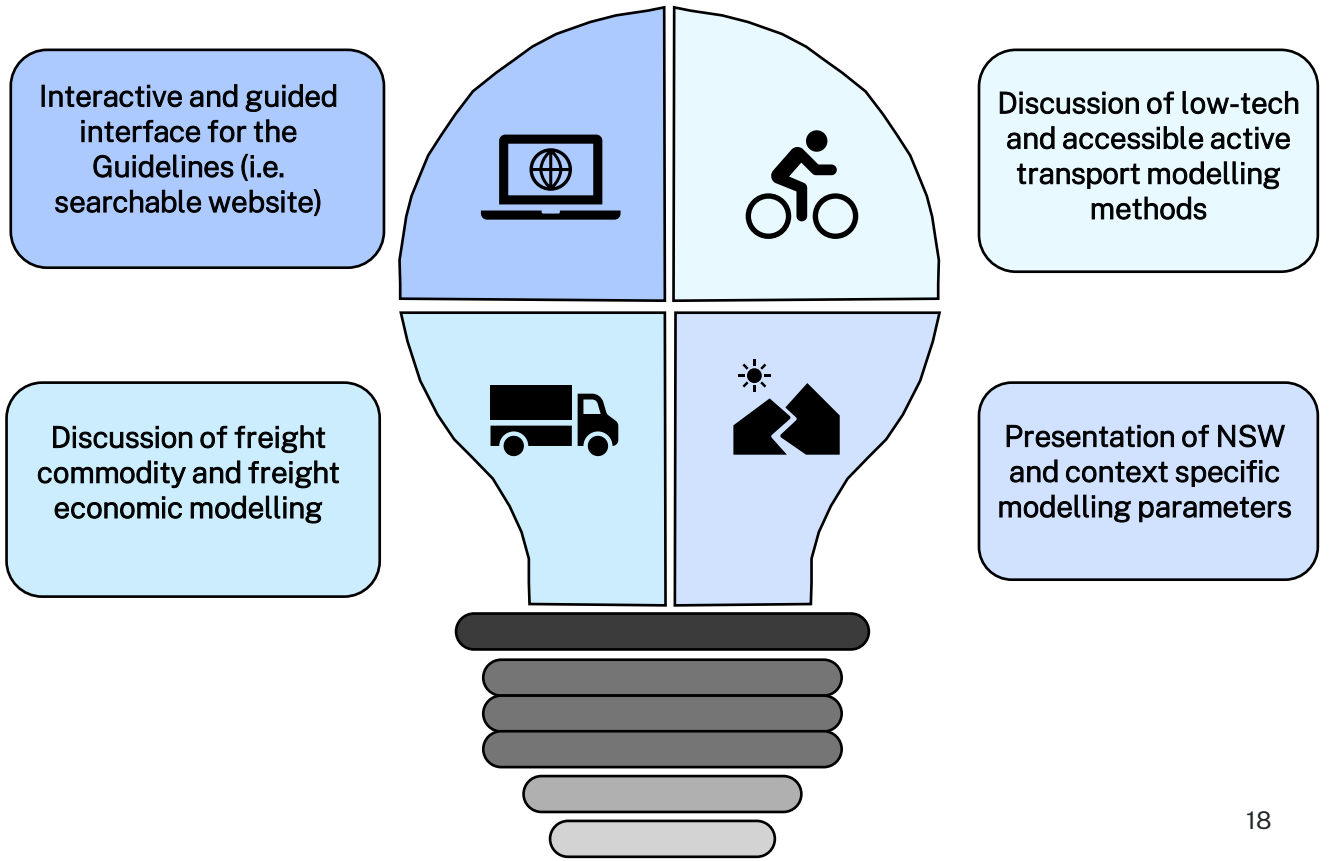
Transport for New South Wales is committed to periodic updates and maintenance of the Transport Modelling Guidelines, informed by

- Industry feedback,
- Stakeholder comments, and
- Evolving and economic appraisal needs

The Transport Modelling Function welcomes industry and research partnerships and collaborations to develop future content for the Guidelines.

Contact the Transport Modelling Function at TransportModelling@transport.nsw.gov.au

Acknowledged limitations and topic gaps of the Guidelines include:



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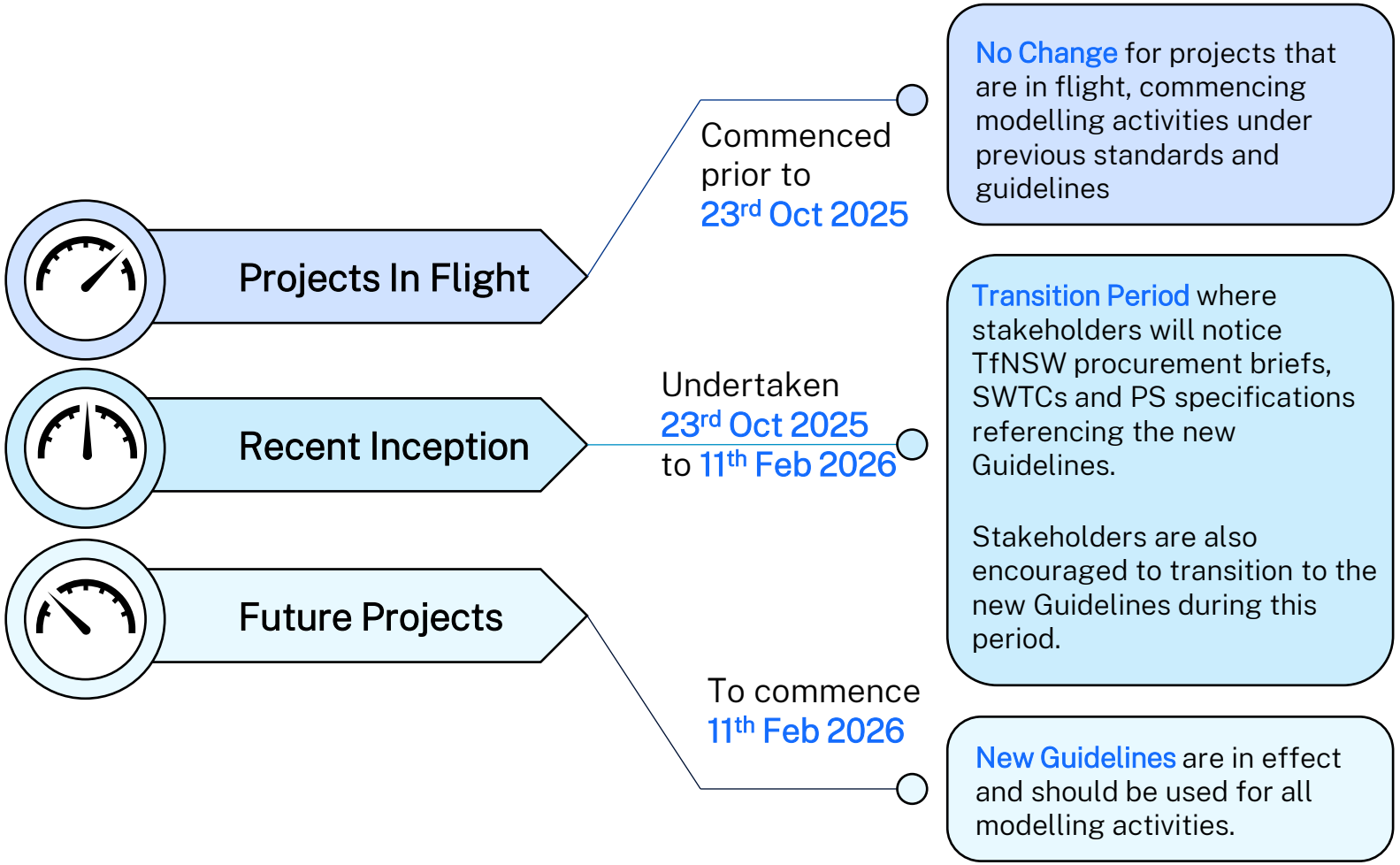
Guidelines Access and Feedback



The TS05461 2025 Transport Modelling Guidelines supersede the following TfNSW Standards and Guidelines:

- TS 05461 Traffic Modelling Guidelines (2013)
- TS 05445 Traffic Signals in Microsimulation Modelling (2018)
- TS 05442 Operational Modelling Reporting Structure (2017)

The Guidelines are hosted and publicly available on the TfNSW Standards Portal.

We enthusiastically encourage and welcome feedback and enquiries via TransportModelling@transport.nsw.gov.au.

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Thank You!

Questions?

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