

AUCKLAND TRANSPORT / NZ TRANSPORT AGENCY NETWORK OPERATING FRAMEWORK TRIAL

Author & Presenter:

Rob Douglas-Jones MEng (Hons)
Traffic Operations Leader – West
Auckland Transport
rob.d-j@aucklandtransport.govt.nz

Co-Authors:

Richard Lloyd BSc (Hons)
Senior Traffic Signal Engineer
Joint Traffic Operations Centre, Auckland
richard.lloyd@jtoc.govt.nz

Paul Glucina BPlan (Hons)
Principal Transport Planner
NZTA, Auckland
paul.glucina@nzta.govt.nz

ABSTRACT

Auckland Transport (AT) and the NZ Transport Agency (NZTA) are trialling the use of the Network Operating Framework, which is based on VicRoads' SmartRoads process. This process, which applies to Auckland's 'One Network' (State Highways and local roads) helps to manage competing demands for limited road space by allocating priority to roads/places for particular transport modes at different times during the day. This approach helps to ensure that a sense of place is considered within town centres and it prioritises the movement of people and goods rather than vehicles.

This process is a proactive approach to planning the network and guiding operational activities that has been developed by VicRoads. This approach includes an inclusive process and a software tool to develop a Network Operating Plan (NOP) which helps assess operational changes and planned investment on the network.

The Auckland trial has involved development of a high level NOP for the entire region and a detailed NOP for a metropolitan centre and the surrounding area.

The trial NOPs have been used on our Route Optimisation Programme and has shown significant benefits for helping to make difficult decisions and trade-offs between different modes. The NOP has helped to inform the strategic direction of route optimisation projects and the Network Fit Assessments ensure linkage between operational decisions and strategic planning.

INTRODUCTION

Over the next 30 years Auckland is anticipated to grow by an additional one million people. Accompanying this growth will be an increasing demand for transport and subsequent competition for the use of limited road space. One of the ways that Auckland Transport (AT) and the NZ Transport Agency (NZTA) are currently looking to manage these competing demands is through the use of the Network Operating Framework process (based on the VicRoads SmartRoads process) to develop Network Operating Plans (NOP). The NOP, which will apply to Auckland's 'One Network' (State Highways and local roads) will help to manage competing demands for limited road space by allocating priority to roads and places for particular transport modes at different times during the day. The NOP enables consideration of a sense of place within town centres and it prioritises the movement of people and goods rather than vehicles.

AT and NZTA through a Partnership Charter for Traffic Operations have committed to working in close collaboration with the aim of "providing an integrated approach to moving people, goods and services safely and effectively throughout the Auckland region". This charter established the principle of operating and developing the Auckland roading network as "One Network" and required the formation of the Joint Traffic Operations Centre (JTOC).

It is envisioned that the use of the Network Operating Framework process in Auckland could help to ensure that decisions, large or small, that impact on the "One Network" are consistent and complimentary across roads managed by our two organisations. Auckland's Integrated Transport Plan (produced in collaboration between AT and NZTA), will stipulate the use of a Network Operating Framework type approach in order to help get the most out of existing infrastructure through operational interventions (such as changes to parking restrictions or traffic signal phasing) as well as helping to inform projects.

This process is currently being trialled in Auckland, and whilst the trial is still on-going and further work needs to be completed before we can decide how best to apply this process here, early results are promising. A comprehensive report of the findings from the trial is currently being prepared (Auckland Transport (2012)) and this paper summarises work completed to date and some key findings.

WHAT IS SMARTROADS?

SmartRoads is a strategy lead approach to planning and operating a road network that has been developed by VicRoads in Melbourne. This approach involves an inclusive / collaborative process for the development of a Network Operating Plan along with a software tool to assist in making decisions for the network. This approach is based around a collaborative agreement of strategic outcomes for the transport system, agreement of the functional purpose for places and road network elements (by mode), developing movement priorities by place, mode and time of day. The approach provides a mechanism for determining where the network is not performing (gaps) and hence where to prioritise interventions and also a methodology for testing interventions against strategic objectives. Lastly the approach includes a feedback loop of knowledge into Strategy development. This is summarised in Figure 1 below:

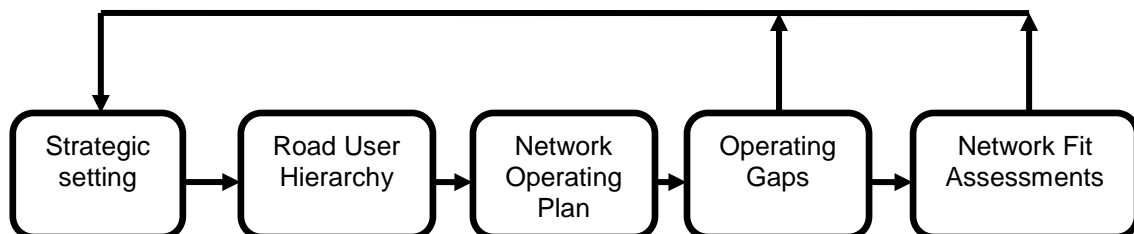


Figure 1: Summary of the Network Operating Framework process

The Network Operating Plan is then used to inform decisions that affect the way the road network is operated, whether they are operational changes or major projects. The objective in Auckland is

to use this framework to help ensure that the transport network is planned in a way that supports and compliments 'places', and the movement of people and freight is prioritised as opposed to just moving vehicles.

The core elements of the framework are described by VicRoads (2012) and summarised below:

1) Road User Hierarchy

A Road User Hierarchy is developed by allocating each transport mode to routes. Routes are selected using SmartRoads guiding principles, drawing on available knowledge, traffic and land use data. This is an inclusive process with all stakeholders involved. The Road User Hierarchy is presented as a colour coded map showing all routes according to priority by mode and place.

2) Network Operating Plans

This builds on the Road User Hierarchy with the addition of including priority weightings for each mode. A separate NOP is created for each time period (e.g. morning peak, inter-peak, evening peak and off-peak). These plans provide a level of detail to help practitioners manage the network temporally and make project decisions that align with the agreed objectives.

A set of simple priority rules for each mode are determined for different land uses and by time of day. Figure 2 shows an example of relative priorities by place and by time of day for pedestrians as used by VicRoads. No arrow indicates neutral priority, the smaller arrows indicate that mode is encouraged and the large arrow indicates strong encouragement of the mode.













 Time of day:	Place:			
	Pedestrian Priority Area 			
	Outside town centres	Strip shopping & major centres	Principal town centre	City centre
AM Peak				
Inter-peak				
PM Peak				
Off Peak				

Figure 2: Example showing relative priorities for pedestrians

3) Operating Gaps

With the priority modes known for each location by time of day the Network Fit Assessment tool allows input of volumes and levels of services and an algorithm is run to ascertain the operating gaps. The Operating Gap which indicates how well we are doing against the plan. The Operating Gaps are calculated by combining numerous inputs;

- Relative priorities from the NOP
- Volumes
- Levels of Service (LoS)
- Relative efficiency factor (takes occupancy into account) &
- Mode shift factor (desired growth in mode over time)

This is presented as a colour coded pie chart (Figure 3) that can be used to identify which locations currently operate at a poor LoS. Slices indicate the scale of deficiencies by mode. This allows the road controlling authority to target interventions at locations or areas with the greatest operational need.

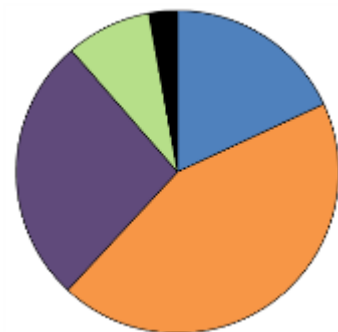


Figure 3: Example Operating Gap Diagram

4) Network Fit Assessments

A Network Fit Assessment is a process used to help determine if a proposed intervention will close the operating gap. The assessment process is used to determine the degree of 'fit' of a proposal (be it an infrastructure project, land use change or change in operation) and whether or not it

supports the intent of the NOP. The assessment is also a collaborative process and provides decision-makers with information to better understand the trade-offs between transport modes within a wider network context.

NETWORK OPERATING FRAMEWORK BENEFITS

The main benefit of this process lie in improving engagement and understanding between engineers, planners and stakeholders, right from setting strategy through to understanding the impacts of projects. The process also provides significant value when assessing options for projects where there is no clear best option. The Network Fit Assessment tool can succinctly show whether the impacts on each are positive or negative and it can show this location by location, or across a wider network area. The process also helps to ensure that projects and operations focus on the movement of people and goods rather than just vehicles, thus helping to maximise the efficient use of the transport system.

TRIAL SCOPE & OBJECTIVES

The objectives of the Auckland Network Operating Framework trial were;

- To determine whether there is value in using this process in Auckland,
- To find out what aspects need to be tailored for use in NZ / Auckland,
- To determine what level of resourcing is required to roll out the process in AT/NZTA,
- To determine how the process could fit into AT and NZTA processes, and
- Ensure officers have a good understanding of the framework process and tool before rolling it out across the region.

It was decided early on that the trial should include the development and testing of two separate NOPs using two different methodologies referred to as the 'Horizontal' and 'Vertical' approaches.

The Horizontal Approach was to build a high-level NOP for the whole Auckland region and determine its potential uses, whereas the Vertical approach was to build a detailed local area NOP.

The Takapuna area on Auckland's North Shore was selected as a suitable location for the Vertical Approach because it has relatively few external links, it supports a wide range of transport modes it includes NZTA roads as well as AT controlled roads and we had a good deal data readily available for the area to help inform the process and input into assessments. The scope of this work-stream included:

- Development of a detailed NOP through a process of workshops involving staff from AT and NZTA.
- Utilising existing traffic data and LoS in order to identify Operating Gaps across the trial area.
- Undertaking Network Fit Assessments using the SmartRoads tool to confirm applicability and understand operating gaps and project fit with the NOP.

The following work is still in progress and bridges both the Horizontal and Vertical work-streams;

- A review of how the tool is set up and how appropriate it is for use in Auckland and NZ. This includes reviewing terminology and factors used in calculations to assess Network Fit.
- Determining how to fit the Network Operating Framework process to the Auckland environment.

TRIAL FINDINGS

Although still a work in progress, we are making good progress with the trial and have completed the Horizontal NOP for the region and the Vertical NOP for Takapuna. This section summarises the main findings to date.

Technical Findings from Network Fit Assessments

One of the Network fit Assessments undertaken for the trial was for a Route Optimisation project.

The Route Optimisation Programme is a joint Auckland Transport / NZTA programme that involves reviewing and optimising major corridors that have signalised intersections. Most of this work is undertaken by JTOC and the Taharoto Road corridor project in Takapuna was selected for use in the SmartRoads trial. Options for improving operations on this congested corridor were assessed using the Network Fit Assessment tool using the NOP developed using the Vertical Approach.

This corridor leads to the Northcote Road interchange on the SH1 Northern Motorway, as well as providing access to a large college, a business park and the Northcote busway station. During the morning peak period approaches heading towards the motorway are regularly congested and cycle time is generally running at 150s which delays pedestrians and buses heading to and from the busway station and central Takapuna.

Two interventions were reviewed using the Network Fit Assessment tool; lower cycle times across the coordinated corridor, and removal of a short section of bus lane heading towards the busway station.

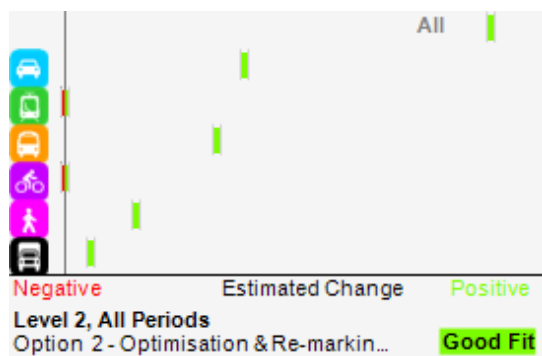


Figure 4: Network Fit Assessment Results for Taharoto Road Route Optimisation Project

The results of one Network Fit Assessment (Figure 4) showed positive impacts for most modes, the exceptions being trams (there aren't any in Takapuna!) and cyclists where the impacts were deemed to be nil or negligible. Its ease of use and simple outputs that can be provided approach by approach or combined across the whole area, provides an effective means of communicating the project pros and cons. This was particularly useful at communicating project benefits that may be counterintuitive to non-engineers. In one example it was used to show how removing a short section of bus lane on an intersection approach was actually beneficial to the majority of buses using the

intersection. It was also found that the assessment can be easily incorporated into the project processes with minimal increase in man hours.

Lessons Learnt

The process, principles and terminology:

We found that it is not practical to develop a high level Road User Hierarchy for the whole region through a workshop. When looking at such a large area many important details get overlooked and to get a good quality output it is necessary to break things down into manageable areas and develop a series of plans to be pieced together.

We found that the Horizontal Approach does not have sufficient detail to assist in specific operational decisions as it is a strategic level plan and it lacks the required detail and consideration of active modes. A NOP developed through the Vertical Approach is suitable tool to assist with these types of decisions. The Horizontal NOP is, however, an agreed principal road network use model, which will be used as the base network and a starting point from which to build up the Vertical Approach NOPs.

Workshops:

Through the trial we quickly learnt that collaboration with buy in from stakeholders is critical to success. One of our early workshops floundered due to poor communication of the principles behind the process and the specific workshop objectives. The build process and concise guidance on the application of Road Use Hierarchy needs to be carefully communicated to workshop participants. We also found that the most effective way of helping a new audience understand the process and its value is to run through a few example case studies.

We also learnt that there appears to be significant demand for NOPs from various sources;

- Strategy and planning functions, e.g. Corridor Management and Local Area Planning

- (Auckland Transport and Auckland Council)
- Operational departments such as JTOC.
- Project and infrastructure delivery functions, e.g. scoping stage for major projects

SmartRoads tool:

It is necessary to review the SmartRoads weightings and factors used in the Network Fit Assessment calculations. The relative efficiency and mode shift factors in particular should be specific to the conditions, projected growth and policies of each city. Work to determine appropriate factors is still in progress as part of the Auckland trial.

Network Fit Assessment:

The LoS resulting from a project are inputs to the SmartRoads tool and they are not calculated or derived from the tool. We found this to be a common misconception of some of the wider working group. The LoS can be obtained from either traffic modelling outputs or by expert consensus in a Network Fit Assessment workshop.

CONCLUSIONS AND NEXT STEPS

The SmartRoads trial in Auckland has found significant value in the process to help align strategic objectives with operational and capital project interventions. We have developed a high level NOP for the region and a detailed NOP for Takapuna and the trial NOPs have been used on our Route Optimisation Programme. We have trialled the Network Fit Assessment tool on a number of real and hypothetical projects and this has shown significant benefits in helping to make difficult decisions and trade-offs between different modes. The project steering group has endorsed the work completed to date and given approval to commence with the proposed next steps.

Based on the trial outcomes and lessons learnt, the next steps required to roll out this process in Auckland includes:

- Resourcing the project team
- Development of a Business Case for SmartRoads in Auckland
- Branding of the SmartRoads approach for Auckland
- Presenting the SmartRoads approach to AT board for Endorsement
- Customising the SmartRoads Network Fit Assessment tool for Auckland
- Developing an engagement strategy and
- Scoping and programming the development of Vertical NOPs to cover the entire Auckland Region.

The Auckland project team are actively engaged with the Network Operating Framework National Working Group and we will continue to draw on and contribute to the experience of this working group.

REFERENCES

Beca (2012), *SmartRoads Auckland Trial Summary Report, Draft*, Auckland: Auckland Transport

VicRoads (2012), *AITPM and VicRoads Seminar Training Manual: Application and Use of Network Fit Assessments*, Melbourne: Author

ACKNOWLEDGEMENTS

We would like to acknowledge the pioneering work undertaken by VicRoads as well as the support provided to this project, in particular from Andrew Wall and Mark Rowland. The authors acknowledge the contribution made by members of the project team; Ranjan Pant (NZTA), Don Munro, Miguel Menezes and Randhir Karma (Auckland Transport), and Stephen Hewett, Joe Phillips and Anita Lin (Beca Infrastructure Ltd.). We would also like to acknowledge Mark Edwards (NZTA) and the Network Operating Framework National Working Group.