

Estimating On-site Wastewater Management System (OWMS) Locations in Canterbury Region

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- Methods
- Results
- Limitations
- Future work

Project background



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On-site Wastewater Management System (OWMS/septic tank)



Issues

- 20 – 25% of NZ's population
- Risks to drinking water supplies
- Not consented (prior to 1998)
- Unknown number and locations

Datasets

<https://mapviewer.canterburymaps.govt.nz/>

Canterbury Maps Viewer About

Search Address / Location

Tasman Sea / Te Tai-o-Rehua

Pacific Ocean / Moana-nui-a-Ki

Westport / Kawatiri

Greymouth / Māwhera

Christchurch / Ōtautahi

Timaru / Te Tihi-o-Marū

Oamaru

Dunedin / Ōtepoti

100km

1,545,031.792219 5,194,562.592288 Meters

Land Information New Zealand, Environment Canterbury | Environment Canterbury

POWERED BY **esri**

Layer List

Layers

- Building Outlines
- Rating Units
- Wastewater Nodes
- Wastewater Pipelines
- Effluent Human Discharge (Areas) - Consented Activities - Consented Activities - Effluent Human Discharge Area
- Effluent Human Discharge - Consented Activities - Consented Activities - Effluent Human Discharge
- Wells and Bores - All
- Community Drinking Water Protection Zones
- Kā Huru Manu - Ngā Ingoa
- Kā Huru Manu - Kā Ara Tupuna
- Kā Huru Manu - Ngā Ingoa (Awa)
- Kā Huru Manu - Ngā Whenua Rāhui (Māori Land Allocations)
- Water-supply Nodes
- Stormwater Nodes

Datasets and goal

Northeast of Ashburton township



Methods

Unknown **Occupied** **Reticulated** **Active**
OWMS **Dwellings** **Dwellings** **Consents**

The diagram illustrates a sequence of four categories: Unknown OWMS, Occupied Dwellings, Reticulated Dwellings, and Active Consents. The relationships between these categories are shown as follows: Unknown OWMS is equal to Occupied Dwellings (indicated by a double orange line), Occupied Dwellings is less than Reticulated Dwellings (indicated by a single orange line), and Reticulated Dwellings is less than Active Consents (indicated by a single orange line).

Locate Occupied Dwellings

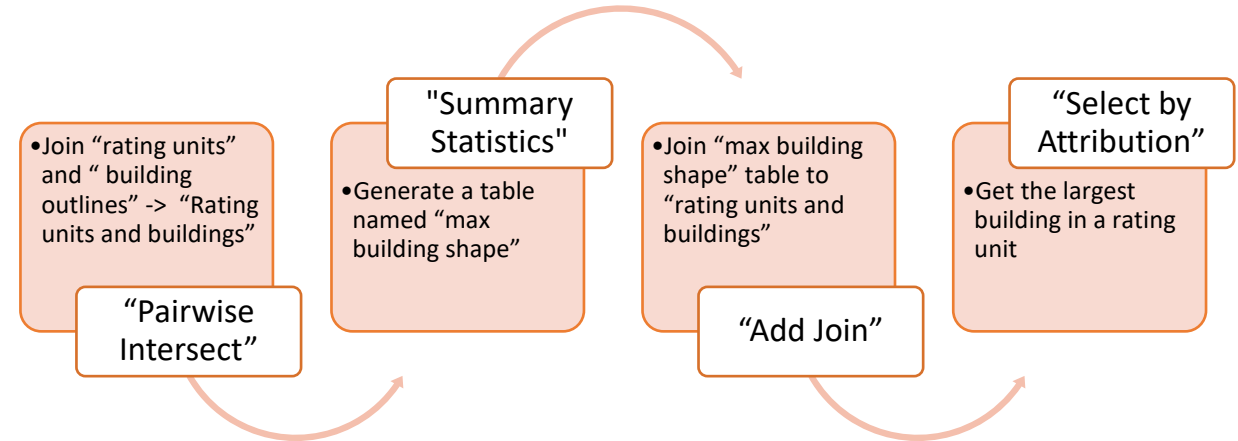
Datasets:

Rating Units and Building Outlines



Method:

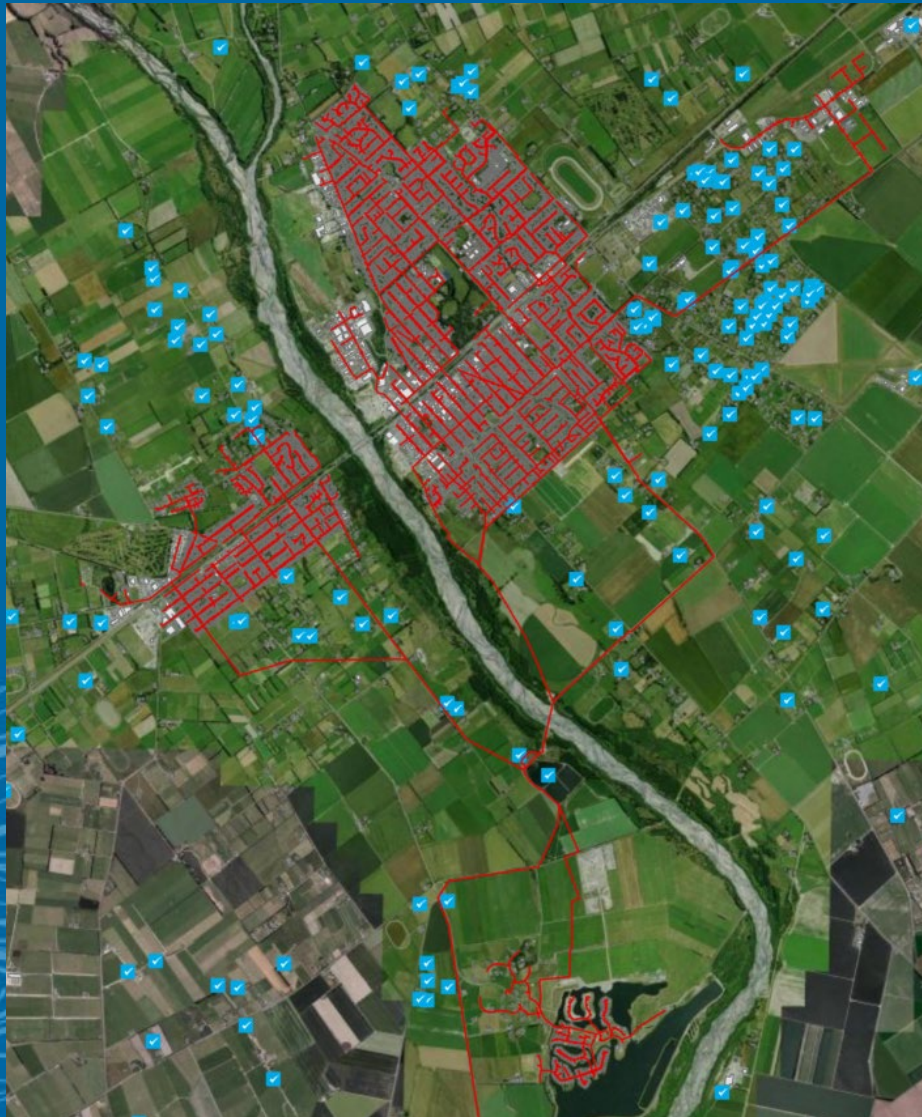
Step1: Locate the largest building in each rating unit



Step2: Remove sheds, vacant rating units



Identify Reticulated Dwellings



← Estimated by the wastewater pipes

Rating Information Current District

Description	Factor	Rate/Charge	Amount
Ashburton Urban Amenity	400000	0.0007450000	\$298.00
Ashburton Waste Collection	1	235.3000000000	\$235.30
Ashburton Wastewater Connected	1	484.8000000000	\$484.80
Ashburton Water Supply Connected	1	514.2000000000	\$514.20
General Rate	400000	0.0004040000	\$161.60
Roading Rate	400000	0.0004330000	\$173.20
Uniform Annual General Charge	1	697.0000000000	\$697.00
Total			\$2,564.10

Rating Information Current Regional

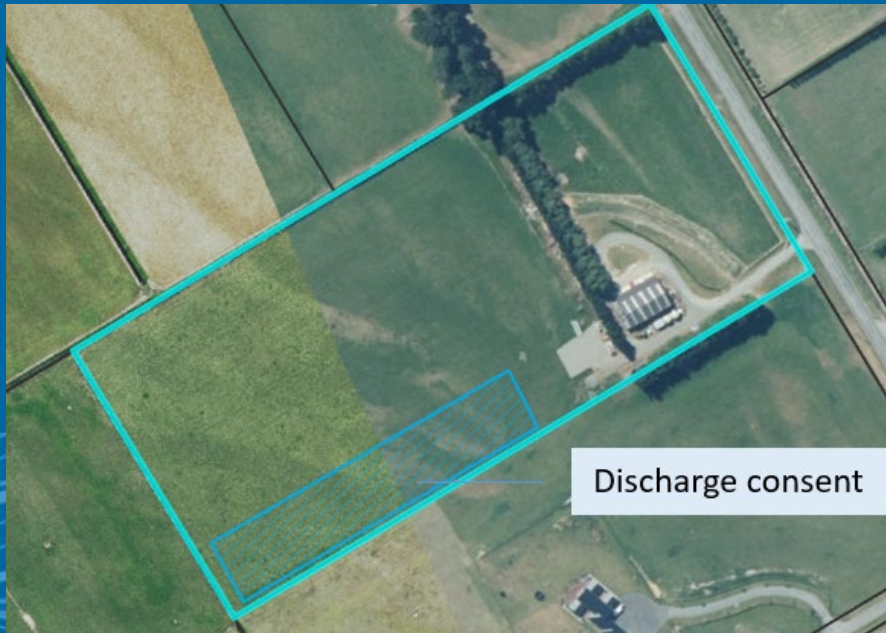
Description	Factor	Rate/Charge	Amount
Ashburton River E Catchment Works	400000	0.00003755	\$15.02
Catchment Works and Services	400000	0.0000120400	\$4.82
Civil Defence Emergency Management	1	13.8600000000	\$13.86
Clean Heat Incentive	400000	0.0000093300	\$3.73
Regional General Rate	400000	0.0003324900	\$133.00
Regional Uniform Annual General Charge	1	46.1000000000	\$46.10
Total Mobility Rate	400000	0.0000080300	\$3.21
Total			\$219.74

↑ Information from the property rate

Identify Dwellings with Active Discharge Consents

Datasets:

Rating Units and Human effluent discharge consents



Method:

ArcGIS Spatial Join

If the polygon of a rating unit contains an active discharge consent, there should be an on-site wastewater system installed in the rating unit.

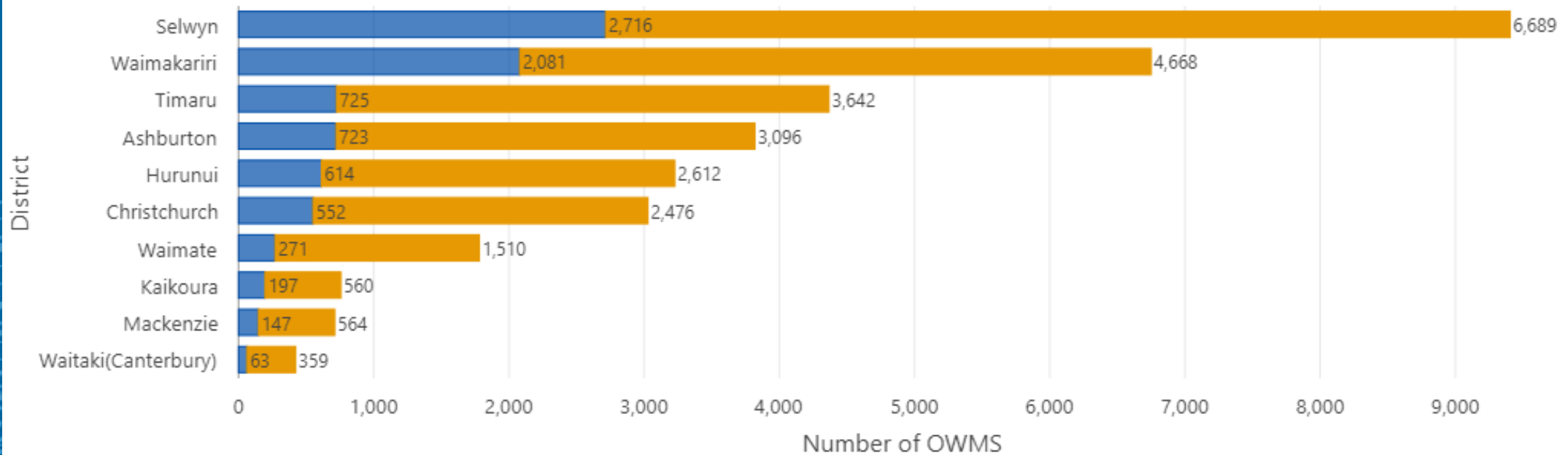
Results

#Consented OWMS: 8089

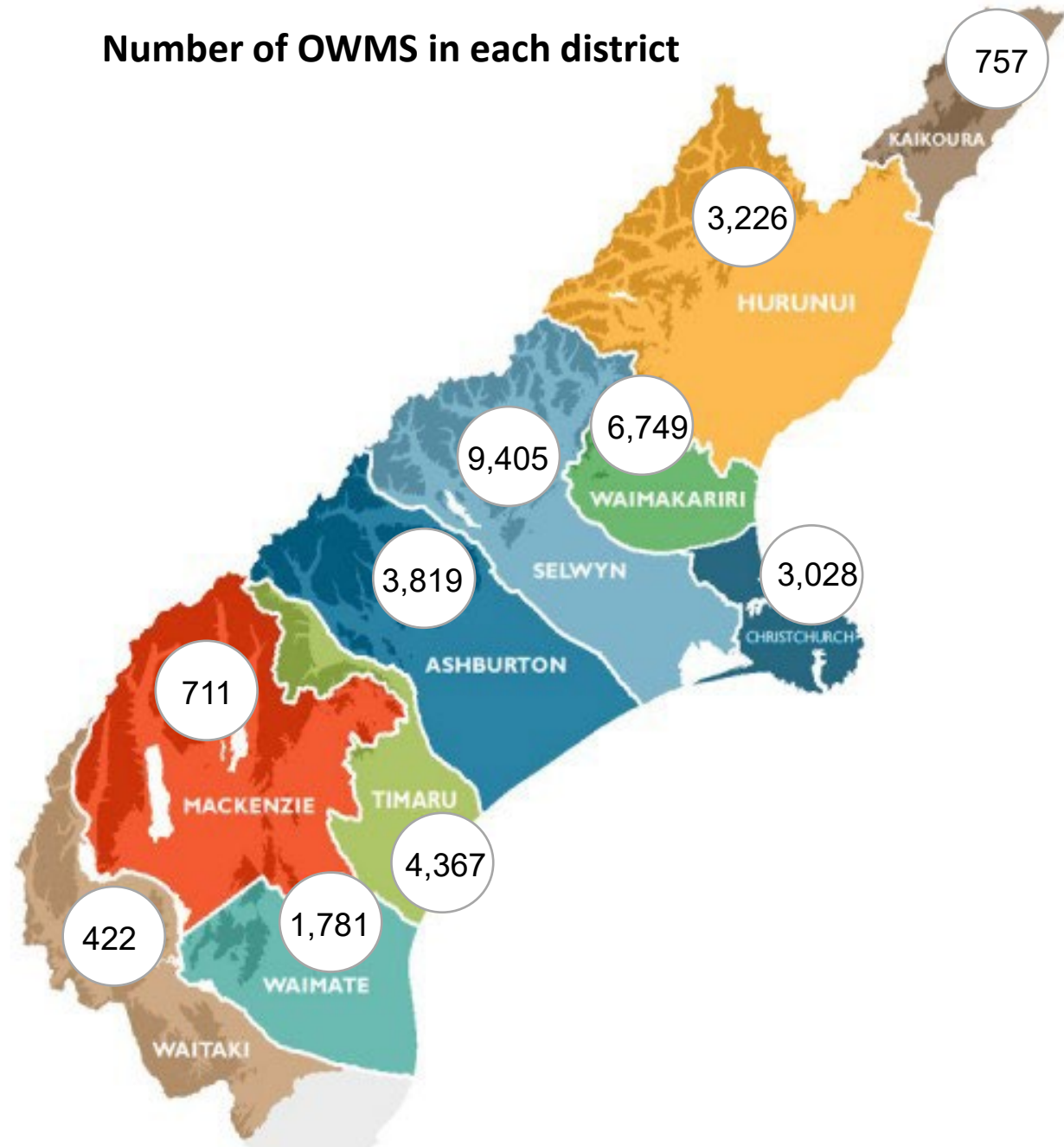
#Estimated OWMS: 26176

Number of OWMS in Canterbury by District

■ Active consents ■ Unconsented

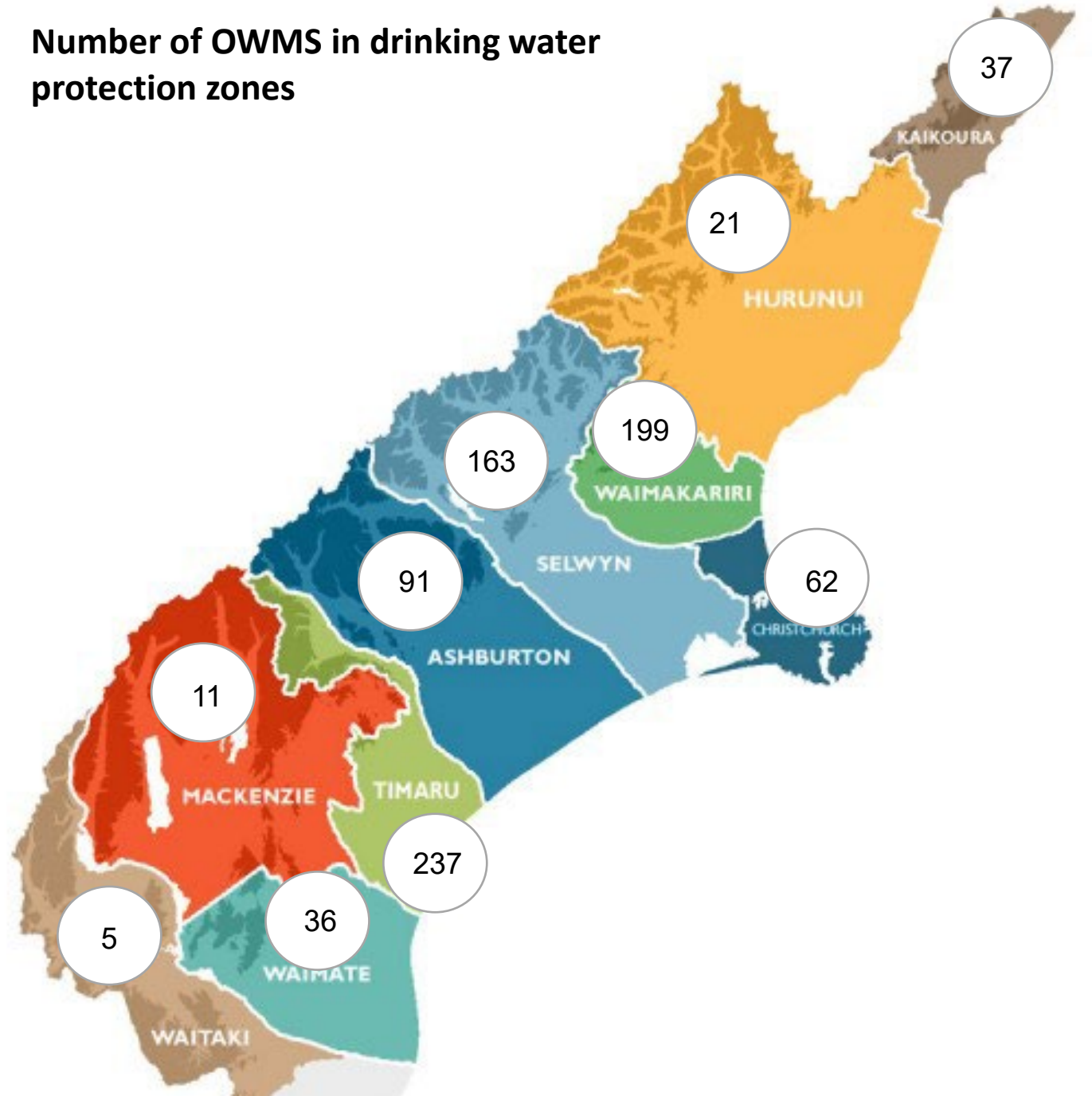


District	Total OWMS	Estimated OWMS	% Estimated OWMS
Selwyn	9,405	6,689	71%
Waimakariri	6,749	4,668	69%
Timaru	4,367	3,642	83%
Ashburton	3,819	3,096	81%
Hurunui	3,226	2,612	81%
Christchurch	3,028	2,476	82%
Waimate	1,781	1,510	85%
Kaikoura	757	560	74%
Mackenzie	711	564	79%
Waitaki	422	359	85%
TOTAL	34,265	26,176	76%

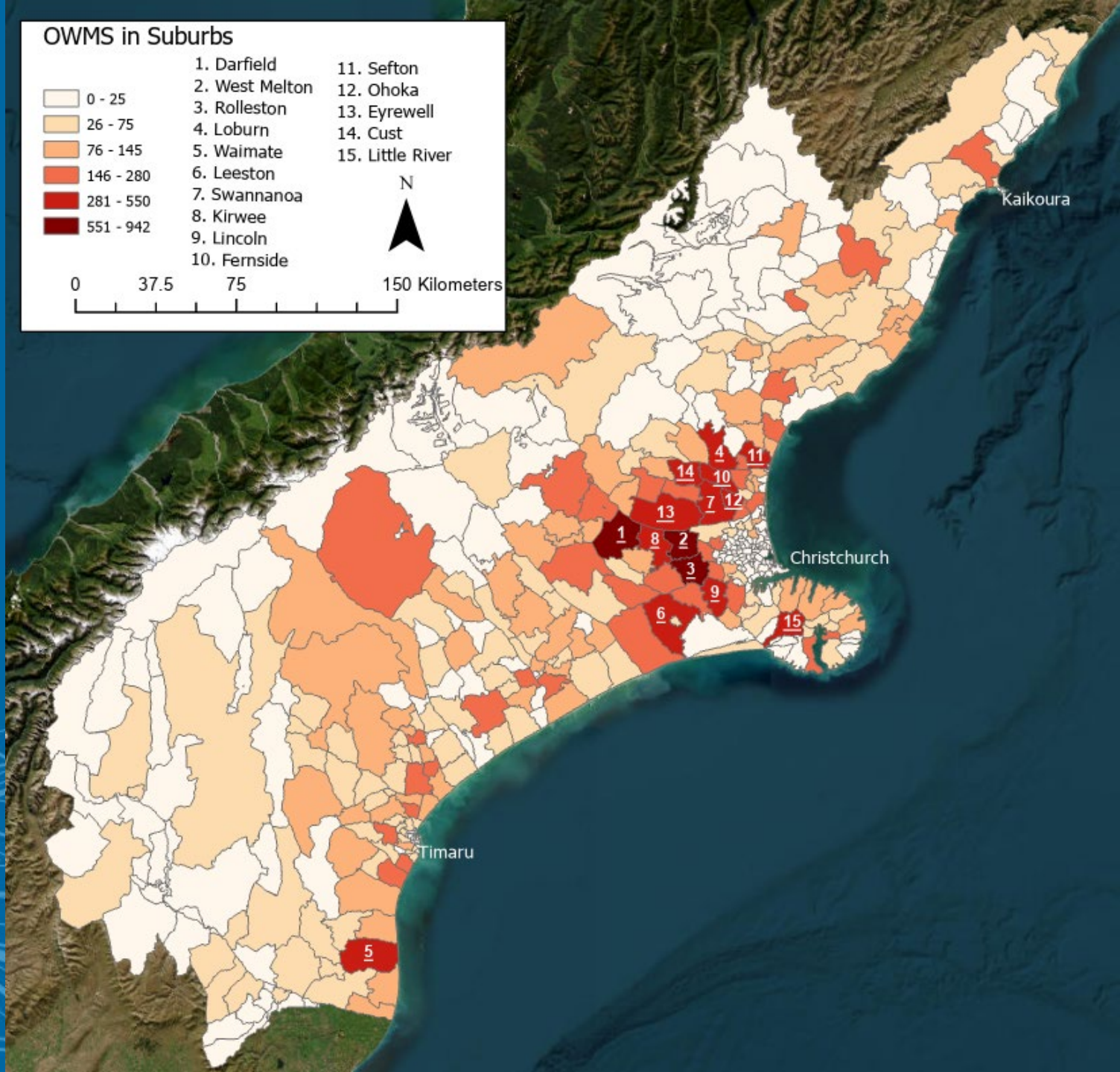
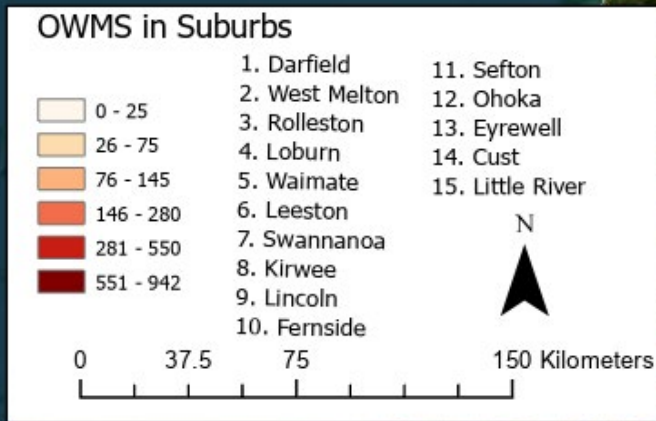


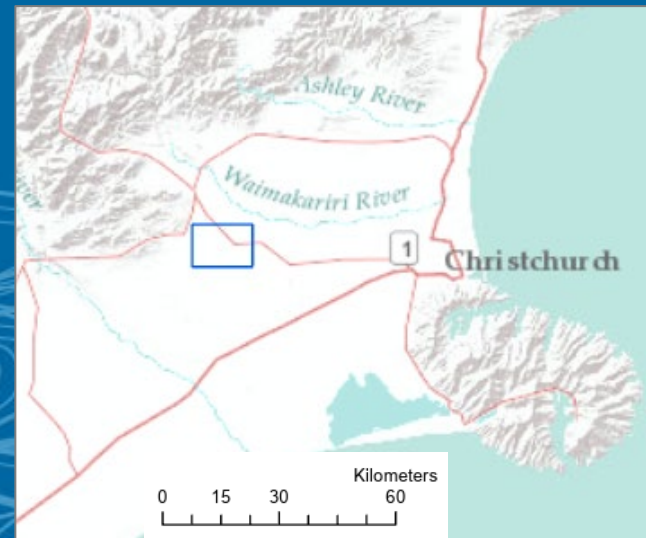
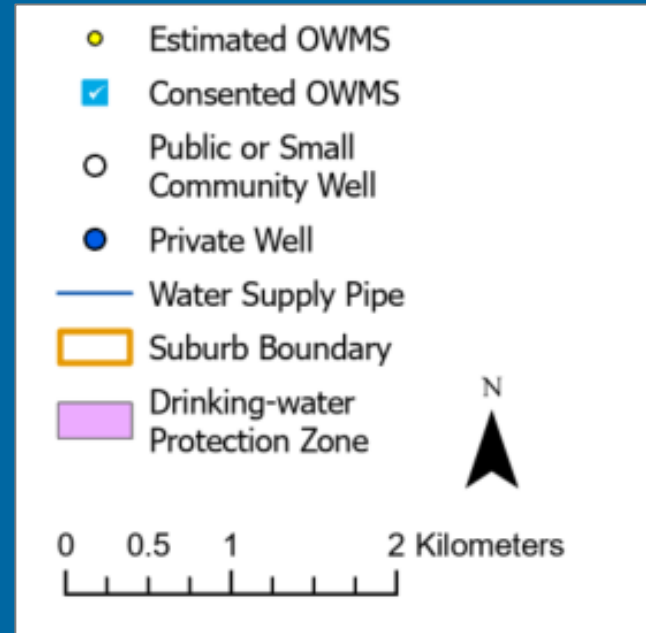
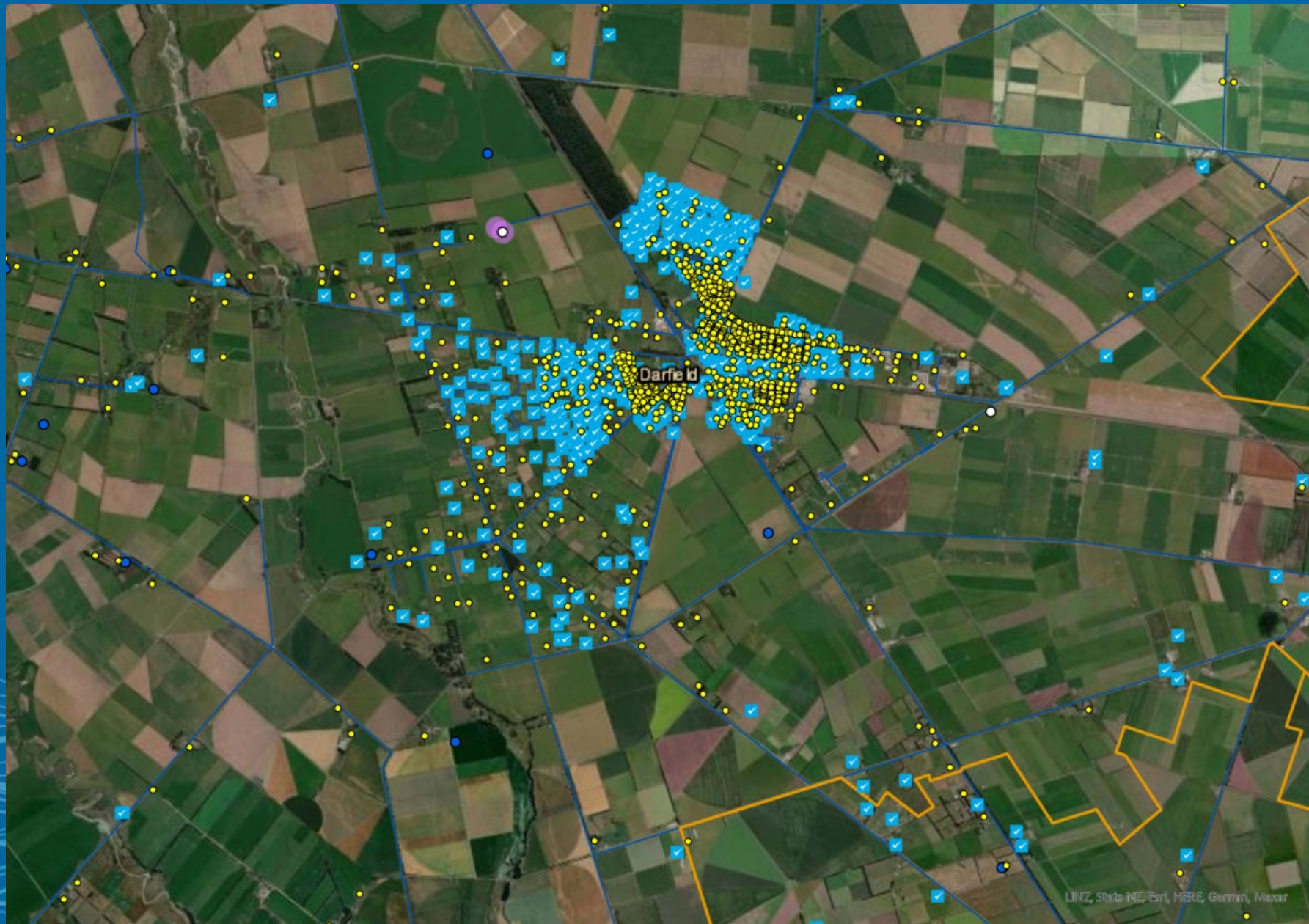
District	# OWMS within DWPZ
Timaru	237
Waimakariri	199
Selwyn	163
Ashburton	91
Christchurch	62
Kaikoura	37
Waimate	36
Hurunui	21
Mackenzie	11
Waitaki	5
TOTAL	862

Number of OWMS in drinking water protection zones

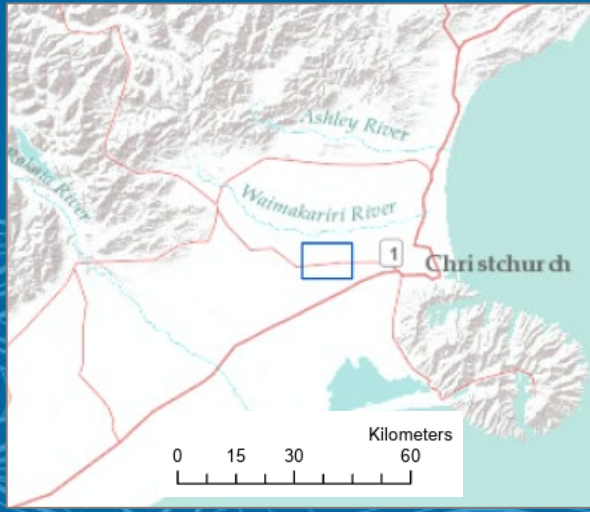
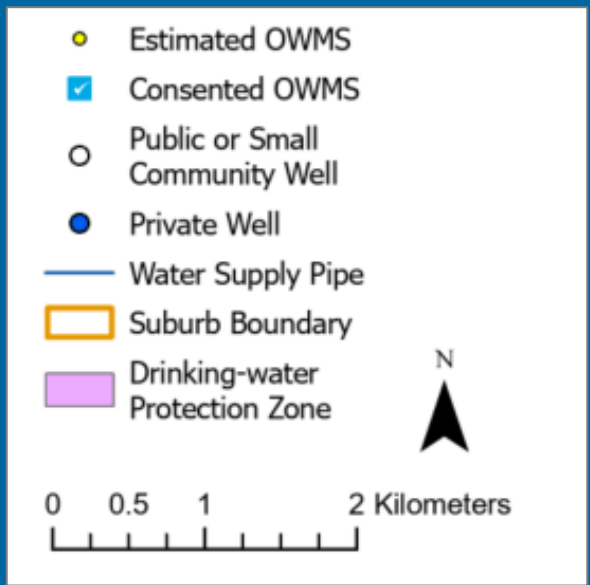
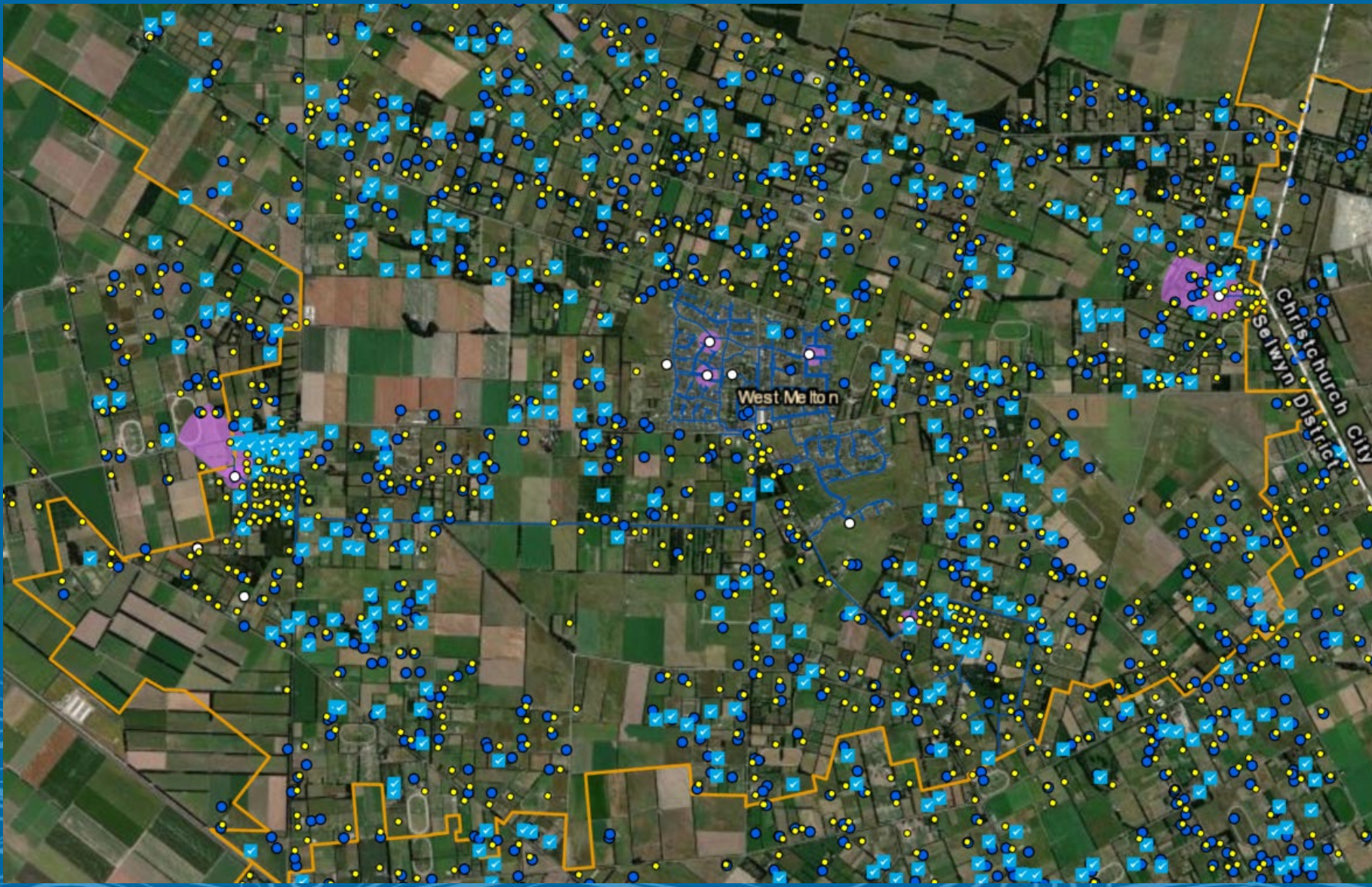


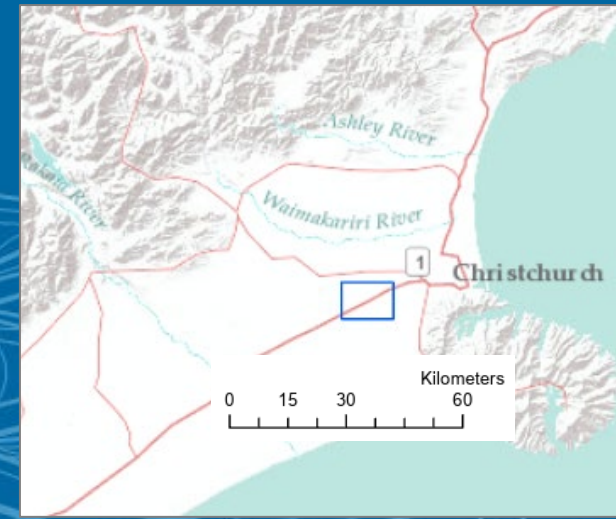
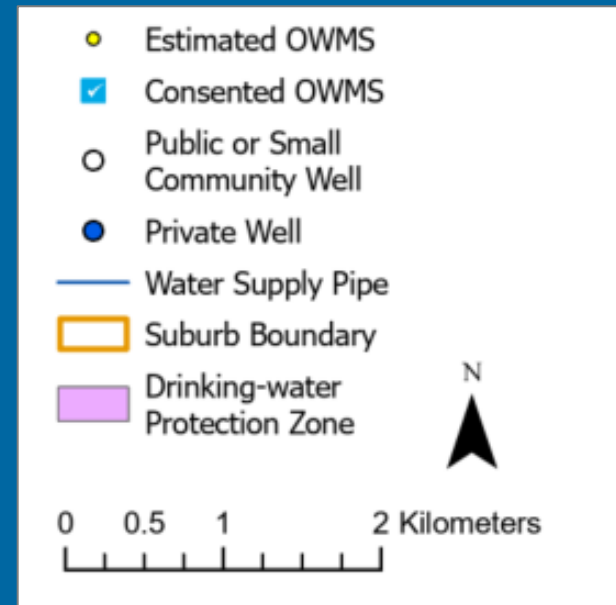
Suburb/ Locality	# Estimated OWMS
Darfield	942
West Melton	683
Rolleston	652
Loburn	508
Waimate	465
Leeston	451
Swannanoa	416
Kirwee	401
Lincoln	376
Fernside	370
Sefton	357
Ohoka	325
Eyrewell	305
Cust	304
Little River	295





LINZ, State NZ, Esri, HERE, Garmin, Mapbox





Limitations

- Cannot determine the types of OWMS identified
- Not reliable in rating units with more than one dwelling, potential under-estimation of the number of OWMS

Future work

- Validate the GIS model with more data
- Identify high risk areas
- Utilise remote sensing techniques to monitor the performance of effluent land application

Acknowledgement



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