

NATIONAL LAND TRANSPORT NOISE MAP

Road Traffic Noise

NZ



Transport Environment
Knowledge Hub (TEKH)

Transport Acoustics Forum

9 May 2019

AECOM

This session...

- **Previous noise mapping projects**
- **National road traffic noise map**
- **Technical matters**
- **Outputs**
- **Lessons learned**

2009

Auckland Motorway Alliance BECA / MDA

- Auckland Motorway Network
- > 65 dB LAeq(24 hour)



2012

AMA

- Auckland Motorway Network
- NZTA led
- Lots of noise barriers
- Full SoundPLAN model out to 100 m from road
- 55 - 70 dB LAeq(24 hour)
- Used for various internal purposes (complaint investigation)



2014

NZTA

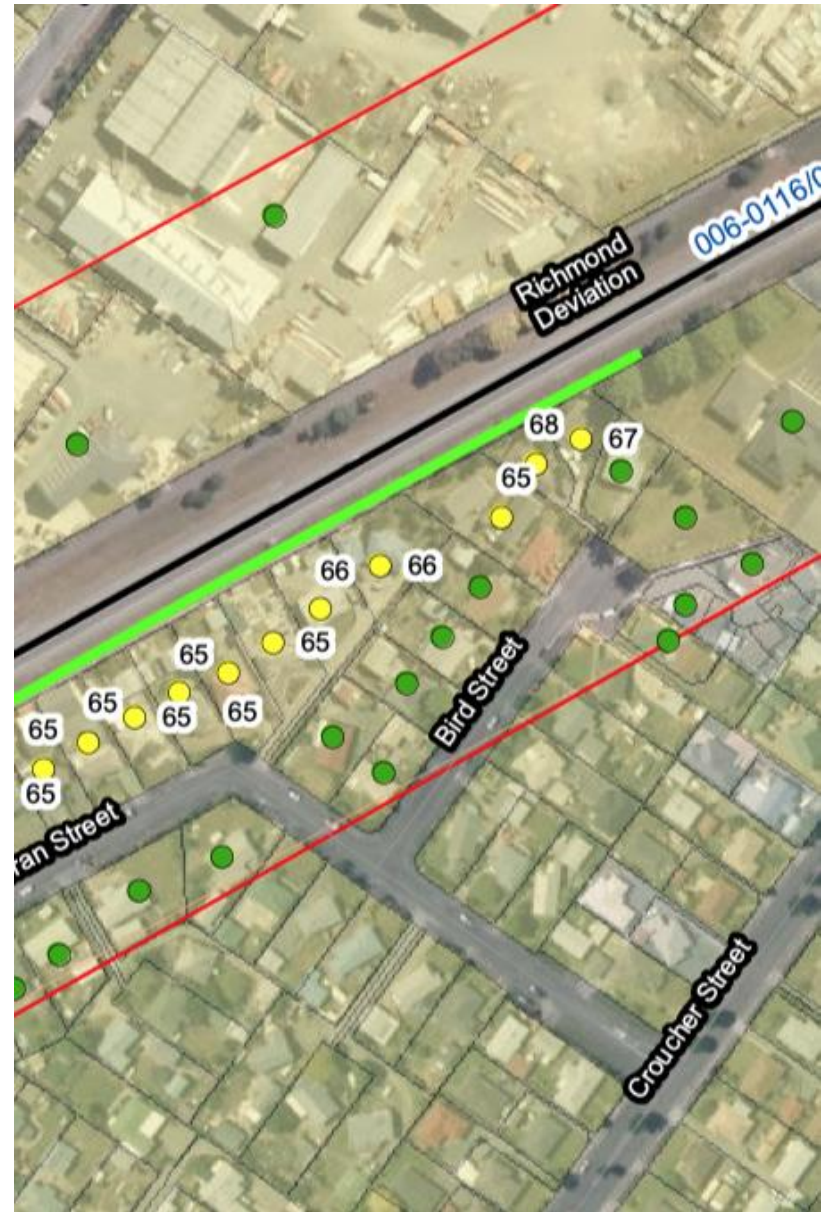
- Land-use control
- Buffer and effects areas calculated for state highway network
- GIS calculations by Transport Agency
- Web map
- Submissions on district plans



2017

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- Retrospective noise mitigation planning (PBC)
- All receivers within 100m of state highway network (c 90,000)
- Treatment options for >64 dB
- Mixture of building footprints and approximations from parcel centroids



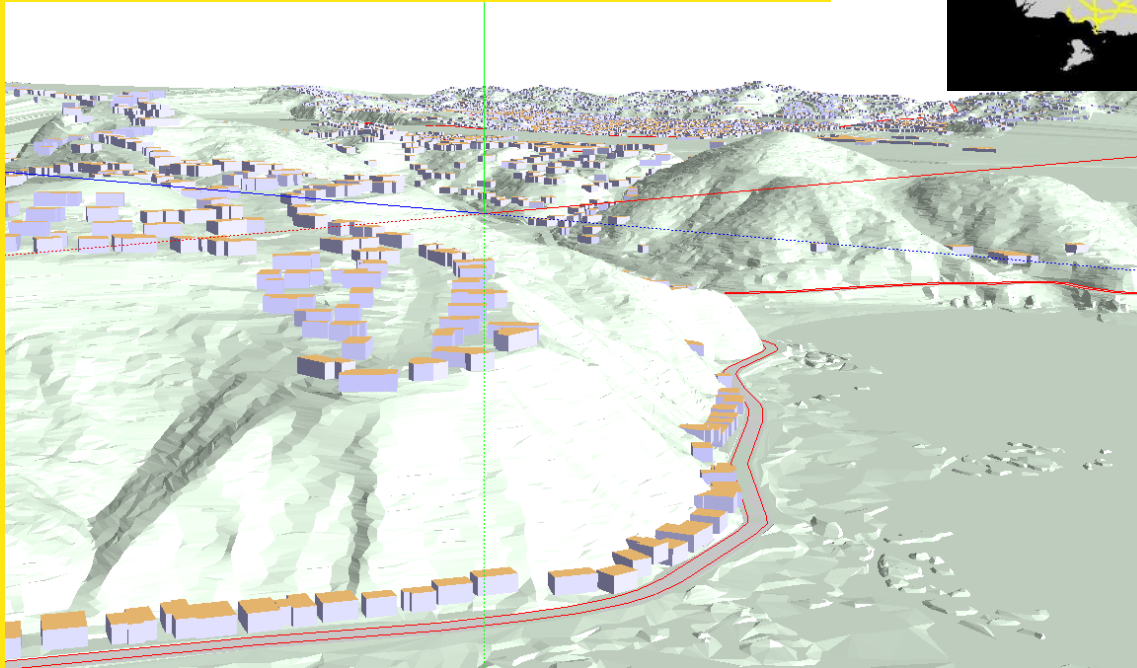
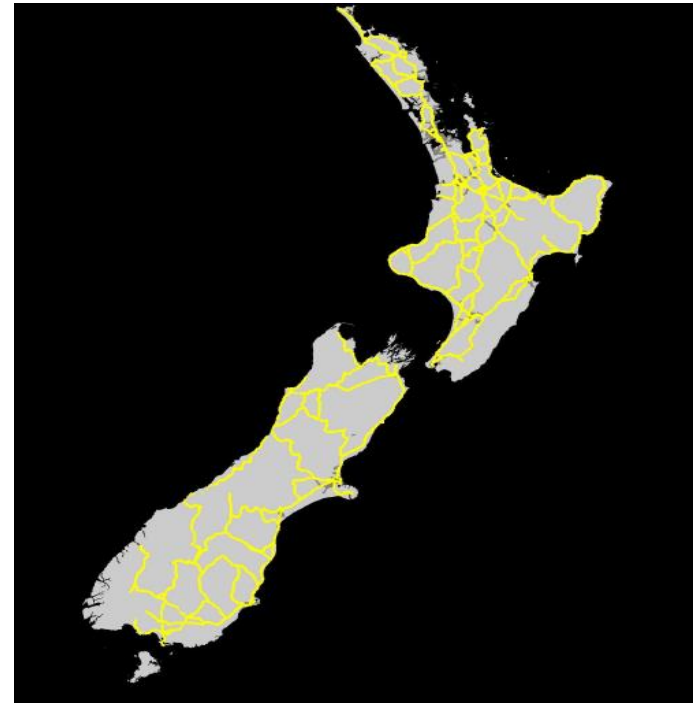
Quiz...

Which of the following conditions is NOT a critical health outcome for populations exposed to road traffic noise?

- **A Cardiovascular disease**
- **B Effects on sleep**
- **C Irritable bowel syndrome**
- **D Cognitive impairment**
- **E Annoyance**

Project Brief 2019

Map the noise emissions from all NZ state highways, regional and arterial roads, prepare noise contours and perform statistical analysis to determine the population noise exposure distribution.



15,000+ km²

TERRAIN

14,000+ km

ROADS

1,600,000+

BUILDINGS

3,000+

BRIDGES

88+ km

NOISE BARRIERS

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Model Data

- **Terrain data collection and division into model sections**
- **Building outline and receiver point collection, collaboration and filtering**
- **Road string attribute assignment and combining datasets**

More about data...

- **Terrain**

Nelson City	Contour	1m	Full	Tasman District Council	Dropbox
Marlborough District	Contour	1m	Most	Marlborough District Council	Download
Buller District	Contour	20m	Full	LINZ	Download

- **Building outline data incomplete for Dunedin, Gisborne, Kawerau, Opotiki, New Plymouth, South Taranaki, Stratford, Western Bay of Plenty.**
- **Some roads using assumed attribute values:**

ONRC	Area	AADT
Regional	Urban	15000
	Rural	10000
Arterial	Urban	5000
	Rural	3000

Surface	R_c	R_t
Chip seal	6	1
Asphalt	0	-2

Then the wish list...

- New data release – LINZ, StatsNZ
- Improve the method for Residential vs Commercial identification
- Noise barrier dataset update

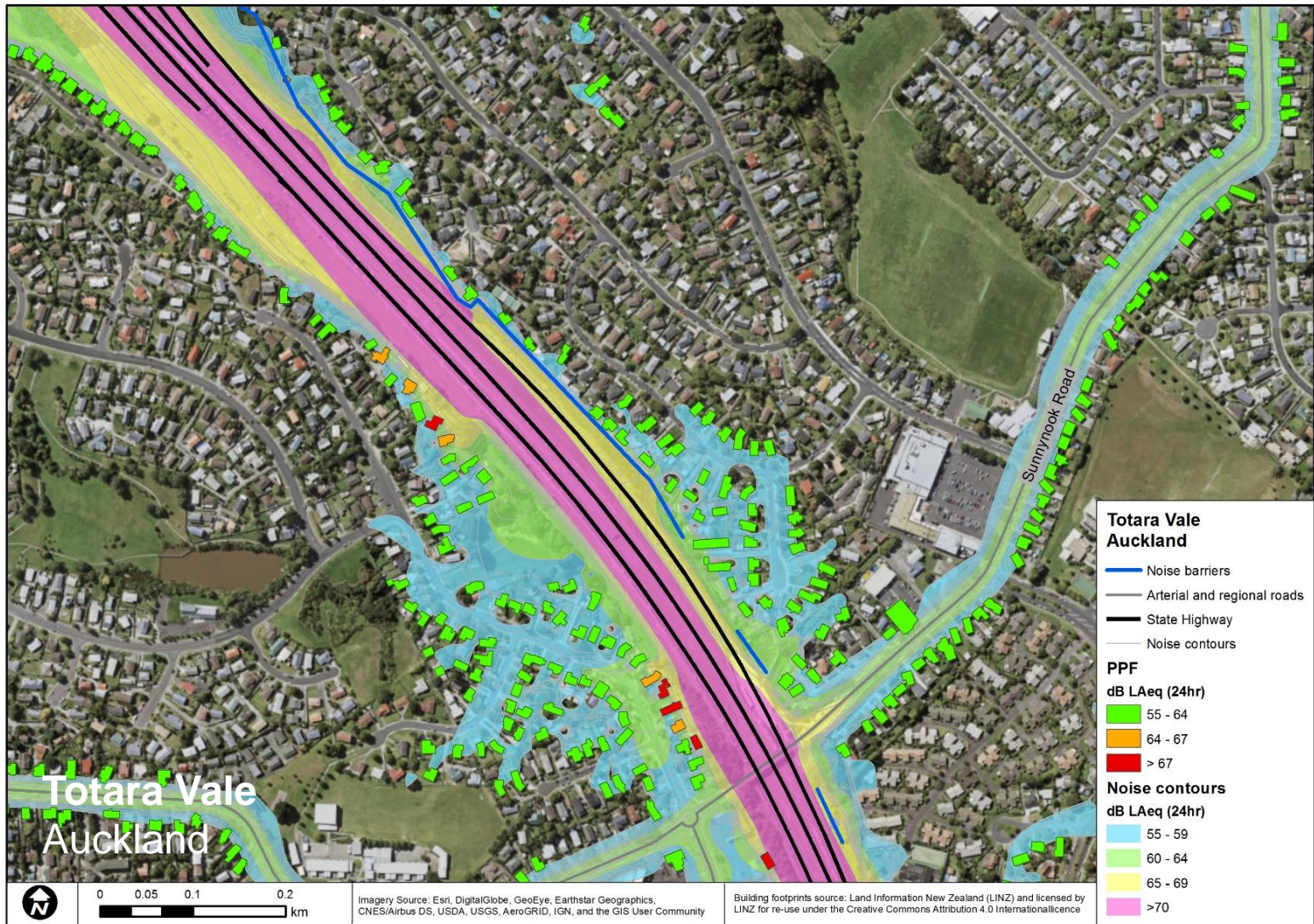
Modelling and Data Management

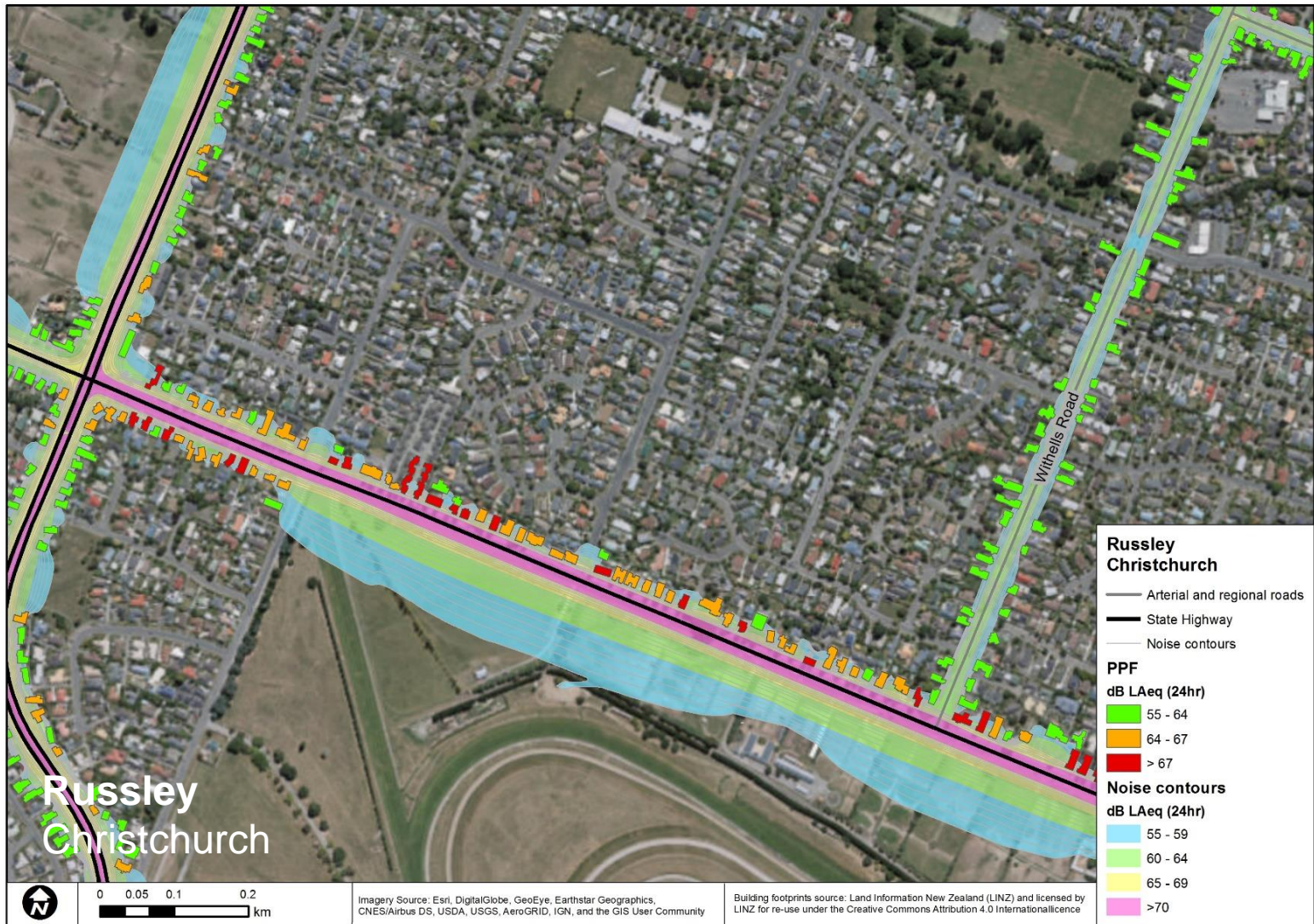
- Modelled the country by districts
- Divided districts up into manageable pieces (161 models for the 66 districts)
- Established a template type model process in SoundPLAN v8.0
- Tiled the calculations in 2km square sections
- Conducted hardware and setting trials to minimise the calculation times and provide reliable stability

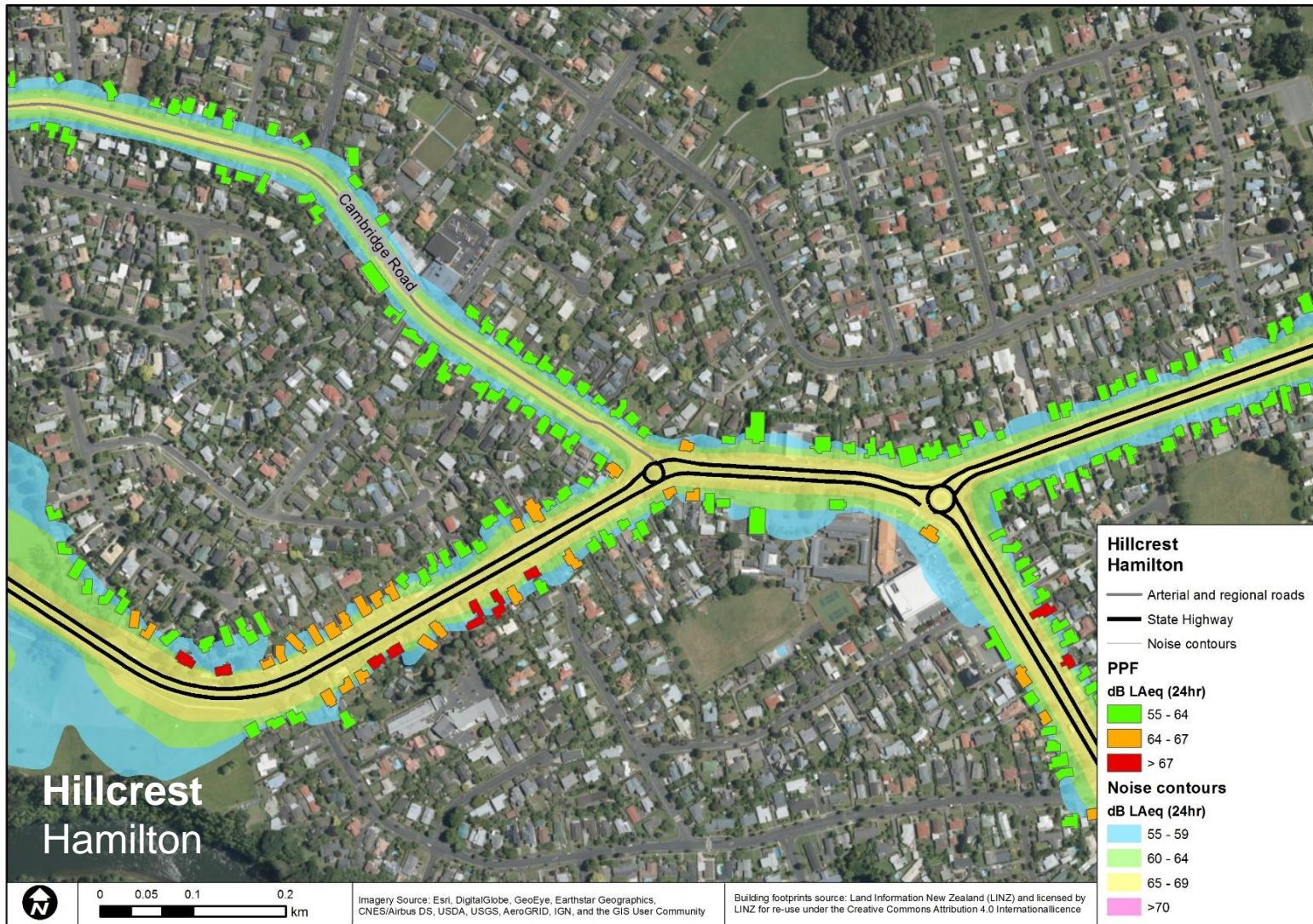


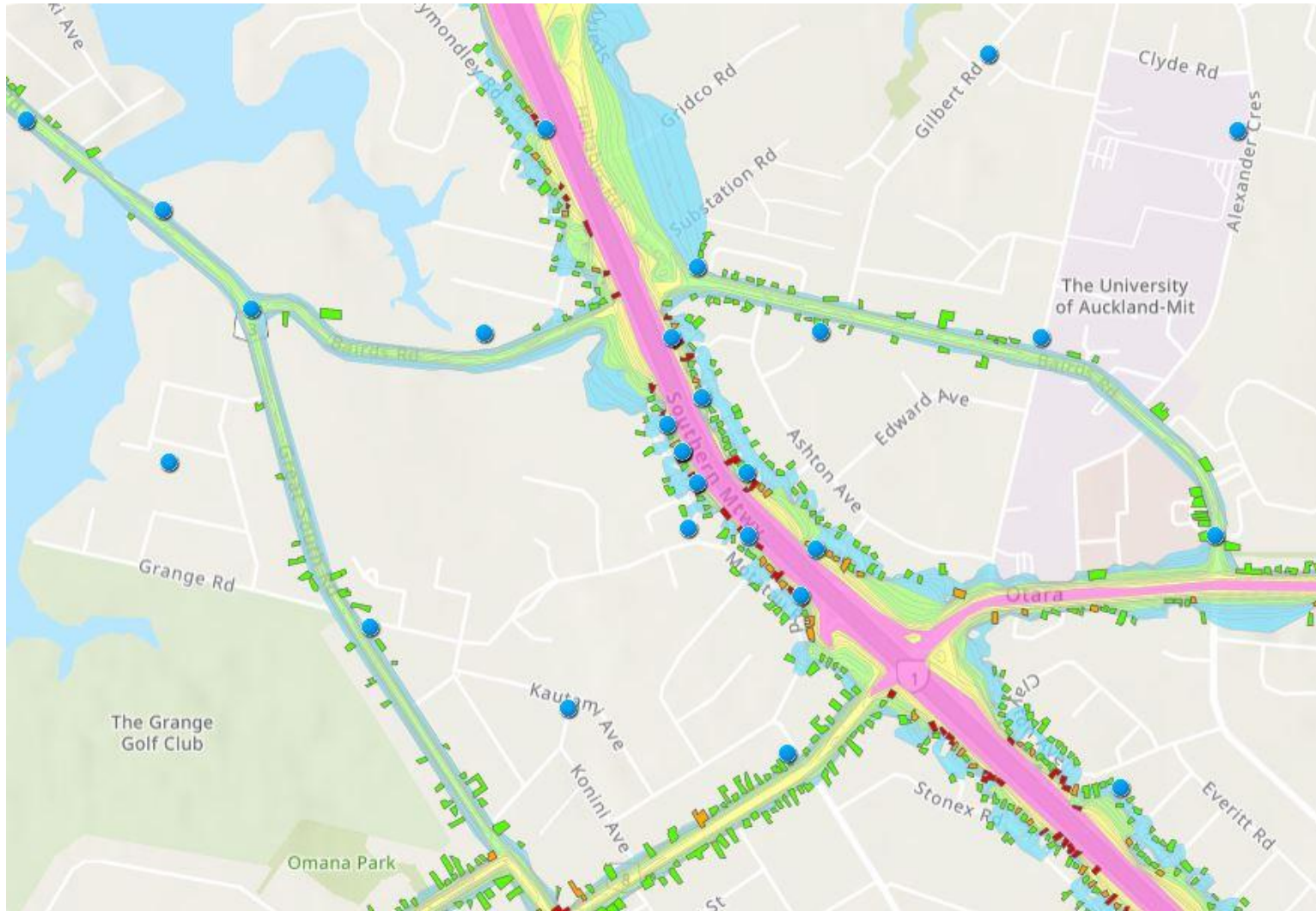
Noise Maps

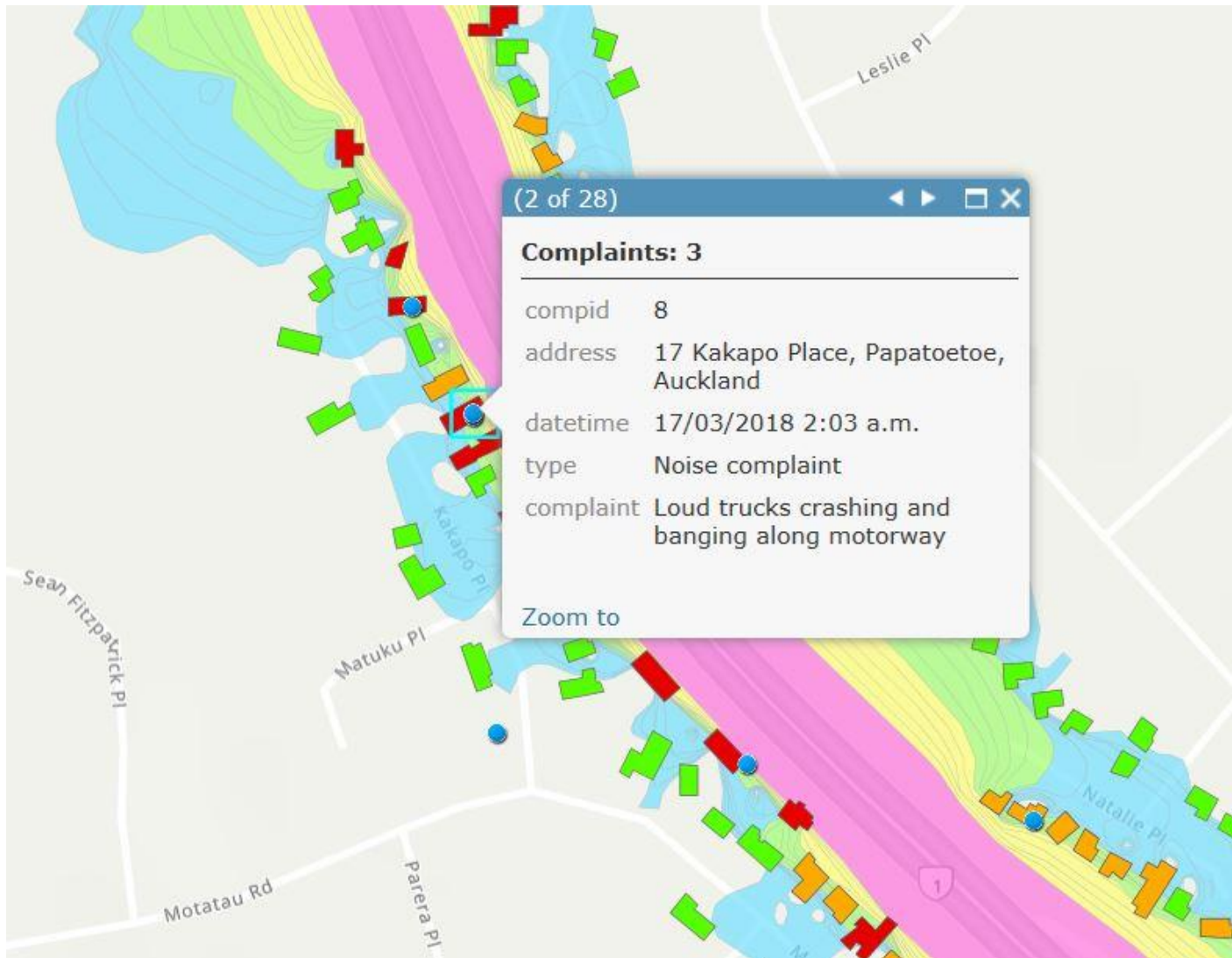
- Noise contours
- PPF Category assignment
- Population exposure counts
- Noise complaint tracing











NZ Population Noise Exposures

- StatsNZ 2013 census data
- Even distribution of population numbers per mesh block
- Counted the number of people exposed to each noise level
- Raw data to Excel for analysis (∞ graphs!!)

Region	Category A			Category B			Category C			Lden			Lnight		
	LAeq(24 hour) < 64 dB			64 dB ≤ LAeq(24 hour) < 67 dB			67 dB ≤ LAeq(24 hour)			LAeq(24 hour) > 45 dB			LAeq(24 hour) > 44 dB		
	Regional & Arterial	State Highway	Total	Regional & Arterial	State Highway	Total	Regional & Arterial	State Highway	Total	Regional & Arterial	State Highway	Total	Regional & Arterial	State Highway	Total
Auckland	1,127,237	86,365	1,213,602	4,089	3,213	7,302	962	2,985	3,947	1,071,041	86,705	1,157,746	1,100,246	89,916	1,190,162
Bay of Plenty	75,786	59,398	135,184	248	862	1,110	6	247	253	72,177	54,077	126,254	73,957	57,137	131,094
Gisborne	6,286	10,511	16,797	0	19	19	0	3	3	5,906	10,039	15,945	6,165	10,337	16,502
Hawke's Bay	70,208	27,268	97,476	247	675	922	16	117	133	66,758	25,227	91,985	68,425	26,553	94,978
Manawatu-Wanganui	90,692	61,559	152,251	90	886	976	13	362	375	88,203	58,338	146,541	89,307	60,318	149,625
Northland	40,518	45,143	85,661	114	586	700	8	162	170	38,113	41,947	80,060	39,236	43,724	82,960
Taranaki	8,702	29,405	38,107	2	480	482	0	65	65	7,877	29,386	37,263	8,333	29,752	38,085
Waikato	134,494	108,048	242,542	581	1,710	2,291	140	601	741	128,227	101,317	229,544	131,294	105,487	236,781
Wellington	277,914	71,769	349,683	5,424	1,644	7,068	2,301	1,121	3,422	269,372	67,828	337,200	277,020	71,034	348,054
Canterbury	317,040	96,468	413,508	980	2,302	3,282	87	819	906	305,163	89,087	394,250	310,804	93,948	404,752
Marlborough	11,846	11,150	22,996	0	168	168	0	62	62	11,620	10,539	22,159	11,702	10,885	22,587
Nelson	22,290	14,996	37,286	71	344	415	7	184	191	20,380	14,008	34,388	21,411	14,747	36,158
Otago	28,641	55,888	84,529	30	852	882	13	256	269	26,183	53,714	79,897	27,569	55,381	82,950
Southland	17,905	32,382	50,287	3	602	605	1	181	182	17,545	31,347	48,892	17,684	32,156	49,840
Tasman	5,119	15,407	20,526	26	663	689	9	233	242	4,564	15,000	19,564	4,850	15,611	20,461
West Coast	745	19,220	19,965	0	82	82	0	17	17	739	18,266	19,005	740	18,740	19,480

Lesson Learned

- Trials...
- Model overlaps
- Computation hardware
- Reduce the number of model sections
- Noise barrier dataset
- Terrain resolution
- National road dataset – NZTA Open Data

Open Data

- **Monthly snapshots available**
- **Includes state highways and roads from territorial authorities**
- **Not sufficient for noise modelling – but could be with some investment by the Transport Agency**
- **Potential for significant return on investment**

The screenshot displays the NZ Transport Agency's Open Data portal. The header includes the agency logo and the 'OPEN DATA' label. The main content area is divided into two columns. The left column lists various data categories: 'permits downloads (1)', 'has an api (1)', 'Content Type', 'Feature Layer (1)', 'Web Mapping Application (1)', 'Tags', 'Roading (2)', 'Road (2)', 'Open Data (1)', 'Aadt (1)', and 'Average Annual Daily Traffic (1)'. The 'Roading (2)' tag is highlighted. The right column shows details for the 'National Road Centreline' dataset, including its type (Feature Layer), last updated date (April 26, 2019), and a description stating it is a hybrid of both p and has been extracted from CoreLogic and the. The dataset is also listed as a 'Web Mapping Application' uploaded on September 20, 2018.

NZ TRANSPORT AGENCY **OPEN DATA**

permits downloads (1)
has an api (1)

Content Type

Feature Layer (1)
Web Mapping Application (1)

Tags

Roading (2)

Road (2)
Open Data (1)
Aadt (1)
Average Annual Daily Traffic (1)

More ▼

centrelines) supplied from individual Road C

Type: Feature Layer
Last Updated: April 26, 2019

National Road Centreline

New Zealand Transport Agency | Open.Data_NZTA

This centrelines dataset is a hybrid of both p
has been extracted from CoreLogic and the

Type: Web Mapping Application
Uploaded: September 20, 2018



Consider Alternative Methods

- SoundPLAN alternatives
- Exposure count methods (Literature review)

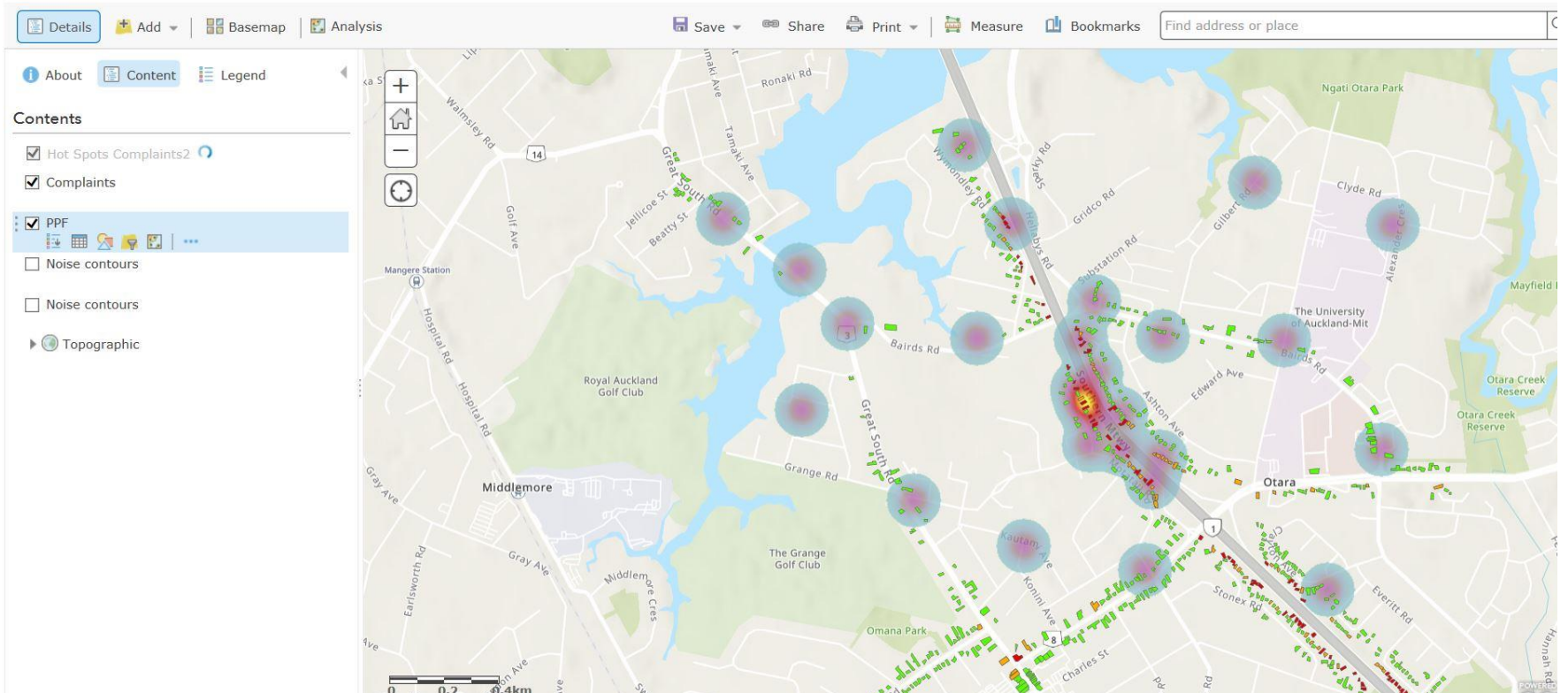
Data Hosting

- Maps and input data currently stored in Shapefile and Geodatabase format on the AECOM server
- Exploring the most attractive ways to host the data
- NZTA may access the data via login to the AECOM ESRI licenced portal



Innovation

- Data mashing and analytics
- Collaboration with territorial authorities for planning – consent applications



Thank you...

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Delivered.