Guide to state highway noise mapping

November 2013

Version 1.1

NZ TRANSPORT AGENCY
WAKA KOTAHI

New Zealand Government

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v1.0	Final	11/11/13	Stephen Chiles
v1.1	Sections 5.1 and 6.1 updated to reference new road surface corrections and method of application. No other aspects of the guide reviewed/updated.	7/12/23	Stephen Chiles

Glossary

Acronym	Description
AADT	Annual average daily traffic
dB $L_{Aeq(24h)}$	24-hour average noise level
CRTN	Calculation of road traffic noise
GIS	Geospatial information system
HNO	Highways and Network Operations
LiDAR	Light detecting and ranging
LINZ	Land Information New Zealand
LTNZ	Land Transport New Zealand (a predecessor of NZ Transport Agency)
NIP	Noise Improvement Programme
NZS 6801	New Zealand Standard 6801:2008 Acoustics – Measurement of environmental sound
NZS 6806	New Zealand Standard 6806:2010 Acoustics – Road-traffic noise – New and altered roads
PPF	Protected premises and facilities
RAMM	Road assessment and maintenance management
RMA	Resource Management Act 1991

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1. Introduction

1.1 Objective

The objective of this guide is to provide a good practice method for road-traffic noise mapping of state highways in New Zealand. A draft guide was prepared in 2011 based on a review of strategic noise mapping conducted for the Auckland motorways in 2009. Additional noise mapping in Auckland was performed in 2013 using the procedure presented in the draft guide. The guide has been updated in the light of that experience, and this is presented as a case study in section 8.

1.2 Noise mapping

Computer noise predictions are commonly performed during the assessment of new projects, with localised noise contours produced. These models are used on a one-off basis to assess the effects of the specific project and to design noise barriers or other measures needed to mitigate those localised effects.

As at 2013, area-wide 'strategic noise mapping' is not routine in New Zealand, although is common in Europe and other parts of the world. Strategic mapping is generally used to determine road-traffic noise exposure of a wider population, and identify the worst affected areas. Applications include:

- performance/trend monitoring (eg Ministry of Transport *Transport monitoring indicator framework*)
- prioritisation of mitigation and maintenance
- integrated land use and transport planning (reverse sensitivity)
- project investigation and reporting
- customer service/complaint investigation.

1.3 Statutory context

The NZ Transport Agency (Transport Agency) is required by the Land Transport Management Act 2003 to 'exhibit a sense of social and environmental responsibility'. The Transport Agency *HNO Environmental and social responsibility policy*[1] and *State highway environmental plan*[2] demonstrate the organisation's commitment to achieve quality environmental and community outcomes, including management of road-traffic noise issues associated with the state highway network.

The environmental plan sets formal objectives regarding noise from the state highway network including:

- *N1 Reduce exposure to high traffic noise levels from the existing state highway network.*

  With respect to this objective, the plan details a Noise Improvement Programme. While the programme is no longer funded nationally, it still provides a framework for assessing retro-fit noise mitigation measures, where noise sensitive locations are exposed to state highway noise above a threshold of 65 dB $L_{Aeq(24h)}$. Prioritisation should be where there is the greatest benefit on the basis of assessment criteria set out in the plan. However, there is not currently proactive identification of high noise exposure areas on a nationwide basis. Strategic noise mapping would be relevant in this context, also allowing for reporting of existing area-wide state highway noise exposure.

[1] http://www.nzta.govt.nz/resources/environmental-and-social-responsibility-manual/index.html.
[2] http://www.nzta.govt.nz/resources/environmental-policy-manual/environmental-policy.html.

- ***N4*** *Influence activities adjacent to state highways to discourage noise-sensitive activities establishing in areas adversely affected, or likely to be in the future, by state highway traffic noise.*

  To support this objective the Transport Agency has a *Reverse sensitivity policy*[3] which aims to proactively manage noise sensitive development near state highways. The implementation of this policy is currently based on estimated noise levels at certain distances from generic state highways, but this could be refined through strategic noise mapping.

For objectives N1 and N4, strategic noise mapping could allow for more efficient and effective implementation of existing processes. As detailed in section 1.2 it could also be relevant for various other purposes. The objective of this guide is not to promote or justify noise mapping of state highways in New Zealand, but this context is included to show why strategic mapping can be of relevance to the Transport Agency.

1.4 NZS 6806

New Zealand Standard NZS 6806[4] is an assessment standard that only applies to new and altered roads. Strategic noise mapping is primarily concerned with existing roads rather than new and altered roads. However, NZS 6806 standardises terminology that is useful when considering all types of roads. Therefore, while NZS 6806 criteria do not apply to the results of strategic mapping, reference is made to terminology from NZS 6806 in this guide, and the criteria are used as benchmark values.

[3] http://www.nzta.govt.nz/resources/planning-policy-manual/docs/planning-policy-manual-appendix-5D.pdf.

[4] NZS 6806:2010, Acoustics - Road-traffic noise - New and altered roads.

2. Methodology

Strategic noise mapping utilises conventional noise modelling techniques, however is performed on a larger scale. The key issues relate to obtaining and managing geospatial information, rather than the acoustics calculations which are relatively straightforward. A flowchart of the overall methodology is presented in Figure 2-1 with references to the sections of this guide.

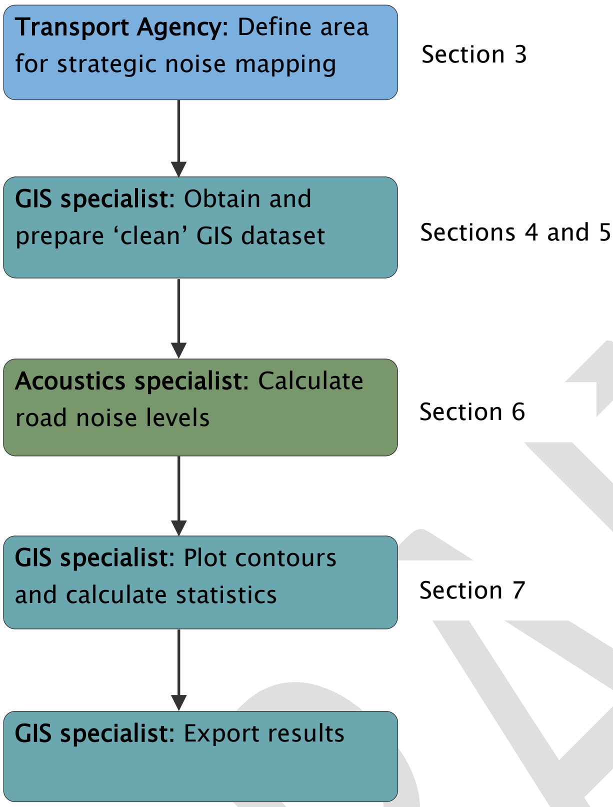

Figure 2-1 Strategic noise mapping process

3. Areas

Each time the Transport Agency initiates strategic noise mapping, the first decision will be the extent of the area to be mapped. There is not a set process for this, but relevant considerations may include:

- Strategic importance. Areas of high strategic importance may warrant mapping.
- Availability of data. Areas with high-quality geospatial data available may be better to group together.
- Source of data. Minimising the number of data sources may reduce the amount of pre-processing. (eg avoid crossing territorial authority boundaries).
- Frequency of updating. Whenever the model is updated, all data should be updated to the same year. If data for some areas are seldom updated, it could be best to keep them separate.
- Type of area. Urban areas defined by Statistics New Zealand will include the areas of highest population density where strategic noise mapping might provide the most benefit.

In other countries where strategic noise maps have been developed, they have primarily been for urban areas. This is because the greatest noise exposures and need for noise management generally occur in those areas. There is no plan for future strategic state highway noise mapping in New Zealand, but it is likely the most benefit could be gained from mapping the main urban areas, as has already occurred in Auckland.

Results of any strategic state highway noise mapping in New Zealand should be made available on a central GIS system. Although different areas may be mapped at different times, the results could be accessed from a single location using a central GIS system. For the end result, it is therefore not critical how the network is segmented or sequenced for the purposes of mapping. However, it is likely to be most efficient for each urban agglomeration or region to mapped at the same time. The most time consuming issue is obtaining and 'cleaning' geospatial information for an area, and once those processes are established the extents of the calculation area have a lesser effect on the scale of the work involved.

Within each area mapped, statistics should be calculated based on reporting sub-areas. These should be based on fixed lengths, or interchanges, as discussed in section 7.2.

4. Data gathering

The Transport Agency Geospatial team should coordinate all data required for noise mapping. The Road Assessment and Maintenance Management (RAMM) database is the main location where relevant geospatial information produced by the Transport Agency is stored. Other geospatial information required for noise mapping is sometimes available from Land Information New Zealand, territorial authorities, Statistics New Zealand, the Ministry of Education and other organisations.

The geospatial information listed in Table 4-1 is required for strategic noise maps. Indicative sources are listed. A significant proportion of external information is already catalogued by the Transport Agency Geospatial team.

Table 4-1 Data requirements

Item	Description	Sources
Road alignment	3D polyline for centreline of each carriageway	RAMM
Road width	Width of each carriageway	RAMM
AADT	The most recent traffic count	RAMM
%HV	The most recent traffic count	RAMM
Posted speed limit		Gazette
Road surface	Current surface type	RAMM
Building footprints	2D polygon	Territorial authority
Building height	Either eaves/roof height or number of floors	Territorial authority
Building types	PPFs in accordance with NZS 6806	Territorial authority, Ministry of Education, LINZ
Parcel boundaries	2D polygon	LINZ
Digital terrain data	Contours as 3D polylines / spot heights	Territorial authority, LINZ
Aerial photographs	Georeferenced bitmaps	Territorial authority
Residential zoning information	2D polygon	Territorial authority
Census mesh blocks	2D polygon	Statistics NZ
Existing noise and safety barrier locations	3D polylines	RAMM

5. GIS pre-processing

In preparation for the noise modelling, the data specified in section 4 should be imported into a suitable GIS system and 'cleaned'. The GIS specialist should provide a single set of 'shapefiles' for the entire area of interest, for the acoustics specialist to use. The acoustics specialist should not be required to conduct any further geospatial data manipulation in the acoustics modelling software. This section outlines the recommended procedures and formats for the preparation of data.

While noise levels should only be assessed up to 100 or 200 metres from the road, data should be provided for a 300 metre distance from roads for visual purposes.

In all the tables of attributes below there is a column labelled 'calculation'. This indicates whether data is actually used in the acoustics calculation or is provided just for context and validation.

5.1 Roads

The accurate assignment of geometry and attributes to roads is fundamental to the noise mapping process. The road should be provided as a shapefile, with the following details. The road polyline should be segmented whenever any attribute changes, for example speed or traffic volume.

Geometry

Road centrelines should be provided as a 3D polylines. There should be a sufficient number of points to accurately describe the alignment, ideally with 0.1 m vertical 0.1–0.5 m horizontal resolution. Filters should be applied to remove excessive points, which would otherwise slow down noise calculations.

Where there is more than one lane in each direction, each carriageway should be defined as a separate road with another centreline. Points for one-way roads and carriageways should be ordered in the direction of travel.

In many instances there may be discontinuities at intersections where geometric data is not available. These small discontinuities are generally not critical acoustically. The GIS specialist may create centrelines and data to join gaps.

Roads that pass through tunnels should be clipped, with the segment inside the tunnel removed.

Attributes

The attributes listed in Table 5-1 should be assigned to each road polyline.

Table 5-1 Road attributes

Attribute name	Description	Units/values	Calculation
Width	Edge-to-edge width of the traffic lanes	metres	Yes
Bridge	True if the road is on a bridge or viaduct	true/false	Yes
Bridge width left	Distance from carriageway centreline to bridge edge	metres	Yes
Bridge width right	Distance from carriageway centreline to bridge edge	metres	Yes
Bridge edge height left	Height of solid parapet on edge of bridge	metres	Yes

Attribute name	Description	Units/values	Calculation
Bridge edge height right	Height of solid parapet on edge of bridge	metres	Yes
AADT	Traffic volume (AADT) based on survey	vpd	Yes
HV	Proportion of heavy and commercial vehicles	percentage points (10% = 10 not 0.1)	Yes
Speed	Posted (gazetted) speed limit	km/h	Yes
Surface	Road surface type	RAMM code	No
Cr	Road surface correction (see below)	dB	Yes
Year	Year of all GIS data	2011	No

Road surfaces

The correction for each road surface type should be taken from the Transport Agency *Guide to assessing road-traffic noise*.[5]

See section 6.1 for requirements relating to the separate adjustment from $L_{A10(18h)}$ to $L_{Aeq(24h)}$, which might be input to the noise modelling software combined with the road surface correction if no other option is available.

5.2 Barriers

Any existing noise walls and concrete safety barriers should be exported as a shapefile with walls/barriers as a 3D polyline. The z-coordinate of the polyline should be the absolute height (elevation) of the barrier at each point. In addition, the polyline should have the attributes detailed in Table 5-2. As for roads, the barrier polyline should be segmented each time an attribute changes.

Table 5-2 Barrier attributes

Attribute name	Description	Units/values	Calculation
Type	Noise wall or solid safety barrier	noise/safety	No
Height	Nominal height (actual height will be automatic from the polyline height and the terrain)	metres	No
Material	Predominant material of barrier panels	concrete/timber/transparent/metal	No

Where a safety barrier is included in part of a bridge, it should be included in the road polyline.

If the height of a concrete safety barrier cannot be obtained it should be assumed to be 0.8 m high relative to the road surface.

[5] https://nzta.govt.nz/resources/guide-to-assessing-road-traffic-noise/

Where a noise/earth bund exists and may form a noise barrier, this should be included as part of the terrain detailed in section 5.4 below. Similarly, any features such as retaining walls which provide acoustics screening should be included in the terrain data.

For noise walls on top of noise bunds the noise wall should be included in the barriers shapefile and the noise bund should be included separately in the terrain shapefile.

5.3 Buildings

All buildings, including commercial and industrial buildings, garages and accessory buildings, within 300 metres of the edge of the road should be included in a shapefile containing building outlines as 3D polygons. The z-coordinate of the polygons should be the height of the centre of the roof of each building. Each building polygon should have the following attributes:

Table 5-3 Building attributes

Attribute name	Description	Units/values	Calculation
Address	Address of the building	address	No
Type	False if not a PPF, or type of PPF	false/residence/hotel/motel/ education/hospital/marae	No
Height	Height from ground to centre of roof	metres	No
Floors	Floors above ground on all façades	integer	Yes

PPFs in accordance with NZS 6806 may be identified using floor area, zoning information, and data from the Ministry of Education for example. For the mapping of the Auckland motorways, all buildings with a plan area between 40 m^2 and 300 m^2 in a residential zone were considered to be residences.

The number of floors stated should be the number of floors above ground on all façades. The lower floor(s) of a house built into a hillside would therefore be discounted. In an extreme case where a house is totally within a hillside on one façade, specific modelling may be required.

If the building heights or number of floors are unknown then appropriate assumptions should be made during the data cleaning process. There is no set process for making such assumptions as it will depend on the types of buildings in the area. Typically, single storey buildings with pitched roofs might be assumed to be 5 m high. If building outlines are not available then that information may need to be digitised from aerial photographs.

5.4 Terrain

Terrain should be provided as 3D polyline topographic contours. The contour interval should ideally be 1 m and topographic contours should extend 300 m from the road. Where terrain data is available as spot heights (eg LiDAR) these should be converted to contours by the GIS specialist.

Prior to exporting topographic contours, a buffer around the traffic lanes should be made, with a constant elevation created across the traffic lanes. The elevation should be the same as the carriageway centreline defined in section 5.1. Contours for the natural terrain level should be provided under bridges and other elevated structures instead of at road level, based on the 'bridge' attribute of roads.

Bunds should be modelled as terrain features. The GIS specialist should create a topographic contour line at the crest of the bund to ensure it is accurately modelled. Where bunds are shown in RAMM but not reflected in recent terrain surveys or LiDAR data they will need to be created.

5.5 Tunnels

Tunnel portals should be provided as a 3D polyline.

5.6 Assessment area

The area of interest is within 100 metres of the edge of the nearest traffic lane in urban areas, and 200 metres in rural areas, defined by Statistics New Zealand. A 2D polyline should be created for each road showing the extent of this area of interest.

5.7 Aerial photographs

Aerial photographs are not necessary for running the acoustics model. However, they are important for the acoustics specialist to be able to verify the data in the acoustics model. A single low-resolution aerial photograph should be provided for the entire area, with high-resolution images provided in 1 km tiles. All images should be geo-referenced.

5.8 Summary

A summary of the data required is provided in Table 5-4.

Table 5-4 Data requirement summary

Filename	Description	Type	Attributes
roads.shp	Roads	3D polylines	Width
			Bridge
			Bridge width left
			Bridge width right
			Bridge edge height left
			Bridge edge height right
			AADT
			HV
			Speed
			Surface
			Cr
			Year
barriers.shp	Barriers	3D polylines	Type
			Height
			Material
			Address

Filename	Description	Type	Attributes
buildings.shp	Buildings	3D polygons	Type
			Height
			Floors
terrain.shp	Terrain	3D polylines	–
tunnels.shp	Tunnel portals	3D polylines	–
extent.shp	Assessment area	2D polygons	–
*.jpg/ .jpw	Aerial photographs	–	–

6. Noise predictions

6.1 Procedures

Noise predictions should be performed by an acoustics specialist using recognised noise modelling software. If the GIS data is supplied in a clean format as specified in section 5, then the acoustics specialist should have little more work to do than pressing the run button in the acoustics software. However, it is important that the acoustics specialist thoroughly checks all the data in the acoustics modelling software, to ensure a valid prediction. There is work described below in the importing of data and modelling of bridges in particular.

Table 6-1 lists the settings which should be used in the computer model.

Table 6-1 Model settings

Parameter	Setting/source
Algorithm	CRTN[6]
Reflections	CRTN
Parameter	$L_{Aeq(24h)}$
Ground absorption	1.0
Calculation area	As defined in section 5.6
Search radius	2.0 km
Noise contour grid	1.5 m height, 5 m resolution
Receiver positions	free-field (building evaluations)

The CRTN algorithm gives results in terms of the $L_{A10(18h)}$. To convert this to $L_{Aeq(24h)}$ a -3 dB adjustment should be made. If the noise modelling software does not allow for this adjustment, then it should be implemented by adding it to the road surface correction in section 5.1, when that road surface correction is input to the noise modelling software.

6.2 Inputs

The shapefiles detailed in section 5 provide the necessary detail for the noise model. This section outlines the steps required to use this data within the noise model. There will be effort required to ensure GIS attributes are correctly assigned to the relevant variables in the acoustics software. This process depends on the particular acoustics software used, so the following guidance only discusses the acoustics requirements. Most commercial software allows automatic translation of attributes while importing data.

Road alignments

Road alignments should be imported from the roads shapefile as polylines and converted to the 'road' object type within the noise modelling software. Each of the attributes detailed in Table 5-1 are to be

[6] *Calculation of road traffic noise* (CRTN). UK Department of Transport and the Welsh Office. ISBN 0115508473. 1988.

assigned to the variables. Bridges should be reviewed manually with ‘self-screening’ or equivalent assigned.

Barriers

Barriers should be imported with barrier height set using the absolute height of each point.

Buildings

The footprints for all buildings and all other structures within the assessment area should be imported into the noise model from the buildings shapefile. As the elevation of the roof is contained in the building outline, the height of the building is determined automatically when fitting to the digital terrain model.

The floor spacing and height of first floor used by the building noise map/façade noise map should be set using the floors and height attributes, as well as the local terrain information. Where the vertices of the building at the ground are of different elevations, the highest value should be used for defining the ground floor.

Free-field predictions should be at all façades of individual buildings, with the noise level assigned to the building being the highest of any façade and floor. While section 5.3 specifies the assignment of PPF attributes to certain buildings, noise predictions should be performed at all buildings (eg including garages). This will allow reclassification of PPFs at a later date to be performed without updating the noise model. This is important as for strategic noise mapping over a wide area assumptions might be made when initially classifying PPFs.

Contours

Topographic contours should be imported directly from the terrain shapefile provided. The computer model should generate a digital terrain model based on the imported topography.

Tunnels

For asset improvement projects where tunnels are in close proximity to PPFs, noise from tunnel portals should be modelled. For strategic noise mapping, however, noise from tunnel portals should be excluded. This is consistent with the EU good practice guide[7].

6.3 Outputs

The outputs listed in Table 6-2 should be produced by the acoustics specialists and exported as two shapefiles.

[7] European Commission Working Group Assessment of Exposure to Noise, *Good practice guide for strategic noise mapping and the production of associated data on noise exposure*, December 2003. http://ec.europa.eu/environment/noise/pdf/wg_aen.pdf.

Table 6-2 Noise model outputs

Filename	Description	Type	Attributes	Detail
Contours.shp	Noise contours	2D polylines	Noise level Year	55 to 70 dB contours in 1 dB intervals
PPFs.shp	Building noise levels. Maximum for all floors and each floor individually.	2D polygons	Maximum noise level L1 noise level L2 noise level L3 noise level L4 noise level L5 noise level Year	Maximum building free-field level

6.4 Computation time

Depending on the size of the assessment area, it may be necessary to spit the model into multiple sections prior to performing the noise calculations. The noise contours should be presented as a continuous output with no anomalies between sections. This is likely to require some overlap between sections.

7. GIS post-processing

7.1 Graphical representation

Contours

The GIS specialist should present the noise mapping results graphically as transparent filled contours overlaid on washed out aerial photographs. Contour colours should be displayed in 5 dB bands as listed in Table 7-1. Contour lines at 1dB intervals could be lightly shown over the shaded bands.

Table 7-1 Contour colouring

Interval	Noise zone fill (pastel colour)
55 dB ≤ $L_{Aeq(24h)}$ < 60 dB	Light blue
60 dB ≤ $L_{Aeq(24h)}$ < 65 dB	Light green
65 dB ≤ $L_{Aeq(24h)}$ < 70 dB	Yellow
$L_{Aeq,24h}$ ≥ 70 dB	Pink

Buildings

All buildings should be plotted with solid fill on top of the coloured noise contours. PPFs should be coloured as described in Table 7-2, which corresponds to categories A, B and C for altered roads under NZS 6806. Buildings that are not PPFs should be shaded dark grey.

Table 7-2 PPF colouring

Interval	Residential footprint (solid colour)
64 dB < $L_{Aeq(24h)}$	Green
64 dB ≤ $L_{Aeq(24h)}$ < 67 dB	Orange
$L_{Aeq(24h)}$ ≥ 67 dB	Red

Roads

The modelled road network used in the acoustics model should be shown as a black line.

Assessment area

The urban/rural 100/200m assessment area should be shown as a red line.

Example output

An example output from the Auckland noise maps adopting these recommendations is provided in Figure 7-1.

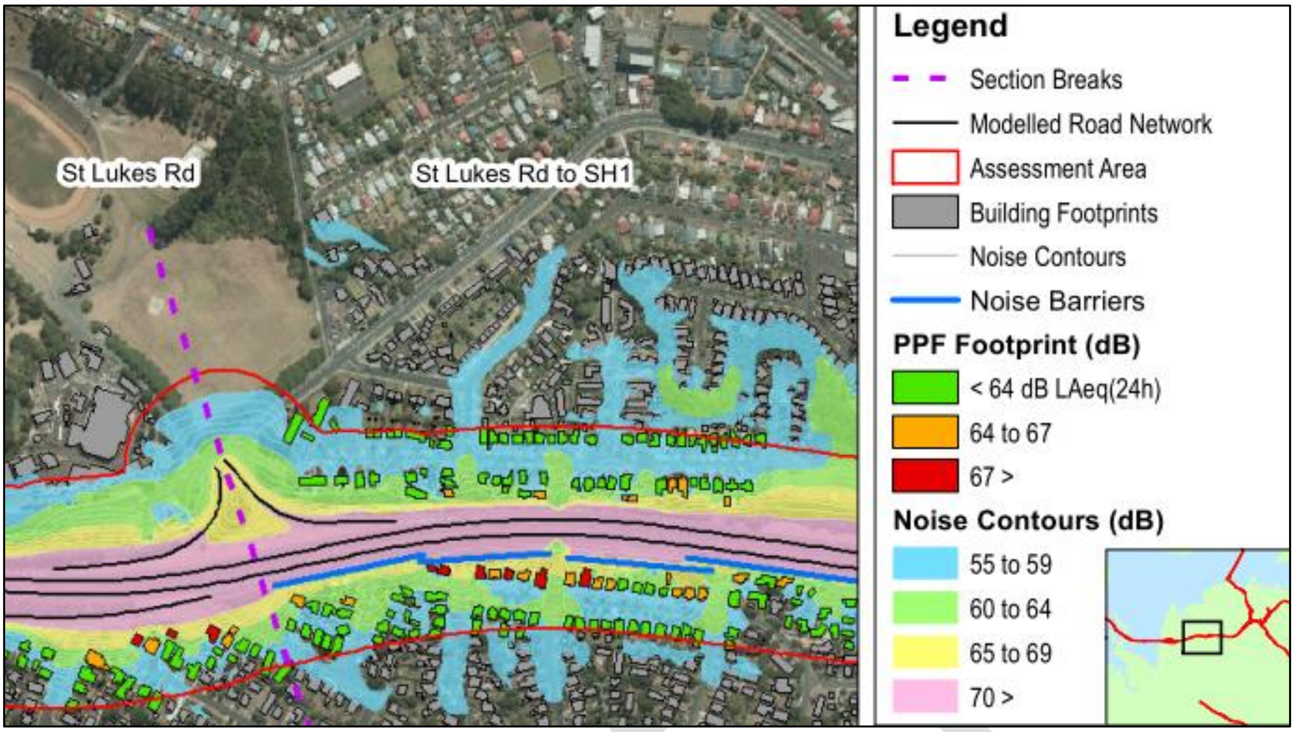

Figure 7-1 **Example graphical output**

7.2 Aggregated results

In addition to the noise contours and individual PPF noise levels, aggregated results should be calculated for various ‘reporting sections’ of state highway. The flowchart in Figure 7-2 outlines a procedure for determining the aggregated results. Reporting sections could be determined using fixed lengths, geographical markers (eg, interchanges/rivers) or other relevant factors. The size of the reporting areas will vary. Reporting areas for rural areas will be larger than urban areas.

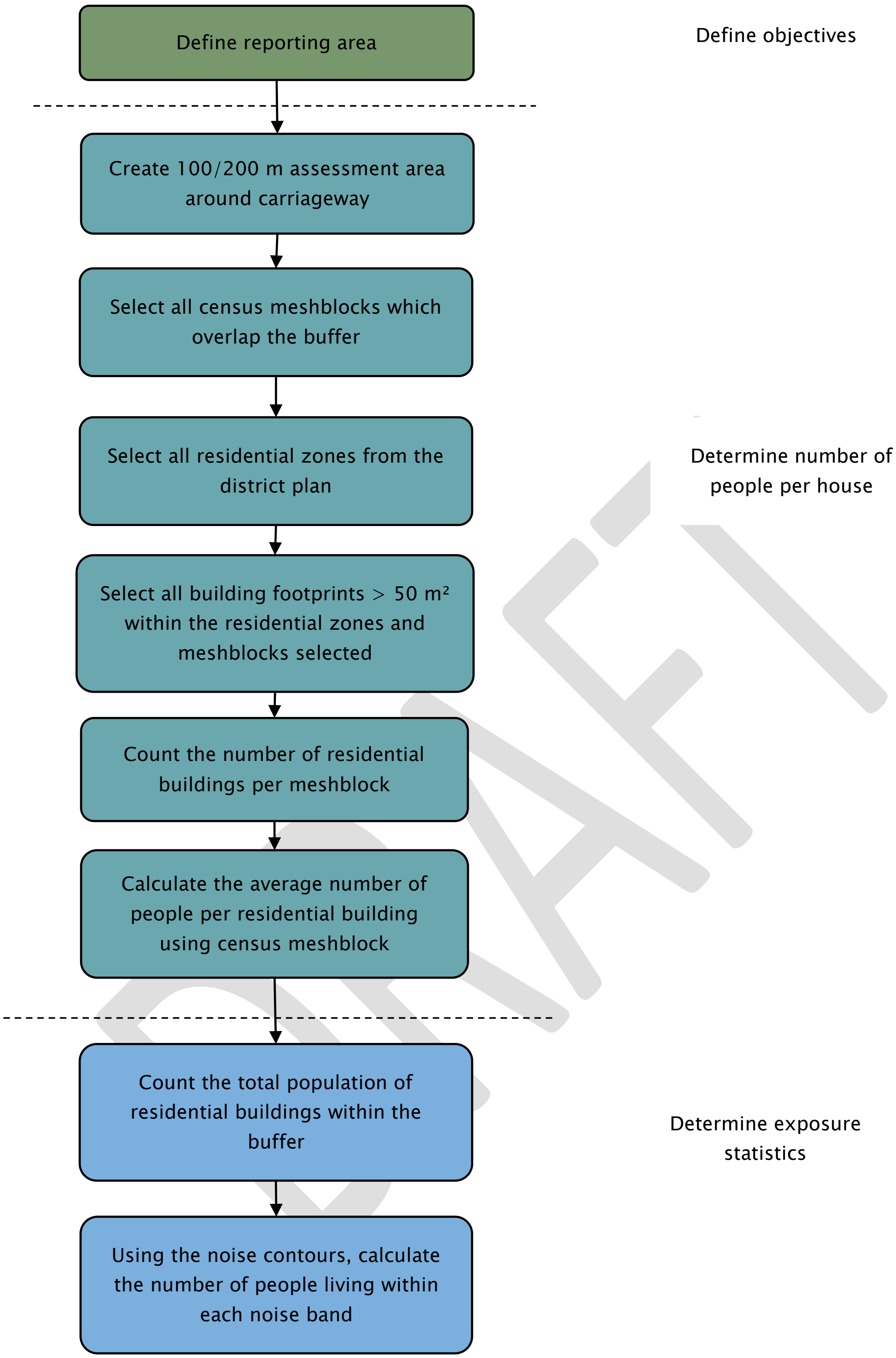

Figure 7-2 **Statistical analysis workflow**

An example of aggregated results from a section of the Auckland study is shown in Table 7-3.

Table 7-3 Example aggregated results from the Auckland noise mapping

Noise zone	Number of residential buildings	Population estimate	Percentage of population
$L_{Aeq(24h)} < 55$ dB	26	79.3	13.7
55 dB ≤ $L_{Aeq(24h)} < 60$ dB	56	185	32
60 dB ≤ $L_{Aeq(24h)} < 65$ dB	37	127.8	22.1
65 dB ≤ $L_{Aeq(24h)} < 70$ dB	31	110.4	19.1
$L_{Aeq(24h)} \geq 70$ dB	25	75.8	13.1

7.3 Central data storage

The results of the strategic noise mapping should be submitted to the Transport Agency Geospatial team to make available on a central GIS system. The layers shown in Table 7-4 should be used for the results of all strategic noise mapping.

Table 7-4 GIS layers

Item	Name
Contour bands	Strategic noise mapping – Noise contours
PPF colouring	Strategic noise mapping – PPFs
Residential areas with statistics	Strategic noise mapping – Aggregated results

8. Auckland case study

8.1 Introduction

A number of sites in South Auckland were identified by MWH as requiring noise barriers under the Noise Improvement Programme (NIP) through a desktop study using complaints information and available noise data. A strategic noise map was created in 2009 to allow future action under the NIP to be more accurately targeted and prioritised. The noise map was prepared with the acoustics specialist performing the majority of the geo-spatial processing. This exercise was repeated in 2013 using updated data, and the recommendations of the draft version of this guide.

8.2 Process

2009 noise mapping

For the initial noise mapping, Marshall Day Acoustics (MDA) was provided with the geospatial information directly from the Auckland Motorways Alliance (AMA). The process used for the 2009 model differed in several instances from the recommendations of this guide. Critically, a significant amount geospatial pre-processing was conducted by the acoustics specialist, whereas a key recommendation of the guide is that all geospatial processing is performed by a GIS specialist. In addition, the process adopted required assigning attributes to roads and buildings using spread sheets with IDs rather than spatially.

2013 noise mapping

In 2013, the exercise was repeated using 2006 and 2011 traffic data and following the draft version of this guide. The GIS data was provide by the AMA and the Transport Agency, and processed by GIS specialists at Beca. The acoustics modelling was performed by MDA, based on shapefiles provided by Beca which included all the necessary parameters as attributes. Post-processing of results was performed by Beca. The 2013 noise mapping exercise confirmed the approach outlined in this guide is practical, and provides significant advantages over the previous approach of GIS data manipulation within acoustics software.

8.3 Lessons learned

The following issues should be considered when undertaking noise mapping:

- Availability of data – One of the main limitations reported in 2009 was the availability of GIS data. This may be a significant issue for other areas where even less data is available. Data that is likely to be difficult to obtain includes detailed topography (LiDAR) and building footprints.
- Consistency of data – It can be difficult to ensure that all data collected was consistent with the model year. Where necessary data from the closest year was used but with a note made of the variation from model year. This is relevant for traffic data, building footprints, and noise barriers.
- Use of results – Results of the 2009 noise mapping were not used by the AMA or the Transport Agency. It is important that before conducting any strategic noise mapping, there is an identified owner of the results, and that person has a programme for how the results will be used.