Managing state highway reverse sensitivity effects

[1]Aaron Hudson and [2]Stephen Chiles

[1,2]New Zealand Transport Agency, 50 Victoria Street, Wellington
[1]aaron.hudson@nzta.govt.nz

Abstract

Port and airport companies have long been proactive in seeking and defending reverse sensitivity controls in district plans. These typically include control boundaries within which new noise sensitive activities around key infrastructure are either prevented or are subject to sound insulation requirements. Such controls are not currently in place for the most widespread environmental noise source in the country, the state highway network, and consequently the NZ Transport Agency frequently has to deal with actual reverse sensitivity effects. To avoid compounding these issues the Transport Agency developed a Reverse Sensitivity Policy in 2007, using a similar approach to that set out in the port and airport noise standards (NZS 6805, NZS 6807 and NZS 6809). However, the state highway network passes through nearly every district in the country and to date controls have only been implemented in a minority of district plans. Councils have often been resistant to including reverse sensitivity controls in district plans, and modifications have been made to standard provisions making them inconsistent around the country. This paper presents a review of these existing issues and introduces the Transport Agency's new draft guide for managing reverse sensitivity effects on the state highway network.

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1. Introduction

The New Zealand Transport Agency operates, maintains and constructs New Zealand's state highway network. Na-tionally the state highway network makes up 12% of New Zealand's total roads. Despite this, almost 50% of all vehicle kilometres travelled and 70% of all freight kilometres travelled within New Zealand are on state highways [1]. The state highway network therefore provides strategic and often critical routes for transporting people and goods within and across regions. As a result the national state highway network passes through nearly every district and adjoins varying land uses. Some of the adjoining land uses are sensitive to the often unavoidable effects of state highway operation, maintenance and construction. For the Transport Agency this results in what is known as '*reverse sensitivity*' complaints or effects.

Reverse sensitivity is the legal vulnerability of an established activity to complaint from a new land use [2]. This can occur in situations where incompatible land uses/activities are located in close proximity to each other, resulting in conflict between the activities. For transport operators there is a risk that new activities (such as houses and schools) that choose to locate near to established roads or railways for example may object to the effects of the transport network (such as noise and vibration) and take action against the operator. As such, the term 'reverse sensitivity' generally relates to the effects of the development of a sensitive activity in an area that is already affected by established activities [3]. For the Transport Agency, reverse sensitivity effects have resulted in restrictions being imposed on the state highway network.

The Mana Esplanade section of State Highway 1, Wellington, provides an example of where reverse sensitivity effects have resulted in restrictions being imposed on state highway operation. Clearways operate along this 2 kilometre section of State Highway 1 to improve traffic capacity during peak travel periods. However, pressure from residents has resulted in heavy vehicle operators being asked to use the central traffic lanes during peak traffic periods to reduce noise and vibration effects on adjoining residents. In practice this compromises the peak capacity of State Highway 1, North of Wellington.

This paper explores reverse sensitivity effects arising from state highways in New Zealand and summarises the existing reverse sensitivity policy introduced by Transit New Zealand in 2007 [4]. Issues with the policy are discussed and a new draft guide to replace the policy is presented.

2. Examples

A common scenario where reverse sensitivity effects can arise is when new houses are built near to a state highway designation which does not yet contain a road. A designation can protect a route for a future road, and explicitly show the community the location so that other development can take account of that future road. However, houses are often built near to designations without taking account of the road-traffic noise that will

occur, resulting in adverse reverse sensitivity effects. Two examples of this have occurred at the Ruby Bay Bypass and Transmission Gully.

2.1 Ruby Bay Bypass, Tasman District

The 10.7 km long Ruby Bay Bypass links Richmond and Motueka in the Tasman District, and was constructed between 2008 and 2010. The Notice of Requirement for the designation was lodged in 2000 and was confirmed subject to a number of conditions including three relating to road-traffic noise at houses existing in 2000. During the period between designation and construction, additional houses were built near the designation. Residents of some of the new houses were disturbed by road-traffic noise when the bypass was completed, particularly when the second-coat chipseal surface was laid. They requested a low-noise porous asphalt surface.

The Transport Agency spent significant resources investigating the complaints relating to the Ruby Bay Bypass and liaising with the residents. The noise levels were found to be reasonable and compliant with the designation conditions. A porous asphalt surface would be expensive and is not justified for this state highway in a rural area with approximately 5,000 vehicles per day. Ultimately, the residents remain dissatisfied with the noise effects they experience and the response of the Transport Agency. This situation could potentially have been avoided if appropriate reverse sensitivity controls had been in place.

2.2 Transmission Gully, Wellington

The Transmission Gully project has had a long gestation. A designation was completed in 2004 and then a new designation alignment was confirmed in 2011. Between 2004 and 2011 a number of houses were built near to the 2004 designation alignment. Despite the houses being built near a known future noise source, and even though the 2011 designation alignment did not come any closer, under the 2011 designation the Transport Agency was required to investigate mitigation for these houses.

Had reverse sensitivity controls been in place following confirmation of the 2004 designation then the subsequent houses would have been appropriately located and designed to mitigate future road-traffic noise. However, this was not the case and consequently the Transport Agency is now responsible for the cost of mitigation. This contrasts with another location along the Transmission Gully route where a subdivision between 2004 and 2011 was subject to reverse sensitivity controls and therefore did not require mitigation under the 2011 designation conditions.

2.3 Existing State highways

Reverse sensitivity effects can also arise where new houses are built near to established state highways.

The Transport Agency receives in the order of ten noise complaints each month from people living near the state highway network, throughout the country. A common request from residents is for the Transport Agency to install noise barriers or low-noise road surfaces. Both of these noise mitigation measures are costly to install and maintain, and it would not be practicable to retrofit the entire state highway network in all locations where they are requested. The Transport Agency spends significant resources investigating and responding to these noise complaints. In many cases where noise mitigation is not practicable residents continue to experience noise that they find disturbing or annoying.

A proportion of noise complaints are made by residents living in houses that have been recently built near to a state highway. If there were nationwide reverse sensitivity controls then this proportion of the complaints would not arise as the buildings would have been appropriately located and designed to avoid adverse noise effects. However, in the absence of controls residents often experience noise disturbance, and the Transport Agency expends resources measuring noise, and liaising with residents.

3. New Zealand Standards

New Zealand's airport companies were early to appreciate the need to manage reverse sensitivity effects. Internationally there are examples of airports that were originally located in relatively open space, but became surrounded by residential development, and consequently had operations constrained, such as by curfews. New Zealand Standard NZS 6805 [5] includes recommendations for land use planning controls to manage the location of residential development near to an airport. Specifically, NZS 6805 recommends inner and outer control boundaries are inserted into district plans to regulate sensitive land use close to airports.

Since NZS 6805 was published in 1992 it has been applied to all major airports through plan change processes, although with some variations made to the recommended procedures. Implementation of these reverse sensitivity controls now provides better certainty for the airport companies allowing forward planning and investment, while ensuring people moving into areas most affected by airport noise have their sleep protected through appropriate building location and design.

Following on from NZS 6805 for airports, NZS 6807 [6] was developed for helicopter landing areas. Comparably NZS 6807 provides similar procedures for managing land use planning. However, because helicopter landing areas are generally established through a resource consent process (as opposed to a plan change) there is no authority to impose planning controls on surrounding land as recommended by the Standard. Consequently, the authors are not aware of any examples where reverse

sensitivity controls have been based on NZS 6807.

For ports NZS 6809 [7] sets out a similar framework to NZS 6805 for airports, including recommended land use planning controls to manage reverse sensitivity effects. This general approach has been applied to most ports in New Zealand.

Unlike NZS 6805, NZS 6807 and NZS 6809, which address both management of the noise source and land use planning, the road-traffic noise standard NZS 6806 [8] only addresses actions for designing new and altered roads. There are no New Zealand Standards for addressing reverse sensitivity effects for roads or railways.

4. Transit New Zeland Policy

To manage the reverse sensitivity effects outlined above, Transit New Zealand (now the New Zealand Transport Agency) published a reverse sensitivity policy in 2007. This policy sets out an approach with: a Buffer Area around state highways within which new buildings containing noise sensitive activities are avoided; and a wider *Effects Area* within which noise sensitive activities can be established but buildings may require acoustic treatment. This approach essentially mirrors the land use planning controls set out in NZS 6805, NZS 6807 and NZS 6809.

This reverse sensitivity policy has been applied extensively by Transport Agency planners since 2007, when approving and commenting on individual land use developments and subdivisions proposed near state highways. This policy has also been used to inform submissions by the Transport Agency on district plan changes and district plan reviews. Due to the timing of this policy being published in 2007 the controls were not incorporated into first generation district plans, but over recent years it has been used to inform some second generation district plans.

4.1 Issues

The implementation of the 2007 reverse sensitivity policy has led to a number of issues including:

- Controls have not been introduced into the majority of district plans across New Zealand. Where controls have been introduced they are inconsistent between districts.
- Councils have been reluctant to impose controls in district plans, mainly due to concerns about increased building costs for ratepayers.
- In constrained urban environments, a buffer area excluding noise sensitive activities might not be consistent with good urban design.
- The extent of the Buffer Area and Effects Area in the policy only has three distance steps based on broad categories of traffic volumes and speeds.
- Insufficient detail is provided on the need for ventilation when windows are closed for sound insulation.
- Outdated vibration criteria are referenced.
- Internal sound level criteria are not the same as specified in NZS 6806.

5. Draft Guideline

To address the issues listed above, the Transport Agency has prepared a draft guide which is intended to replace the reverse sensitivity policy once finalised. The draft guide maintains the same overall approach with a Buffer Area and Effects Area, but refines the implementation of the recommended controls in several respects.

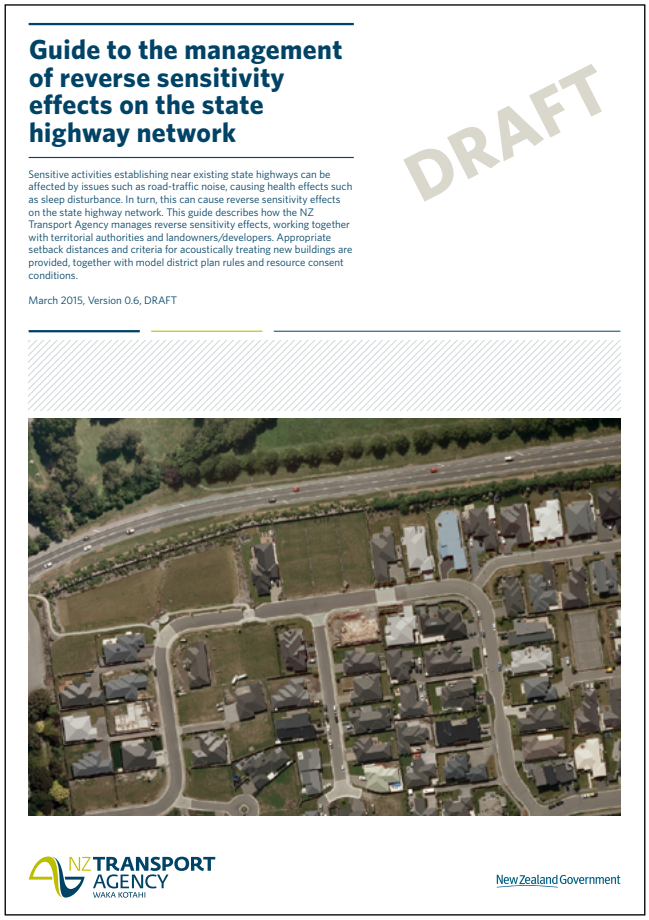

Figure 1: Draft Transport Agency guide

In preparing the guide the Transport Agency has undertaken work to inform the approach recommended. This includes:

- A case study into the costs of acoustically treating new houses near to state highways.
- A review of the ventilation requirements and development of a new specification for systems to be installed when windows are required to be closed for sound insulation.
- Development of a more refined calculation method to determine the recommended extent of the Buffer and Effects Areas. Previously distances were based just on traffic flow and speed, but now are also based on the road surface and percentage of heavy vehicles.

- Generation of public web-based GIS maps showing the recommended Buffer and Effects Areas for the entire network.
- Development of standard district plan provisions and consent conditions.

This work is all detailed in the guide. Additional information and case studies are also included to provide better context for the controls recommended.

While the basic controls are similar to the current policy, it is now recommended that noise sensitive activities should be permitted in the Buffer Area for urban areas, but subject to additional controls (such as for vibration). This approach recognises that urban development densities often constrain the Buffer Area available and good urban design principles. While this is a significant change to the existing policy, in practice this approach has been taken in many cases.

5.1 District Plans

Consistent application of the Transport Agency's reverse sensitivity guide is still reliant on the controls being incorporated into individual district plans. The most effective approach for achieving this is through the statutory 10 year district plan review process. In practice it will therefore be many years before there is widespread adoption of the recommended land use controls.

The Transport Agency is interested in exploring further opportunities for nationally consistent guidance for managing reverse sensitivity effects. Should such an opportunity arise, a National Environment Standard or similar national guidance instrument would be a more effective method of managing reverse sensitivity effects on New Zealand's land transport networks.

5. Conclusions

Reverse sensitivity effects can arise from noise sensitive activities such as residential activity, establishing near to transport operations. Some transport operators such as airports and ports have implemented guidance in New Zealand Standards to manage reverse sensitivity effects. While starting over a decade later, Transit and now the Transport Agency have adopted a similar approach for reverse sensitivity controls for state high-ways. However, given that state highways span nearly every district, controls have not yet been achieved for most of the network.

The Transport Agency has now prepared a draft guide to refine its approach to reverse sensitivity. As part of the development of this guide, the Transport Agency is consulting to obtain external feedback.

Longer term, the approach in the guide should provide a consistent basis for managing reverse sensitivity effects into the future.

References

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