Modelling Group
WATER NEW ZEALAND

Modelling Symposium

Challenges of Flood Plain Publication

Presented by
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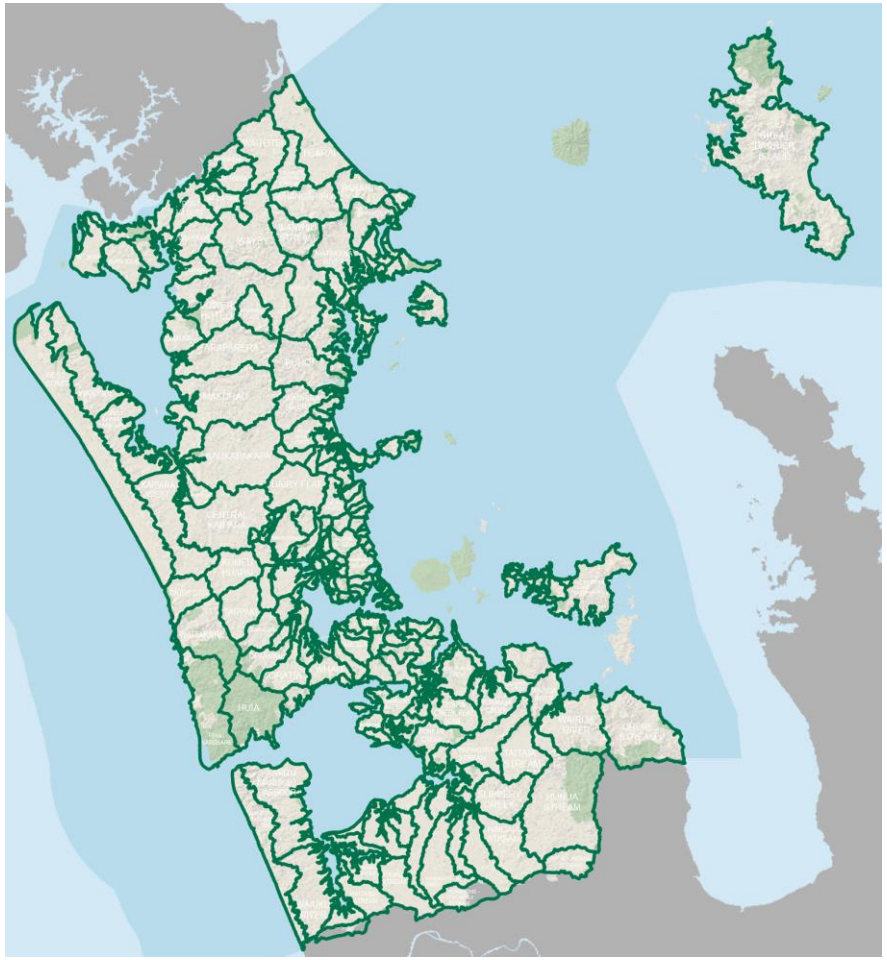
water
NEW ZEALAND
The New Zealand Water & Wastes Association Waiora Aotearoa

Contents

- Flood Plains in Auckland
- Flood Plain Production Process
- Challenges

Flood Plains in Auckland



- 1/3 of NZ population in Auckland
- Auckland area ~5,000km²
- 233 catchments

Flood Plains in Auckland

- Assume MPD and climate change
- 1% AEP rainfall event
- Flood plain area 740km²
- 14% of Auckland region within flood plains
- Updated on a rolling programme

Why Publish Flood Plains?

- Local Government Official Information and Meetings Act (LGOIMA)

44A Land information memorandum

(1) A person may apply to a territorial authority for the issue, within 10 working days, of a land information memorandum in relation to matters affecting any land in the district of the authority.

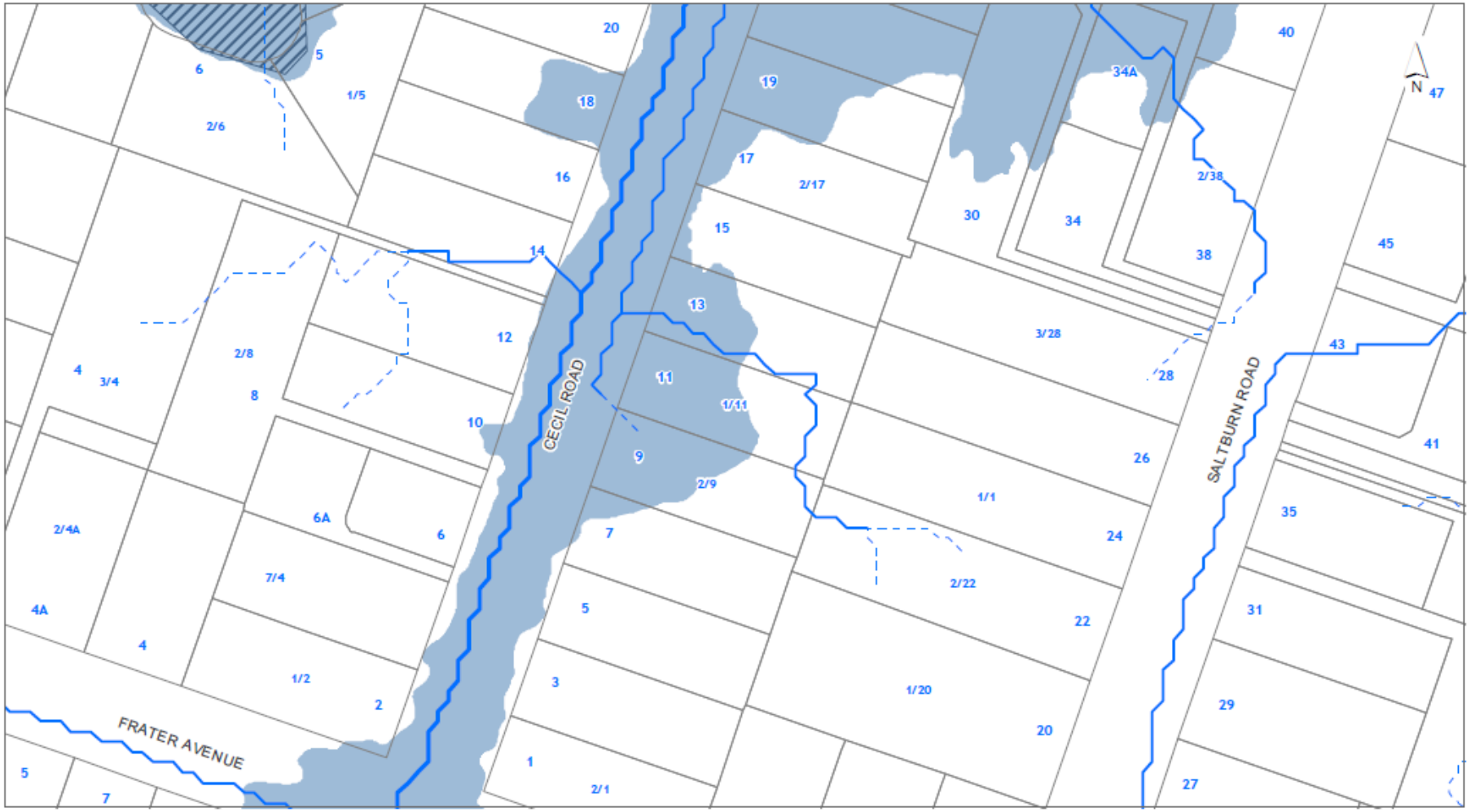
(2) The matters which shall be included in that memorandum are—

(a) information identifying each (if any) special feature or characteristic of the land concerned, including but not limited to potential erosion, avulsion, falling debris, subsidence, slippage, alluvion, or inundation, or likely presence of hazardous contaminants, being a feature or characteristic that—

(i) is known to the territorial authority; but

(ii) is not apparent from the district scheme under the Town and Country Planning Act 1977 or a district plan under the Resource Management Act 1991:

Auckland Council | Special Land Features | Map



DISCLAIMER:
This map/plan is illustrative only and all information should be independently verified on site before taking any action. Copyright Auckland Council. Land Parcel Boundary information from LINZ (Crown Copyright Reserved). Whilst due care has been taken, Auckland Council gives no warranty as to the accuracy and plan completeness of any information on this map/plan and accepts no liability for any error, omission or use of the information. Height datum: Auckland 1946.

Natural Hazards - Flooding

1/11 Cecil Road Milford 0620

Flat 1 DP 131592 on Lot 29 DP 7185 1/2sh

0 6.5 13 19.5
Meters

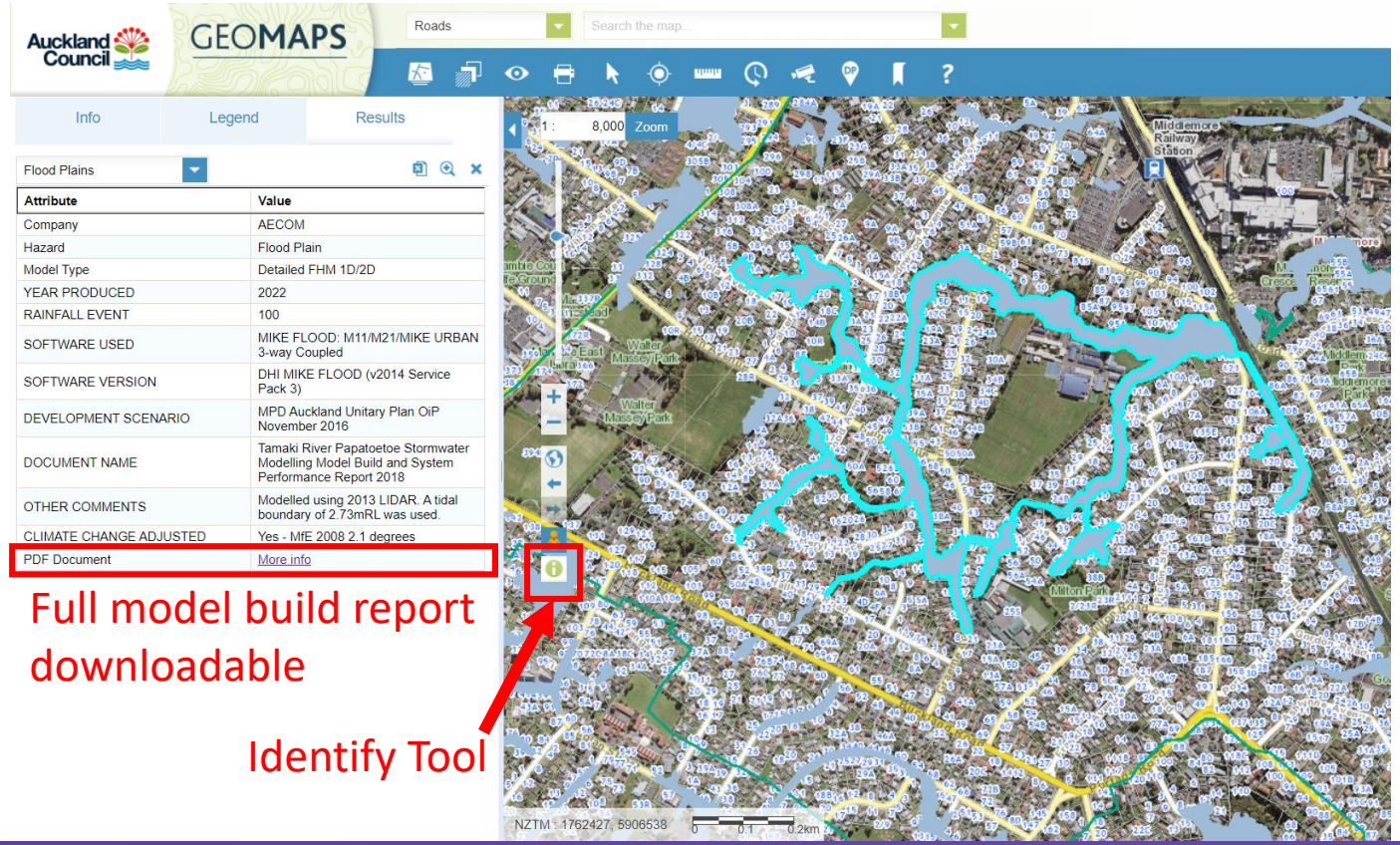
Scale @ A4
= 1:1,000

Date Printed:
7/01/2020

Auckland Council
Te Kaunihera o Tāmaki Makaurau

Auckland Council GeoMaps

https://geomapspublic.aucklandcouncil.govt.nz/viewer/index.html



Full model build report downloadable

Identify Tool

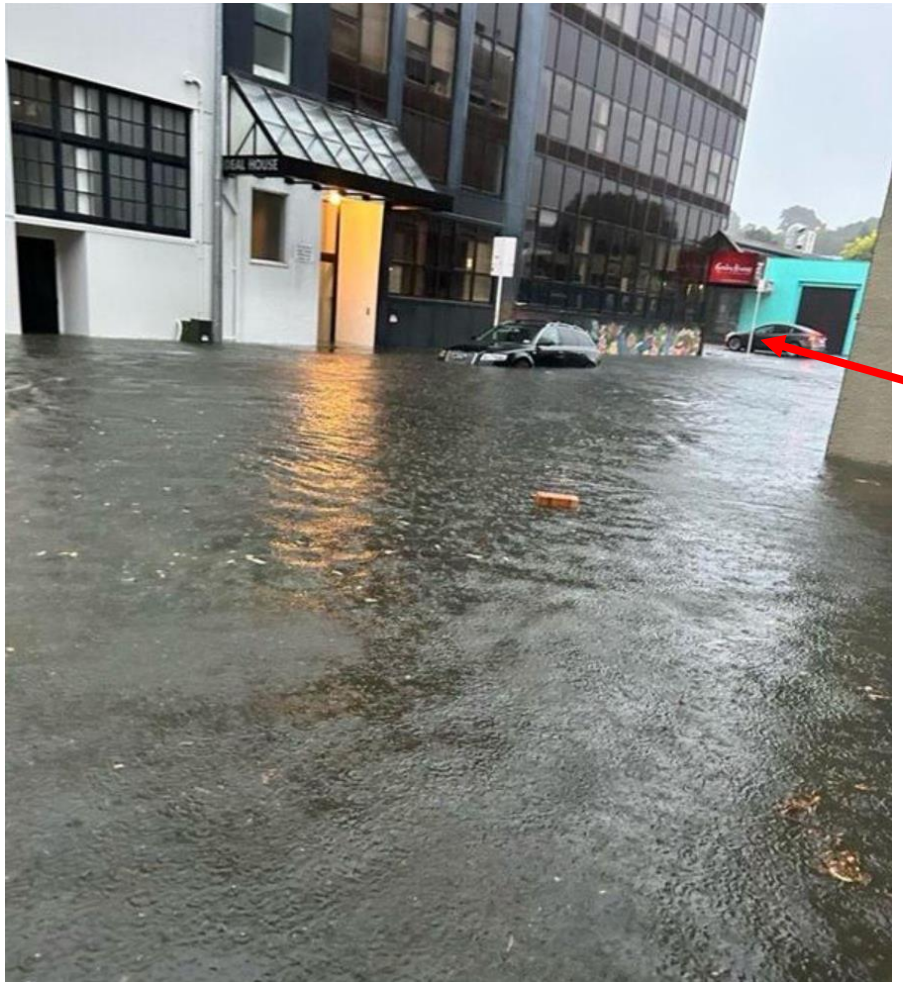
Other Uses

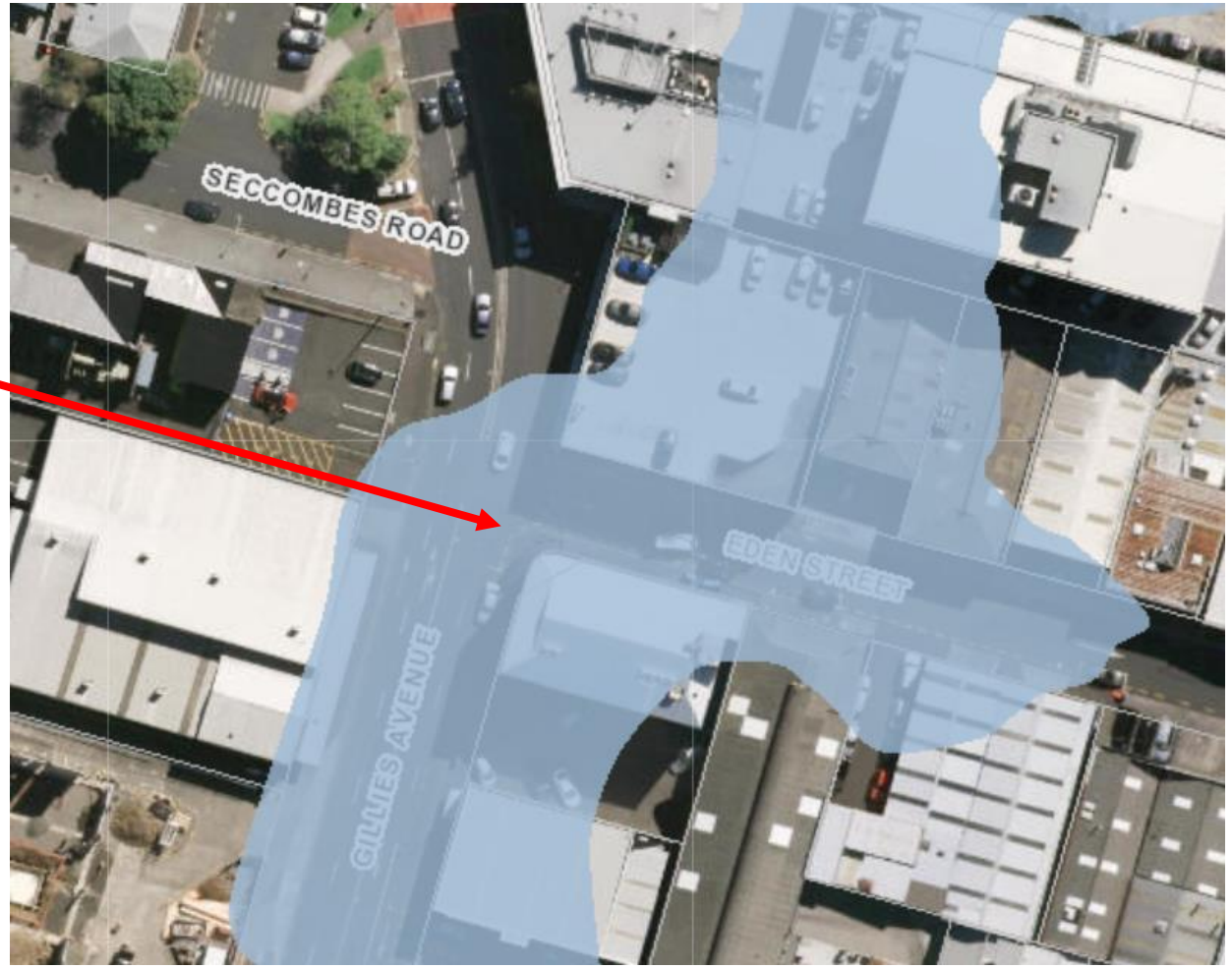
- Support regulatory functions
  - Resource consenting
  - Building control

- Support catchment and regional planning
  - Identify and mitigate flood risk
  - Development of tools

- To influence behaviour and decisions of the community

Storm Event – 27th January 2023





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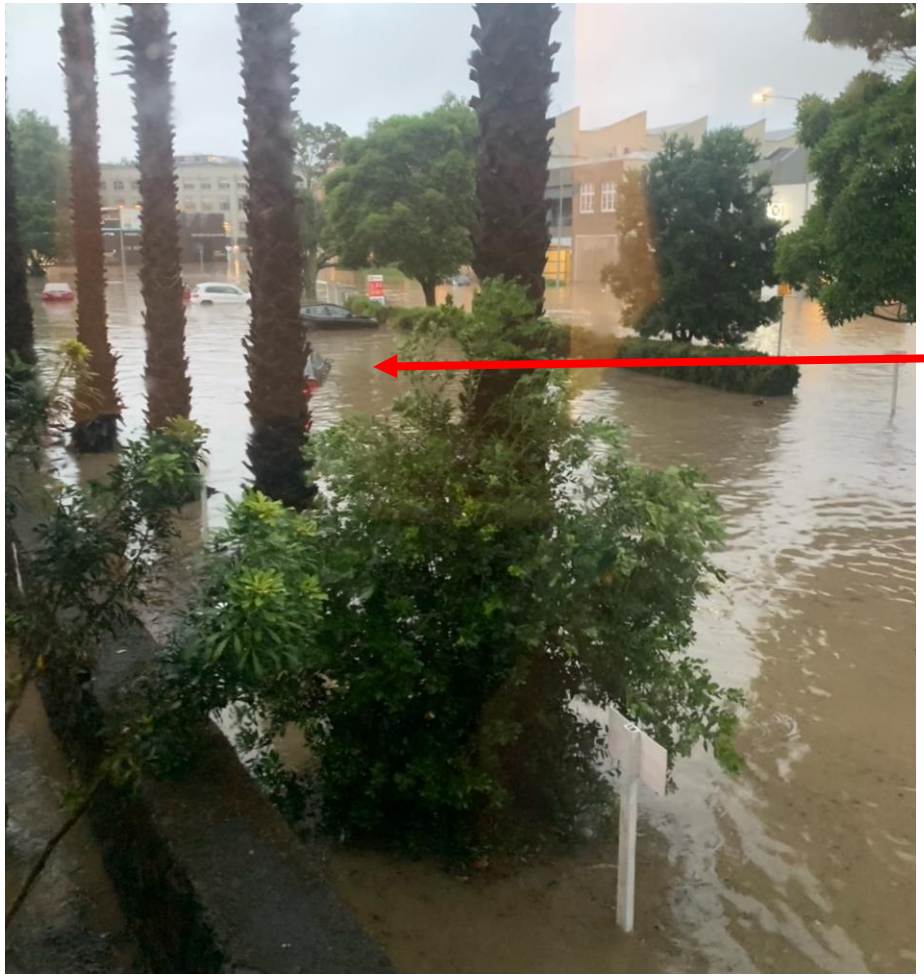

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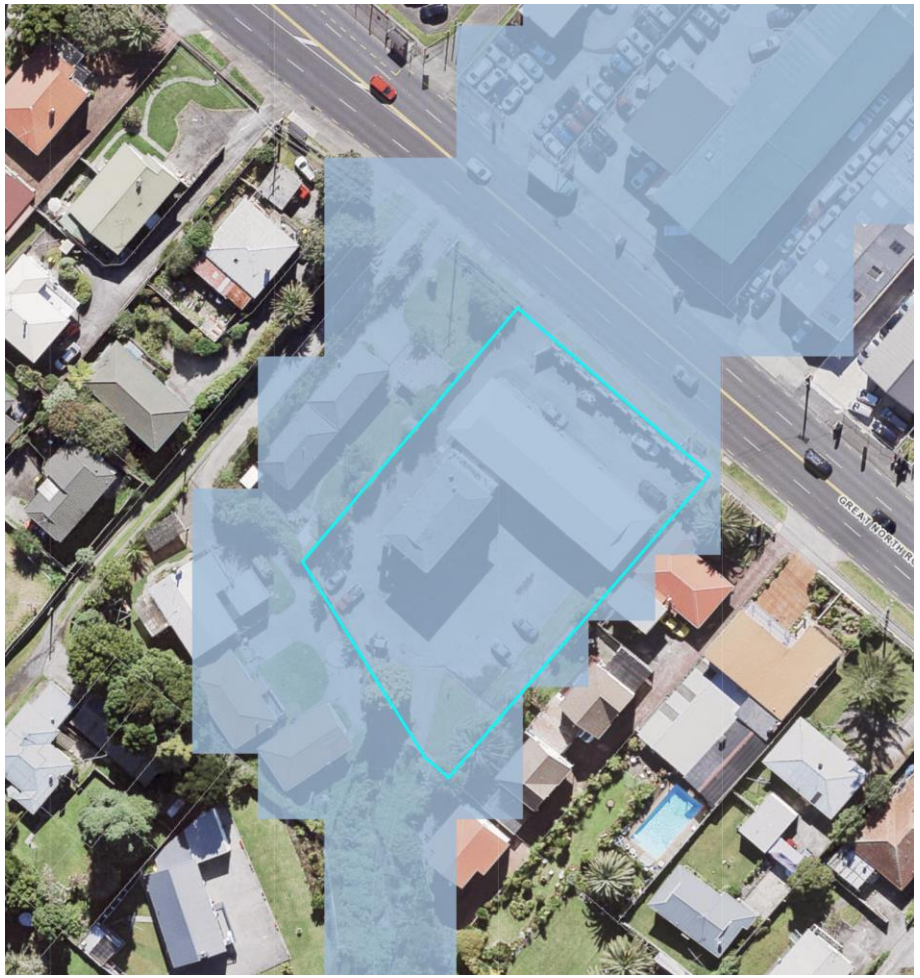


Storm Event – 27th January 2023

Bus evacuated on the Northern Motorway. (Source: 1News)

Flood Plain Mapping Criteria

- Start of flood plain:
  - Above ground flow reaches 2m³/s; or
  - Flood prone area with flood depth >300mm

- Flood plains will terminate if the above ground flow drops below 0.5m³/s

Criteria differs from the Auckland Unitary Plan Definition!

Flood Plain Production Process

Model

1. Schematisation
2. Build
3. Review and Finalisation

Flood Plains

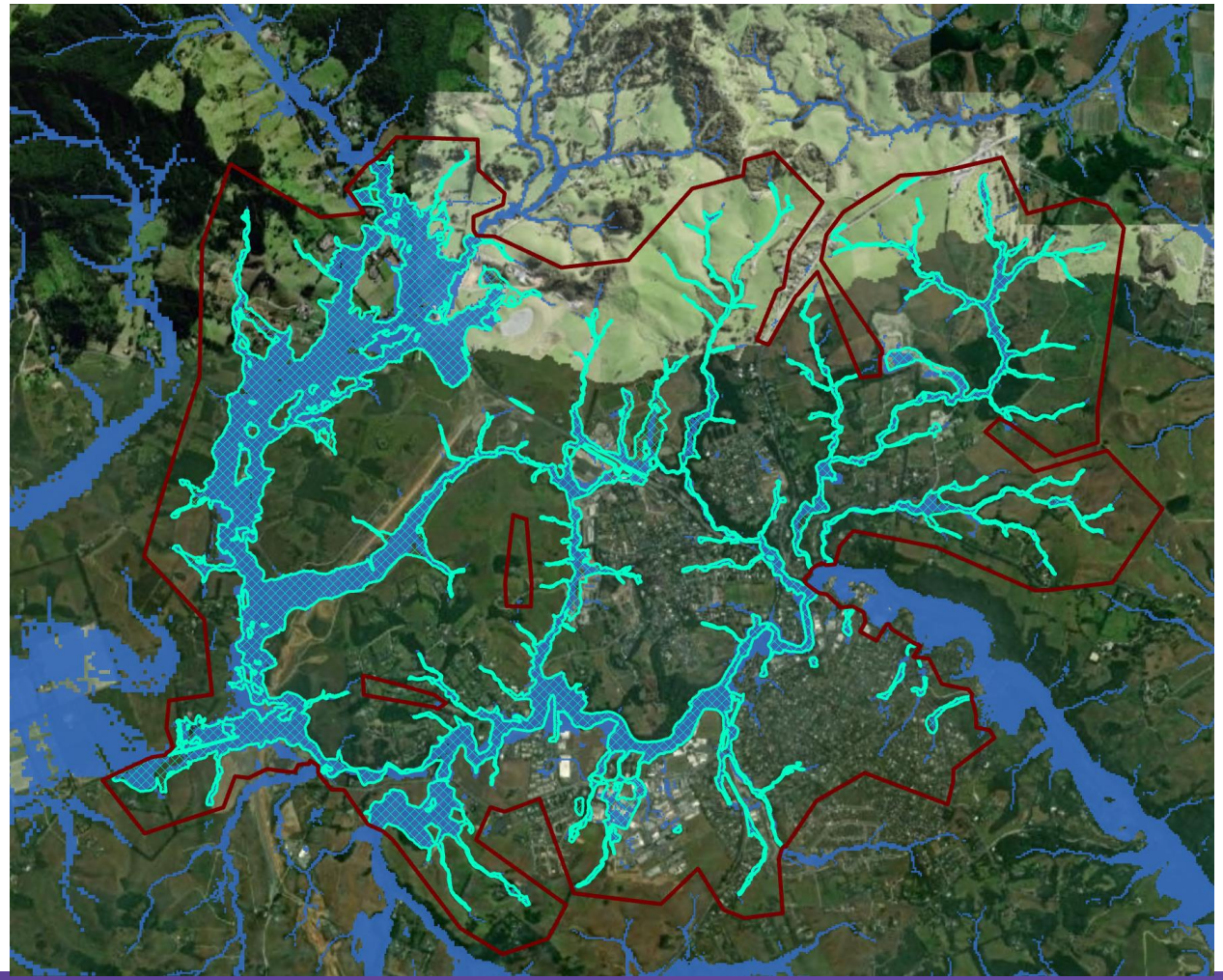
1. Drawing
2. Review and Approval
3. Publication

Model Schematisation

Schematised to meet flood plain mapping criteria:

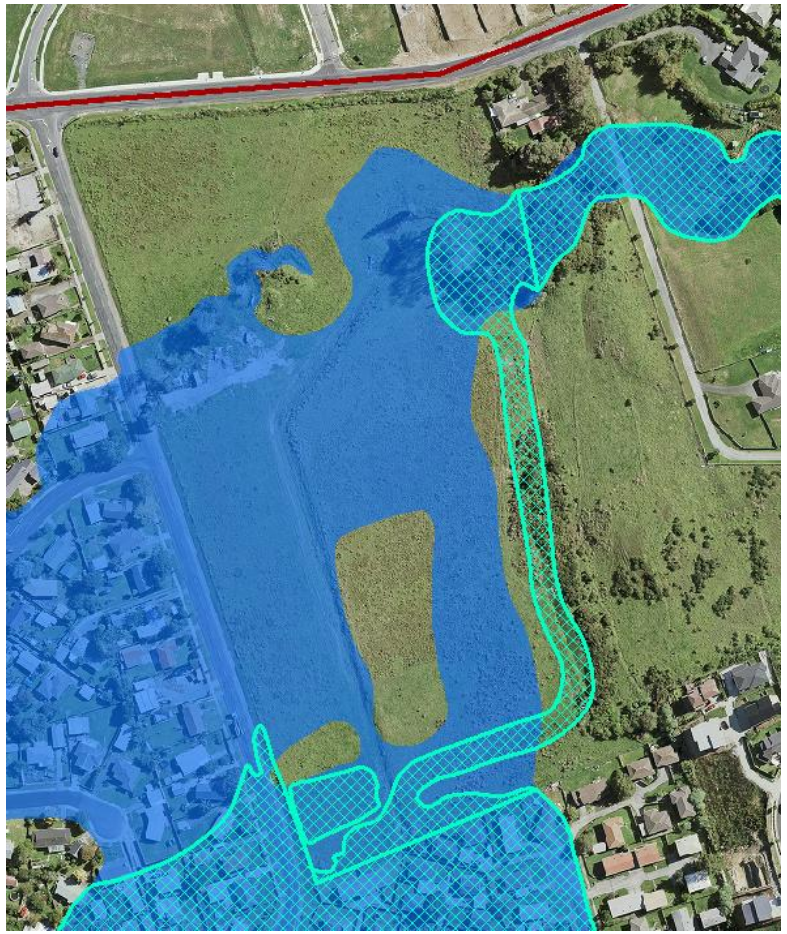
- Subcatchment delineation to generate flow <2m³/s
- Include all upstream flood prone areas
- Sufficient network representation to drain flood prone areas

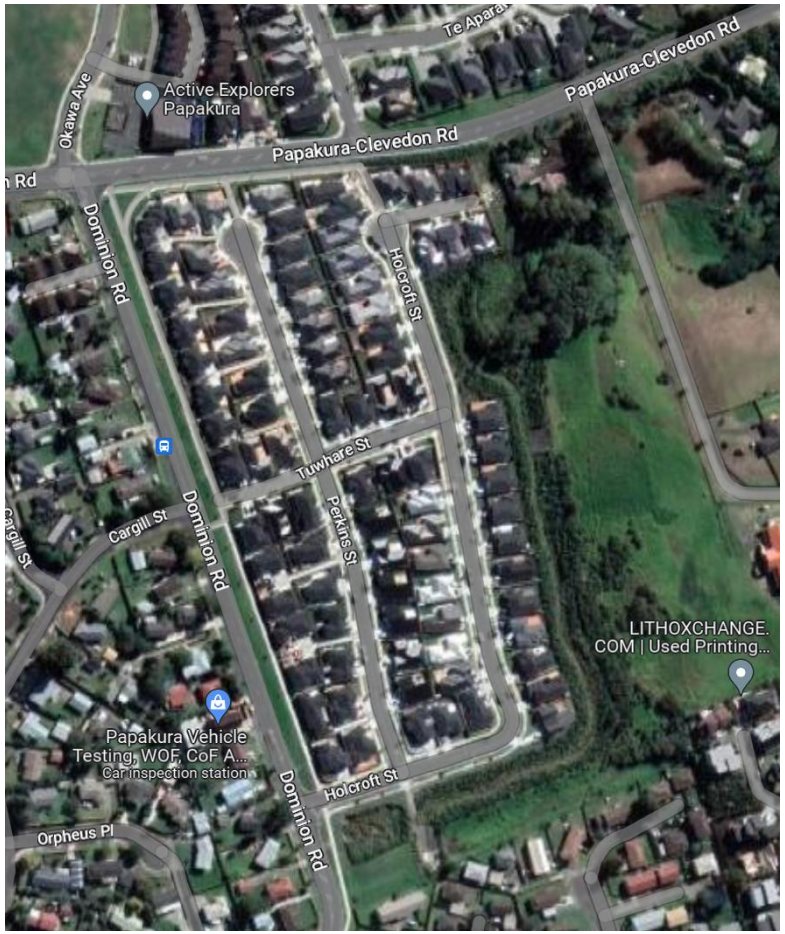
Model Schematisation



- Amend update extent to exclude areas not explicitly modelled

Model Build





- Quality and accuracy of outputs depend on the model
- Model outdated
- Utilise new information available for the area

Model Review and Finalisation

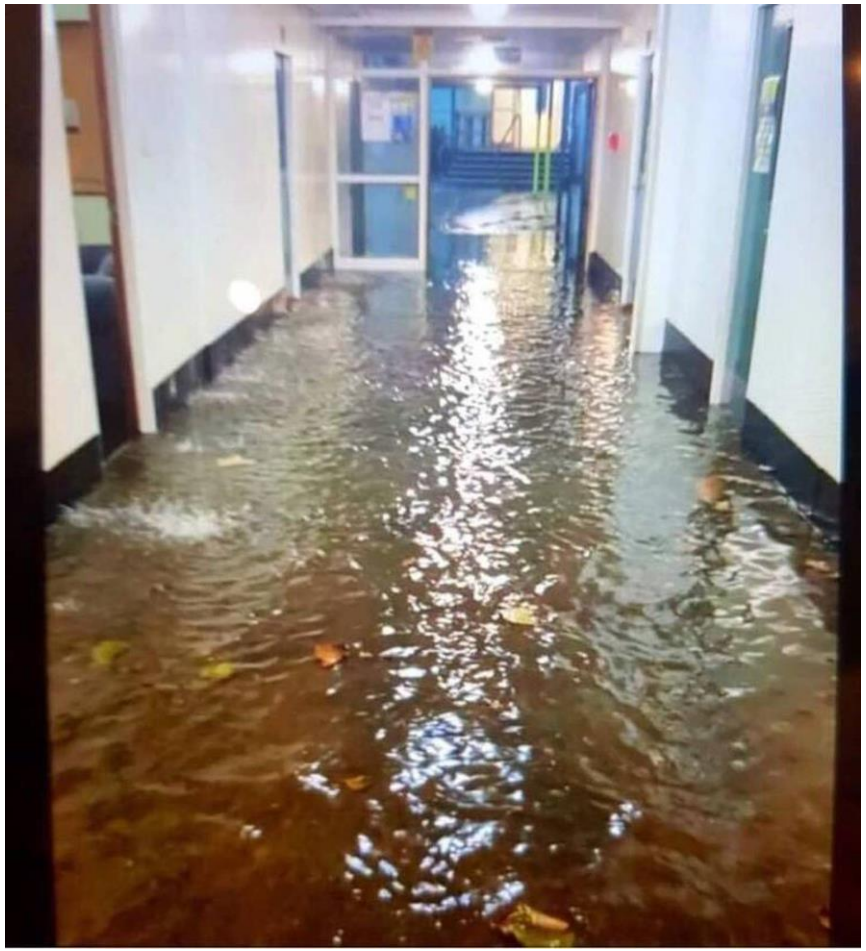
- Thorough QAQC to be undertaken
- Model must be signed off before drawing flood plains

Flood Plain Mapping

- Not meeting flood plain criteria but potential high flood risk
    - How to quantify?

- Flood plain mapping criteria does not equate to flood risk quantification

Overland Flow Path Flooding

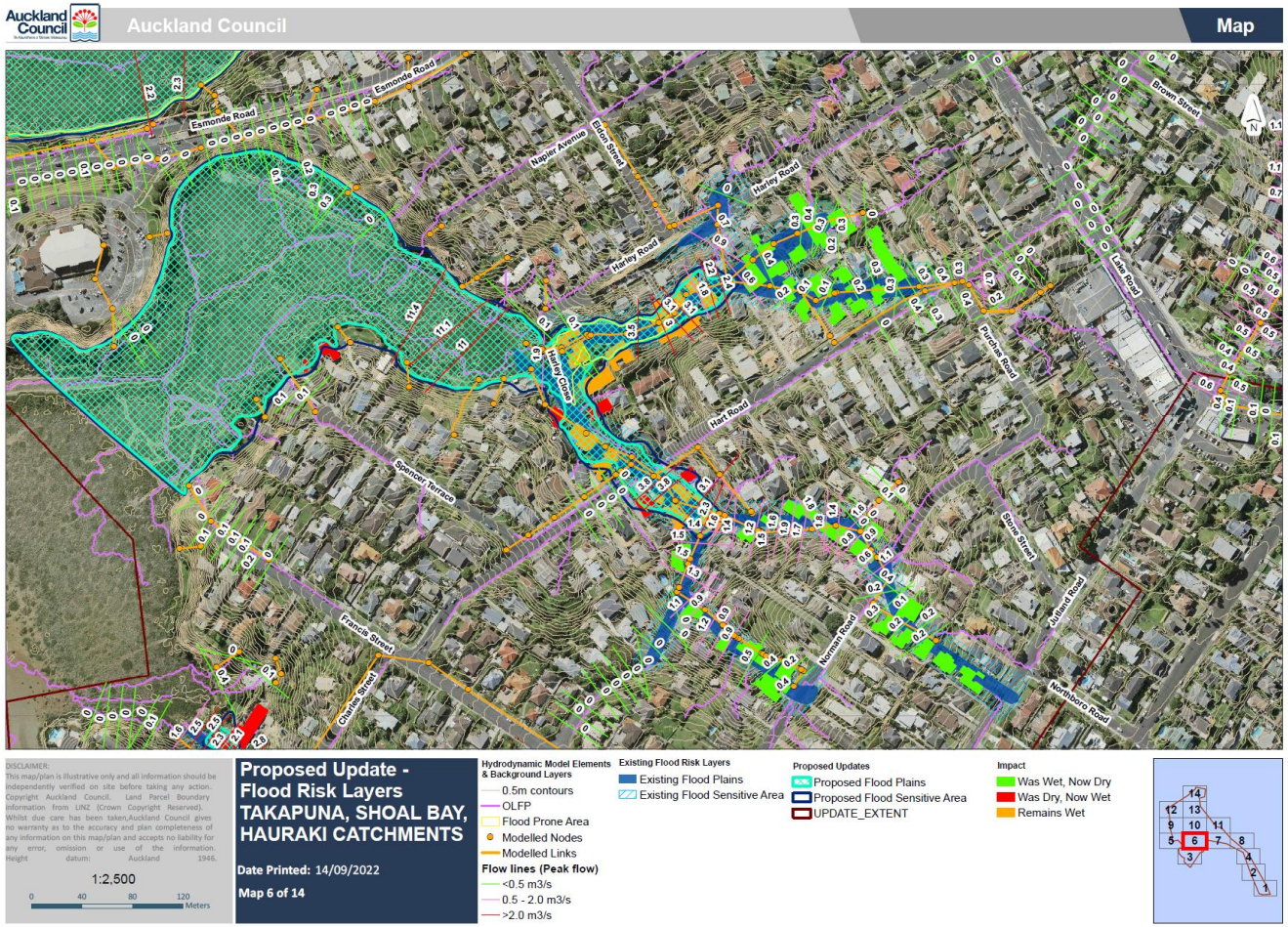


Flood Plain Review

- Checking against:
  - Mapping criteria
  - Asset data
  - Overland flow paths
  - Contours
  - Aerial photography
  - Existing flood plains

- No Spot Checks!

Flood Impact Mapping Tool



Auckland Unitary Plan (AUP) Definition

Floodplain

The area of land that is inundated by runoff from a specified rainfall event, with an upstream catchment generating $2m^3/s$ or greater of above ground flow, taking into account:

- any increases in impervious areas that would arise from changes in land use enabled by the policies and zonings of the Plan;
- the effects of climate change over a 100 year timeframe in respect of the frequency and duration of rain fall events and a 1m sea level rise; and
- assuming that primary drainage is not blocked.

Excludes the following areas:

- constructed depressions or pits within the Special Purpose - Quarry Zone

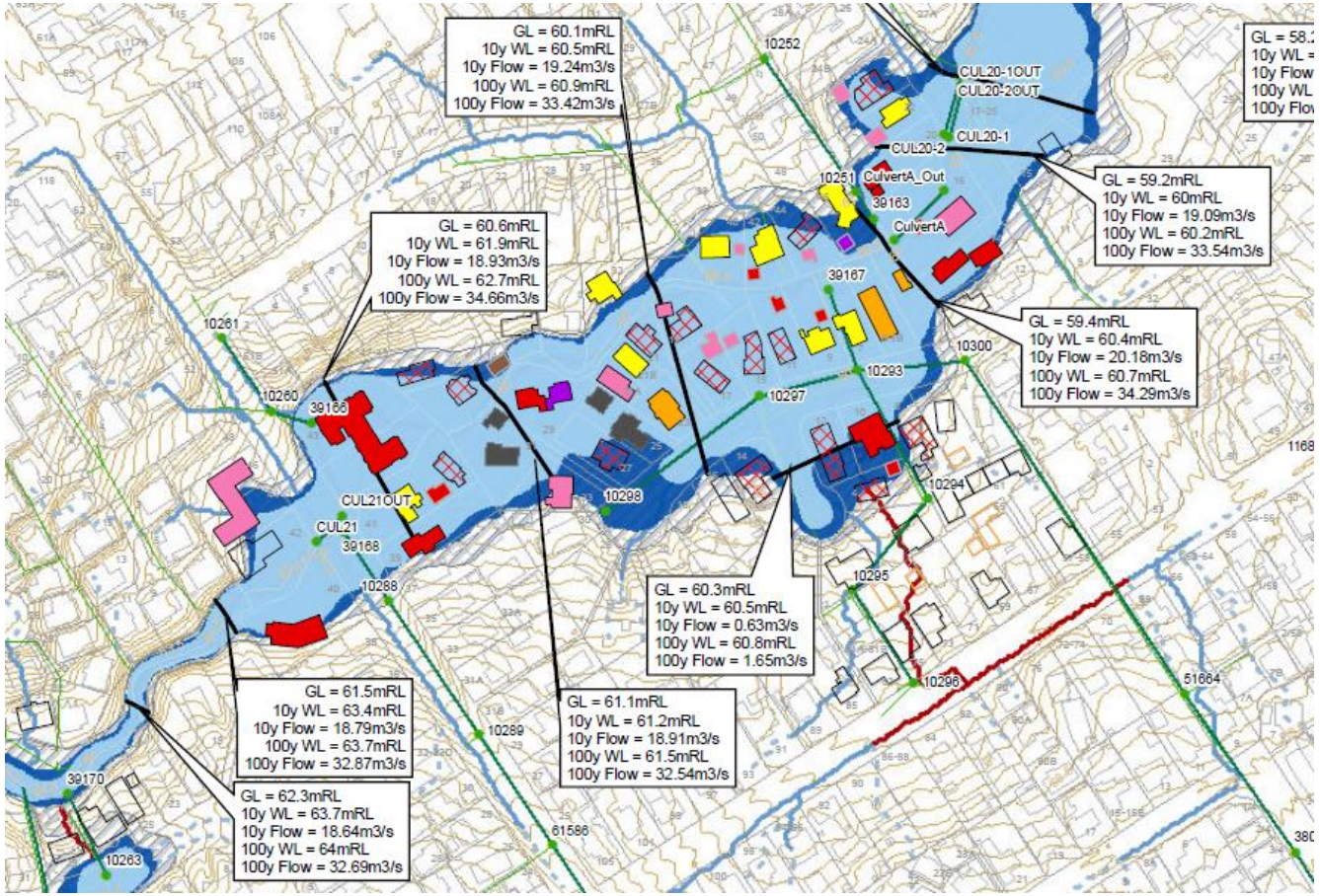
Auckland Unitary Plan (AUP) Definition

> *Note: The Council holds publicly available information showing the modelled extent of floodplains affecting specific properties in its GIS viewer for the one per cent annual exceedance probability (AEP) rainfall event (the floodplain maps). The floodplain map is indicative only although Council accepts its accuracy with regard to land shown on the floodplain map as being outside the floodplain. A party may provide the Council with a site specific technical report prepared by a suitably qualified and experienced person to establish the extent, depth and flow characteristics of the floodplain.*
>
> *When taking account of impervious areas that would arise from changes in land use enabled by the policies and zonings of the Plan, recognition should be given to any existing or planned flood attenuation works either exiting or planned in an integrated catchment management plan.*
>
> *Council will continually update the floodplain map to reflect the best information available.*

Remaining Challenges

- Is a one-size fits all flood plain sufficient?
- A simple polygon for a flood plain – is it enough? (depth, velocity, hazard?)
- Only 1% AEP with climate change scenario
  - More frequent events?
  - More extreme event?
  - Blockage scenario?

More Frequent Events?



Legend

- 10 year MPD Floodplain
- 100 year MPD Floodplain
- Flood Sensitive Area
- Flow Sections

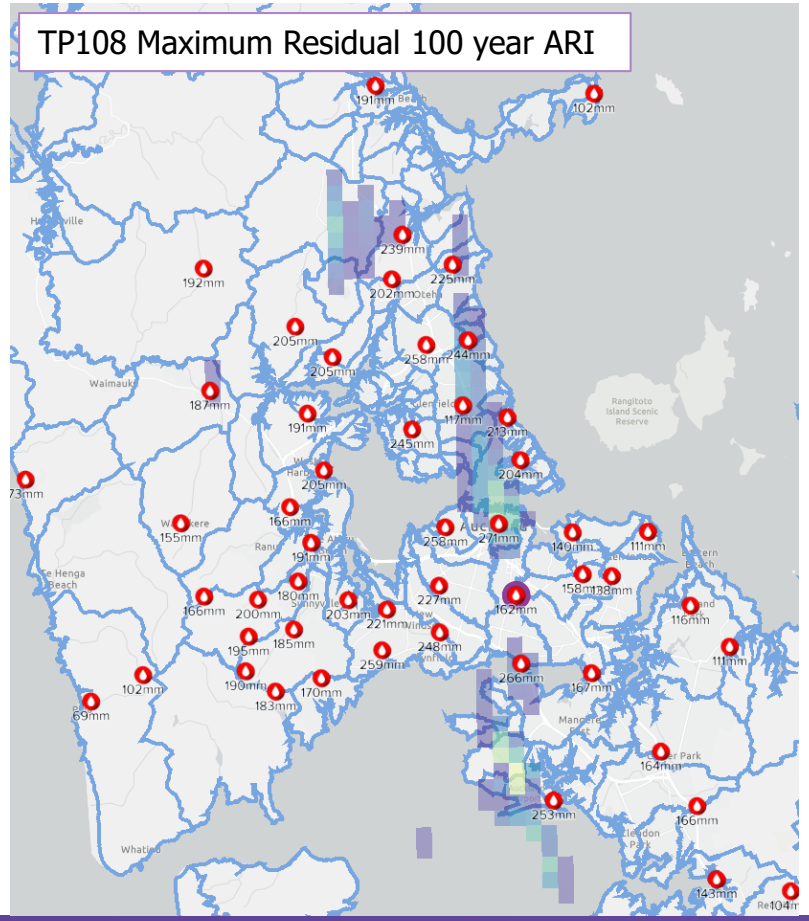
Habitable Floor Flood Frequency

- 2 year ARI
- 5 year ARI
- 10 year ARI
- 20 year ARI
- 50 year ARI
- 100 year ARI
- within 500mm of 100 year flood level
- Surveyed, not at risk of flooding

Non-Habitable Floor Flood Frequency

- 2 year ARI
- 5 year ARI
- 10 year ARI
- 20 year ARI
- 50 year ARI
- 100 year ARI
- within 500mm of 100 year flood level
- Surveyed, not at risk of flooding
- Unable to be surveyed

More Extreme Events?



- 27th of January storm exceeded 1% AEP at some locations

More Extreme Events?

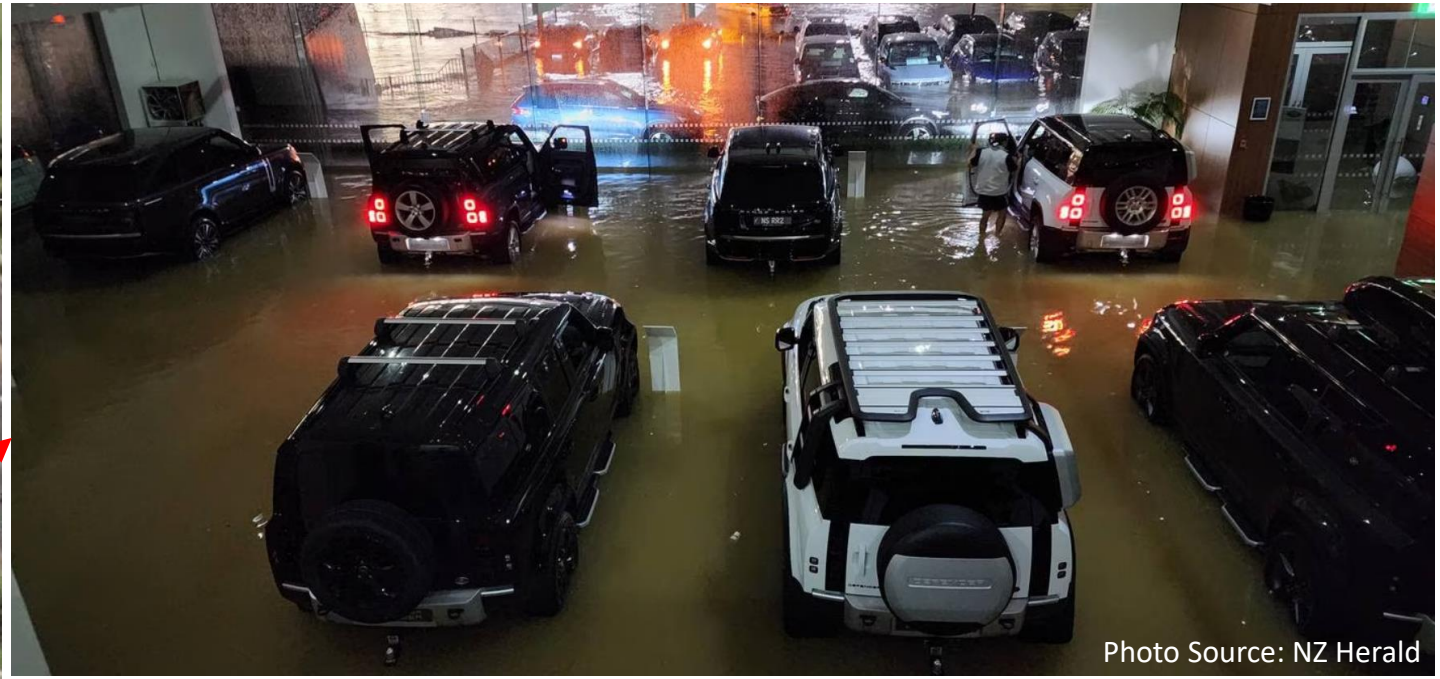


Photo Source: NZ Herald

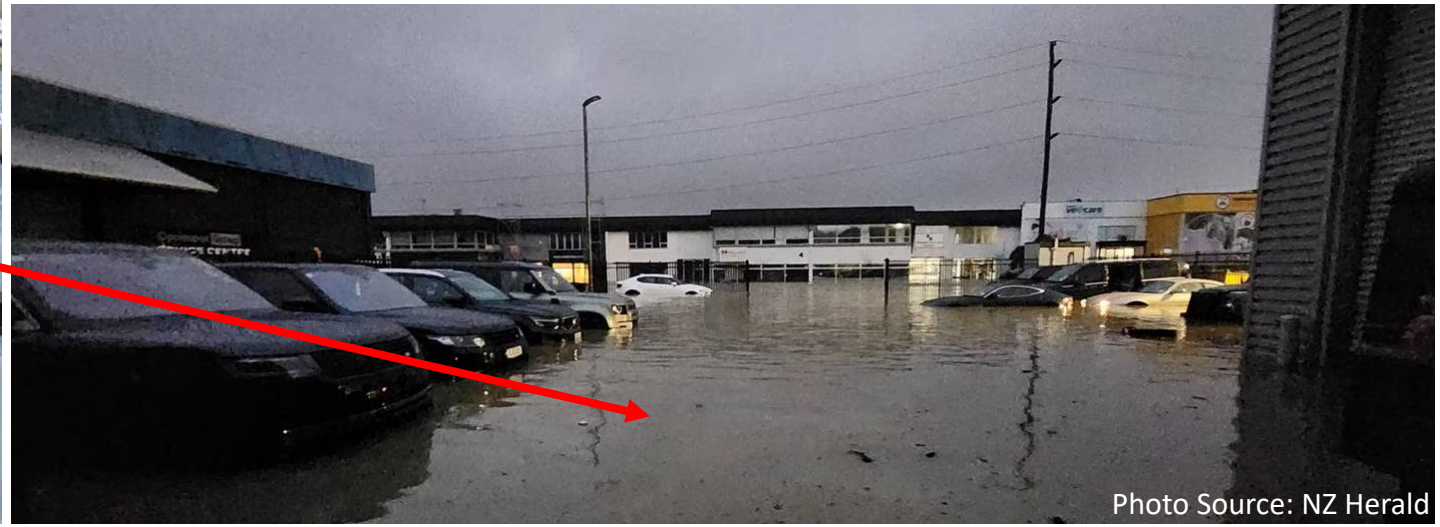


Photo Source: NZ Herald

Blockage Scenario?

Flood Prone Area

Attribute	Value
Flood prone area ID	0
Can fill in a 100yr ARI rainfall event	Yes
Catchment Area (m2)	9195701
Minimum elevation (m RL)	29.47
Spill elevation (m RL)	39.52
Spill ponding depth (m)	10.05
Volume to spill elevation (m3)	314070
Rainfall required to fill flood prone area (mm)	57
Rainfall depth 100yr ARI future scenario (mm)	218
Flood prone elevation in 100yr ARI event (m RL)	Null
Flood prone depth in 100yr ARI event (m)	Null
Flood prone volume stored in 100yr ARI event (m3)	Null
Max. flooded area in the 100yr ARI Future Scenario (m2) prior to spilling	117188.303757

- Flood Prone Area with potential to fill if downstream culvert blocked

- Detailed information is available through:
  - Flood Report – downloadable from Geomaps
  - hwdevelopment@aucklandcouncil.govt.nz
  - hwcustomerandcommunity@aucklandcouncil.govt.nz

Conclusions

- The challenge of creating an ‘accurate’ flood plain, fit for what purpose?
- Effort required to understand input data, assumptions, limitations
- Taking care in building and reviewing the model and flood plains

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Thank you!
Questions? Patai?

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