



# NRC Region-wide River Flood Model

## Bertrand Salmi (Water Technology)



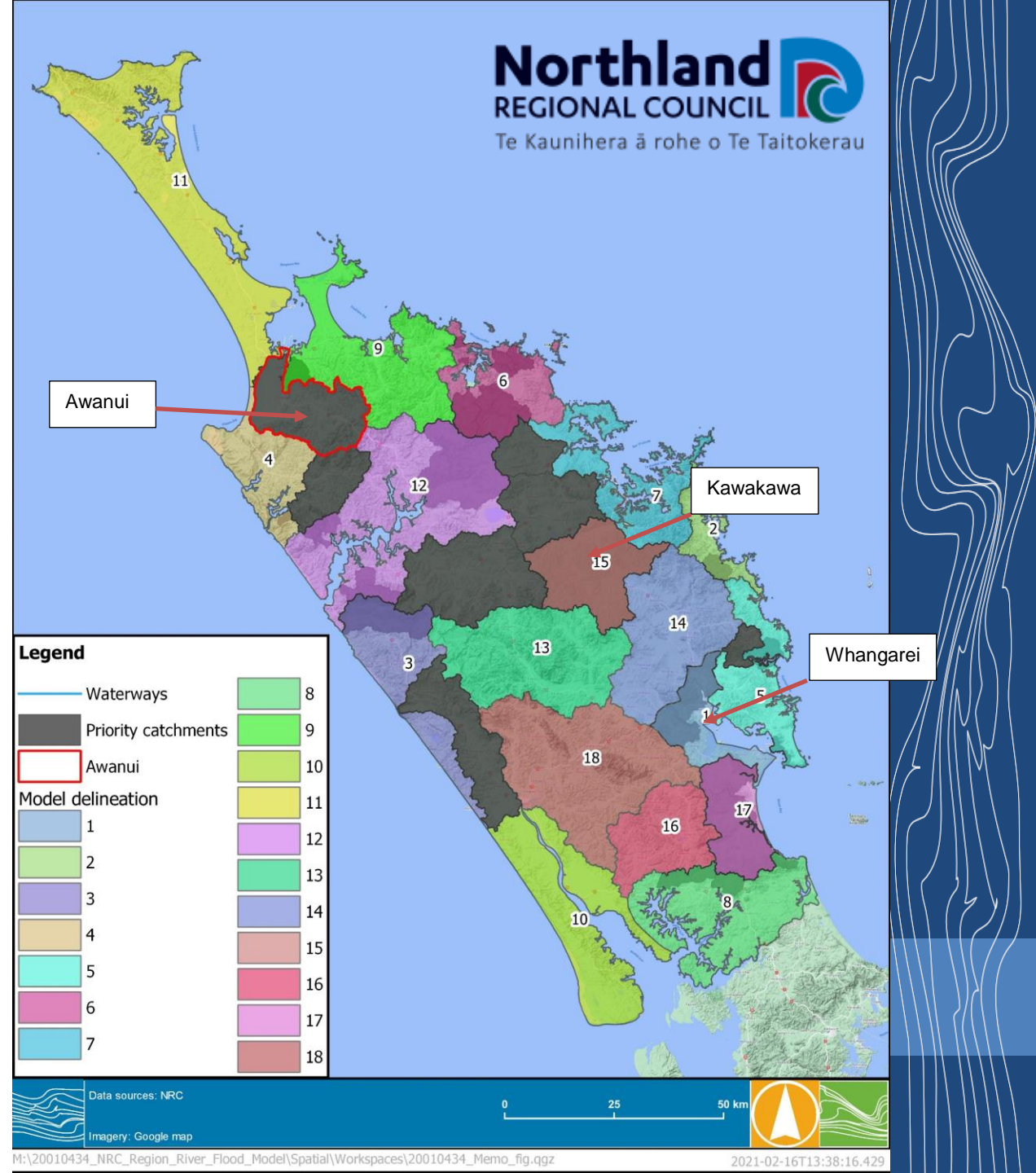


**Northland**  
REGIONAL COUNCIL  
Te Kaunihera ā rohe o Te Taitokerau

**Beca**

19 Catchments

3 Priority Catchments





# Flood depth maps



\\fs01\\M-Drive\\20010434\_NRC\_Region\_River\_Flood\_Model\\Spatial\\Workspaces\\NRC\_ExampleMaps\\Filtering\_Options.mxd

2/03/2021

## CALIBRATION CRITERIA

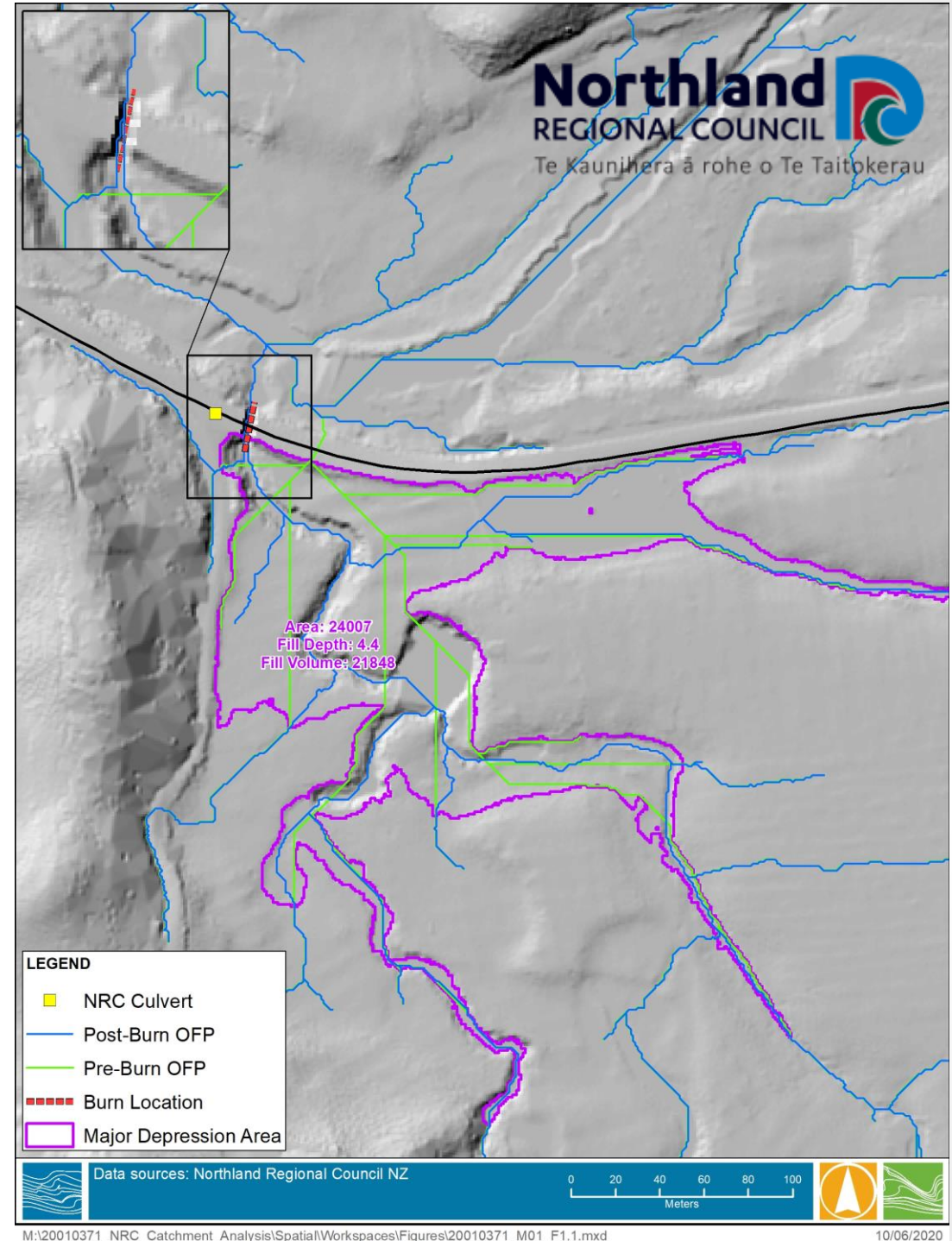
- Comparison of flow hydrographs
- Flows within 15% (+/-) of recorded flow (where NRC Q/H rating table is considered suitable)
- Peak flow and volume within 20% (+/-) of recorded flow (where NRC Q/H rating table is considered suitable)
- Surveyed flood levels within 300 mm
- Timing of peak within 1 hour



A newly flown 2020 1M LiDAR DEM file

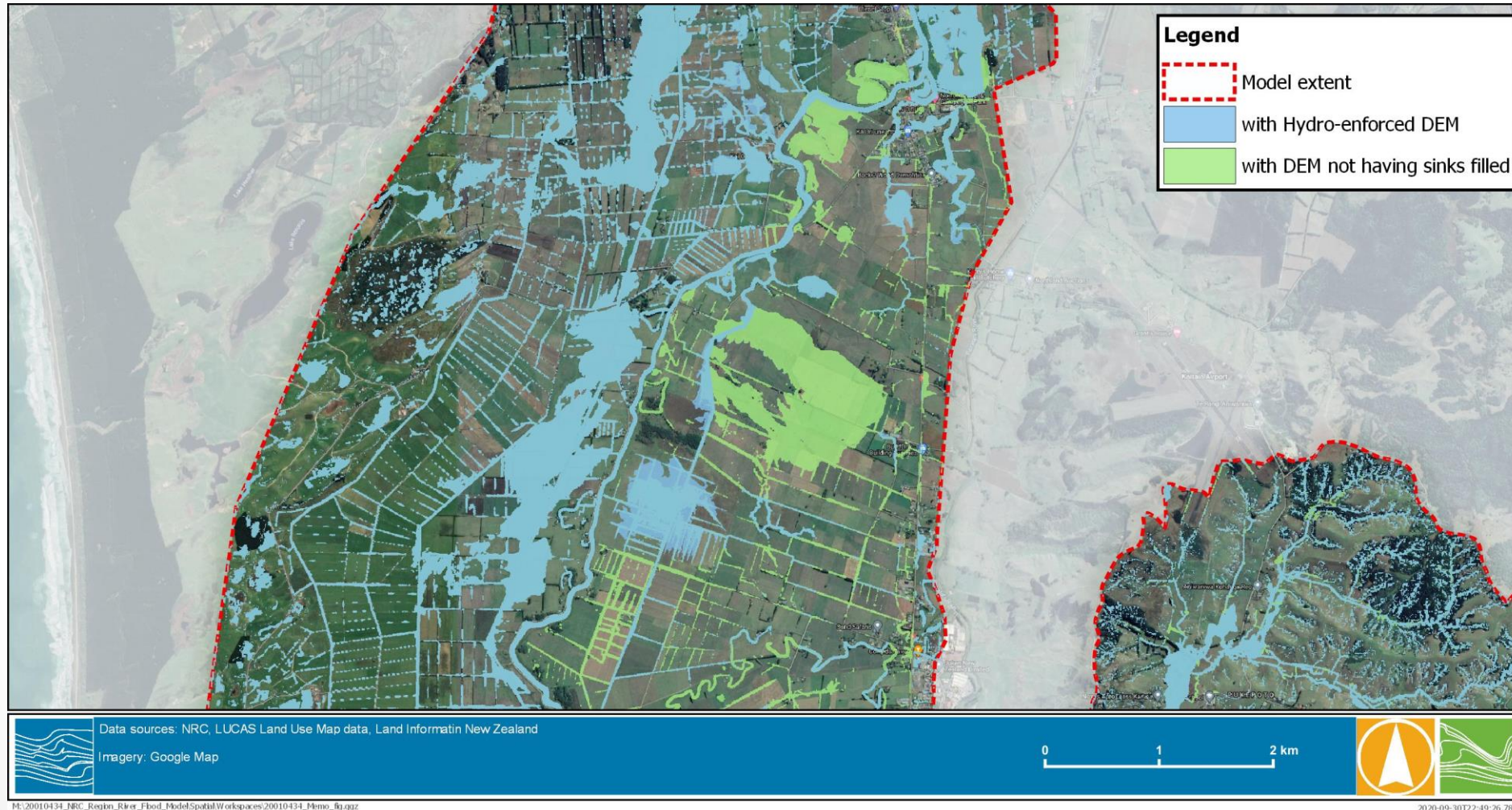
3000+ burn lines were created

Depression filled  
>0.5m depth **AND** >5, 000m<sup>3</sup> volume, OR  
>20,000m<sup>2</sup>





# DEM-ENFORCED





179 Rainfall Stations

48 with post-2000 records

79 daily & sub-daily rainfall records

61 Gauge Stations found within the study area with historic records available

Data downloaded from NRC Website and NIWA Climate Data Portal

Rainfall IFD and design temporal pattern data from NIWA's High Intensity Rainfall Design System

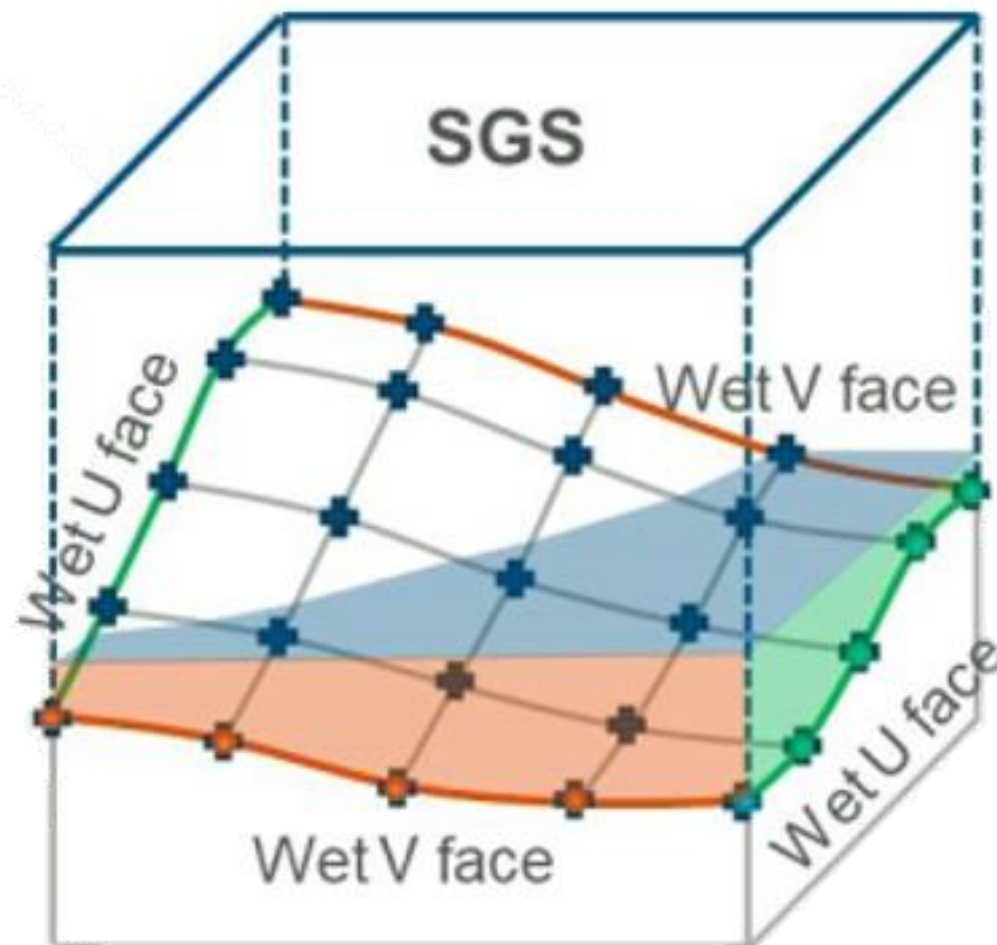
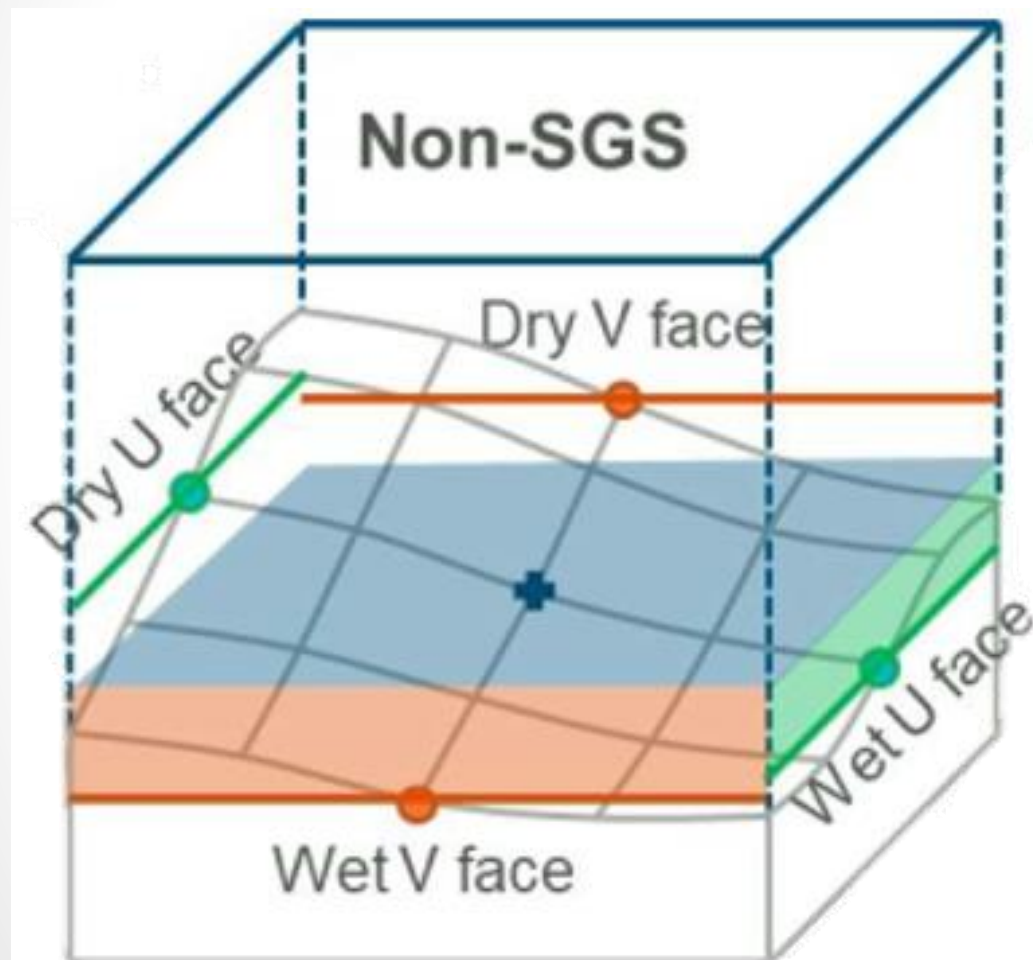




# Model Tests

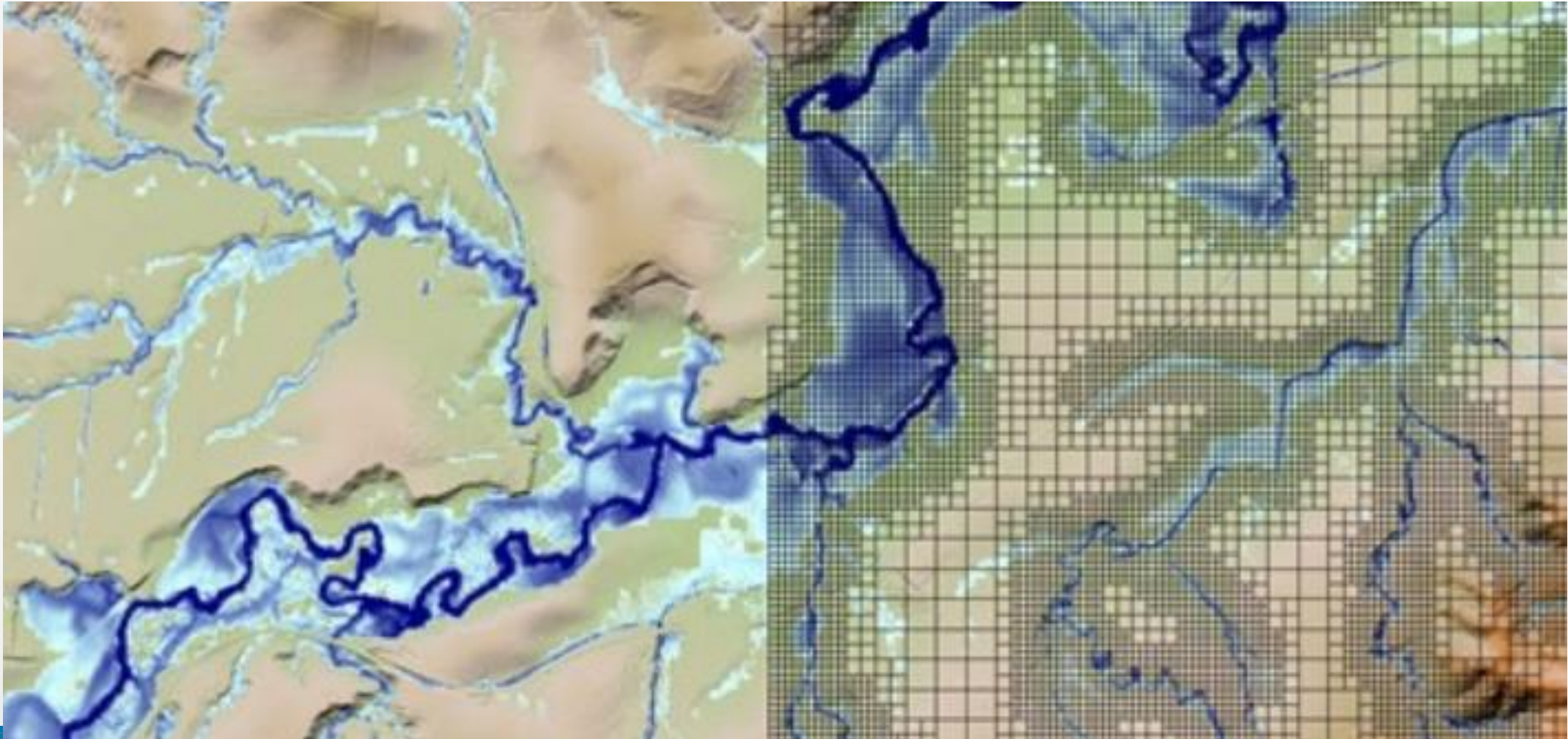
- ***Base scenario: 10m grid resolution for the entire catchment***
- ***SGS scenario: 10m grid resolution with 5m sub-grid sampling distance***
- ***Quadtree scenario: 10m base grid resolution along with 2.5m grid resolution at Kaitatia township***
- ***Quad-tree + SGS: a combination of SGS scenario and Quad Tree (QT) scenario above***

# Sub-Grid Sampling



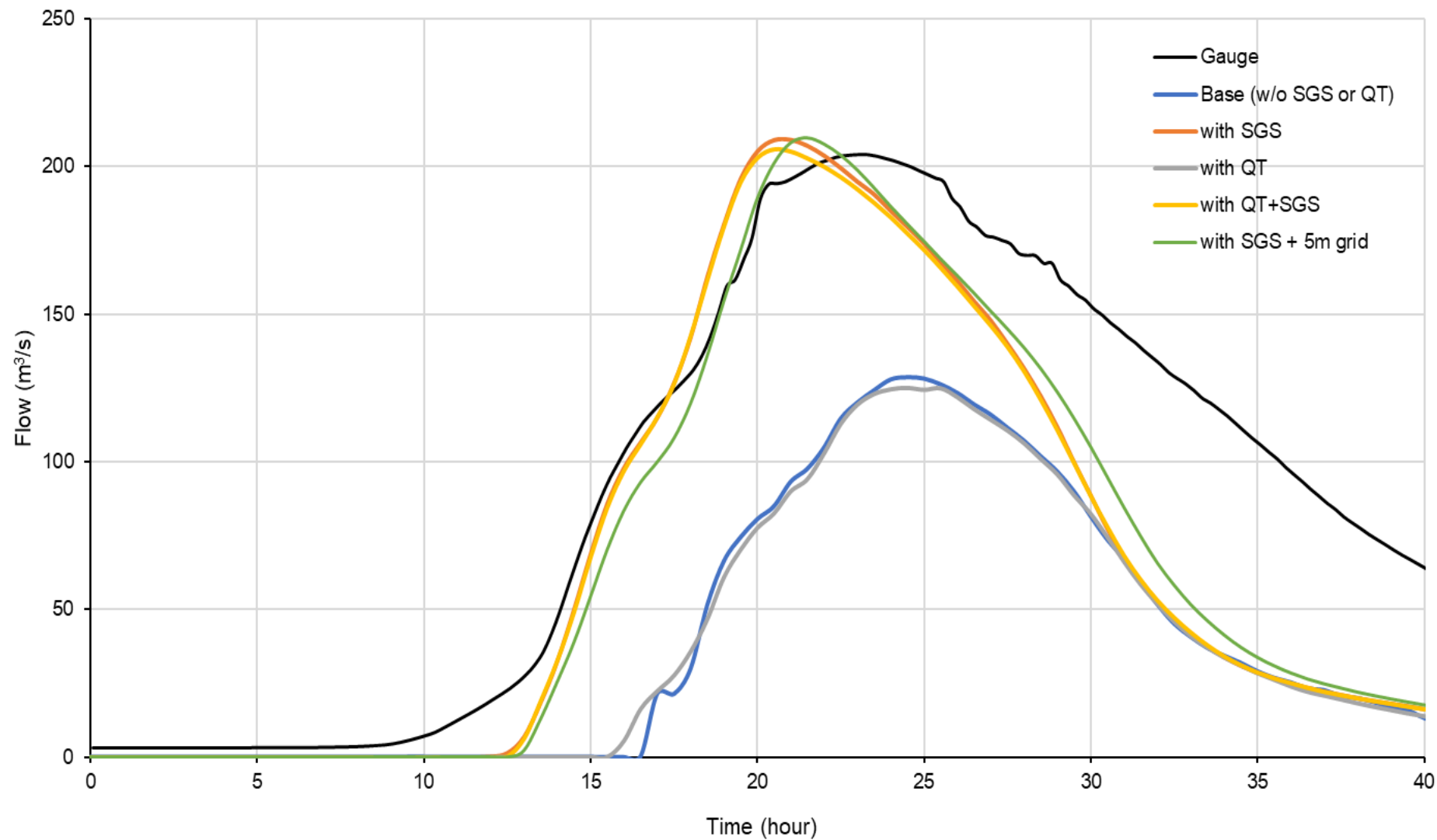


# Quadtree



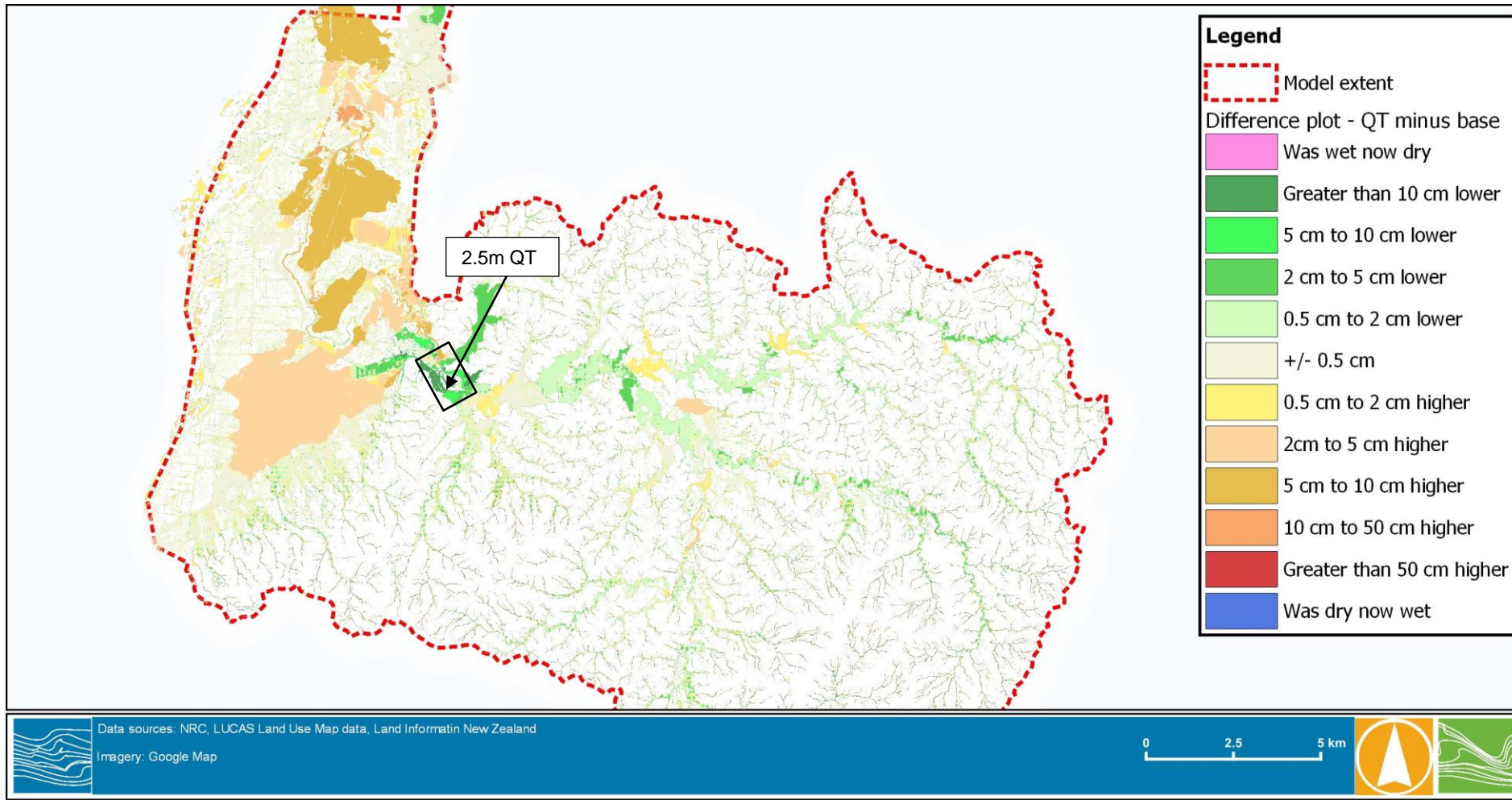
# Model Results

Awanui at School Cut





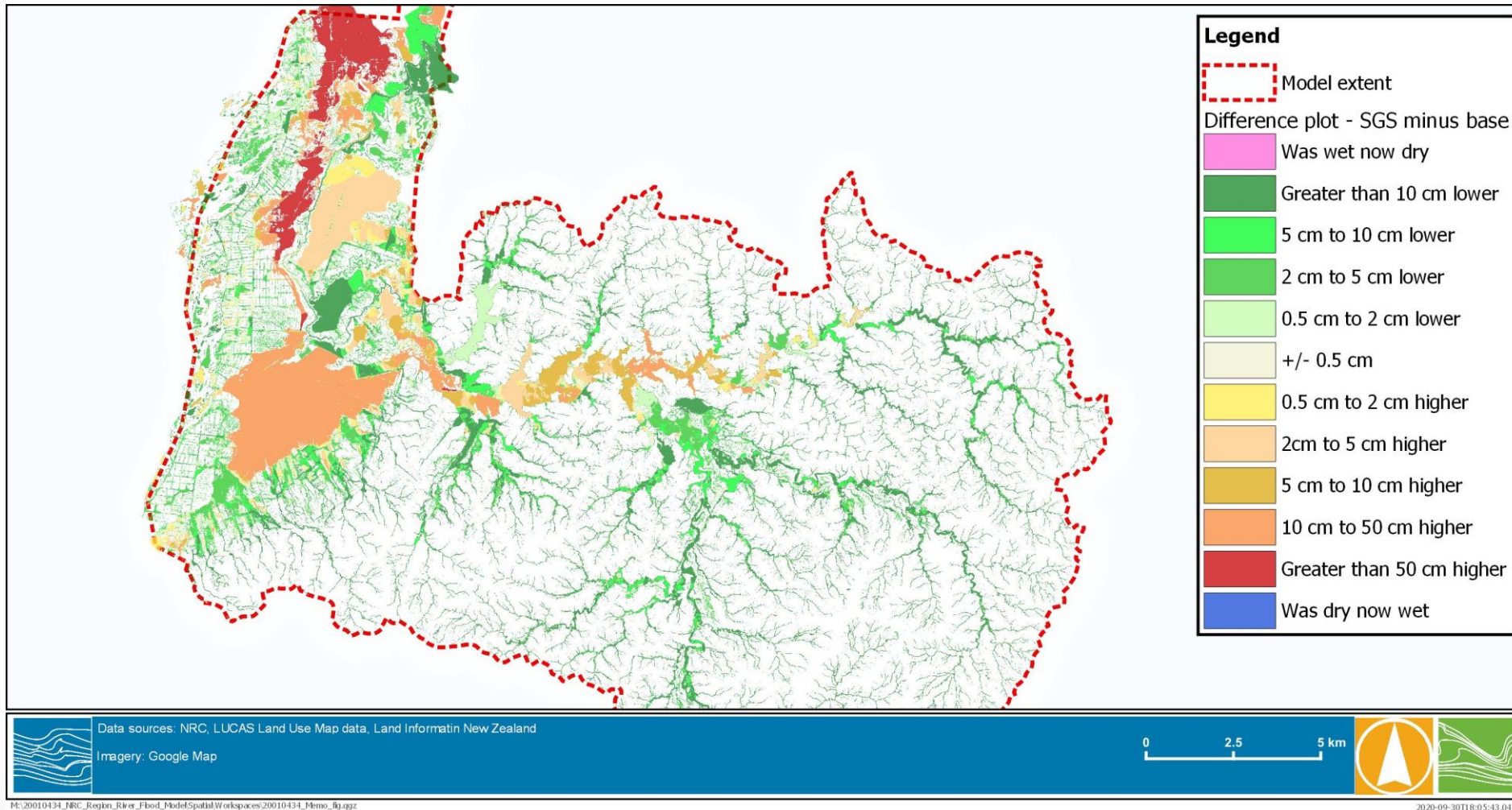
# QUADTREE AND BASE SCENARIO



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2020-09-30T18:01:45.485

# SGS AND BASE SCENARIO

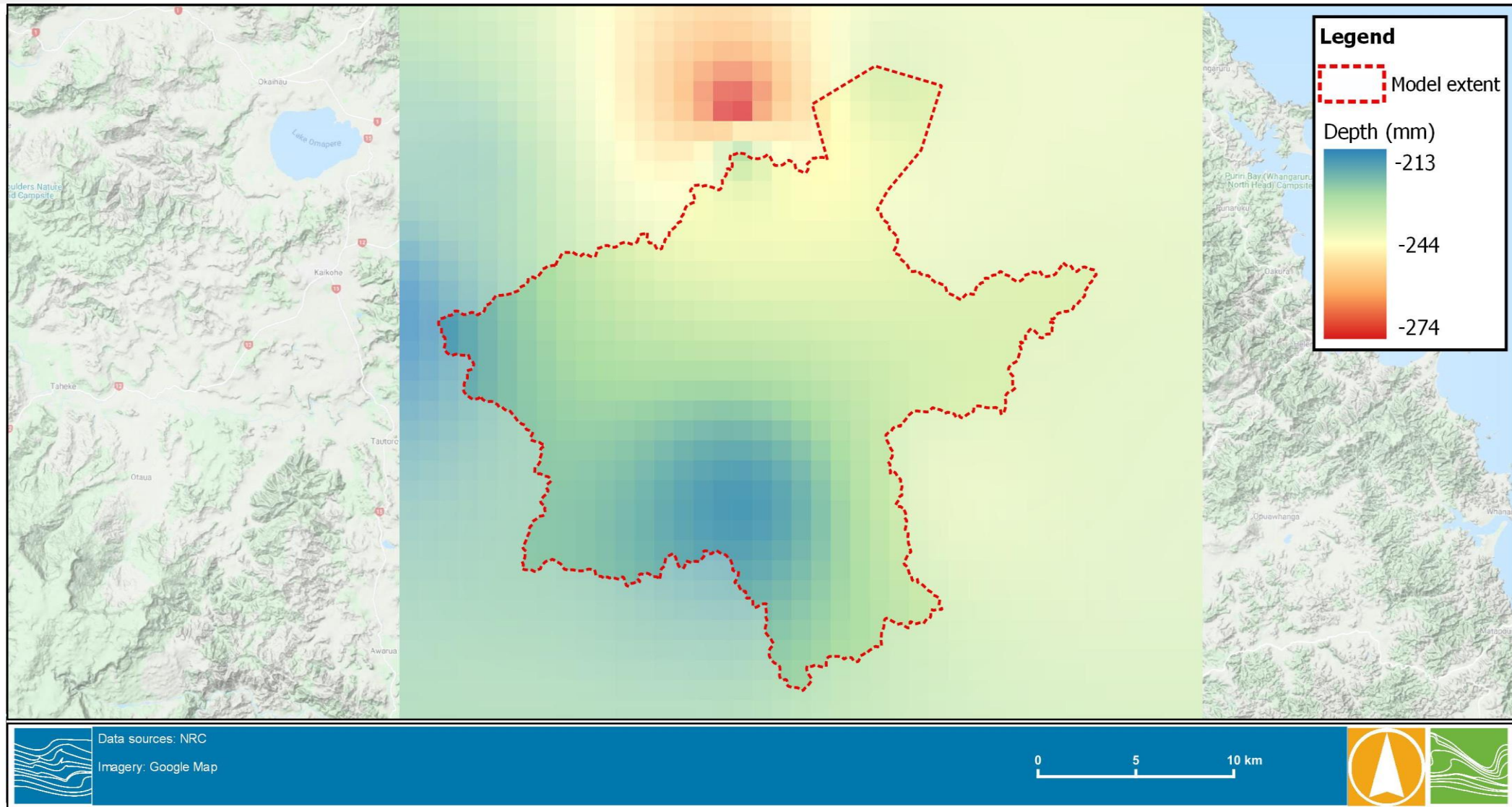




# Run Time Comparison

Scenario	Run time (hour)	Compared to base scenario
Base	3.25	-
SGS (10m grid + 1m SGS)	5	1.5 times
Quadtree	12	3.7 times
SGS + QT	20	6 times
SGS (5m grid + 1m SGS)	30	9 times

# KAWAKAWA



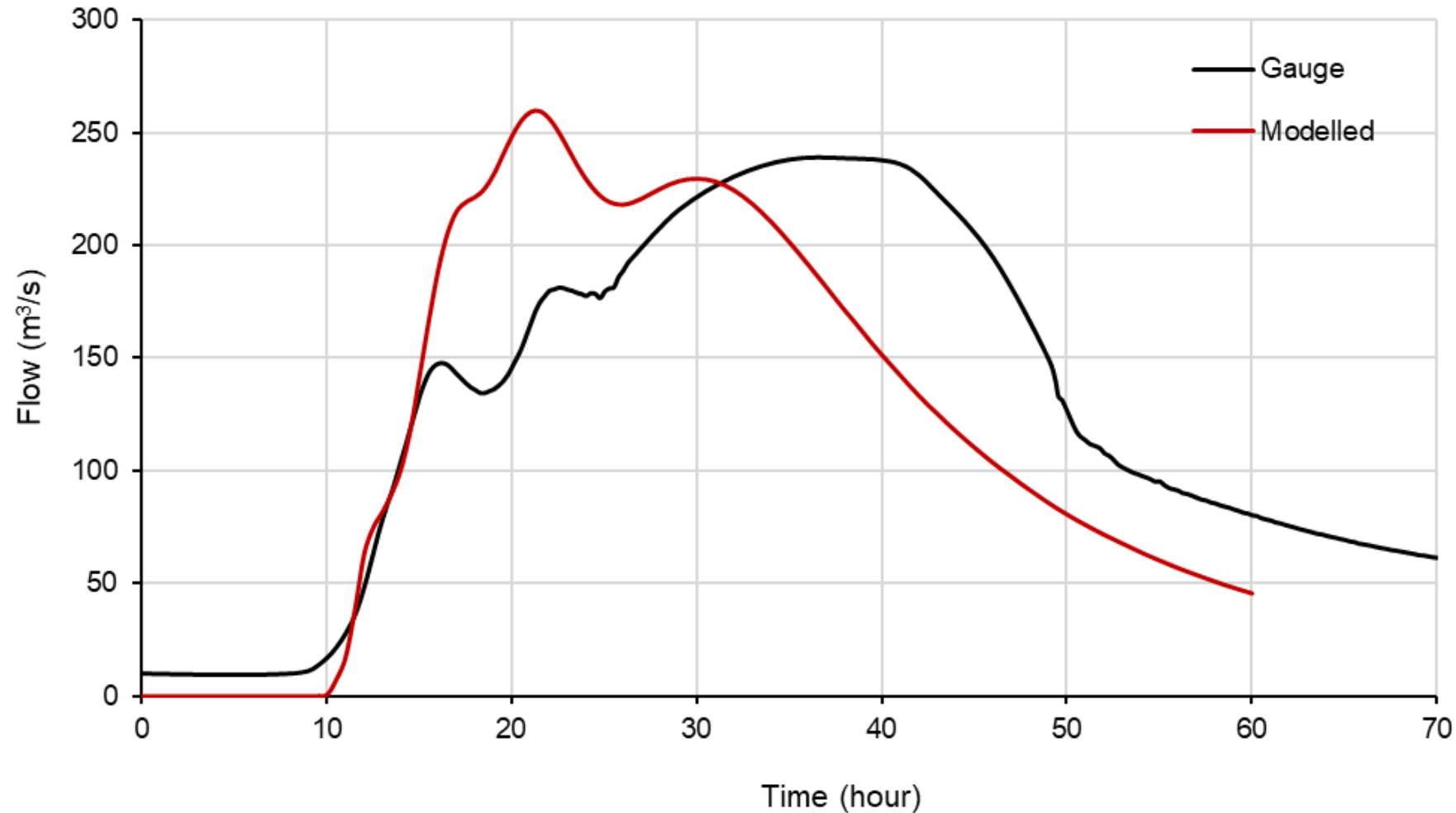
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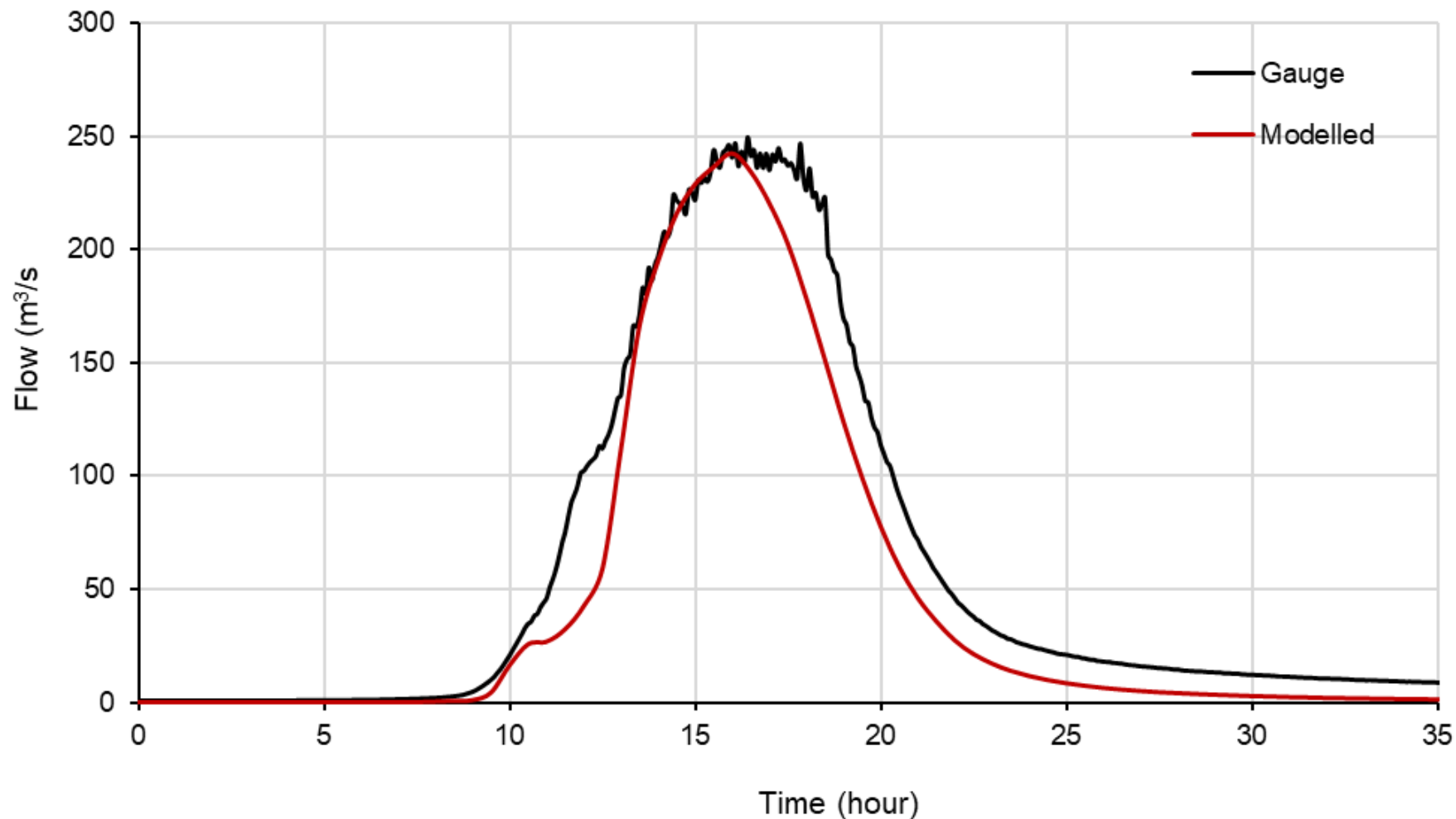
# Waiharakeke River (2011)

Waiharakeke at Willowbank



# Tirohanga River (2011)

Tirohanga below Old Mill

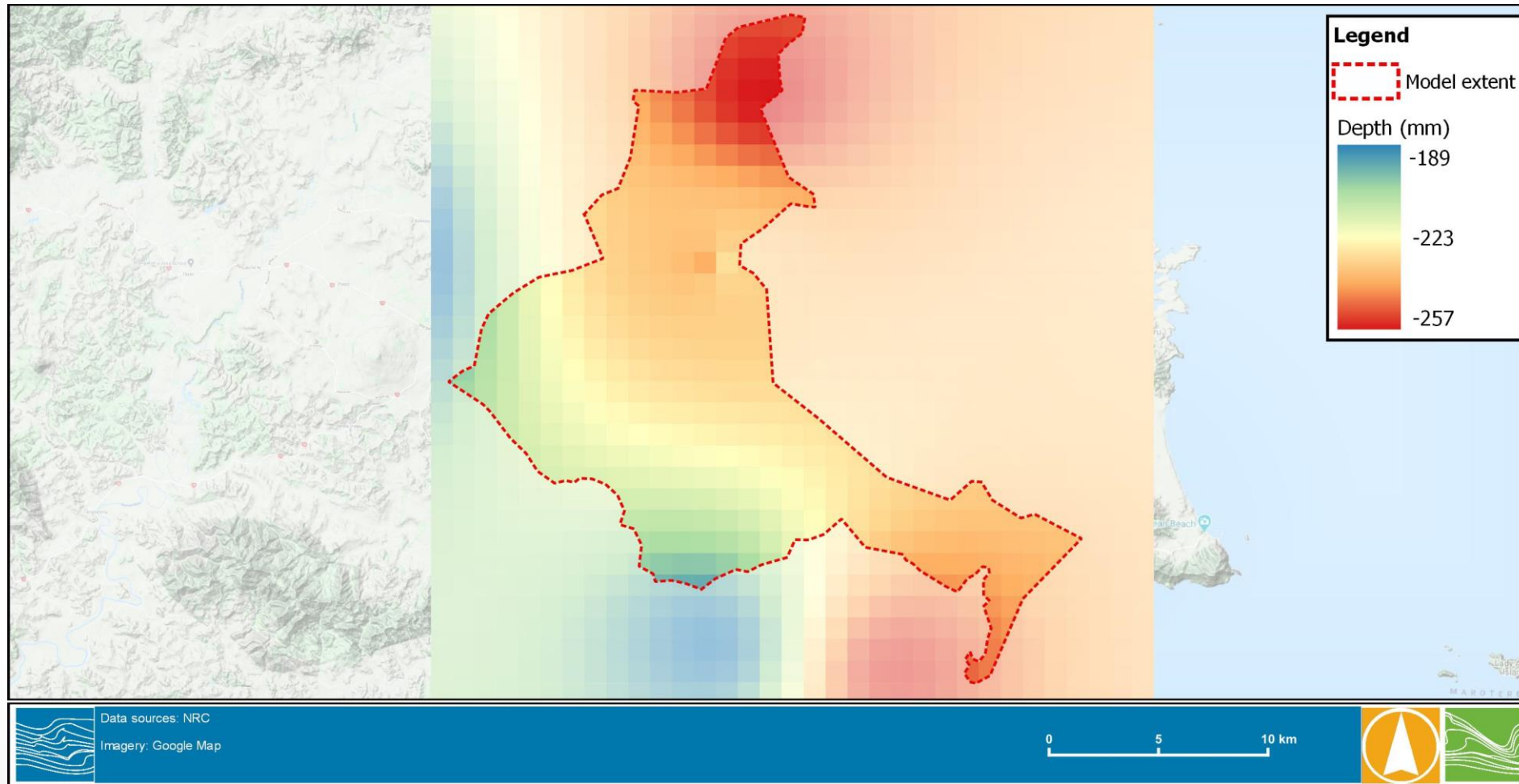




# Kawakawa

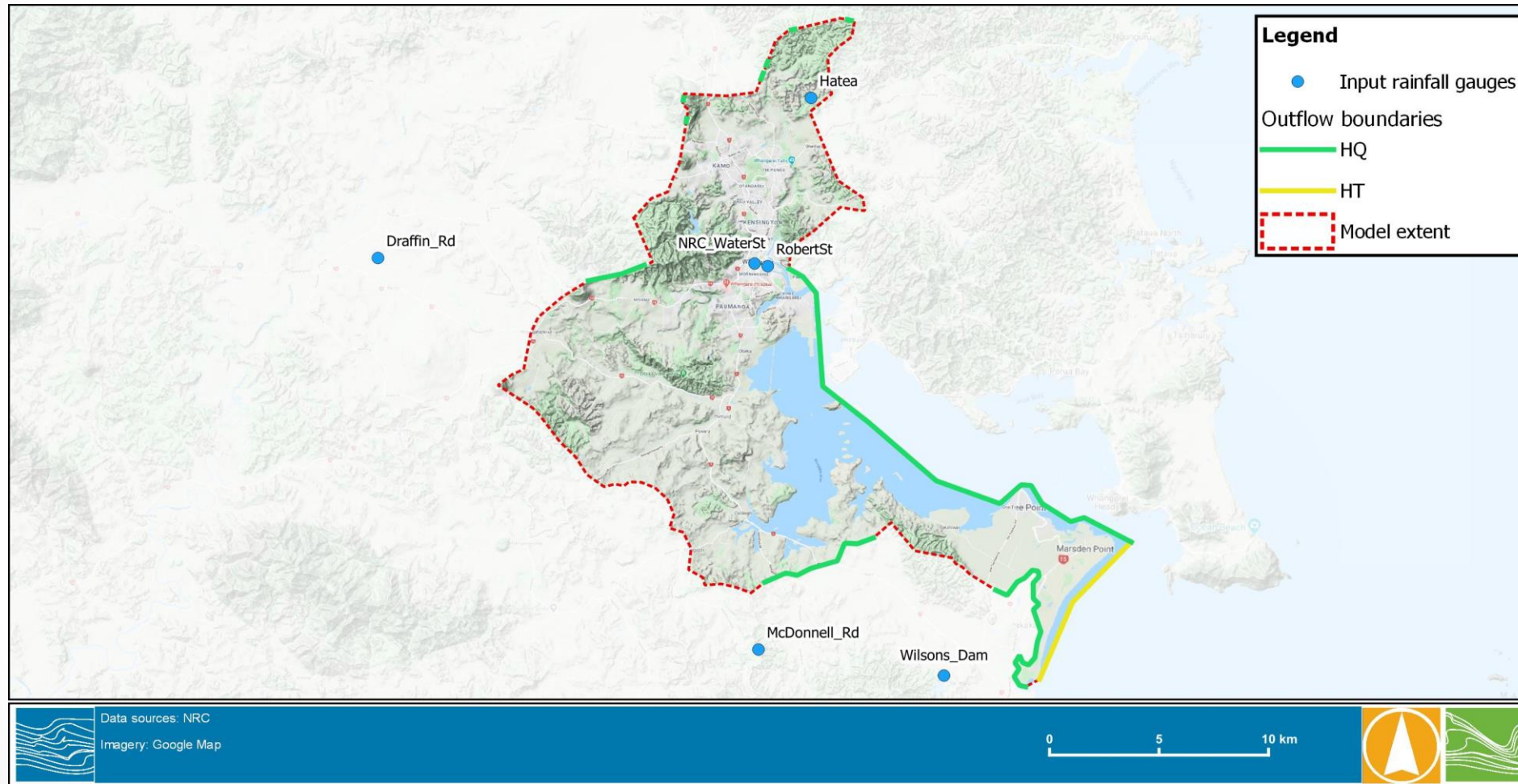
Location	Peak Flow within 15% recorded	Volume Flow within 15% recorded	Peak WSE within 300mm of recorded	Time to Peak within +/- hour	Model Flow within 10% of recorded flow at the same stage
Willowbank	Y	Y	Y	N	Y
Below Old Mill	Y	N	Y	Y	N

# WHANGAREI





# WHANGAREI

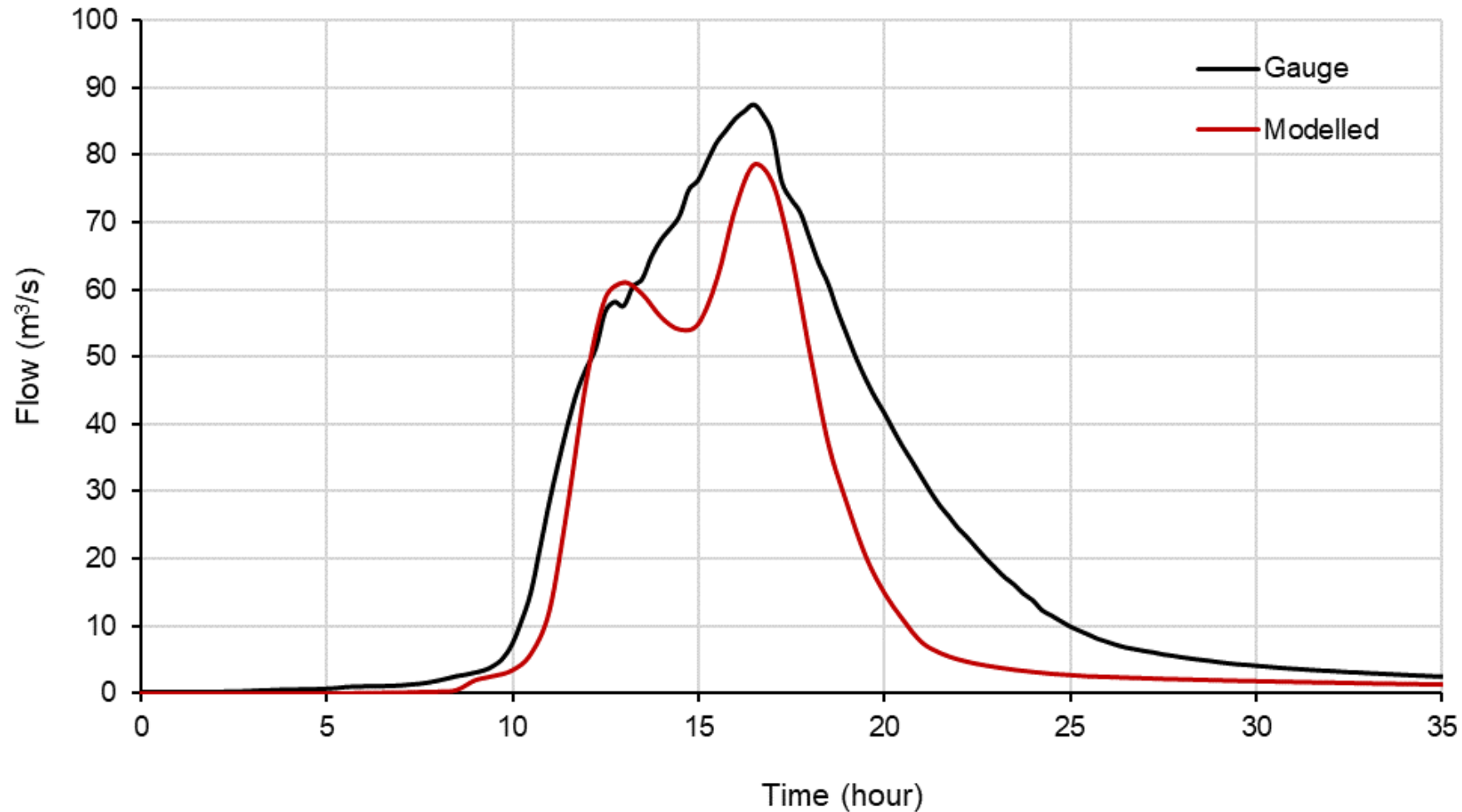


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# Waiarohia River (2011)

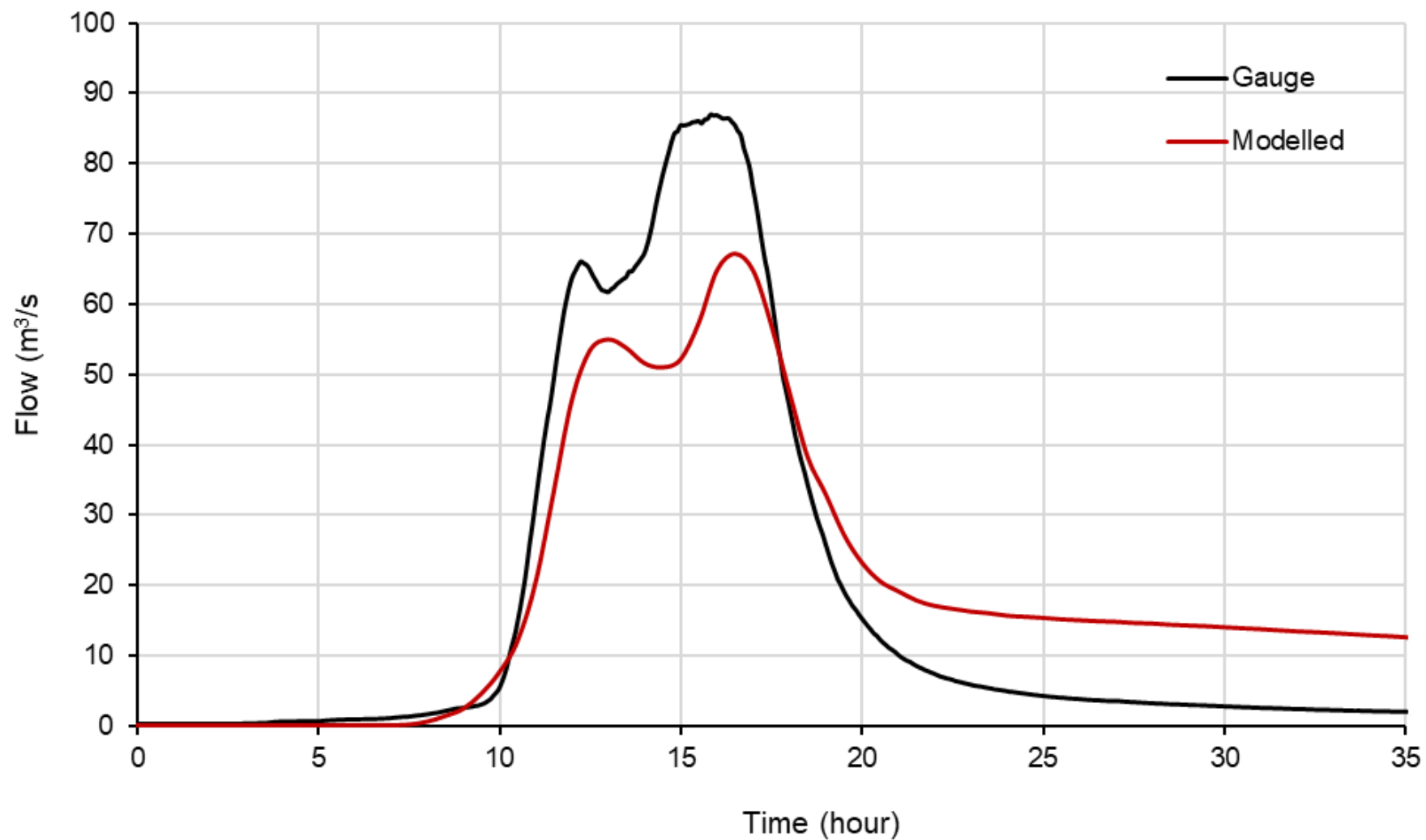
Waiarohia at Lovers Lane





# Raumanga Creek (2011)

## Raumanga at Bernard St



# Whangarei

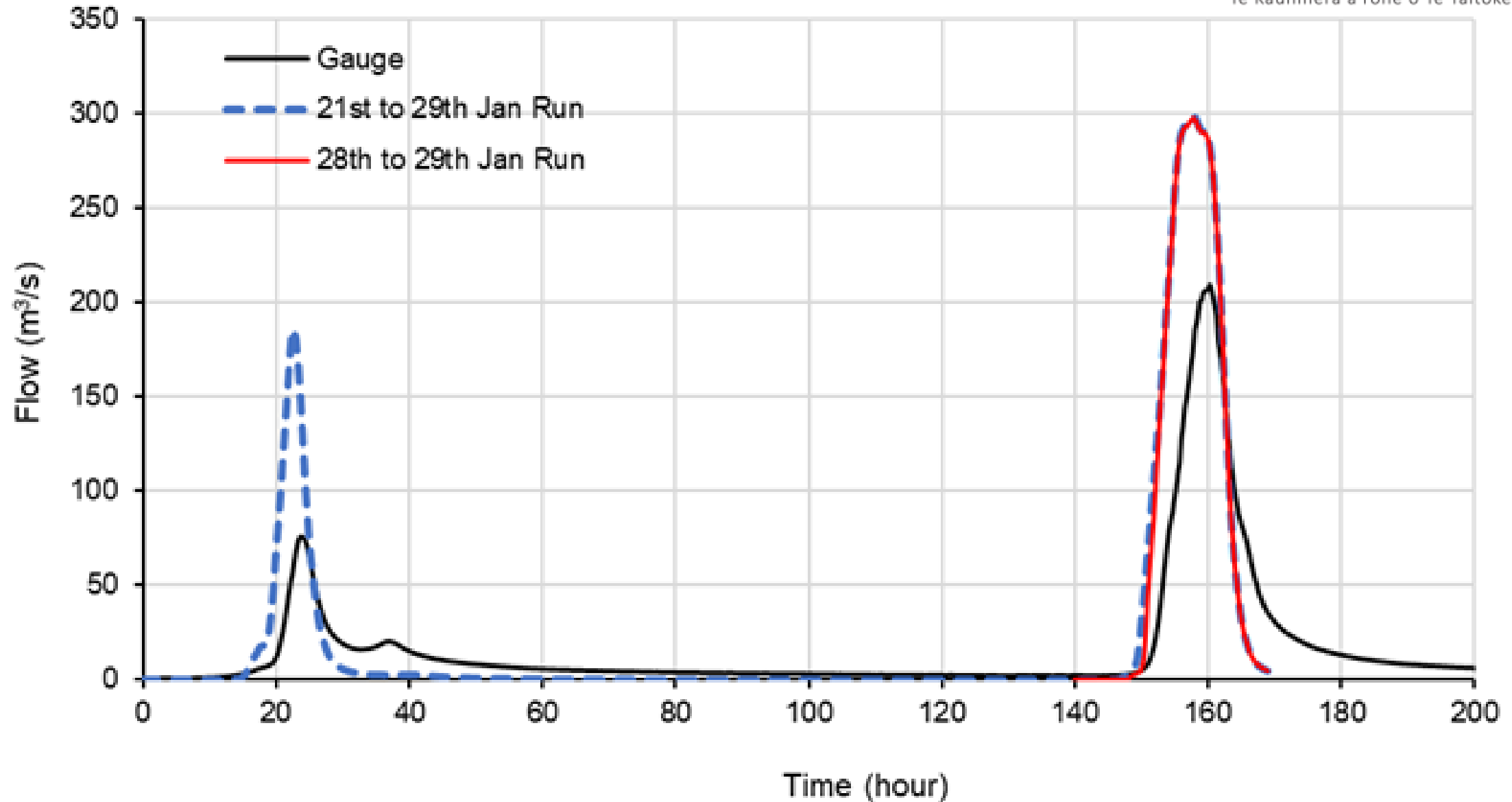
Location	Peak Flow within 15% recorded	Volume Flow within 15% recorded	Peak WSE within 300mm of recorded	Time to Peak within +/- hour	Model Flow within 10% of recorded flow at the same stage
Lovers Lane	Y	N	Y	Y	N
Bernard St	N	N	Y	Y	N



# Summary of Model Limitations

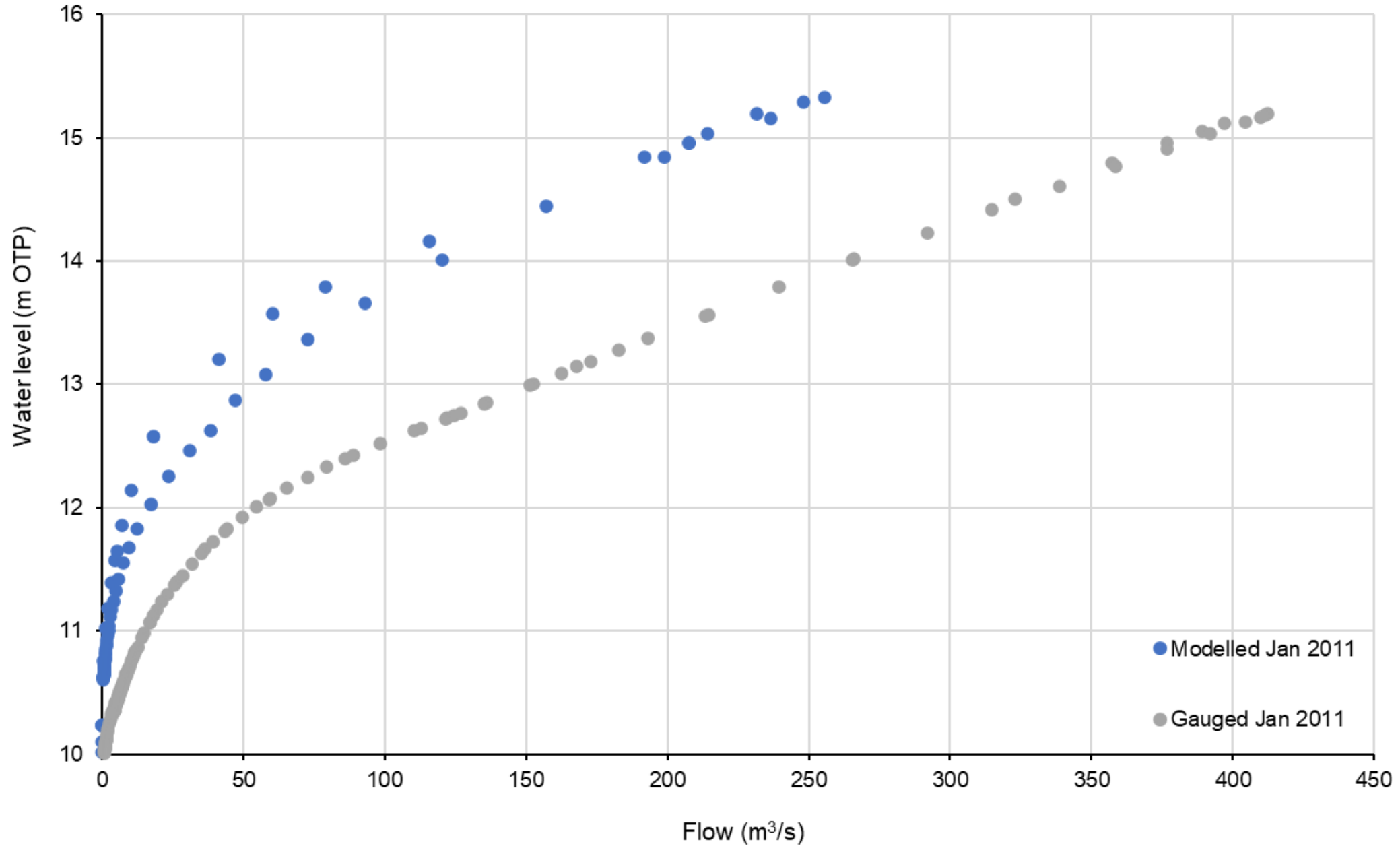
- Hydraulic model review by BECA
- Antecedent Conditions
  - January 2011 event was preceded by heavy rainfall across the region 6-7 days earlier
- Focusing the calibration on fitting recorded levels rather than hydrological processes, could result in a risk translating model parameters to ungauged catchments.

# Kaeo at Waiare Road





## Hatea at Whareora Rd





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