REPORT

Tonkin+Taylor

Consequential Flood Effects - Pakowhai Stopbank

Prepared for
Hawke's Bay Regional Council
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Executive summary

Hawke's Bay Regional Council has engaged Tonkin & Taylor Ltd to assess the potential flood impacts associated with the proposed Pakowhai Secondary Stopbank. The stopbank is intended to mitigate flooding in the Pakowhai area by managing flows from the Tūtaekurī-Waimate Stream, and overflows from the Ngaruroro and Tūtaekurī Rivers. The stopbank is designed to contain approximately 200 m^3/s of flow with 500 mm freeboard and allowance for some overtopping of the proposed spillway. The 200 m^3/s design event may compromise flow from a variety of sources. A 250 m wide spillway is incorporated into the stopbank towards the downstream end to allow discharge during high-flow events, conveying up to 40 m^3/s of flow in a 200 m^3/s event. It is important that inappropriate development (e.g. building) does not occur in the path of spillway flow releases.

To assess the proposed stopbank performance, a two-dimensional (2D) hydraulic model was developed. This model estimates flooding during various scenarios, including existing conditions, the proposed stopbank configuration, and sensitivity analyses involving different inflow locations and flow magnitudes. The model indicates that the proposed stopbank will significantly reduce flooding in the northern and eastern parts of Pakowhai. The model indicates that with the redirection of flow from this area, the land to the west of the proposed stopbank is susceptible to an increase in flood depth, velocity and hazard, notably along State Highway 2 and adjacent farmland.

The model indicates that the number of buildings exposed to high flood hazard will decrease with the proposed stopbank in place. Of the 841 buildings within the modelled area, 360 will experience a reduction in hazard category, while 54 will experience an increase. Flood impacts on road infrastructure also decrease, with a net 1.45 km of local roads experiencing reduced flood hazard. Bridges and Transmission Towers were assessed, with minor increases in flood depth and velocity.

Further modelling of a nominal overdesign event with a 300 m^3/s inflow indicates that the proposed stopbank crest level, with 500 mm freeboard, is sufficient to accommodate the increased flood levels. The spillway would convey a larger flow under these conditions, reaching up to 120 m^3/s. A smaller local catchment event was also assessed (with an inflow of 30 m^3/s), indicating that the proposed stopbank effectively prevents overtopping without additional effects.

The first version (v1) of this report was externally peer reviewed by Beca in September 2025. The second version of the report (v2) provided additional information to address the questions raised, for Becas' re-review. This version of the report (v3) is final, post the peer review process.

1 Introduction

Hawke's Bay Regional Council (HBRC) have engaged Tonkin & Taylor Ltd (T+T) to undertake a consequential flood effects assessment for the proposed Pakowhai Secondary Stopbank located in Pakowhai, Hawkes Bay. The purpose of the proposed stopbank is to protect existing properties in the Pakowhai area from flooding during specific hydrological conditions in the Tūtaekurī-Waimate Stream, the Ngaruroro River, and the Tūtaekurī River.

This report presents a summary on the consequential flood effects of the proposed stopbank.

This work has been undertaken in accordance with the conditions of engagement dated 5 August 2024 and variation dated 18 June 2025.

1.1 Background

The proposed stopbank alignment is shown in Figure 1.1. The proposed alignment generally follows the left bank of the Tūtaekurī-Waimate Stream from State Highway 50 (SH50) to the existing Ngaruroro River stopbank.

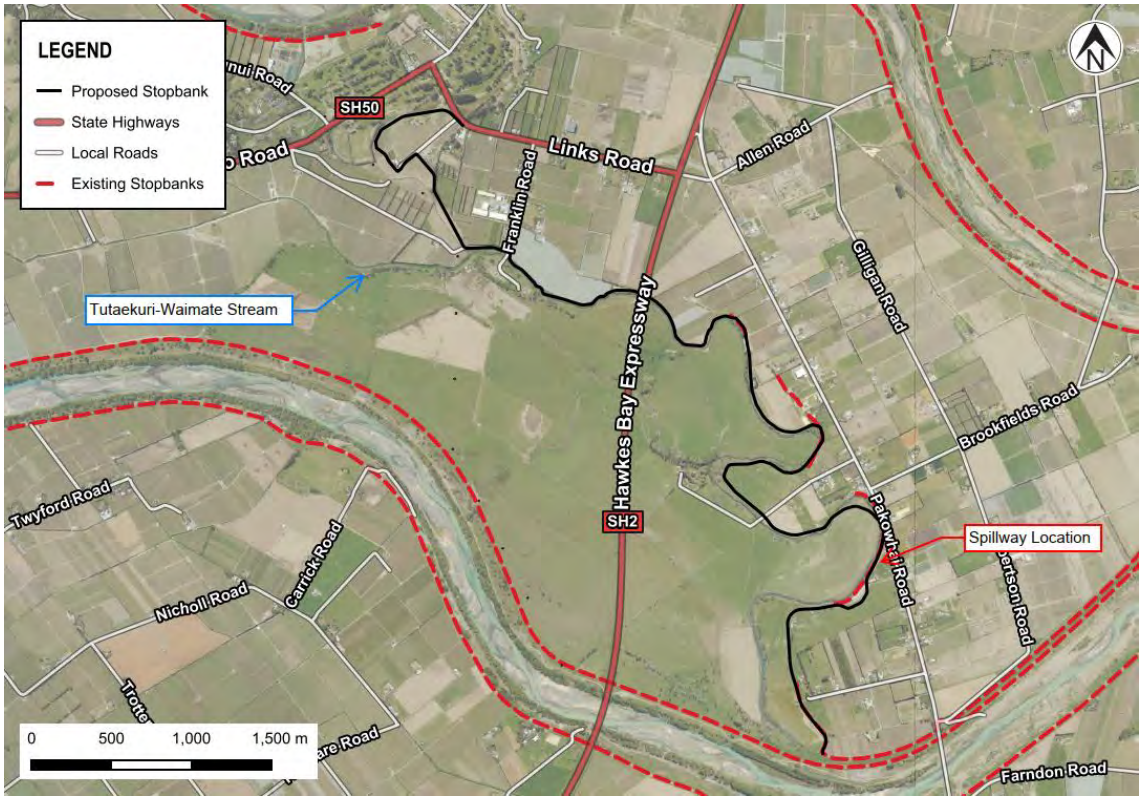


Figure 1.1: Proposed stopbank alignment.

The proposed stopbank will be approximately 9 km long and have a crest level between approximately 11.4 m RL and 8.2 m RL (NZVD vertical datum). At its southern end, the stopbank will tie into the existing secondary stopbank of the Ngaruroro River (part of the outfall channel of the Tūtaekurī-Waimate), as shown on Figure 1.1. Figure 1.2 below illustrates a typical cross section of the proposed Pakowhai stopbank.

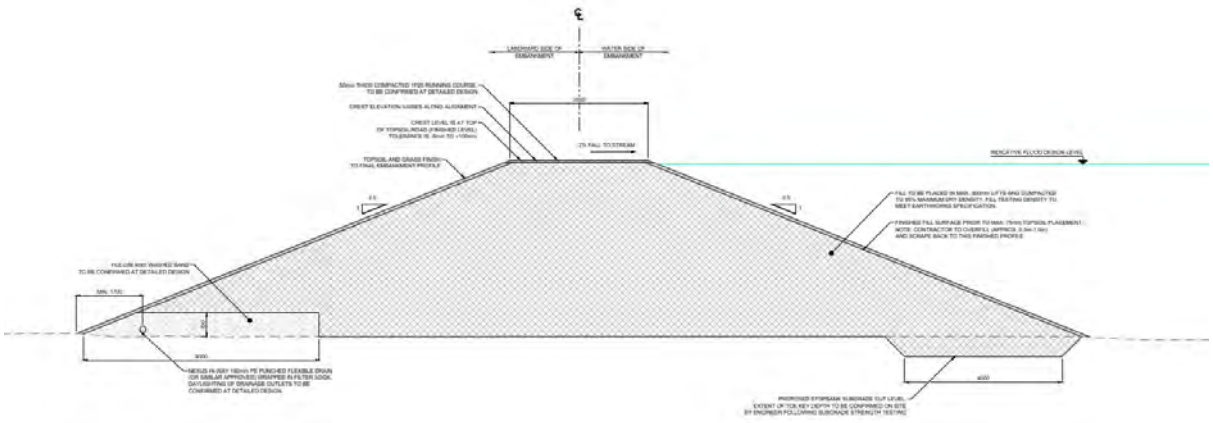


Figure 1.2: Typical cross section of proposed Pakowhai stopbank.

The stopbank will include a 250 m wide spillway with a crest level at approximately 7.5 m (NZVD) to discharge flows from the riverside of the stopbank to the landward side, as shown on Figure 1.1. The spillway crest level has been selected based on specific hydrological conditions discussed in Section 2.2. Flow which discharges over the spillway will be conveyed into land east of Pakowhai Road. Earthworks in the vicinity of the spillway and Pakowhai Road are proposed to facilitate the conveyance of this flow.

Along parts of the proposed stopbank alignment, there are remnants of a historic stopbank. This stopbank will either be left in place or removed where required for construction of the proposed stopbank.

Preliminary geometric design has been completed for the stopbank and associated works. The alignment and design crest level of the stopbank may change during subsequent design stages.

2 Flood scenario overview

To assess the consequential flood effects of the proposed stopbank, T+T has simulated different flood scenarios using a 2-dimensional hydraulic model. Two scenarios were modelled, including:

1 "Base scenario" – Existing conditions based on 2023 LiDAR.

2 "Stopbank scenario" – Includes the base scenario with a "glasswall"[1] along the stopbank alignment and a spillway crest level at 7.5 m (NZVD).

2.1 Hydraulic modelling

The purpose of the model is to estimate the consequential flood effects of the proposed stopbank on the Pakowhai area. The model was built in 2D TUFLOW Heavily Parallelised Compute (HPC) Software with HPC and adaptive timestep. The model domain includes the area between the Tūtaekurī and Ngaruroro Rivers, encompassing the Pakowhai area. The model domain area is approximately 21.5 km^2 with a computational cell size of 8 m x 8 m in areas that require less resolution down to 2 m x 2 m in areas requiring finer resolution (using Quadtree nest). The model includes sub grid sampling to better represent terrain features while maintaining a larger cell size.

[1] Represents an impermeable barrier that prevents water from flowing beyond the defined barrier alignment.

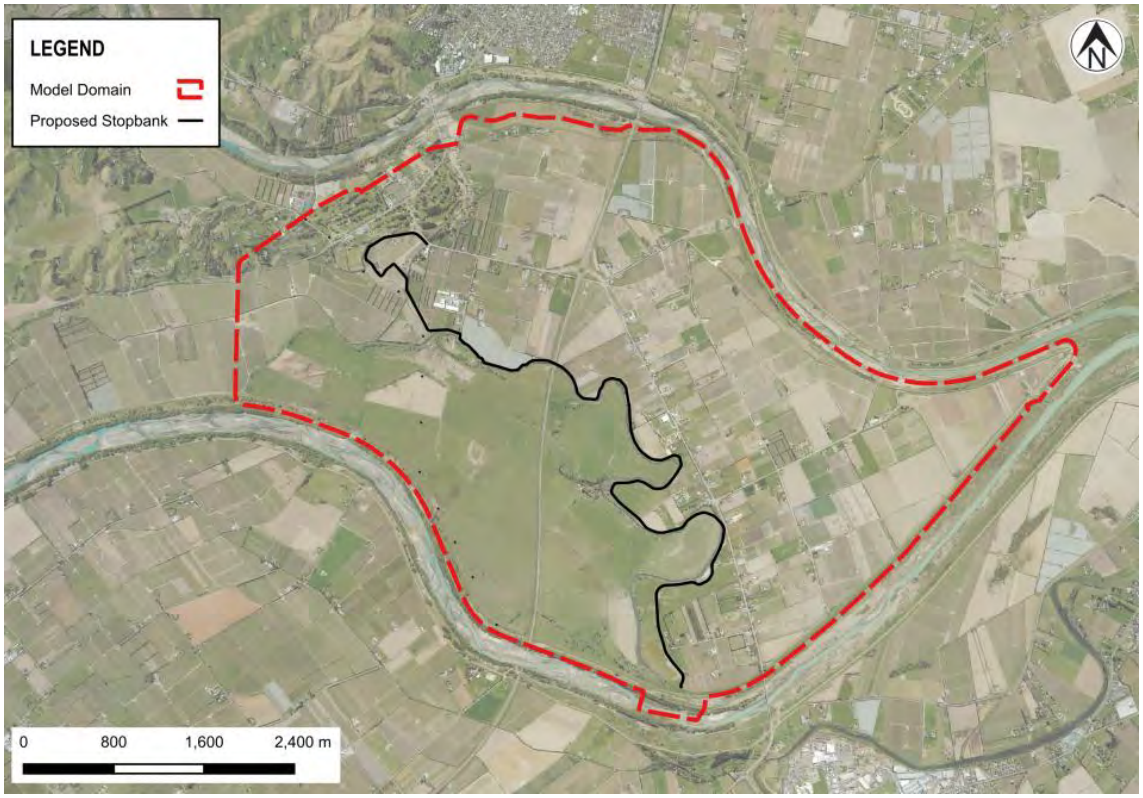


Figure 2.1: Hydraulic model domain.

Model elevation data was based on the 2023 Light Detection and Ranging (LiDAR) 1 m Digital Elevation Model (DEM), from Land Information New Zealand (LINZ). The existing stopbanks within the model domain were enforced into the model using estimated stopbank crest elevations along the stopbank centrelines.

Bridges were represented in the model to account for surcharging, pressure flow of bridge decks and submerged bridge flow at higher water levels. The two bridges included in the model are the Franklin Road and State Highway 2 (SH2) bridges, shown on Figure 2.2. Three culverts were included in model underneath SH2 using the TUFLOW 1d_nwk feature, shown on Figure 2.2. Other small culverts were not included in the model as they will have minimal hydraulic influence at the modelled discharges.

Hydraulic roughness is a parameter used in hydraulic modelling to describe the resistance to surface water flow across the terrain, within a channel, or through a pipe. Hydraulic roughness is represented in the model using Manning's 'n' roughness value, based on information from the Land Cover Database (LCDB)[2] version 5, supplied by Landcare Research New Zealand.

An inflow boundary condition was applied at the upstream end of the model domain to simulate inflows from the Tūtaekurī-Waimate Stream and Ngaruroro River breakout. A constant stage level boundary was applied to the downstream end of the model to represent tailwater conditions in the Ngaruroro River. The location of the upstream and downstream boundary conditions is shown in Figure 2.2. An additional scenario which includes an inflow from a Tūtaekurī River breakout was also modelled as discussed further in Section 6.1.

[2] https://lris.scinfo.org.nz/layer/104400-lcdb-v50-land-cover-database-version-50-mainland-new-zealand/, Downloaded 30 May 2023.

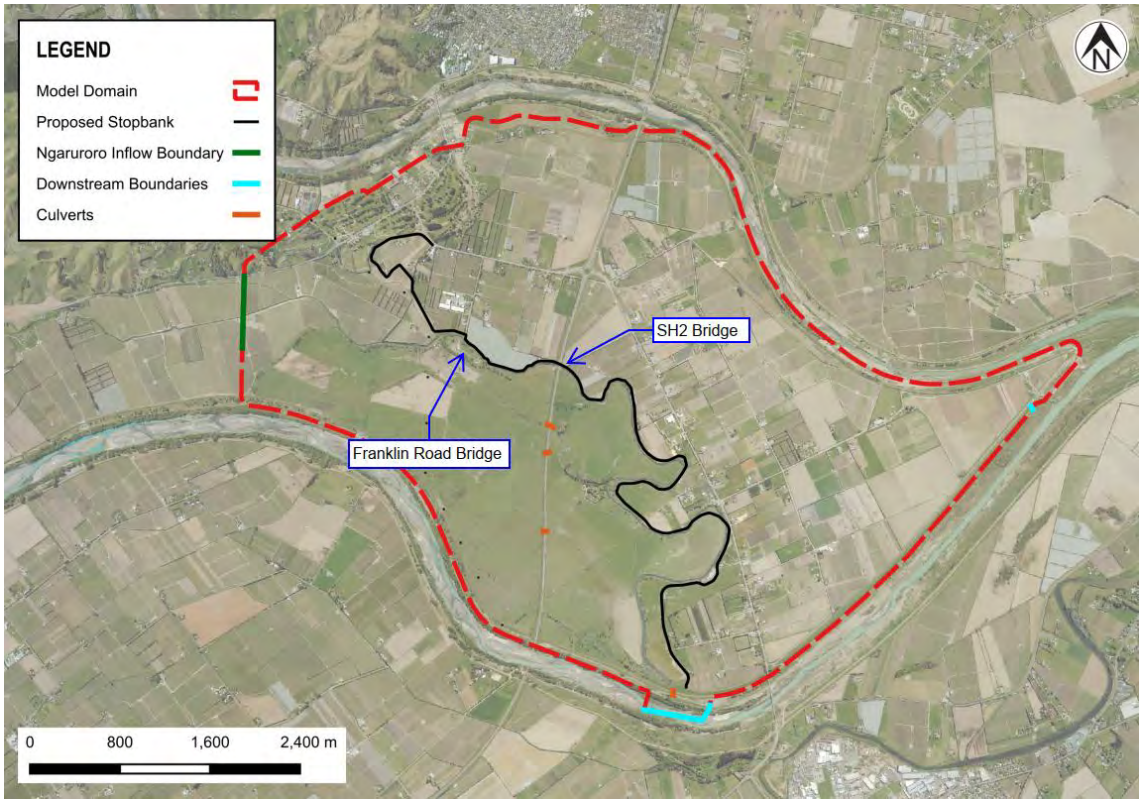


Figure 2.2: Location of model boundary conditions.

2.2 Basis of assessment

As instructed by HBRC, the stopbank and spillway crest levels have been designed on the basis of a chosen peak flow rate and spillway discharge, rather than a specific hydrological return period event. HBRC have indicated that the proposed stopbank is to be designed to manage approximately 200 m^3/s flow with a freeboard of 500 mm and allowance for some overtopping of the proposed spillway.

A flow of 200 m^3/s may represent several potential hydrological events, including:

- A localised flood event within the Tūtaekurī-Waimate Stream catchment well in excess of a 100-year event.
- Stopbank overtopping from a flood event within the Ngaruroro and/or Tūtaekurī River, corresponding to a return period between 100 and 500 years.
- Non-overtopping stopbank breach (e.g. piping failure) from a flood event within the Ngaruroro or Tūtaekurī Rivers, corresponding to a return period of less than 100 years (i.e. the Waiohiki overflow embankment does not operate).
- A combination of the above.

It is important to note that the above scenarios (including in combination) may also result in flow in excess of 200 m^3/s.

The estimation of the return period ranges stated above are based on modelling conducted separately for the Heretaunga Plains Scheme Review project[3]. This work indicates that upstream of Pakowhai, the existing stopbanks on the Ngaruroro River overtop between a 100 and 500-year event. The scheme review modelling suggests that peak flows into the Pakowhai area could be in the

[3] Tonkin & Taylor Ltd. August 2024. *Heretaunga Plains Flood Protection Scheme – Hydraulic Model Build Report*.

order of 180 m^3/s in the 200-year event which includes stopbank overtopping but no breaches/failure. Comparing flood extents between the scheme review modelling and the modelling completed for Pakowhai stopbank suggests that the flows into the Pakowhai area during Cyclone Gabrielle are likely to be significantly higher than 200 m^3/s, noting this includes flow from overtopping and stopbank breaches/failures. A Cyclone Gabrielle scenario (including observed breaches/failure locations) run for the scheme review modelling suggests that peak flows into the Pakowhai area could have been in the order of 1,700 m^3/s.

Construction is currently underway for a new stopbank at Waiohiki to prevent the Tūtaekurī River overtopping into Pakowhai up to a 100-year Tūtaekurī River event.

The model assumes a constant tailwater level during a 500-year flood event in the Ngaruroro River which is conservative. This level was estimated based on modelling conducted separately for the Heretaunga Plains Scheme Review project.

Initial modelling of a 200 m^3/s flow indicates approximately 40 m^3/s discharge over the proposed spillway. Further modelling estimates that the spillway will activate between a flow of 130–150 m^3/s within the Tūtaekurī-Waimate Stream catchment.

A flood event with an inflow of 300 m^3/s was also modelled to evaluate the proposed stopbank performance under a higher flow condition, such as a large event in the Ngaruroro and/or Tūtaekurī Rivers. Based on the scheme review modelling, the return period for 300 m^3/s flow could be in the order of a 240-year event which includes stopbank overtopping but no breaches/failure. Additionally, a smaller event with a peak inflow of 30 m^3/s was assessed to understand the effects of the stopbank under less severe flooding, such as a localised event in the Tūtaekurī-Waimate Stream catchment. The proposed embankment may also be subject to overdesign events greater than 300 m^3/s and in this instance, flooding would be more adverse than the current estimate outlined in this report.

2.3 Inflow hydrograph sensitivity

Two hydrograph shapes were considered for the model inflow boundary. One was based on a theoretical flood in the Tūtaekurī-Waimate catchment[4], while the other was based on the modelled stopbank overflow in the Heretaunga Scheme Review model[3] at the location of the inflow boundary. Both hydrographs were scaled to the same peak flow.

As illustrated in Figure 2.3, the two hydrographs exhibit considerably different shapes. The hydrograph from the Heretaunga model features a narrower peak, indicating a smaller volume of water entering the model, resulting in less extreme downstream effects.

[4] Tonkin & Taylor Ltd. March 2024. *Tūtaekurī-Waimate Stream hydrology memo.* Found in Appendix G.

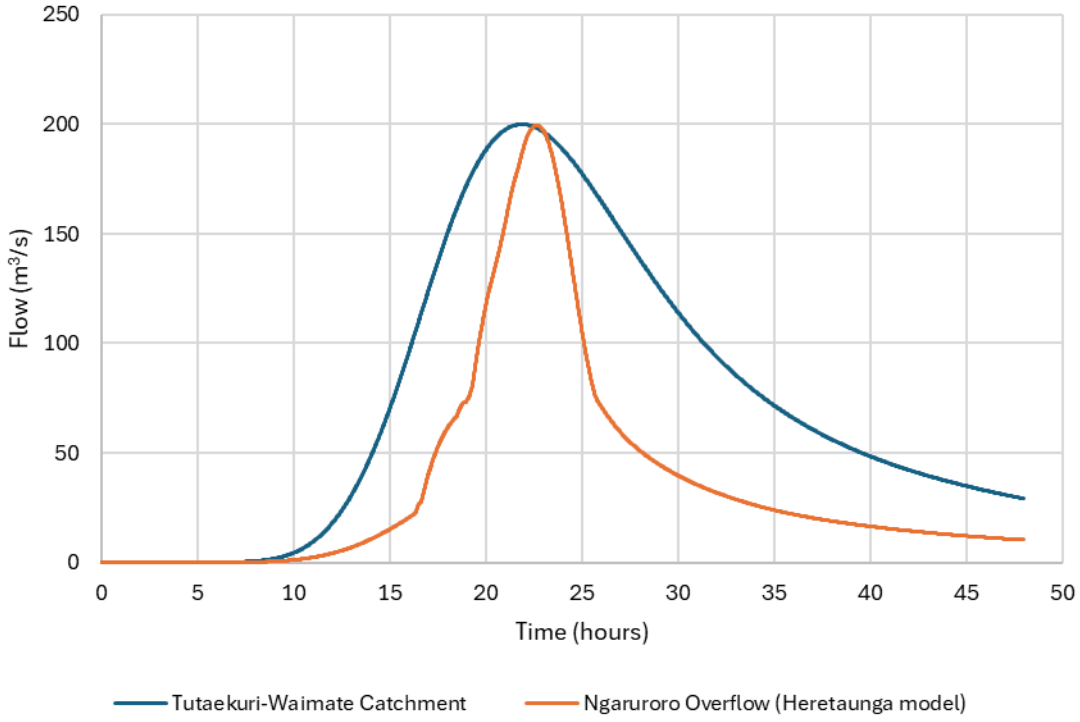


Figure 2.3: Scaled inflow hydrograph comparison.

Different hydrograph shapes will result in different flood extents, particularly in the area to the west of the proposed stopbank which is more sensitive to flood volume than peak flow. The hydrograph shape will be influenced by the hydrological conditions, e.g. a flood in the Tūtaekurī-Waimate Stream and/or overtopping or non-overtopping failure of the Tūtaekurī and Ngaruroro Rivers stopbanks. To adopt a more likely conservative approach, the hydrograph scaled from the Tūtaekurī-Waimate catchment was used throughout this assessment.

3 Flood effects

Sections 3.1, 3.2 and 3.3 detail the consequential effects on flood extent, velocity and hazard in the Pakowhai area as a result of implementing the proposed stopbank.

Maximum estimates of flood depth, velocity and hazard maps for the base scenario and stopbank scenario with an inflow of 200 m^3/s are provided in Appendix A.

3.1 Effects of flood extent

Figure 3.1 below compares the estimated flood extents for the modelled base and stopbank scenarios under an inflow of 200 m^3/s. The figure shows that the proposed stopbank reduces the flooding in the north and northeast Pakowhai area, while increasing flood extents immediately downstream of the proposed spillway and in areas upstream/west of the proposed stopbank. Different inflow locations (e.g. resulting from potential inflow from the Tūtaekurī River may result in different flood extents).

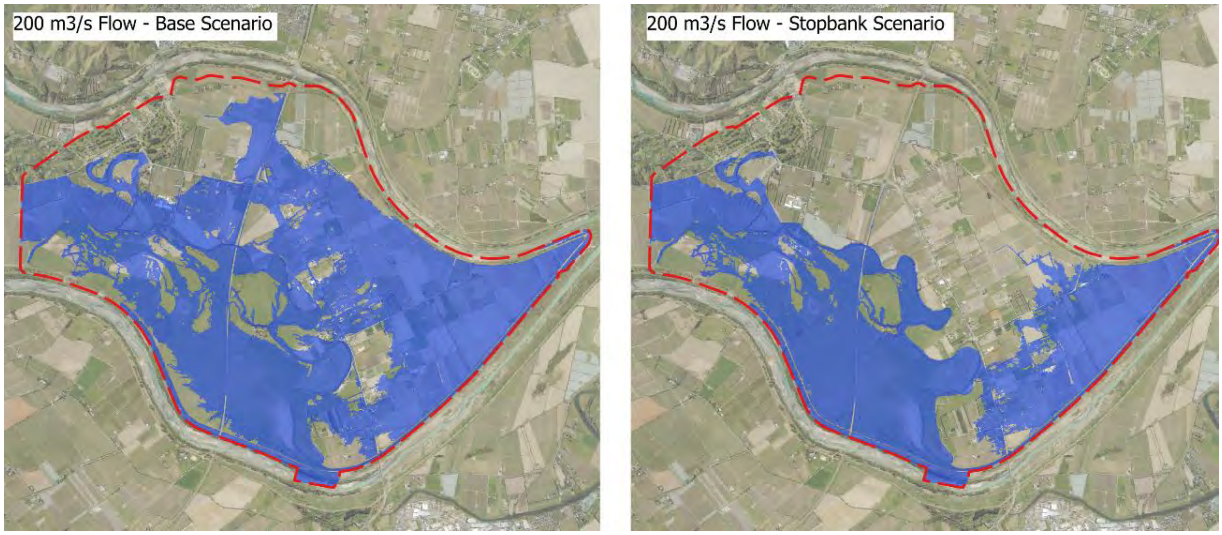


Figure 3.1: Estimated flood extent during the 200 m^3/s flow event. Where flood depth is less than 50 mm, extent is not shown.

Figure 3.2 below shows the maximum estimate of flood depth difference between the base and stopbank scenario shown at Figure 3.1 with a 200 m^3/s inflow. Areas that have an increased flood extent (was dry now wet) are susceptible to an increase in silt deposition.

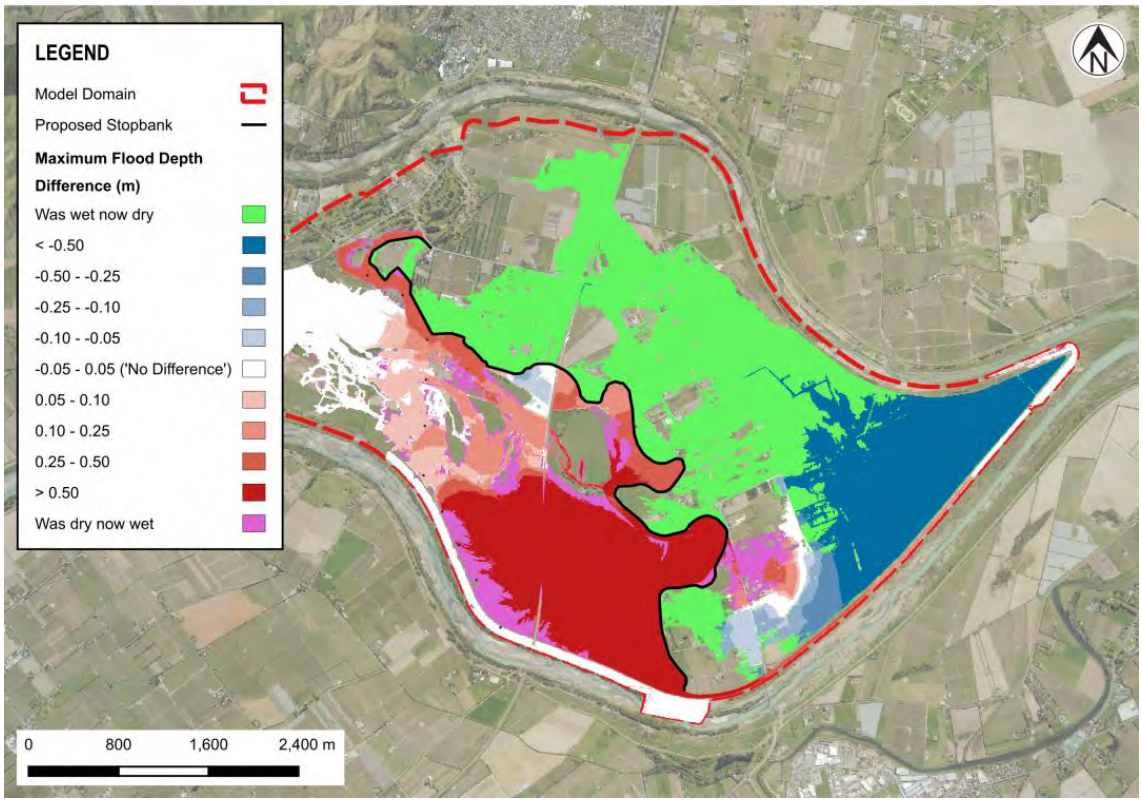


Figure 3.2: Maximum flood depth difference – base scenario vs stopbank scenario (200 m^3/s flow).

Figure 3.2 shows that the largest flood depth increase is seen to the south and west of the proposed stopbank, in the pastoral farmland area, and including an approximately 1 km section of SH2. In the base scenario, there is significant amounts of flooding in this area with maximum flood depths ranging from 1.2 m to 1.8 m from SH2 to the downstream end of the stream. Flood depth in this area increases by up to 0.6 m, meaning the proposed stopbank increases these flood depths up to

approximately 1.8 m to 2.4 m in this area. Immediately downstream of the spillway, there is an increase in flooding across Pakowhai Road and in the adjacent properties. This is expected due to the redirection of flow through the spillway.

3.2 Effects on velocity

An assessment of velocity was completed to estimate areas in which velocity had increases or decreases, subject to implementing the proposed stopbank. Increased velocity can cause an increase in erosion with potential degrade agricultural land and increase sediment loads downstream.

Figure 3.3 presents an overview of the maximum velocity difference between the base and stopbank scenario for a flow of 200 m^3/s. In areas where flooding has increased, flood velocities have also risen, as expected due to the greater volume of flow redirected by the implementation of the proposed stopbank. The largest increases of flood velocity are seen in the horticultural area upstream of SH2 and downstream of the spillway.

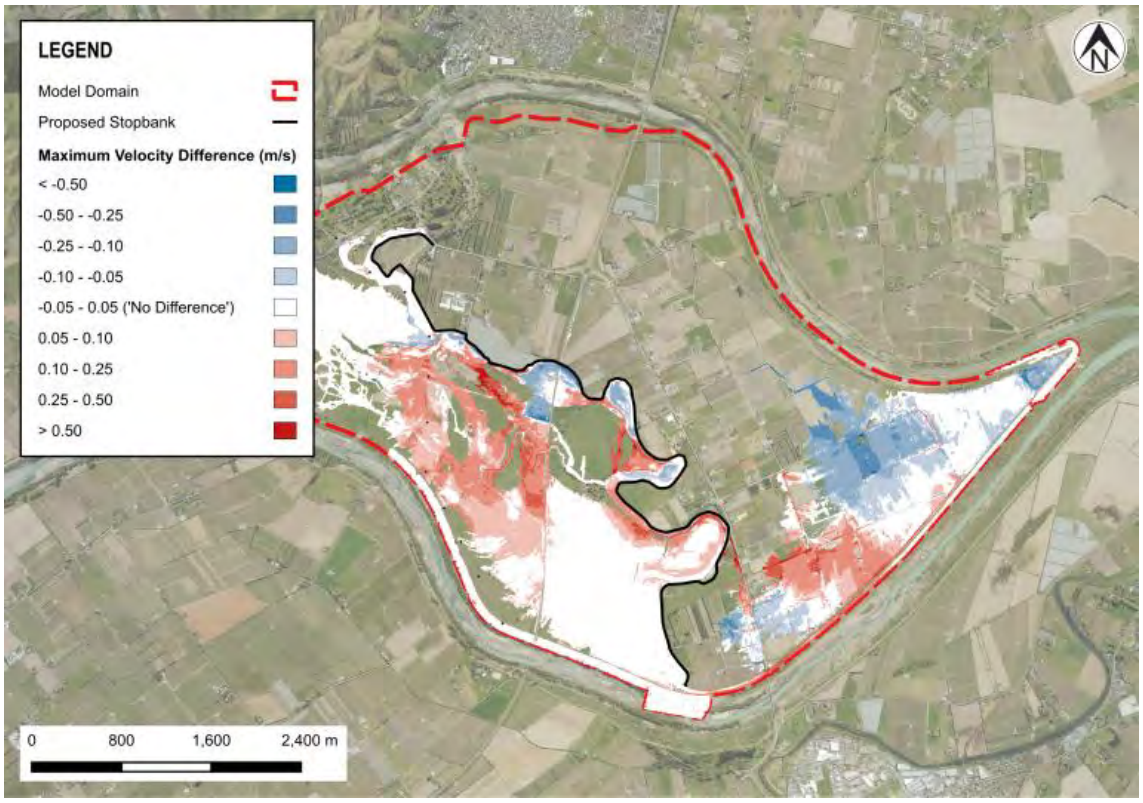


Figure 3.3: Maximum velocity difference – base scenario vs stopbank scenario (200 m^3/s flow).

3.3 Effects on flood hazard

An assessment of flood hazards was completed to inform the assessment of consequential flood hazard effects of the proposed stopbank. To assess flood hazard effects, the "*Australian Disaster Resilience Handbook 7 Managing the Floodplain: A Guide to Best Practice in Flood Risk Management in Australia (AIDR 2017)"* was adopted which provides an overview of various risk categories based on flood depth and velocity, see Figure 3.4.

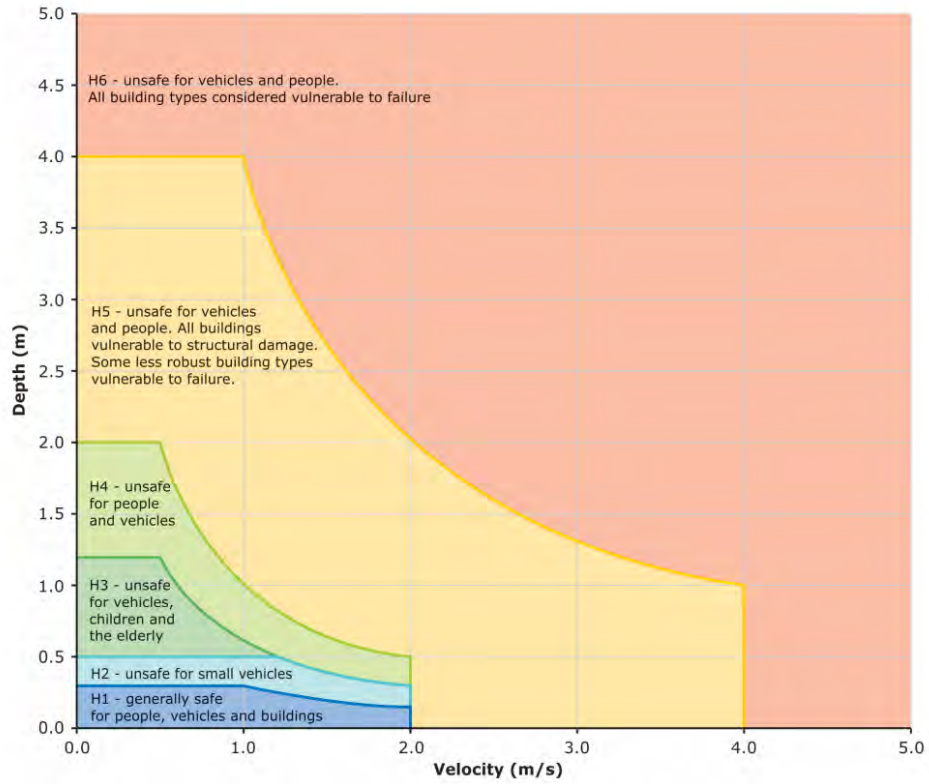


Figure 3.4: Hazard threshold defined by Smith et al (2014).

Flood hazard outputs as defined by Smith et al (2014) were generated from the model outputs and compared to estimate the effect on flood hazard caused by the proposed stopbank. Building footprints and roads have been considered in this assessment but there may be other infrastructure within the affected area which has not been considered at this time.

Economic effect of non-structural building damage (e.g., flooding above floor level but below H5 hazard) is not included in the hazard thresholds defined by Smith et al (2014). Therefore, this has not been included in the assessment. Risk to life (PAR/PLL) has not been explicitly assessed.

Figure 3.5 below presents a comparison of the flood hazard in both the base scenario and stopbank scenario, where the colours are reflective of the colours defined by Smith et al (2014) and presented in Figure 3.4. Figure 3.6 shows a difference map between hazard classes across the whole domain between the base and stopbank scenario.

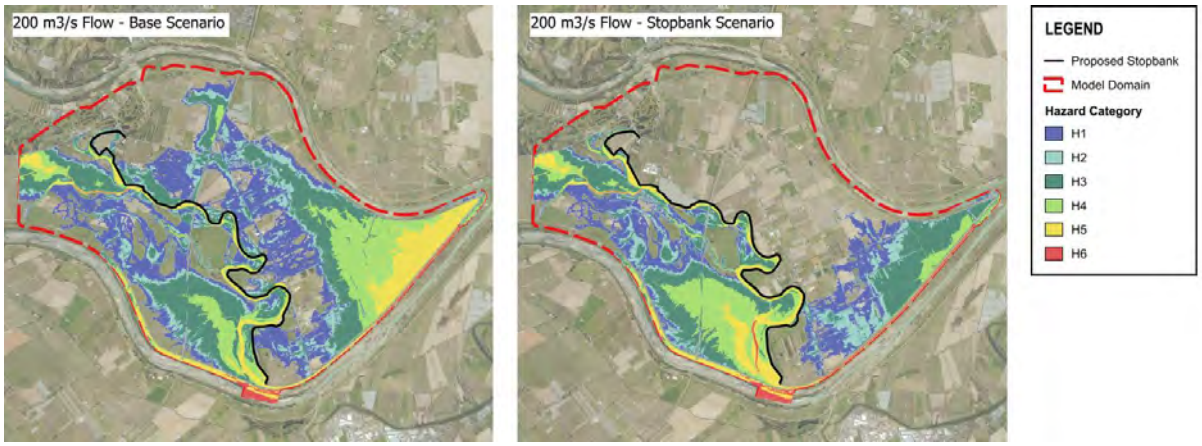


Figure 3.5: Flood hazard during the 200 m^3/s flow event for the base scenario and stopbank scenario.

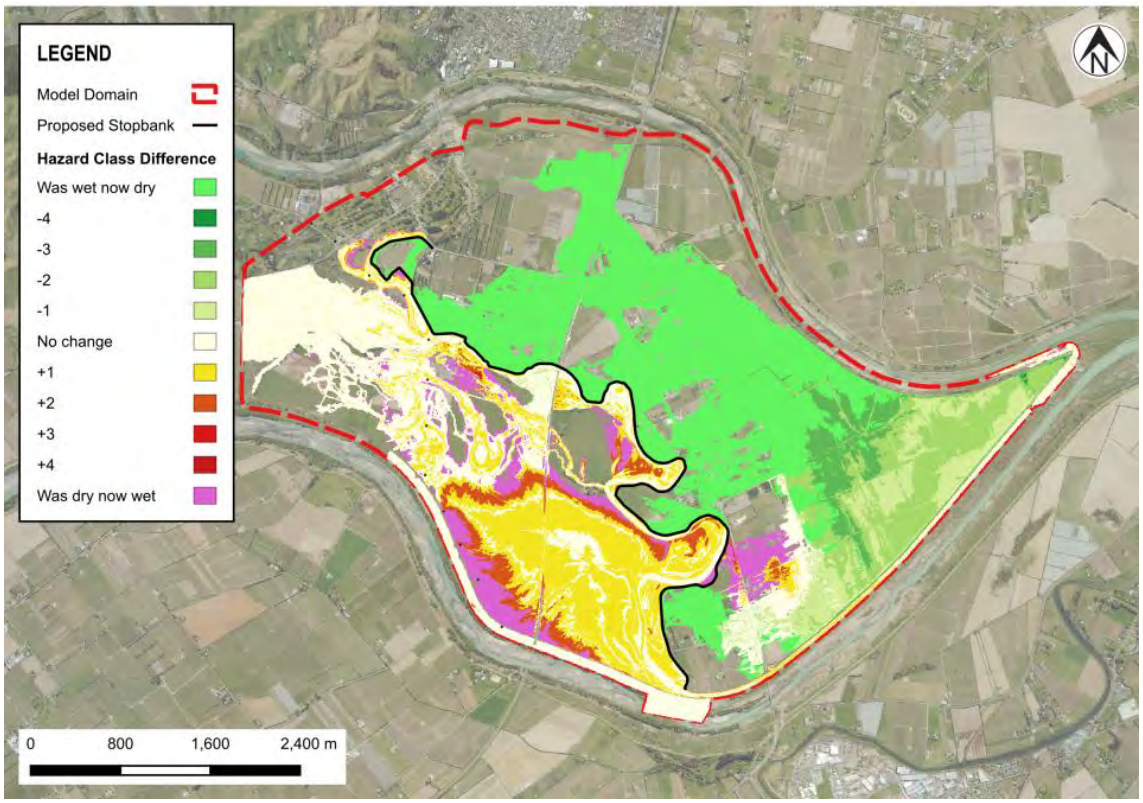


Figure 3.6: Hazard class difference map – base scenario vs stopbank scenario (200 m^3/s flow).

Within the model domain, flood hazard is significantly reduced on the eastern side of the proposed stopbank due to either the elimination or reduction of flooding in that area. Hazard levels increase in the agricultural area surrounding SH2, where a larger volume of water inundates land west of the proposed stopbank. Additionally, hazard levels are increased downstream of the spillway due to the intentional redirection of flow to this area.

4 Effects on infrastructure

4.1 Buildings

Buildings footprints have been sourced from LINZ[5], noting the LINZ building layer does not differentiate between non-habitable, habitable or temporary buildings. The layer includes building footprints up until 12 June 2025. All buildings were included in this assessment, regardless of whether thought to be an ancillary structure, to reduce the risk of miscounting.

The government has established three main categories which have been used to determine the future sever weather risk for specific areas across Hawke's Bay. The Land Category definitions are as follows:

- **Land Category 2C:** "community level interventions are effective in managing future sever weather risk event."
- **Land Category 3:** "future severe weather event risk cannot be sufficiently mitigated. In some cases, some current land uses may remain acceptable, while for others there is intolerable risk of injury or death."

[5] https://data.linz.govt.nz/layer/101290-nz-building-outlines/.

Within the model domain, there are 841 buildings, including dwellings, farm sheds, and ancillary structures. 259 of these buildings lie within the Land Category 3 zone, and 323 lie within the Land Category 2C zone. The buildings within the model domain, and Land Categorisation boundaries are shown on Figure 4.1.

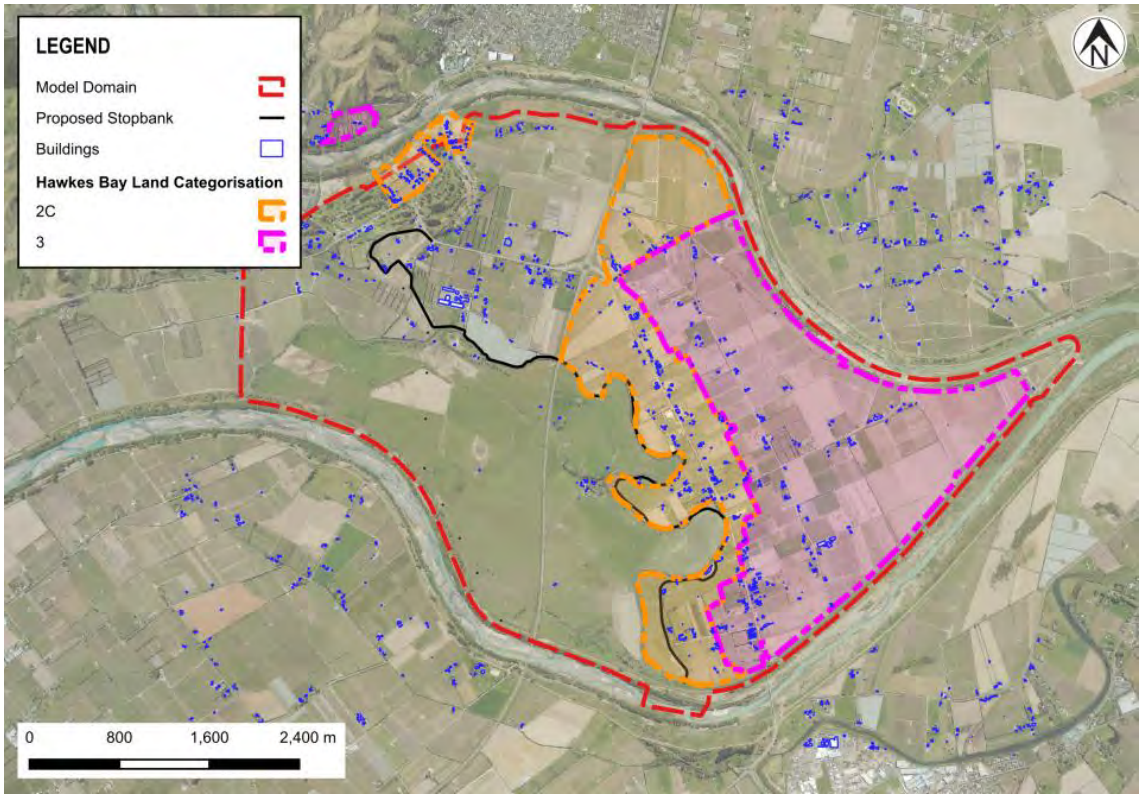


Figure 4.1: Land Categorisation zones within the Pakowhai model.

There is a total of 349 buildings that were unaffected by neither the base nor the stopbank scenario. Table 4.1 below shows the number of buildings subject to depth and velocity changes between the base and stopbank scenario for the remaining 493 buildings. The decrease in flood effects for depth, velocity and hazard typically occur to the east of the proposed stopbank, due to either the elimination or reduction of flooding in this area. Information on buildings, including property title and flood effects are found in Appendix B.

Table 4.1: Flood effects on buildings within model domain subject to flooding

	Increase	Decrease
Depth	**86** (10 in Land Cat 2C, 43 in Land Cat 3)	**406** (144 in Land Cat 2C, 187 in Land Cat 3)
Velocity	**123** (10 Land Cat 2C, 83 in Land Cat 3)	**369** (144 in Land Cat 2C, 140 in Land Cat 3)

Table 4.2. below shows how many buildings have moved between each hazard category between the base and stopbank scenarios for all Land Categories. For example, there are 23 buildings which reduce from H4 to H1 hazard. There is a total of 54 buildings that have increased by at least one hazard category, and a total of 360 buildings that have decreased by at least one hazard category.

Table 4.2: Changes in flood hazard (number of buildings) under a 200 m^3/s flow event

			Stopbank Hazard Category						
			H0	H1	H2	H3	H4	H5	H6
		Totals	643	129	40	20	9	0	0
Base Hazard Category	H0	386	349	28	8	1			
	H1	264	203	51	7	2	1		
	H2	88	48	22	14	4			
	H3	65	39	5	8	10	3		
	H4	35	4	23	3	2	3		
	H5	3				1	2	0	
	H6	0							0

Note: Inclusive of all 841 buildings in the model domain.

As defined by Smith et al (2014) and mentioned in Section 3.3 above, H5 is defined as causing buildings to be vulnerable to structural damage. It is important to note that in the stopbank scenario, there are no buildings that fall within this category. One building reduces from H5 to H3, and 2 buildings reduce from H5 to H4.

Two of the three buildings are associated with the HBRC pumpstation, which we understand HBRC are currently considering upgrading and raising electrical systems and controls to the surrounding stopbank levels. The third building lies upstream of the pump station, in the southeastern area of the model domain. It is unclear to see what the third building is based on aerial imagery, however, the building measures 11 m^2 therefore is unlikely to be residential structure.

Four buildings have increased to a hazard category of H4, three increasing from H3 and one from H1. The singular building that has increased from H1 to H4 is located streamside of the stopbank and is commonly referred to as the 'potato shed'. Further details on the flood effects associated with this building can be found in Section 4.5.

Of the three buildings that have increased from H3 to H4, one appears to be an ancillary structure located on the western side of Links Road that has since been removed, based on Google Street View imagery dated November 2024. Another is an open-sided farming shed (inferred from Google Street View imagery), located east of State Highway 2 in the southern area of the model domain. The third appears to be an ancillary structure to a residential property located at the end of Franklin Road, based on aerial imagery.

Table 4.3 and Table 4.4 show how many buildings have moved between each hazard category between the base and stopbank scenarios for Land Category 2 and 3 areas.

Table 4.3: Changes in flood hazard (number of buildings) under a 200 m^3/s flow event: LC2 area

			Stopbank Hazard Category						
			H0	H1	H2	H3	H4	H5	H6
		Totals	313	6	2	1	1	0	0
Base Hazard Categor	H0	27	19	5	2	1			
	H1	205	203	1			1		

	H2	48	48		0				
	H3	39	39			0			
	H4	4	4				0		
	H5	0						0	
	H6	0							0

Table 4.4: Changes in flood hazard (number of buildings) under a 200 m^3/s flow event: LC3 area

			Stopbank Hazard Category						
			H0	H1	H2	H3	H4	H5	H6
		Totals	98	114	31	6	0	0	0
Base Hazard Category	H0	124	98	20	6				
	H1	48		44	3	1			
	H2	34		22	12				
	H3	14		5	7	2			
	H4	28		23	3	2	0		
	H5	1				1		0	
	H6	0							0

4.2 Roads

Road centrelines have been sourced from LINZ[6], noting the layer does not include private roads or other accessways. The sections below detail the flood effects on State Highway 2, Pakowhai Road and other local roads where data is available.

4.2.1 State Highway 2 (SH2)

For this assessment, SH2 has been referenced by chainage, shown in Figure 4.2 starting from the SH2 bridge (aligned with the stopbank centreline) to the Ngaruroro River. This was chosen as a reference point as there is no flooding on SH2 north of the stopbank in the stopbank scenario.

[6] https://data.linz.govt.nz/layer/50329-nz-road-centrelines-topo-150k/.

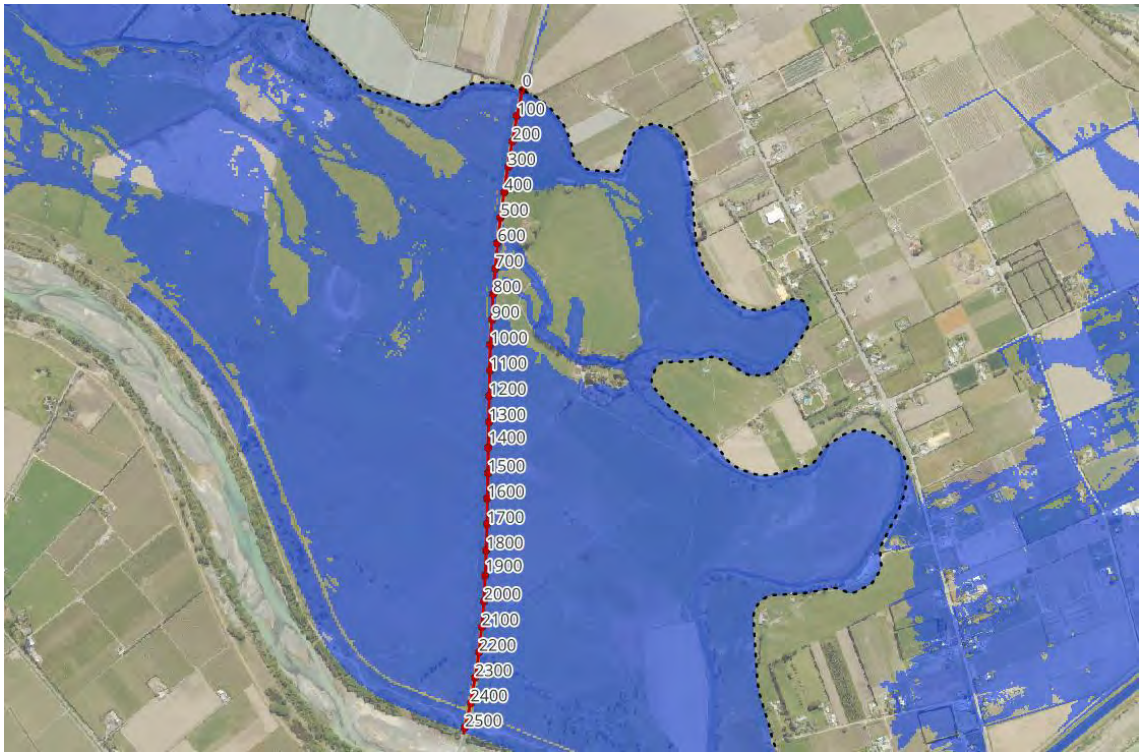


Figure 4.2: Reference chainage along SH2 (underlay of flood extents for 200 m^3/s flow event with stopbank scenario).

According to Smith et al (2014), all vehicles are unsafe at a hazard of H3 and higher. The model indicates that during the base scenario, there is a 220 m length of road between chainages of 1430 m and 1650 m that is subject to H3 hazard or higher. During the stopbank scenario, this length of road is increased to 790 m between chainages of 1160 m and 1950 m. The graphs in Figure 4.3 present the flood level, flood velocity and flood depth duration (when water depth > 100 mm) for both the base scenario (blue) and stopbank scenario (orange) subject to a 200 m^3/s flow event. The shading in the top graph shows the area where the flood hazard is H3 or above based on either the base or stopbank scenario.

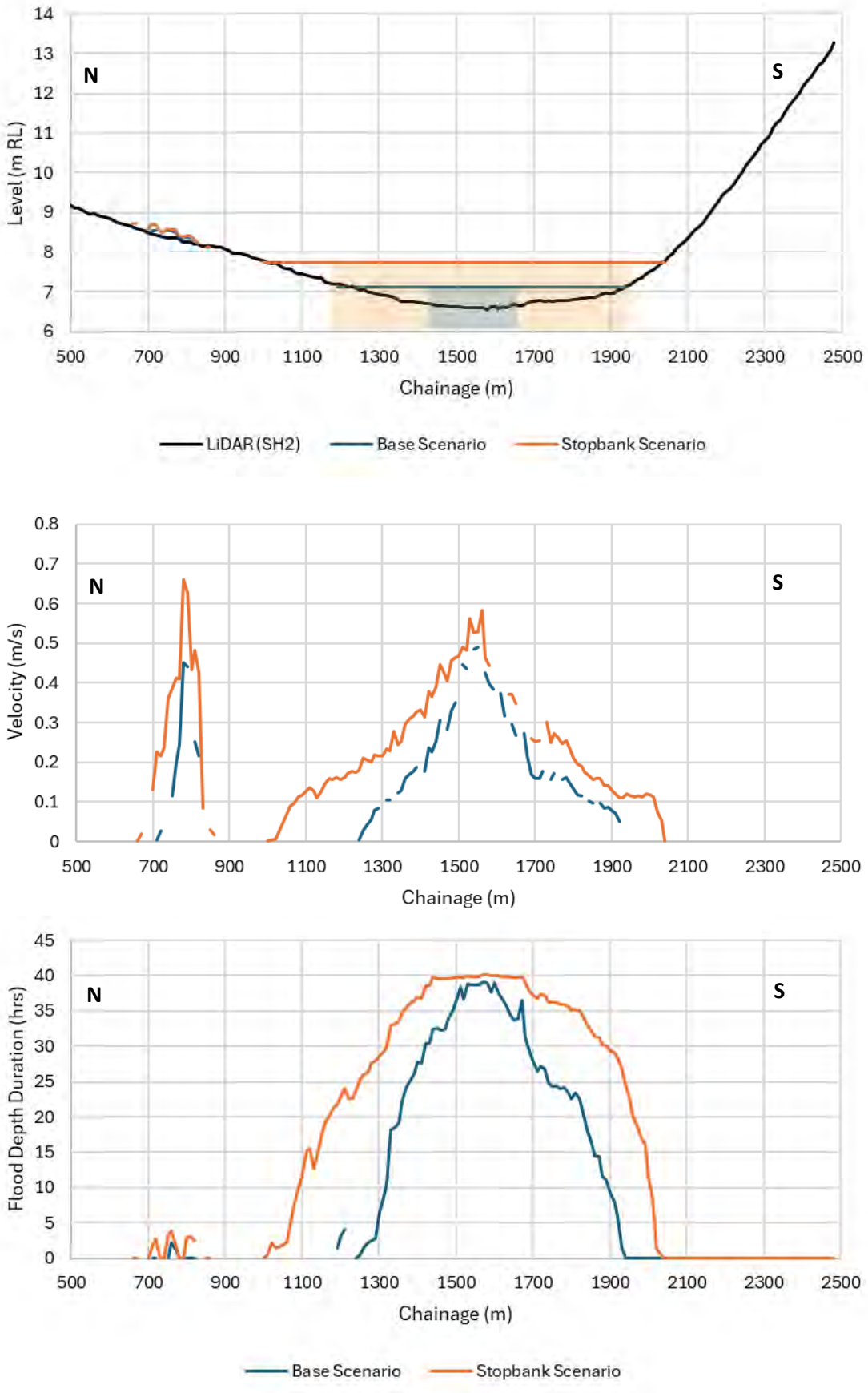


Figure 4.3: Flood level, velocity and depth duration (> 100 mm) along SH2 in the base and stopbank scenario (200 m^3/s flow event).

4.2.2 Pakowhai Road

Pakowhai Road is to the east of the proposed stopbank, extending approximately 3.8 km through the model domain from the SH50 roundabout to the Ngaruroro River and is a local arterial road. In the base scenario, Pakowhai Road experiences flooding from flood waters outflanking from the Tūtaekurī-Waimate Stream into the eastern area of Pakowhai. Estimated flood depths along Pakowhai Road reach up to a maximum of 0.3 m in the base scenario. Under the stopbank scenario, flooding on Pakowhai Road has been eliminated for the northernmost 2.5 km until the spillway. Downstream of the spillway, flood depths are estimated to increase between 0.1 – 0.3 m between the base and stopbank scenario. Figure 4.4 below presents the maximum flood depth difference between the base scenario and stopbank scenario subject to a flow of 200 m^3/s, downstream of the spillway and Table 4.5 presents maximum flood depth and velocity.

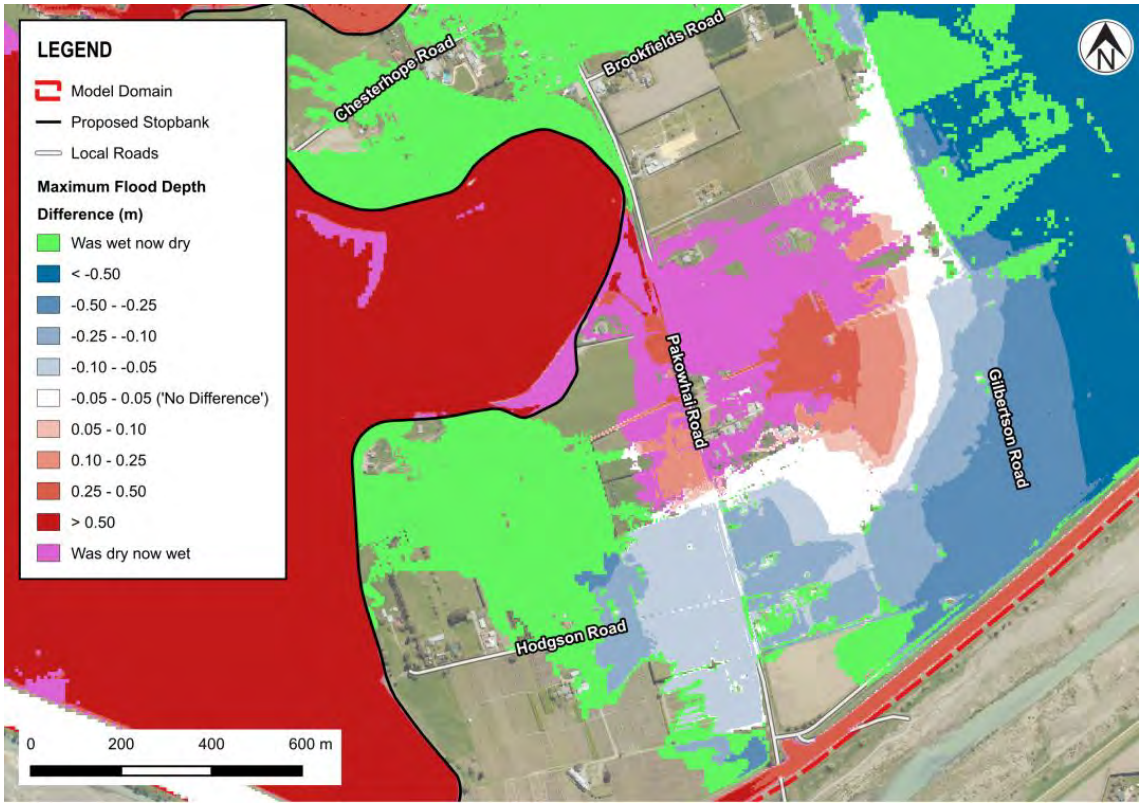


Figure 4.4: Estimated maximum flood depth difference downstream of the spillway, onto Pakowhai Road (200 m^3/s flow event).

Table 4.5: Maximum flood depth and velocity estimates on Pakowhai Road, downstream of the spillway in the base and stopbank scenarios

	Base Scenario	Stopbank Scenario
Depth (m)	0.17	0.30
Velocity (m/s)	0.62	1.20

While the redirection of flow through the spillway increases the flood depth and velocity in this area, the hazard category along Pakowhai Road for the base scenario and stopbank scenario does not exceed H1, therefore is not considered unsafe for vehicles. The hazard categories in this area for the base and stopbank scenarios are seen in Figure 4.5 below.

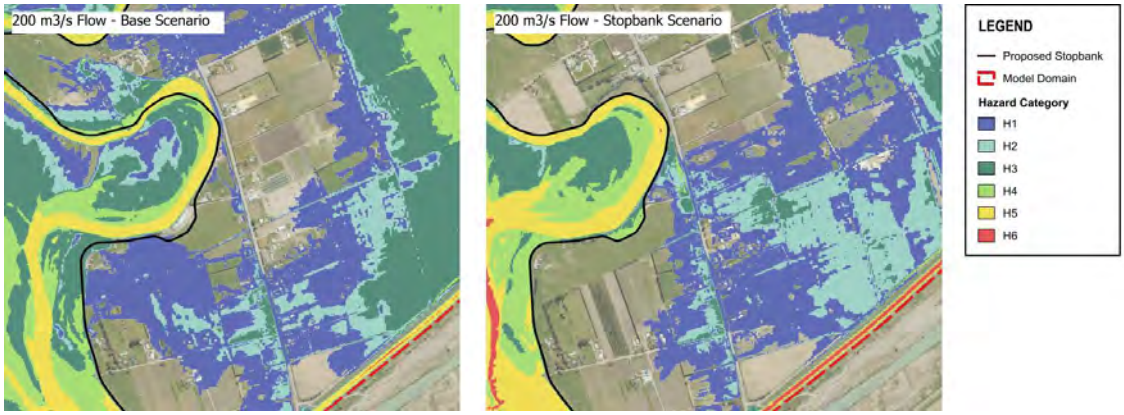


Figure 4.5: Assessed hazard class comparison downstream of spillway onto Pakowhai Road between base scenario and stopbank scenario (200 m^3/s flow event).

4.2.3 Other local roads

Other local roads within the Pakowhai model domain have been assessed for flood hazard in both the base and stopbank scenarios. This assessment was completed on the road centrelines sourced from LINZ[6] which was found to have nine road attributes within the model domain that were unnamed. Upon inspection of aerial imagery, these roads appear to be minor back roads, and for the purpose of this assessment have been named as 'Unnamed Road' followed by a number between one and nine. A map of the roads assessed can be found in Appendix C.

Table 4.6 below presents the length of local road (in metres) affected by each category of flood hazard in the base and stopbank scenarios. The colour code in the table for hazard categories H1 – H6 are as follows:

- Green indicates where the length of road subject to the hazard category has been reduced in the stopbank scenario.
- Red indicates where the length of road subject to the hazard category has increased in the stopbank scenario.
- Yellow indicates that there is no difference in length of road affected by respective hazard category.

These colour rules are reversed for H0 category, as an increase in the length of road affected by H0 is indicative of an improvement of flood conditions.

For example, in the base scenario Allen Road has 610 m of H0, 560 m of H1 and 110 m of H2 hazard. In the stopbank scenario the road has 1280 m of H0 (which is the entire road length).

Table 4.6: Length of local road (in metres) affected by each hazard category

Road Name		H0	H1	H2	H3	H4	H5	H6
Allen Road	Base	610	560	110	0	0	0	0
	SB	1280	0	0	0	0	0	0
Brookfields Road	Base	660	260	70	480	500	0	0
	SB	1360	610	0	0	0	0	0
Chesterhope Road	Base	300	840	150	20	50	20	0
	SB	680	50	60	510	30	50	0

Road Name		H0	H1	H2	H3	H4	H5	H6
Franklin Road	**Base**	310	150	200	50	0	0	0
	SB	700	0	0	10	0	0	0
Gilbertson Road	Base	330	980	450	340	0	0	0
	SB	920	910	270	0	0	0	0
Gilligan Road	Base	240	1250	690	80	0	0	0
	SB	2260	0	0	0	0	0	0
Hatas Lane	Base	870	0	0	0	0	0	0
	SB	870	0	0	0	0	0	0
Hodgson Road	Base	280	370	110	0	0	0	0
	SB	470	220	70	0	0	0	0
Korokipo Road	Base	1650	0	0	0	0	0	0
	SB	1650	0	0	0	0	0	0
Links Road	Base	1540	220	220	10	0	0	0
	SB	1990	0	0	0	0	0	0
Ngati Hinewera Lane	Base	210	0	0	0	0	0	0
	SB	210	0	0	0	0	0	0
Omaranui Road	Base	910	0	0	0	0	0	0
	SB	910	0	0	0	0	0	0
Pakowhai Road	Base	1630	2120	30	0	10	10	10
	SB	3130	650	0	0	10	10	10
Sisson Road	Base	0	0	0	20	380	0	0
	SB	10	180	160	50	0	0	0
Unnamed Road 1	Base	90	0	0	20	0	50	0
	SB	80	10	0	0	0	50	20
Unnamed Road 2	Base	30	480	370	780	240	10	10
	SB	260	390	170	760	290	50	0
Unnamed Road 3	Base	130	290	0	0	0	0	0
	SB	420	0	0	0	0	0	0
Unnamed Road 4	Base	470	0	0	0	0	0	0
	SB	470	0	0	0	0	0	0
Unnamed Road 5	Base	640	0	0	0	0	0	0
	SB	640	0	0	0	0	0	0
Unnamed Road 6	Base	130	50	0	0	0	0	0
	SB	180	0	0	0	0	0	0
Unnamed Road 7	Base	540	0	0	0	0	0	0
	SB	540	0	0	0	0	0	0
Unnamed Road 8	Base	650	20	0	10	0	0	0
	SB	650	10	10	10	0	0	0
Unnamed Road 9	Base	140	50	70	170	50	0	0
	SB	410	40	20	10	0	0	0

Road Name		H0	H1	H2	H3	H4	H5	H6
Victoria Lane	Base	200	0	0	0	0	0	0
	SB	200	0	0	0	0	0	0
Waiohiki Road	Base	630	0	0	0	0	0	0
	SB	630	0	0	0	0	0	0

Table 4.6 indicates that there is approximately 3.32 km of road that is subject to a hazard category of H3 or higher, noting all vehicles are unsafe at a hazard of H3 and higher. In the stopbank scenario this value reduces to 1.87 km of road meaning overall, there is a net decrease of 1.45 km of road in the H3 or higher category with the proposed stopbank.

4.3 Bridges

There are two bridges that have been included in the Pakowhai model, Franklin Road and State Highway 2. The model results indicate:

- The flood water flows over the Franklin Road bridge deck in both the base and stopbank scenario. The maximum water depth over the bridge deck increases from 0.4 m to 0.7 m and the maximum flood velocity increases from 1.3 m/s to 1.8 m/s from the base scenario to stopbank scenario. The flood depth duration remains unchanged between the two scenarios.
- The SH2 bridge does not overtop in either the base or stopbank scenario; however, in both cases, the water level reaches the soffit. Figure 4.6 shows a conceptual cross section with the modelled water levels shown.

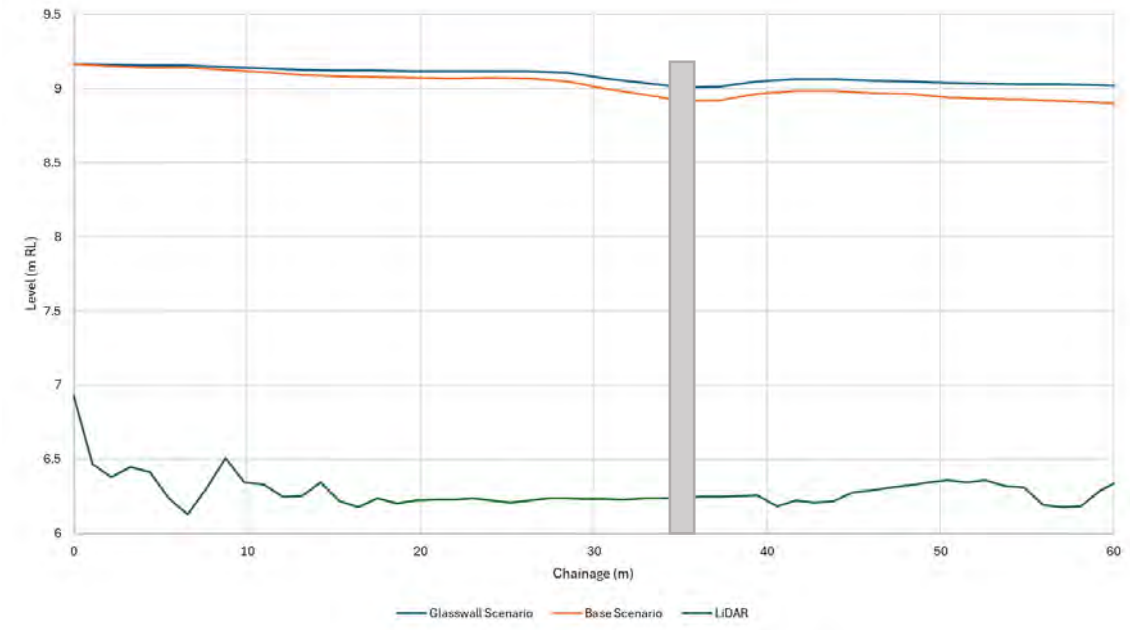


Figure 4.6: SH2 bridge water level profiles (200 m^3/s flow event).

4.4 Transmission Towers

Transmission line data has been sourced from Transpower Open Data[7]. There is one 220 kV transmission line that runs through the western area of Pakowhai. Transmission Towers along this line were identified by the vertices in the line layer exported from Transpower. A 5 m buffer was

[7] https://data-transpower.opendata.arcgis.com/datasets/0c8db240553f47b5844bdc2eb1146b9b_0/explore.

then applied to vertices to find the maximum flood statistics for each tower. For this assessment, the Transmission Towers have been labelled as per Figure 4.7.

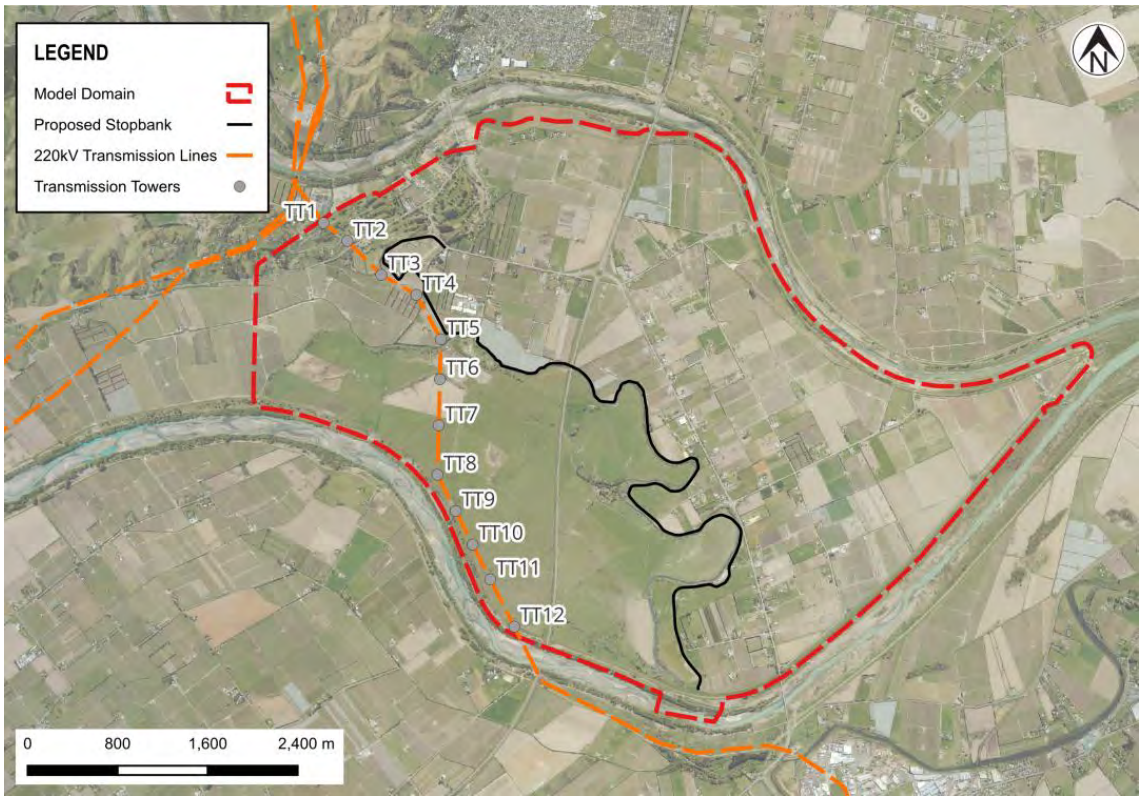


Figure 4.7: Transmission Towers in Pakowhai model domain.

Table 4.7 summarises the estimated flood statistics derived from the model results for the Transmission Towers located within the Pakowhai model domain.

Table 4.7: Estimated flood statistics at Transmission Towers within Pakowhai model domain

	Depth (m)		Velocity (m/s)		Hazard (H1 – H6)	
	Base	Stopbank	Base	Stopbank	Base	Stopbank
TT1	-	-	-	-	-	-
TT2	-	-	-	-	-	-
TT3	0.93	1.27	0.22	0.24	3	4
TT4	0.60	0.95	0.05	0.07	3	3
TT5	0.51	0.75	0.43	0.36	3	3
TT6	0.11	0.19	0.32	0.51	1	1
TT7	0.33	0.43	0.54	0.61	2	2
TT8	0.18	0.27	0.34	0.47	1	1
TT9	-	0.24	-	0.05	-	1
TT10	0.03	0.53	0.05	0.08	1	2
TT11	-	0.11	-	0.02	-	1
TT12	2.16	2.16	0.97	0.97	5	5

The assessment highlights the following:

- Transmission Towers 9 and 10 are unaffected in the base scenario but are exposed to flood depths and velocities in the stopbank scenario, likely due to their location within an area of increased flooding across the model domain.
- The greatest increase in flood depth occurs at Transmission Tower 4, with a maximum rise of 0.35 m, while Transmission Tower 6 experiences the highest increase in flood velocity. Velocities around all towers increase by no more than 0.2 m/s.
- Transmission towers 1 and 2 remain unaffected in both scenarios, likely due to their position in the northern part of the model domain.

4.5 Spillway operation

During an adopted 200 m^3/s inflow event, the spillway conveys a peak flow of approximately 40 m^3/s. To mitigate flooding in the northern area, an existing bund that lies adjacent to Pakowhai Road has been extended to tie into the propose stopbank at the start of the spillway. In the stopbank scenario, several buildings that remain unaffected in the base scenario are exposed to flooding, as shown in Figure 4.8.

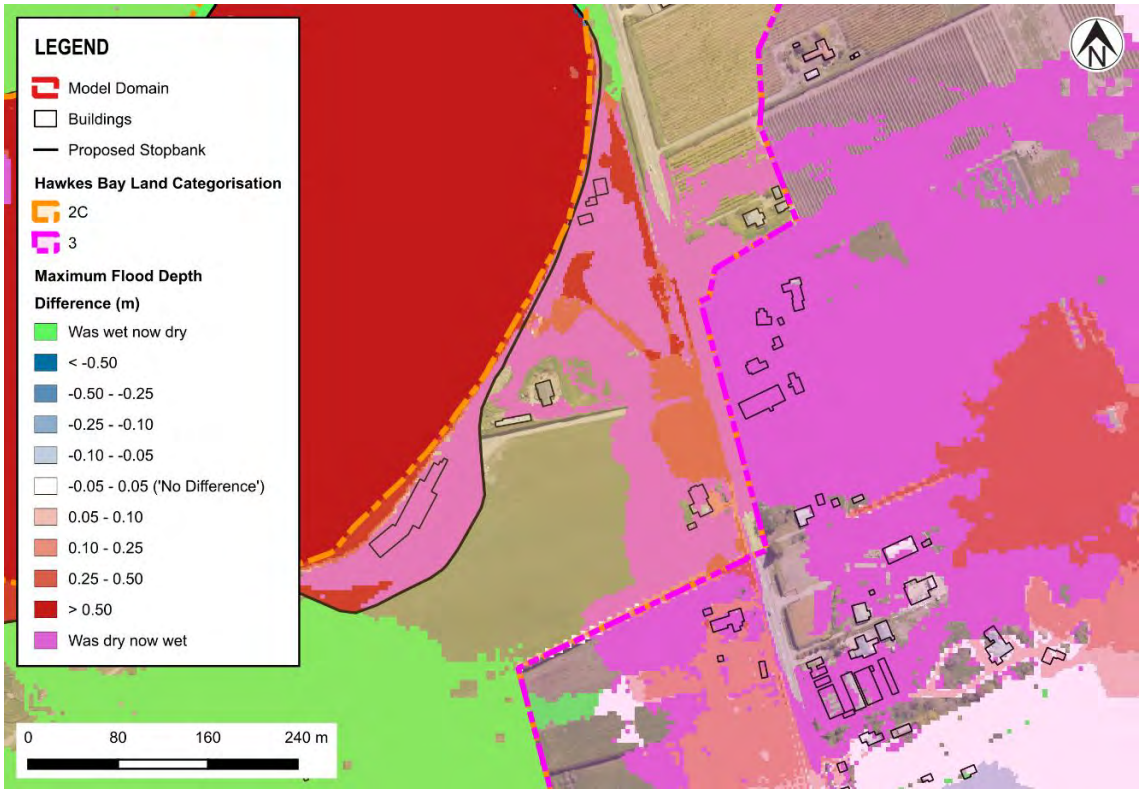


Figure 4.8: Maximum flood depth difference downstream of the spillway – 200 m^3/s inflow.

Although the stopbank scenario introduces new flooding exposure, only two buildings shown in Figure 4.9 experience flood depths and velocities high enough to be classified under a hazard category of H3. There is one building, located streamside of the stopbank (commonly known as the 'potato shed'), that falls under hazard category H4 due to a maximum flood depth of approximately 1.2 m and velocity of 0.5 m/s (as shown in Figure 4.10). A cluster of buildings in the northern area downstream of the spillway are also affected but are under acquisition by Hawke's Bay Regional Council. These buildings are currently classified Category 2C. To the east of Pakowhai Road, flood depth estimates reach up to 0.3 m with velocities as high as 0.8 m/s. This area is classified as Category 3.

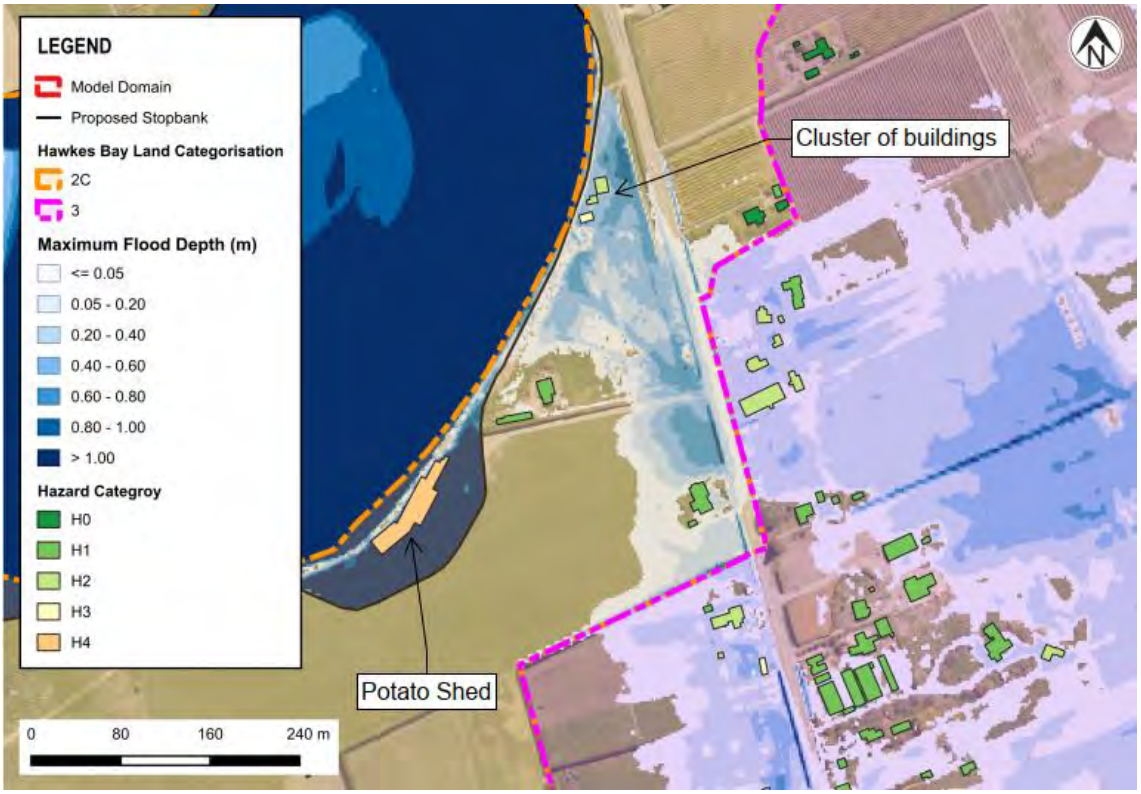


Figure 4.9: Maximum flood depth downstream of the spillway - 200 m^3/s inflow - with buildings and hazard categories overlaid.

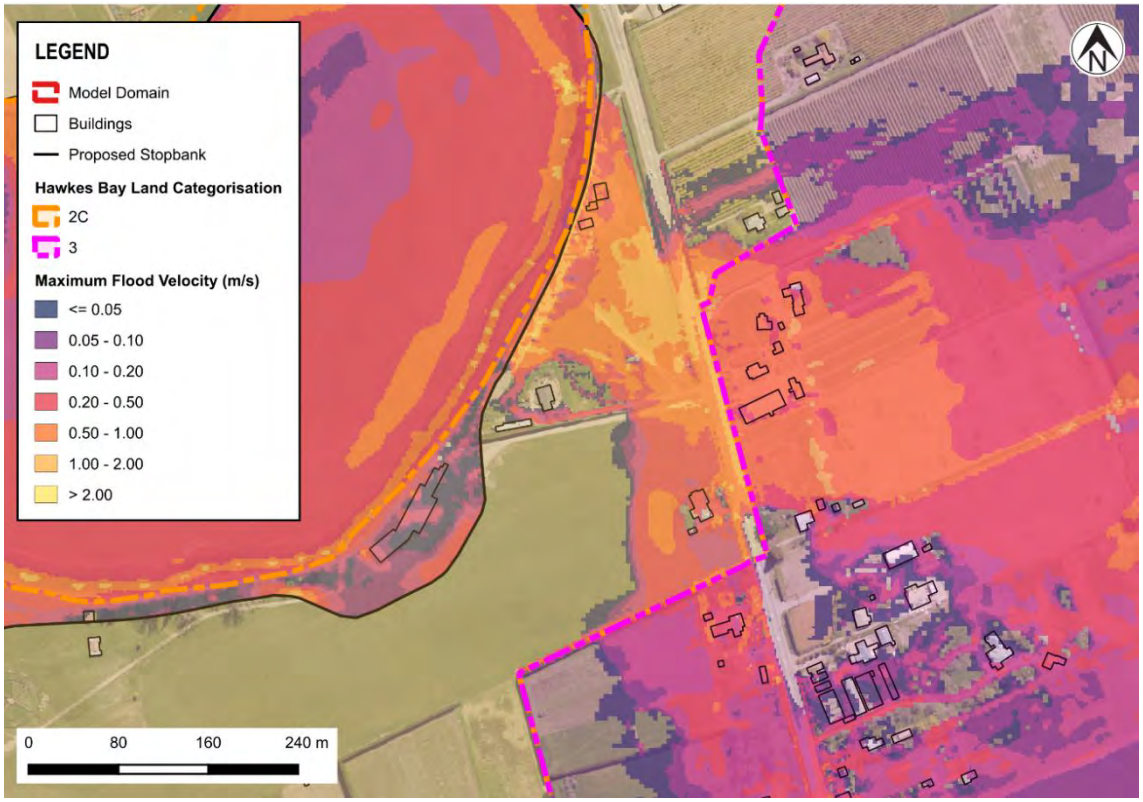


Figure 4.10: Maximum flood velocity downstream of the spillway - 200 m^3/s inflow.

Several buildings in this area have been removed since Cyclone Gabrielle, effectively reducing some of the associated flood risk. While specific building details are unknown, a comparison can be made using the latest aerial imagery from Google Earth, shown in Figure 4.11 below.

It is important that future buildings and/or other significant obstructions are not placed in the flow path downstream of the spillway, including land that is currently assessed as Category 2C and Category 3. Areas of land currently assessed as Category 2C (e.g. as shown at Figure 4.10) may require additional measures/restrictions/recategorisation be implemented to ensure this outcome.

Figure 4.11: Latest aerial imagery downstream of proposed spillway (Google Earth, February 2025).

4.6 Ngaruroro Flood Protection Scheme

The modelling shows that water levels at the inlet of the existing culvert (flap gated) from the Tūtaekurī-Waimate Stream into the Ngaruroro River, increase with the proposed stopbank during flood conditions. This could result in more discharge into the Ngaruroro River compared to the base case scenario, affecting the performance of the Ngaruroro River stopbanks. Based on the scheme review modelling, the water level within the Ngaruroro River is higher than the water level at the culvert inlet for the beginning and peak of the flood event. During this time, the culvert flap gates will be closed preventing water from discharging into the Ngaruroro River at the peak of the event. As such, the performance of the Ngaruroro River stopbanks will not be affected.

5 Evacuation

A high-level assessment of the effects on evacuation routes from the Pakowhai area is provided below.

Under current conditions, potential evacuation routes for people within the Pakowhai area include SH50 and Waiohiki Road bridges over the Tūtaekurī River, SH2 and Pakowhai Road bridges over the Ngaruroro River and SH50 and Omarunui Road to the west.

Flood hazard within the Pakowhai area could materialise if the Ngaruroro and/or Tutaekuri River stopbanks overtop during a large flood event. A flood in the Tūtaekurī-Waimate Stream alone is unlikely to have significant effects on evacuation routes as the peak flows within the stream are relatively low, even during large return period events. HBRC monitors the Ngaruroro and Tūtaekurī Rivers during a flood and can provide warnings prior to the stopbanks overtopping, allowing time for residents to evacuate before water starts to enter the Pakowhai area. A stopbank breach without overtopping would give less warning time, but this would be similar to current conditions. HBRC Civil Defence have been approached for comment on procedural aspects of flood evacuation but due to staff availability, no responses have been provided.

The model indicates that the length of >H3 flood hazard along SH2 will increase with the proposed stopbank near the peak of the flood (see Figure 4.3), which may reduce the ability to evacuate along SH2. The increased flood hazard at SH2 is primarily driven by water volume accumulating to the west of the proposed stopbank, resulting in greater water depth over the road. This depth increase would be observed as water ponding and rising relatively slowly to the east of SH2. The model shows that water does not begin to overtop the road until approximately 18 hours after the start of the event, and it takes another 10 hours to reach its maximum depth. This should provide residents with adequate time to evacuate the area. It is important that HBRC and/or Waka Kotahi and/or civil defence provide the necessary road closures, and any evacuation notices are timely to ensure evacuation routes are not compromised.

Links Road to the SH50 Tūtaekurī bridge is the main evacuation route for people located north of the proposed stopbank. The ability for these people to evacuate will generally improve compared to the base case scenario because the stopbank contains more water in the area to the south. This reduces the number of locations where water flows over Links Road and SH50 compared to the base case, resulting in improved egress.

Pakowhai Road is the main evacuation route for people located east of the proposed stopbank. The warning time and ability for these people to evacuate will generally improve compared to the base case scenario because the stopbank contains more water in the area to the west. During overdesign events, the proposed stopbank spillway will convey flow into the Land Category 3 area at a defined location. This reduces the number of locations where water flows over Pakowhai Road compared to the base case, resulting in improved egress.

Table 5.1: Evacuation route effects

Area	Evacuation route	Effect on route due to proposed stopbank
South and west of proposed stopbank	North or south along SH50/SH2 over Tūtaekurī and/or Ngaruroro River bridges.	Reduced - increased water depths over SH2 at the peak of the event.
East of proposed stopbank, south of spillway	South along Pakowhai Road to Pakowhai Road Ngaruroro River bridge.	Improved – longer warning time
North/east of proposed stopbank, north of spillway	Links Road, Pakowhai Road to SH50 Tūtaekurī River bridge.	Improved – reduced flood depths + longer warning time.

6 Sensitivity analysis

6.1 Ngaruroro and Tūtaekurī River inflow event

A sensitivity analysis was undertaken to assess potential changes to flooding in response to different model inflow locations. The model was run with the 200 m^3/s flow split between two locations: the Ngaruroro River overflow boundary condition, and a second boundary condition near the new Waiohiki stopbank to represent an overflow from the Tūtaekurī River. The boundary condition location for the sensitivity analysis is shown in Figure 6.1.

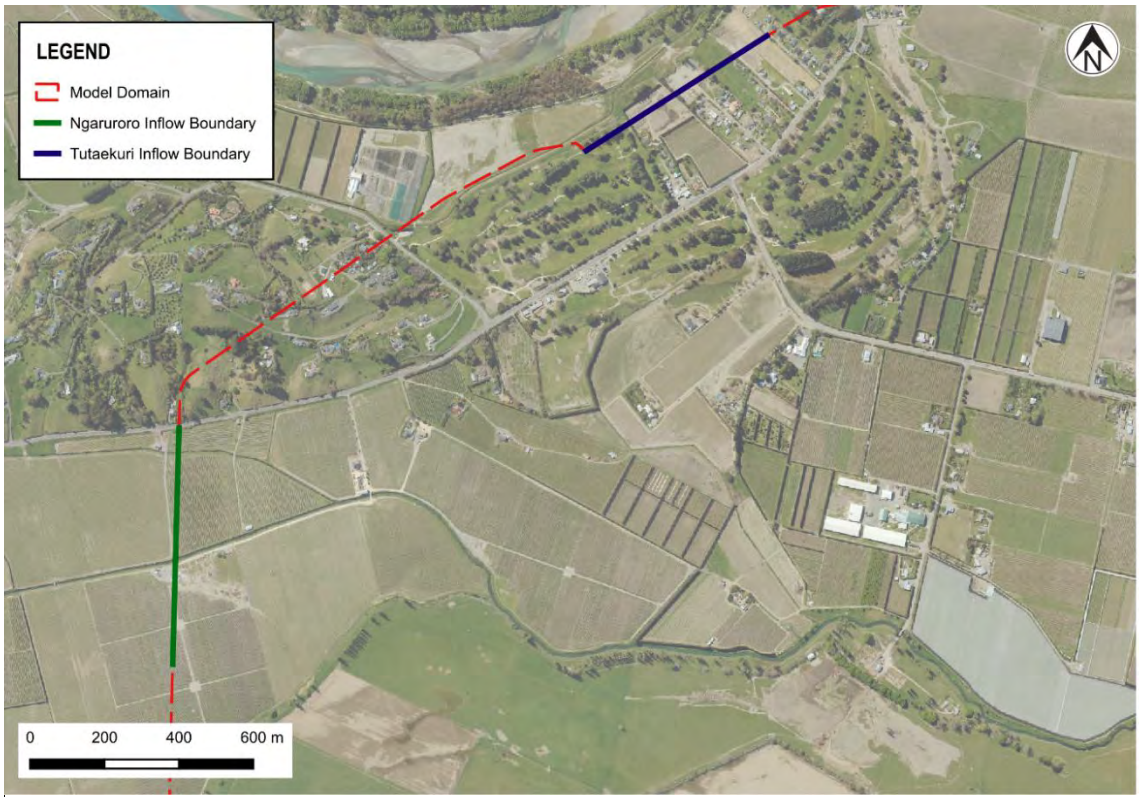


Figure 6.1: Inflow boundary conditions in the Pakowhai model representing overflows from the Ngaruroro and Tūtaekurī Rivers.

The sensitivity scenario was run with 150 m^3/s applied to the Ngaruroro overflow inflow boundary, and 50 m^3/s applied to the Tūtaekurī overflow inflow boundary. This could represent a scenario in which the Ngaruroro Rover stopbank at Omahu/Fernhill and the Waiohiki stopbank overtop. Flood extents of the 200 m^3/s stopbank scenarios under both inflow conditions are presented in Figure 6.2 below.

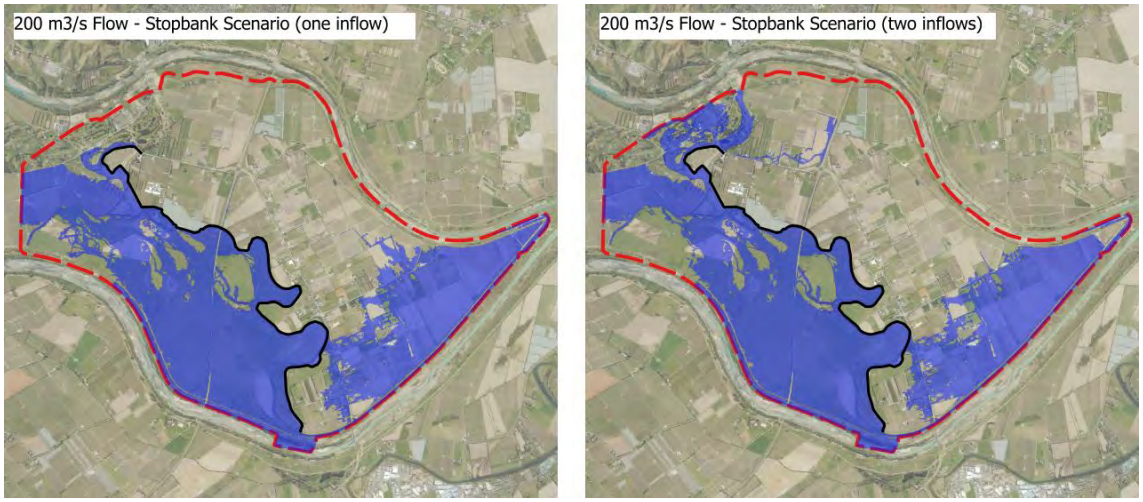


Figure 6.2: Difference in flood extents between the stopbank scenarios (one inflow vs. two inflows)

The largest difference in flood depths occurs at the northern area of the stopbank, where the flood levels in the two scenarios differ by 200 to 300 mm. Following the flow downstream, the flood levels gradually converge, reaching the same elevation approximately 250 metres upstream of the Franklin Road bridge. The stopbank crest will be designed with a target freeboard of 500 mm which accommodates the flood level differences identified in the sensitivity analysis. Note that the upstream end of the stopbank at Links Rd, is constrained by existing topography and the outflanking noted in Figure 5.2 is unlikely to be addressed without raising of Links Rd (which is beyond the project scope).

Maximum estimates of flood depth, velocity and hazard maps for the base and stopbank scenario with two inflows (combined 200 m^3/s) are found in Appendix D.

6.2 Overdesign event

A sensitivity analysis was undertaken to assess potential changes to flooding in response to an overdesign event. The overdesign event was run with 300 m^3/s flow through the singular boundary condition representing the Ngaruroro River overflow. This scenario was run with the same stopbank glasswall configuration as the previous model runs. Figure 6.3 below shows the maximum flood depth difference between the base and stopbank scenario, with an inflow of 300 m^3/s.

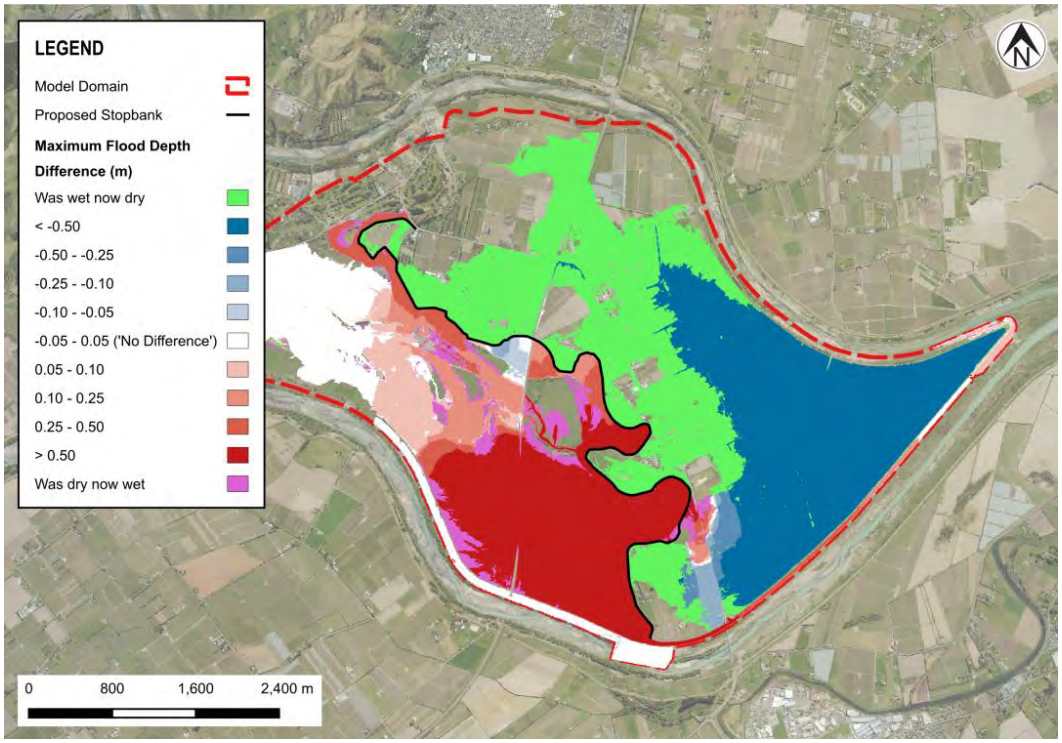


Figure 6.3: Maximum flood depth difference – base scenario vs stopbank scenario (300 m^3/s inflow).

The 300 m^3/s scenario shows a similar pattern to the 200 m^3/s scenario, with flood depths generally increasing in the southwest area of the domain and decreasing significantly in the northeast, landward to the proposed stopbank. Flood depths increase by approximately 0.6 to 0.7 metres downstream of SH2, while a reduction of around 1.1 metres is observed in the eastern corner of the model domain.

Comparing the two stopbank scenarios with both 200 m^3/s and 300 m^3/s flows, the modelled flood levels in the stream rise by approximately 100 to 300 mm. These differences are most pronounced at the upstream and downstream ends of the stream, with the central section showing smaller differences due to increased conveyance capacity. The Pakowhai stopbank is designed to be 500 mm above the 200 m^3/s flood level, providing sufficient freeboard to accommodate the 100 to 300 mm increase observed in the overdesign event. The freeboard adjacent to the spillway and the downstream/southern extent of the stopbank will be increased to 900 mm.

Additional flow will discharge over the spillway in the 300 m^3/s flow event to approximately 120 m^3/s compared to the 200 m^3/s event (approximately 40 m^3/s). It is important to note that the assessment described in this report assumes that the spillway remains intact. Flow over the spillway in excess of what the spillway is designed for may result in damage to the spillway and additional flow past the stopbank at that location. In this instance, flooding beyond the stopbank may be considerably more adverse than the estimates illustrated in this report.

Maximum estimates of flood depth, velocity and hazard maps for the base and stopbank scenario with a flow of 300 m^3/s are found in Appendix D.

7 Local catchment event

A sensitivity analysis was undertaken to assess potential changes to flooding in response to a smaller local catchment flood event. A scenario was modelled to simulate a 100-year flood in the Tūtaekurī-Waimate Stream, with no overflow from the Ngaruroro or Tūtaekurī Rivers. The peak flow in the

stream during a 100-year event is approximately 30 m^3/s, which was inputted into the Pakowhai model with the hydrograph presented in Section 2.3 above.

As shown in the maximum flood depth difference map in Figure 7.1, there are a several areas of overtopping in the base scenario that do not overtop in the stopbank scenario. While flood levels in the stream increase by up to 200 mm from implementing the proposed stopbank, this does not cause in any additional adverse effects. i.e. the stopbank effectively mitigates overtopping without creating significant new flood risks.

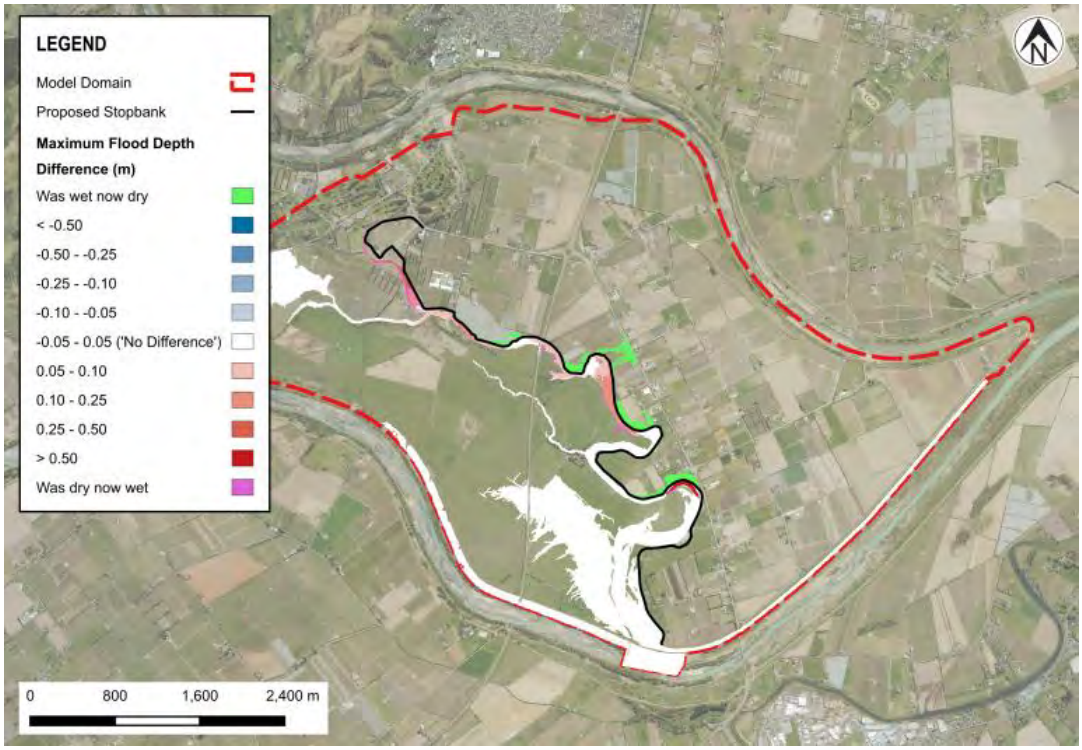


Figure 7.1: Maximum flood depth difference between base and stopbank scenario - 30 m^3/s inflow

Maximum estimates of flood depth, velocity and hazard maps for the base and stopbank scenario with a flow of 30 m^3/s are found in Appendix E.

8 Conclusions

HBRC have engaged T+T to assess the flood effects for the proposed Pakowhai Secondary Stopbank. The stopbank design currently provides protection against a 200 m^3/s flow and 500 mm of freeboard, with an allowance for some overtopping of the spillway.

Flood effects assessments have been undertaken using the Pakowhai hydraulic model, for scenarios both with and without the proposed stopbank, to evaluate changes in flood depth, velocity and hazard across the surrounding area in a 200 m^3/s flow scenario. The model results indicate that the flood effects increase to the west of the stopbank, particularly along SH2 and within the adjacent horticultural land, while flood effects decrease to the north and east of the stopbank, where the stopbank effectively blocks and redirects floodwaters. The model also shows a significant reduction in the number of building footprints affected by flooding in the stopbank scenario. However, there are some buildings and infrastructure west of the stopbank that experiences more severe flood impacts.

An overdesign event was modelled, and the model results indicate that the 500 mm freeboard that is to be applied to the 200 m^3/s flood level for the design stopbank crest will be able to accommodate for a 300 m^3/s event. Additional flow will discharge over the spillway in this event.

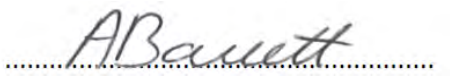
It is important that the flowpath downstream of the spillway remains free of obstructions.

9 Applicability

This report has been prepared for the exclusive use of our client Hawke's Bay Regional Council, with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose, or by any person other than our client, without our prior written agreement.

Tonkin & Taylor Ltd
Environmental and Engineering Consultants

Report prepared by:



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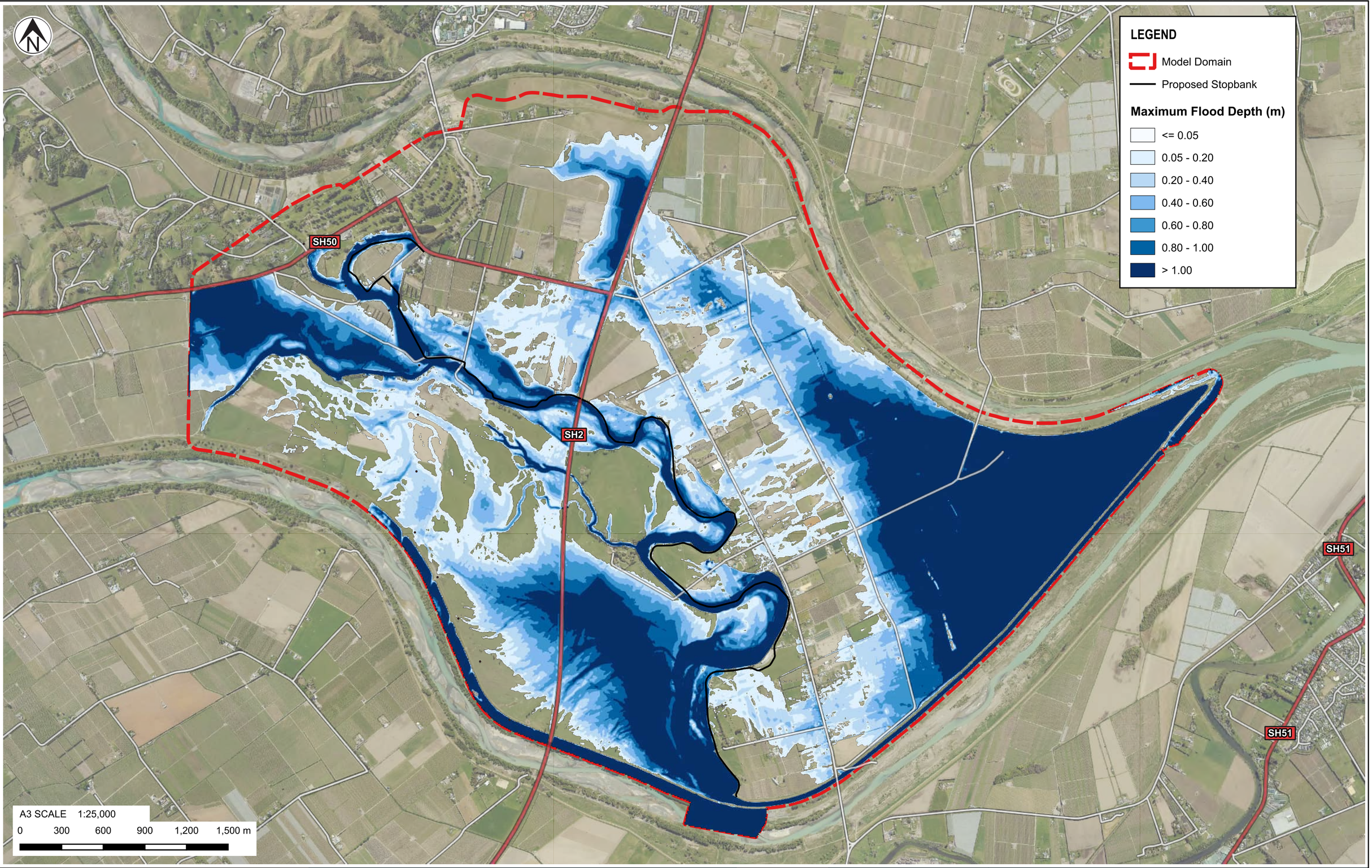
Appendix A Flood maps – 200 m^3/s (design)



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NOTES:
To be read in conjunction with "Consequential Flood Effects - Pakowhai Stopbank" report dated August 2025.

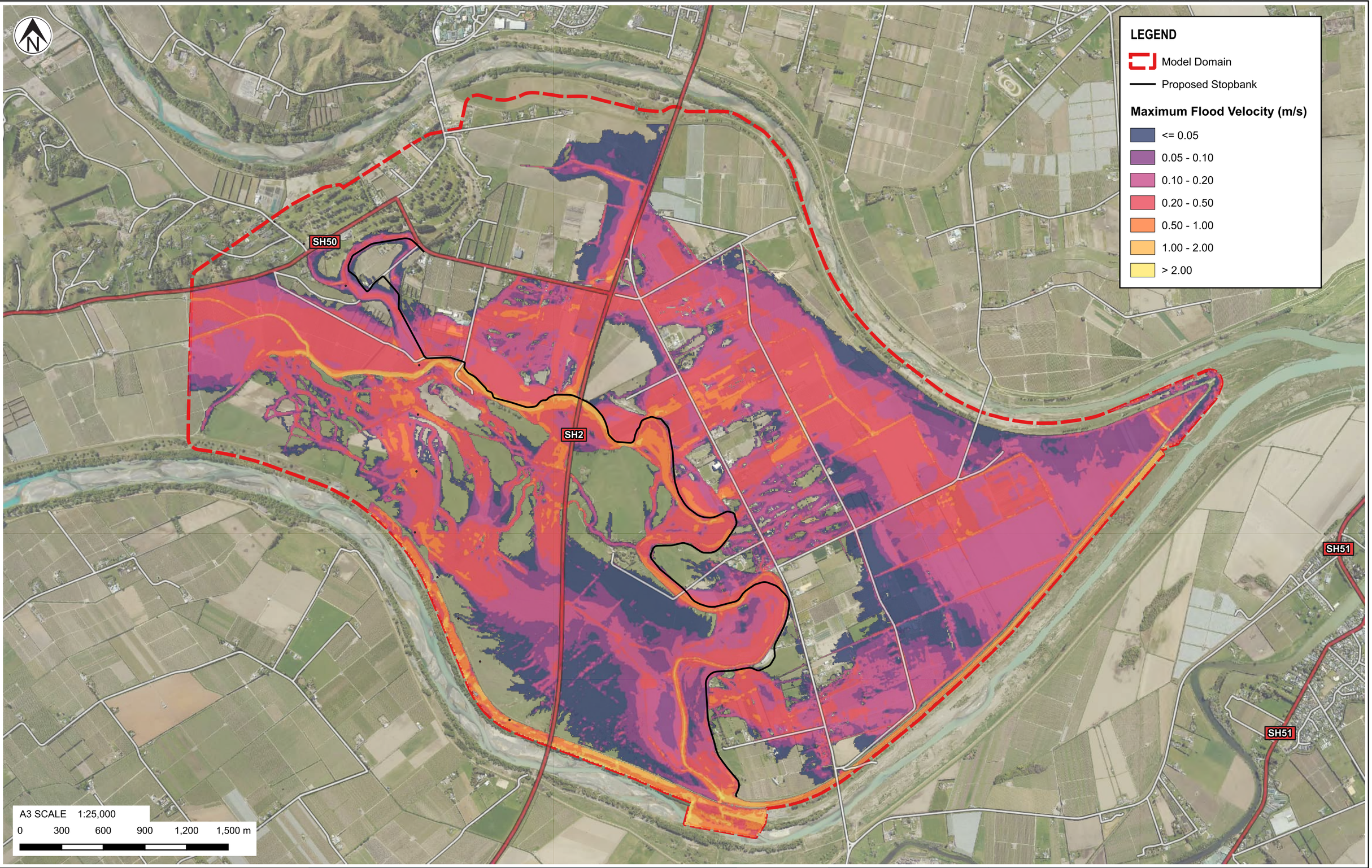
REV	DESCRIPTION	GIS	CHK	DATE
0	First version			AUG.25

LOCATION PLAN

PROJECT No.	1017353.2403	
DESIGNED	LEBA	AUG.25
DRAWN	LEBA	AUG.25
CHECKED		
APPROVED		DATE

CLIENT **HAWKE'S BAY REGIONAL COUNCIL**
PROJECT **PAKOWHAI STOPBANK**
TITLE DESIGN EVENT (BASE) - 200 M3/S MAXIMUM FLOOD DEPTH
SCALE (A3) 1:25,000 FIG No. FIGURE A1. REV 0

T:\Auckland\Archive\WaterModels\3_WORKING\1017353.2403_Pakowhai\Pakowhai_TUFLOW\2_models\model_v1\QGIS_Working_LEBA.qgz Layout: Auguest A3 Appendix Template Drawn by LEBA



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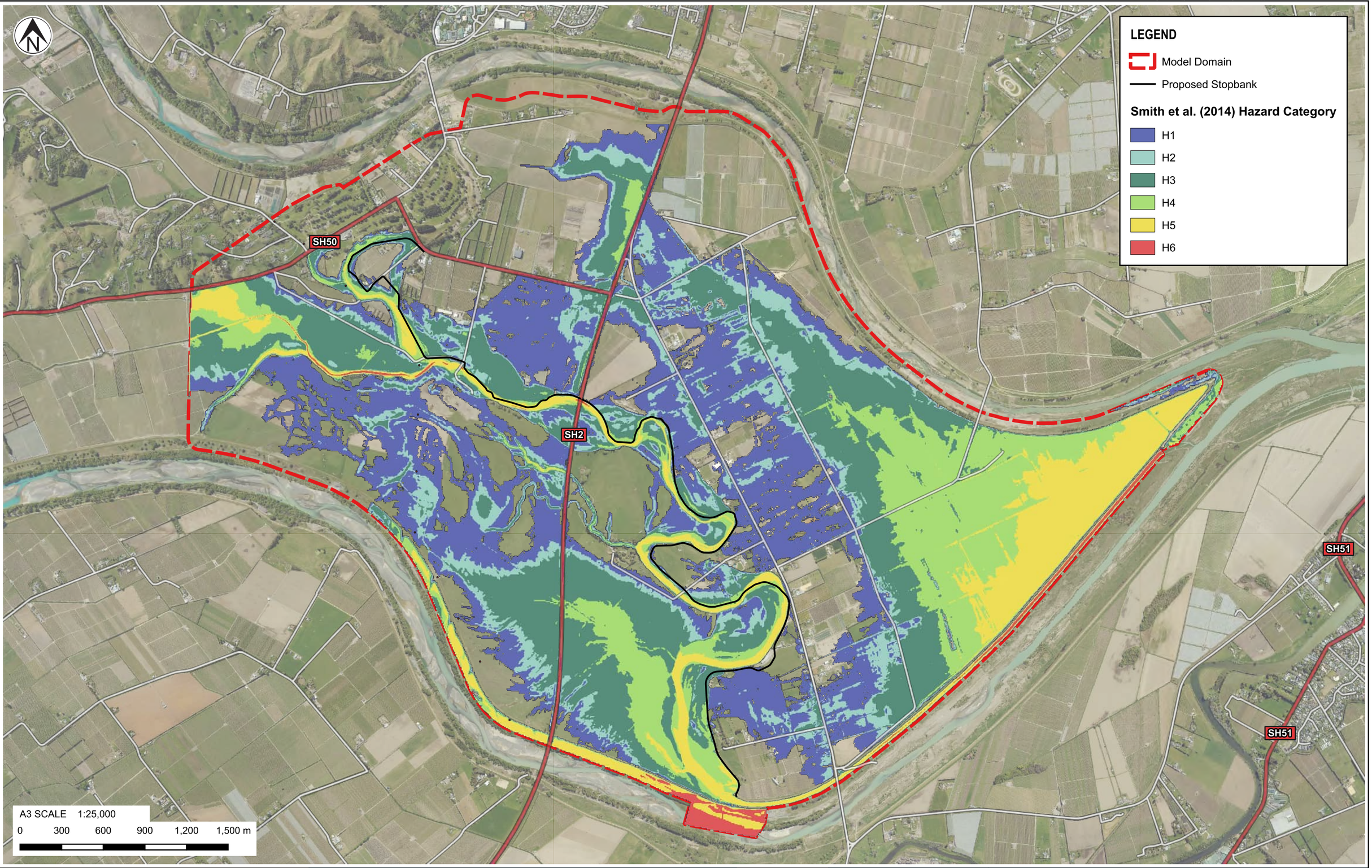
REV	DESCRIPTION	GIS	CHK	DATE
0	First version			AUG.25

LOCATION PLAN

			APPROVED	DATE
PROJECT No.	1017353.2403			
DESIGNED	LEBA	AUG.25		
DRAWN	LEBA	AUG.25		
CHECKED				

CLIENT **HAWKE'S BAY REGIONAL COUNCIL**
PROJECT **PAKOWHAI STOPBANK**
TITLE DESIGN EVENT (BASE) - 200 M3/S
MAXIMUM FLOOD VELOCITY
SCALE (A3) 1:25,000 FIG No. FIGURE A2. REV 0

T:\Auckland\Archive\WaterModels\3_WORKING\1017353.2403_Pakowhai\Pakowhai_TUFLOW\2_models\model_v1\QGIS_Working_LEBA.qgz Layout: Auguest A3 Appendix Template Drawn by LEBA



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REV	DESCRIPTION	GIS	CHK	DATE
0	First version			AUG.25

LOCATION PLAN

PROJECT No.	1017353.2403		
DESIGNED	LEBA	AUG.25	
DRAWN	LEBA	AUG.25	
CHECKED			
APPROVED		DATE	

CLIENT **HAWKE'S BAY REGIONAL COUNCIL**

PROJECT **PAKOWHAI STOPBANK**

TITLE DESIGN EVENT (BASE) - 200 M3/S MAXIMUM FLOOD HAZARD

SCALE (A3) 1:25,000 FIG No. FIGURE A3. REV 0

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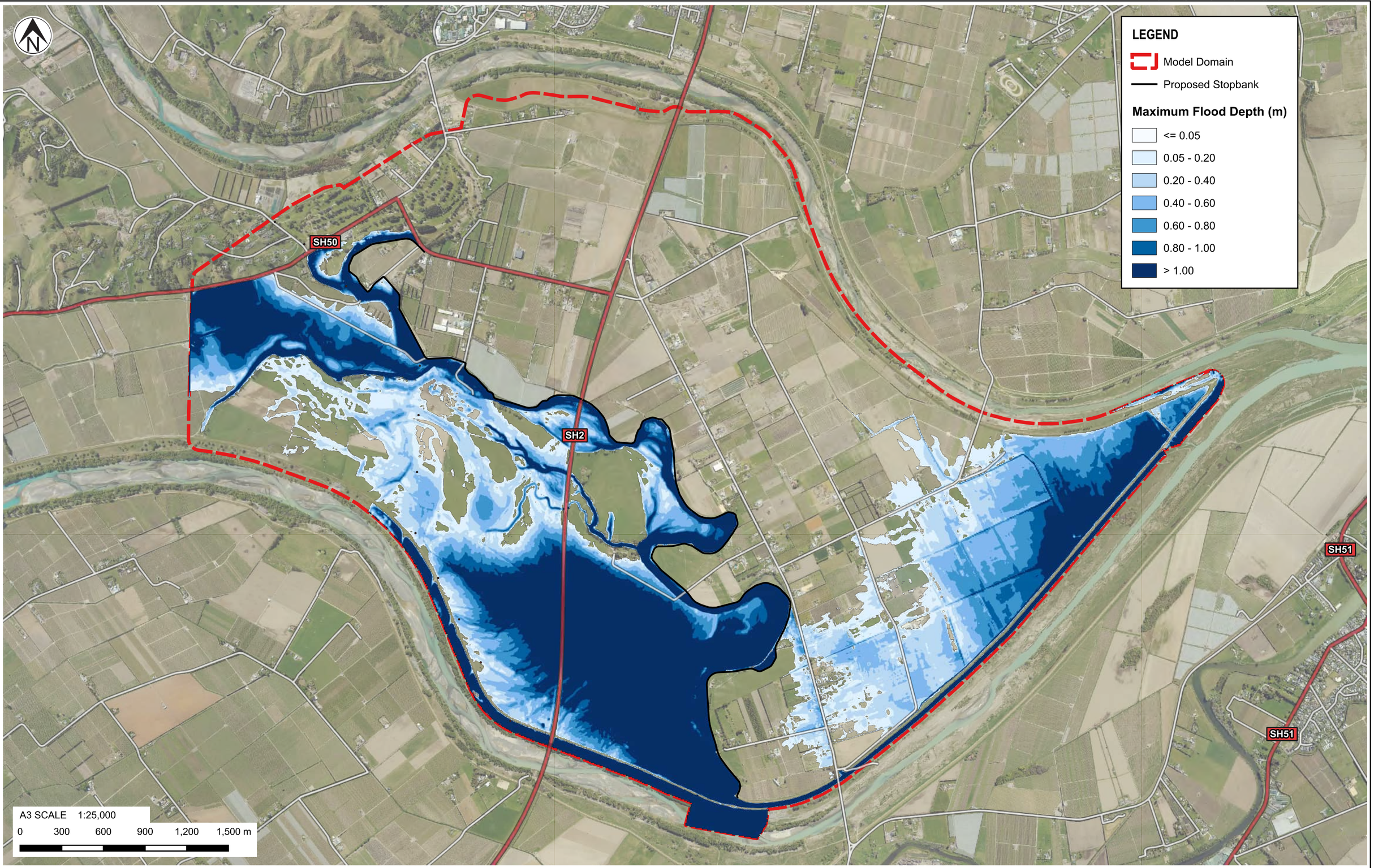

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To be read in conjunction with "Consequential Flood Effects - Pakowhai Stopbank" report dated August 2025.

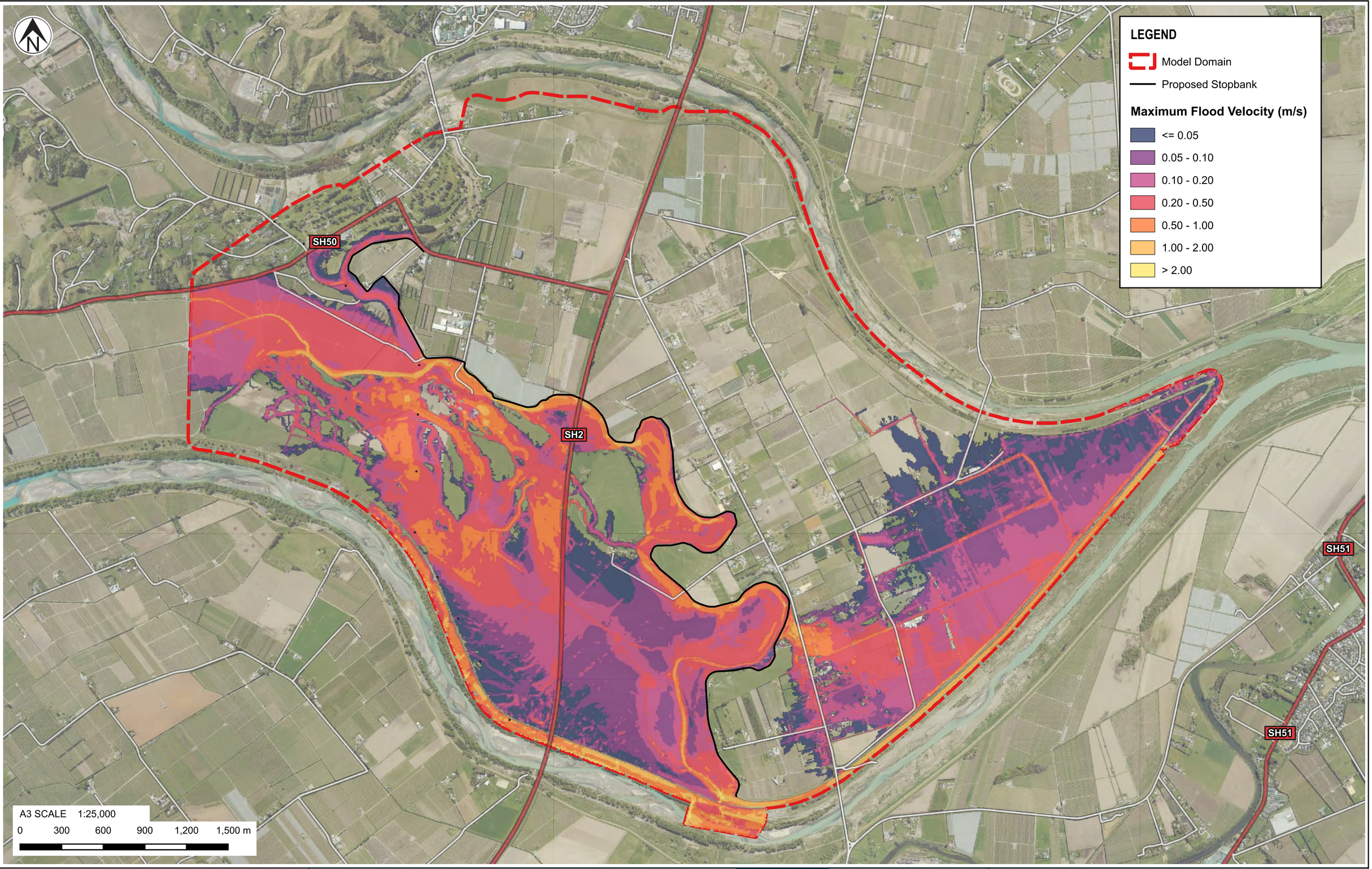
REV	DESCRIPTION	GIS	CHK	DATE
0	First version			AUG.25

LOCATION PLAN

PROJECT No.	1017353.2403		
DESIGNED	LEBA	AUG.25	
DRAWN	LEBA	AUG.25	
CHECKED			
APPROVED		DATE	

CLIENT **HAWKE'S BAY REGIONAL COUNCIL**
PROJECT **PAKOWHAI STOPBANK**
TITLE DESIGN EVENT (STOPBANK) - 200 M3/S MAXIMUM FLOOD DEPTH
SCALE (A3) 1:25,000 FIG No. FIGURE A4. REV 0

T:\Auckland\Archive\WaterModels\3_WORKING\1017353.2403_Pakowhai\Pakowhai_TUFLOW\2_models\model_v1\QGIS_Working_LEBA.qgz Layout: Auguest A3 Appendix Template Drawn by LEBA



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NOTES:
To be read in conjunction with "Consequential Flood Effects - Pakowhai Stopbank" report dated August 2025.

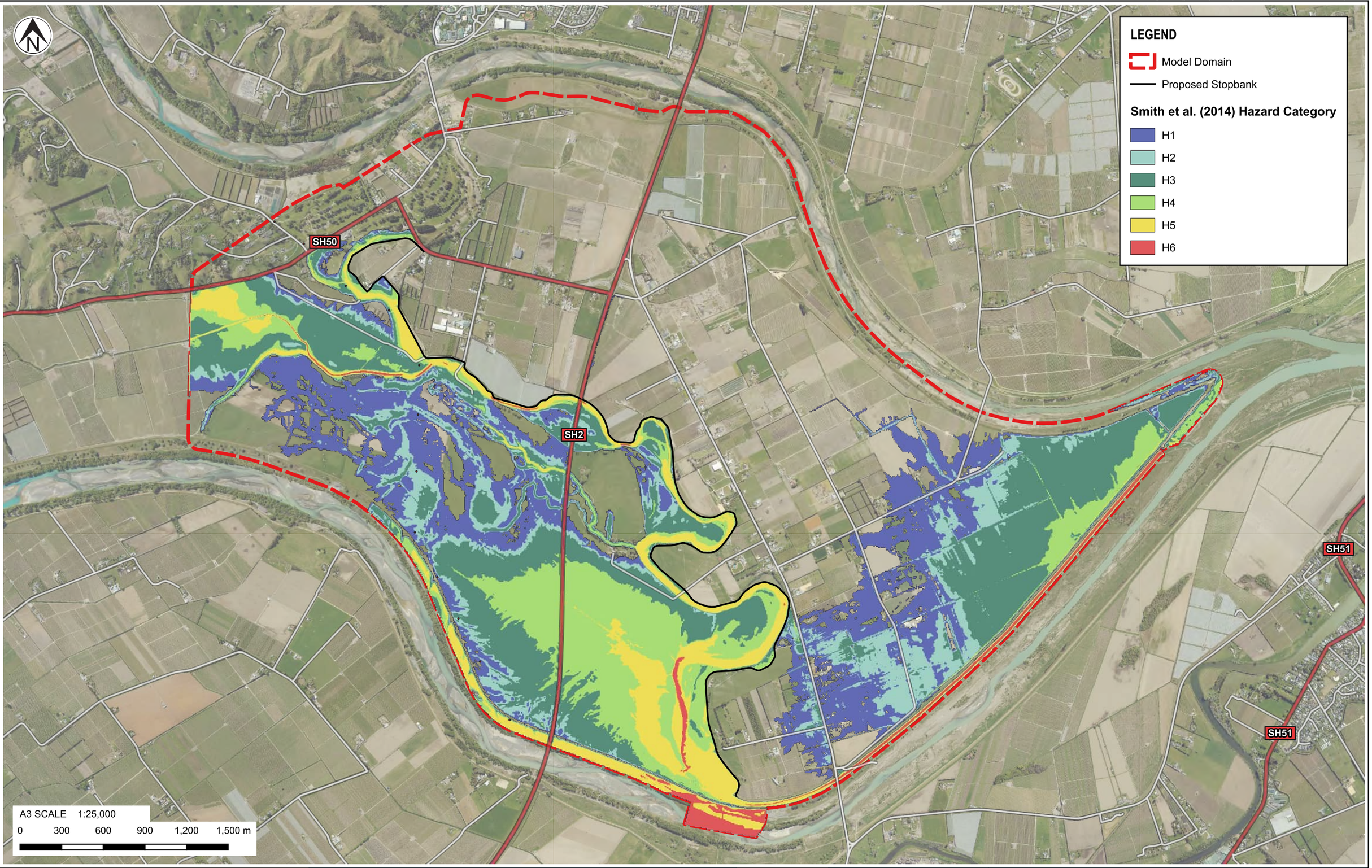
REV	DESCRIPTION	GIS	CHK	DATE
0	First version			AUG.25

LOCATION PLAN

PROJECT No.	1017353.2403		
DESIGNED	LEBA	AUG.25	
DRAWN	LEBA	AUG.25	
CHECKED			
APPROVED		DATE	

CLIENT **HAWKE'S BAY REGIONAL COUNCIL**
PROJECT **PAKOWHAI STOPBANK**
TITLE DESIGN EVENT (STOPBANK) - 200 M3/S MAXIMUM FLOOD VELOCITY
SCALE (A3) 1:25,000 FIG No. FIGURE A5. REV 0

T:\Auckland\Archive\WaterModels\3_WORKING\1017353.2403_Pakowhai\Pakowhai_TUFLOW\2_models\model_v1\QGIS_Working_LEBA.qgz Layout: Auguest A3 Appendix Template Drawn by LEBA



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REV	DESCRIPTION	GIS	CHK	DATE
0	First version			AUG.25

LOCATION PLAN

PROJECT No.	1017353.2403	
DESIGNED	LEBA	AUG.25
DRAWN	LEBA	AUG.25
CHECKED		
APPROVED		DATE

CLIENT **HAWKE'S BAY REGIONAL COUNCIL**

PROJECT **PAKOWHAI STOPBANK**

TITLE DESIGN EVENT (STOPBANK) - 200 M3/S MAXIMUM FLOOD HAZARD

SCALE (A3) 1:25,000 FIG No. FIGURE A6. REV 0

Appendix B Buildings affected

Building ID	Legal Description	Depth Difference	Velocity Difference	Base Hazard	Stopbank Hazard
1749719	Part Puninga 4A3 Block	-1.32	-0.01	5	4
1749720	Part Puninga 4A3 Block	-1.29	0.05	5	4
4991415	Lot 1 DP 15447, Lot 1 DP 16826, Lot 2 DP 15447, Lot 2 DP 16826, Lot 2 DP 28433	-1.33	0.01	5	3
5008402	Lot 1 DP 16776, Lot 1 DP 21289	0.01	0.00	4	4
5008388	Lot 1 DP 16776, Lot 1 DP 21289	0.01	0.00	4	4
1749353	Lot 1 DP 16776, Lot 1 DP 21289	0.01	0.00	4	4
1749713	Lot 1 DP 15447, Lot 1 DP 16826, Lot 2 DP 15447, Lot 2 DP 16826, Lot 2 DP 28433	-1.34	-0.04	4	3
1749711	Lot 1 DP 15447, Lot 1 DP 16826, Lot 2 DP 15447, Lot 2 DP 16826, Lot 2 DP 28433	-1.34	-0.02	4	3
1749708	Lot 1 DP 15447, Lot 1 DP 16826, Lot 2 DP 15447, Lot 2 DP 16826, Lot 2 DP 28433	-1.33	-0.05	4	2
1749610	Lot 1 DP 28433	-1.34	-0.47	4	2
1749712	Lot 1 DP 15447, Lot 1 DP 16826, Lot 2 DP 15447, Lot 2 DP 16826, Lot 2 DP 28433	-1.28	-0.05	4	1
1749632	Lot 1 DEEDS 908, Lot 2 DP 344659, Lot 2 DP 369218, Lot 2 DP 409048, Lot 3 DP 21852, Lot 3 DP 316123, Lot 4 DP 316123, Lot 5 DP 21852, Lot 6 DP 21852	-1.14	0.15	4	2
4991417	Section 11 Block XII Heretaunga SD	-1.32	-0.08	4	1
1749630	Lot 1 DEEDS 908, Lot 2 DP 344659, Lot 2 DP 369218, Lot 2 DP 409048, Lot 3 DP 21852, Lot 3 DP 316123, Lot 4 DP 316123, Lot 5 DP 21852, Lot 6 DP 21852	-1.20	0.25	4	1
1749611	Lot 1 DP 28433	-1.34	-0.37	4	1
5008217	Lot 1 DP 28433	-1.34	-0.39	4	1
1749710	Section 11 Block XII Heretaunga SD	-1.33	-0.06	4	1
1749714	Lot 3 DP 11710, Lot 4 DP 11710	-1.30	-0.18	4	1
1749306	Lot 1 DP 28433	-1.33	-0.50	4	1
5008215	Lot 1 DP 28433	-1.34	-0.34	4	1

	Lot 1 DEEDS 908, Lot 2 DP 344659, Lot 2 DP 369218, Lot 2 DP 409048, Lot 3 DP 21852, Lot 3 DP 316123, Lot 4 DP				
4991676	316123, Lot 5 DP 21852, Lot 6 DP 21852	-1.03	0.23	4	1
5008216	Lot 1 DP 28433	-1.33	-0.43	4	1
1750040	Lot 1 DP 316123	-1.31	-0.24	4	1
1749284	Lot 1 DP 488023	-1.27	-0.06	4	1
	Lot 1 DEEDS 908, Lot 2 DP 344659, Lot 2 DP 369218, Lot 2 DP 409048, Lot 3 DP 21852, Lot 3 DP 316123, Lot 4 DP				
1749631	316123, Lot 5 DP 21852, Lot 6 DP 21852	-1.19	0.15	4	1
4991414	Lot 2 DP 488023	-1.29	-0.07	4	1
1750041	Lot 1 DP 316123	-1.31	-0.28	4	1
5008406	Lot 1 DP 488023	-1.29	-0.40	4	1
1750035	Lot 2 DP 316123	-1.21	-0.22	4	1
1750045	Lot 1 DP 488023	-1.30	-0.20	4	1
1750044	Lot 2 DP 316123	-1.27	-0.22	4	1
1749602	Lot 1 DP 18326	-1.22	-0.35	4	1
5008404	Part Lot 3 DP 18326	-1.24	-0.30	4	1
1750048	Lot 1 DP 488023	-1.31	-0.10	4	1
1749259		-1.48	-0.47	4	0
1748963	Lot 1 DP 12012	-1.30	-0.78	4	0
4991673	Lot 2 DP 316123	-1.26	-0.25	4	0
5008403	Part Lot 3 DP 18326	-1.25	-0.31	4	0
1747540	Lot 2 DP 543135, Lot 3 DP 543135, Lot 4 DP 543135	0.61	0.03	3	4
1854778	Lot 2 DP 16843	0.34	0.01	3	4
1749438	Lot 1 DP 16776, Lot 1 DP 21289	0.00	0.00	3	3
1748993	Lot 2 DP 543135, Lot 3 DP 543135, Lot 4 DP 543135	0.44	0.22	3	4
1749363	Lot 2 DP 21295	0.00	0.00	3	3
1749363	Lot 2 DP 21295	0.00	0.00	3	3
4991419	Lot 1 DP 22965, Lot 2 DP 2721, Section 2 SO 9891	0.10	-0.05	3	3
1748990		0.29	0.03	3	3
1749437	Lot 2 DP 21295	0.01	0.00	3	3

1749437	Lot 2 DP 21295	0.01	0.00	3	3
1748985	Lot 1 DP 22965, Lot 2 DP 2721, Section 2 SO 9891	0.12	-0.05	3	3
1748234		-0.07	-0.04	3	3
1747235	Lot 1 DP 7850	-0.06	0.17	3	3
1748202	Lot 1 DP 4867	-0.08	0.19	3	2
1747234	Lot 1 DP 7850	-0.06	0.07	3	2
1748217	Lot 1 DP 367490	-0.36	0.12	3	2
1748218		-0.40	0.06	3	2
1748206	Lot 1 DP 326953	-0.12	0.08	3	2
1748036	Lot 1 DP 326953	-0.12	0.09	3	2
1748219	Lot 1 DP 344659	-0.41	-0.03	3	2
1748220		-0.41	0.04	3	2
1748213		-0.28	0.28	3	1
1748212	Lot 1 DP 409048	-0.45	0.29	3	1
1749629	Lot 1 DEEDS 908, Lot 2 DP 344659, Lot 2 DP 369218, Lot 2 DP 409048, Lot 3 DP 21852, Lot 3 DP 316123, Lot 4 DP 316123, Lot 5 DP 21852, Lot 6 DP 21852	-1.00	0.24	3	1
1749626	Lot 2 DP 18562, Lot 2 DP 329407, Lot 2 DP 532547	-0.39	0.07	3	1
4991675	Lot 1 DP 409048	-0.57	0.49	3	1
1750037	Part Lot 3 DP 18326	-1.07	-0.37	3	0
1748901	Lot 2 DP 16843	-1.06	-0.11	3	0
1750033	Lot 5 DP 9597, Lot 7 DP 9597	-0.97	-0.08	3	0
1750030	Lot 5 DP 9597, Lot 7 DP 9597	-0.95	-0.06	3	0
1749601	Lot 1 DP 18326	-0.94	-0.46	3	0
1750032	Lot 5 DP 9597, Lot 7 DP 9597	-0.81	-0.34	3	0
1748898	Lot 1 DP 12012	-0.80	-0.41	3	0
1748955	Lot 1 DP 12012	-0.75	-0.36	3	0
1750031	Lot 5 DP 9597, Lot 7 DP 9597	-0.74	-0.08	3	0
1749293	Lot 2 DP 27865	-0.72	-0.26	3	0
4991492	Lot 1 DP 26971	-0.71	-0.36	3	0
1748986	Lot 2 DP 12012, Section 1 SO 9891	-0.71	-0.19	3	0

1749597	Lot 1 DP 16859, Lot 2 DP 16859	-0.69	-0.48	3	0
4991292	Part Lot 1 DP 15963, Part Section 1 SO 10777	-0.68	-0.23	3	0
1854767	Lot 1 DP 20523	-0.66	-0.14	3	0
5008422		-0.65	-0.32	3	0
1854772	Lot 1 DP 20523	-0.65	-0.33	3	0
1748938	Part Lot 1 DP 15963, Part Section 1 SO 10777	-0.64	-0.32	3	0
4991495	Lot 1 DP 26971	-0.63	-0.40	3	0
1854770	Lot 1 DP 20523	-0.63	-0.19	3	0
1749014	Lot 2 DP 27865	-0.63	-0.27	3	0
	Lot 1 DP 12546, Lot 2 DP 309041, Section 15 Block XI				
1748977	Heretaunga SD	-0.62	-0.34	3	0
4991494	Lot 1 DP 26971	-0.62	-0.45	3	0
1748937	Part Lot 1 DP 15963, Part Section 1 SO 10777	-0.61	-0.21	3	0
4991296	Part Lot 1 DP 15963, Part Section 1 SO 10777	-0.60	-0.31	3	0
1748940	Part Lot 1 DP 15963, Part Section 1 SO 10777	-0.60	-0.28	3	0
1748987	Lot 2 DP 12012, Section 1 SO 9891	-0.60	-0.21	3	0
5008419		-0.60	-0.34	3	0
1748943	Part Lot 1 DP 15963, Part Section 1 SO 10777	-0.59	-0.33	3	0
1748964	Lot 1 DP 12012	-0.59	-0.53	3	0
1748941	Part Lot 1 DP 15963, Part Section 1 SO 10777	-0.58	-0.27	3	0
1748942	Part Lot 1 DP 15963, Part Section 1 SO 10777	-0.58	-0.30	3	0
1748939	Part Lot 1 DP 15963, Part Section 1 SO 10777	-0.55	-0.29	3	0
1749458	Lot 2 DP 354017	-0.55	-0.42	3	0
1749596	Lot 1 DP 16859, Lot 2 DP 16859	-0.54	-0.50	3	0
1749505	Lot 1 DP 12698	-0.52	-0.39	3	0
1748945	Part Lot 1 DP 15963, Part Section 1 SO 10777	-0.52	-0.29	3	0
1749598	Lot 1 DP 16859, Lot 2 DP 16859	-0.50	-0.38	3	0
1854768	Lot 1 DP 20523	-0.48	-0.34	3	0
1748994	Lot 2 DP 543135, Lot 3 DP 543135, Lot 4 DP 543135	0.41	0.10	2	3
1748982	Lot 1 DP 22965, Lot 2 DP 2721, Section 2 SO 9891	0.12	-0.10	2	3
4991418	Lot 1 DP 22965, Lot 2 DP 2721, Section 2 SO 9891	0.11	-0.10	2	3

1748983	Lot 1 DP 22965, Lot 2 DP 2721, Section 2 SO 9891	0.13	-0.11	2	3
1749003	Lot 2 DP 543135, Lot 3 DP 543135, Lot 4 DP 543135	0.19	0.01	2	2
1748245	Lot 1 DP 450556	-0.06	0.20	2	2
1748232	Lot 3 DEEDS 632, Part Lot 2 DEEDS 632	-0.07	0.00	2	2
1748243	Lot 1 DP 450556	-0.07	0.15	2	2
1748201	Lot 1 DP 4867	-0.06	0.44	2	2
1747209	Lot 1 DP 4867	-0.06	0.39	2	2
5008099	Lot 2 DP 7850	-0.06	0.13	2	2
1854100	Lot 2 DP 28285	0.10	0.02	2	2
1747230	Lot 6 DEEDS 632	0.09	0.13	2	2
1748244	Lot 1 DP 450556	-0.06	0.07	2	2
1748233	Lot 3 DEEDS 632, Part Lot 2 DEEDS 632	-0.07	-0.03	2	2
1747915	Lot 3 DEEDS 632, Part Lot 2 DEEDS 632	-0.06	-0.07	2	2
1747746	Lot 3 DEEDS 841	-0.10	0.08	2	2
1748205	Lot 2 DP 326953	-0.12	0.33	2	2
1747920	Lot 2 DP 7850	-0.06	-0.02	2	1
1747918	Lot 2 DP 7850	-0.06	0.06	2	1
5008095	Lot 3 DEEDS 632, Part Lot 2 DEEDS 632	-0.07	-0.04	2	1
1748229	Part Lot 1 DP 7343	-0.07	-0.10	2	1
1749616	Lot 4 DEEDS 493	-0.13	0.05	2	1
1747909	Lot 3 DEEDS 632, Part Lot 2 DEEDS 632	-0.07	-0.05	2	1
1747914	Lot 3 DEEDS 632, Part Lot 2 DEEDS 632	-0.06	-0.04	2	1
1748235	Lot 3 DEEDS 632, Part Lot 2 DEEDS 632	-0.05	-0.06	2	1
1748204	Lot 2 DP 326953	-0.11	0.26	2	1
1748203	Lot 2 DP 326953	-0.12	0.38	2	1
1747908	Lot 3 DEEDS 632, Part Lot 2 DEEDS 632	-0.07	-0.03	2	1
1748228	Part Lot 1 DP 7343	-0.07	-0.07	2	1
1747913	Lot 3 DEEDS 632, Part Lot 2 DEEDS 632	-0.07	-0.05	2	1
5008265	Lot 16 DEEDS 493	-0.03	0.10	2	1
1747924	Lot 2 DP 450556	-0.21	-0.23	2	1

	Lot 1 DEEDS 908, Lot 2 DP 344659, Lot 2 DP 369218, Lot 2 DP 409048, Lot 3 DP 21852, Lot 3 DP 316123, Lot 4 DP				
1748216	316123, Lot 5 DP 21852, Lot 6 DP 21852	-0.23	0.35	2	1
1748207	Lot 1 DP 326953	-0.22	0.28	2	1
1747742	Lot 3 DEEDS 841	-0.10	-0.24	2	1
5008097	Lot 2 DP 450556	-0.21	-0.23	2	1
1747925	Part Lot 8 DEEDS 632	-0.15	-0.13	2	1
1749625	Lot 2 DP 18562, Lot 2 DP 329407, Lot 2 DP 532547	-0.38	0.11	2	1
1748211	Lot 1 DP 409048	-0.41	-0.03	2	1
1749512	Lot 3 DEEDS 437	-0.52	-0.29	2	0
1854568	Lot 16 DP 10306	-0.49	-0.27	2	0
1749303	Lot 1 DEEDS 474	-0.49	-0.42	2	0
1749594	Lot 1 DP 26971	-0.49	-0.34	2	0
5008353	Lot 3 DEEDS 437	-0.48	-0.34	2	0
1749604	Lot 1 DP 16859, Lot 2 DP 16859	-0.47	-0.20	2	0
1749501	Lot 1 DP 26973	-0.47	-0.56	2	0
1749461	Lot 2 DP 27865	-0.47	-0.19	2	0
1748936	Lot 1 DP 460806	-0.46	-0.47	2	0
4991566	Lot 2 DP 374026	-0.46	-1.13	2	0
1750036	Part Lot 26 DEEDS 80, Part Lot 27A DEEDS 80	-0.45	-0.24	2	0
1749480	Lot 1 DP 512396	-0.44	-0.22	2	0
5008352	Lot 3 DEEDS 437	-0.44	-0.22	2	0
1749496	Lot 2 DP 27865	-0.43	-0.25	2	0
1749513	Lot 3 DEEDS 437	-0.42	-0.27	2	0
1749603	Lot 1 DP 16859, Lot 2 DP 16859	-0.41	-0.32	2	0
1749507	Lot 1 DP 12698	-0.40	-0.28	2	0
1748988	Lot 2 DP 12012, Section 1 SO 9891	-0.40	-0.38	2	0
1750038	Part Lot 26 DEEDS 80, Part Lot 27A DEEDS 80	-0.39	-0.13	2	0
1748968	Section 13 Block XI Heretaunga SD	-0.38	-0.68	2	0
1854567	Lot 16 DP 10306	-0.37	-0.20	2	0
1748931	Lot 1 DP 460806	-0.37	-0.63	2	0

1749605	Lot 1 DP 16859, Lot 2 DP 16859	-0.37	-0.14	2	0
1748946	Lot 1 DP 28436, Section 9 SO 10979	-0.37	-0.35	2	0
1749445	Lot 1 DP 24674	-0.37	-0.37	2	0
1749495	Lot 2 DP 27865	-0.37	-0.36	2	0
4991559	Lot 2 DP 374026	-0.36	-1.00	2	0
1748930	Lot 1 DP 460806	-0.36	-0.53	2	0
1855095		-0.36	-0.70	2	0
1749623	Lot 2 DP 18562, Lot 2 DP 329407, Lot 2 DP 532547	-0.35	-0.01	2	0
1748981	Lot 1 DP 28436, Section 9 SO 10979	-0.35	-0.11	2	0
5008350	Lot 2 DP 20869, Lot 2 DP 512396	-0.35	-0.29	2	0
1748974		-0.34	-0.14	2	0
1748969	Section 13 Block XI Heretaunga SD	-0.33	-0.27	2	0
1749498	Lot 4 DP 12698	-0.33	-0.48	2	0
1749592	Lot 1 DP 26971	-0.33	-0.45	2	0
1749500	Lot 1 DP 26973	-0.32	-0.51	2	0
1749253	Lot 2 DP 389718	-0.31	-0.51	2	0
1747214	Lot 2 DP 6071, Lot 3 DP 6071	-0.30	-0.07	2	0
1749593	Lot 1 DP 26971	-0.30	-0.46	2	0
4991400	Lot 14 DP 10306	-0.29	-0.22	2	0
5008421	Lot 2 DP 354017	-0.28	-0.32	2	0
1749447	Part Lot 2 DEEDS 474	-0.28	-0.19	2	0
1854854	Section 1 SO 9886	-0.28	-0.29	2	0
1748972		-0.28	-0.10	2	0
1749627	Lot 1 DP 532547	-0.27	-0.02	2	0
1750018	Lot 2 DP 10154, Lot 3 DP 10154	-0.22	-0.17	2	0
1749643		-0.15	-0.15	2	0
1747221	Part Lot 2 DEEDS 376	1.22	0.36	1	4
1749010	Lot 2 DP 543135, Lot 3 DP 543135, Lot 4 DP 543135	0.23	0.02	1	3
1749025	Lot 2 DP 543135, Lot 3 DP 543135, Lot 4 DP 543135	0.20	0.03	1	2
1747229	Lot 7 DEEDS 632	0.23	0.59	1	3
5008448	Lot 1 DP 2039, Lot 1 DP 28285	0.26	0.04	1	2

1748989	Lot 2 DP 543135, Lot 3 DP 543135, Lot 4 DP 543135	0.16	0.15	1	2
1747228	Lot 7 DEEDS 632	0.23	0.34	1	2
1749439	Lot 1 DP 520459	0.01	0.00	1	2
1748037	Part Lot 2 DP 6024	0.06	0.22	1	1
1747232	Lot 6 DEEDS 632	-0.06	0.24	1	1
1748194	Lot 2 DP 432341	0.06	0.05	1	2
5008234	Lot 7 DEEDS 632	0.20	0.51	1	2
5008348	Lot 2 DP 543135, Lot 3 DP 543135, Lot 4 DP 543135	0.07	-0.24	1	1
1749355	Lot 2 DP 520459	0.01	0.00	1	1
5008259	Lot 6 DEEDS 632	0.05	0.09	1	1
5008096	Lot 3 DEEDS 632, Part Lot 2 DEEDS 632	-0.07	-0.05	1	1
1749004	Lot 2 DP 543135, Lot 3 DP 543135, Lot 4 DP 543135	0.06	0.11	1	1
1748209	Lot 3 DP 326953	0.07	0.08	1	1
1747225	Lot 7 DEEDS 632	0.18	0.45	1	1
1747912	Lot 3 DEEDS 632, Part Lot 2 DEEDS 632	-0.06	-0.04	1	1
5008235	Lot 6 DEEDS 632	0.08	0.05	1	1
1748210	Lot 3 DP 326953	0.10	-0.01	1	1
1748237	Lot 2 DP 28750	-0.07	-0.07	1	1
1747911	Lot 3 DEEDS 632, Part Lot 2 DEEDS 632	-0.07	-0.05	1	1
1748231	Part Lot 1 DP 7343	-0.06	-0.07	1	1
1748196	Lot 2 DP 432341	0.07	0.05	1	1
1748240	Lot 1 DP 28750	-0.09	-0.06	1	1
1747740	Part Lot 2 DP 6024	-0.04	-0.09	1	1
1747743	Lot 3 DEEDS 841	-0.10	-0.19	1	1
1747738	Part Lot 2 DP 6024	0.10	0.34	1	1
1748241	Lot 1 DP 28750	-0.09	-0.06	1	1
4991606	Lot 3 DP 326953	-0.14	0.09	1	1
1747231	Lot 6 DEEDS 632	0.08	0.17	1	1
1749359	Part Lot 1 DP 15678	0.01	0.00	1	1
1747921	Lot 2 DP 450556	-0.08	-0.31	1	1
5008261	Part Lot 2 DP 6024	-0.06	0.11	1	1

1747222	Part Lot 2 DEEDS 376	0.07	0.55	1	1
1749619	Lot 1 DP 329407	-0.03	0.05	1	1
1854806		0.06	0.02	1	1
1748215	Lot 1 DEEDS 908, Lot 2 DP 344659, Lot 2 DP 369218, Lot 2 DP 409048, Lot 3 DP 21852, Lot 3 DP 316123, Lot 4 DP 316123, Lot 5 DP 21852, Lot 6 DP 21852	-0.21	0.27	1	1
1748208	Lot 3 DP 326953	-0.19	0.10	1	1
1748242	Lot 1 DP 28750	-0.08	-0.07	1	1
1749614	Lot 4 DEEDS 493	-0.14	0.08	1	1
1748230	Part Lot 1 DP 7343	-0.06	-0.03	1	1
1747737	Lot 1 DP 432341	0.04	0.11	1	1
5008260	Part Lot 2 DP 6024	-0.03	-0.02	1	1
5008264	Part Lot 2 DP 6024	0.01	0.06	1	1
1748197	Lot 16 DEEDS 493	-0.02	0.08	1	1
5008447	Part Lot 1 DP 15678	-0.01	0.00	1	1
1748200	Lot 16 DEEDS 493	-0.02	0.10	1	1
1747739	Part Lot 2 DP 6024	0.00	0.04	1	1
5008098	Lot 2 DP 450556	-0.12	-0.22	1	1
1749617	Lot 4 DEEDS 493	-0.11	0.00	1	1
4991605	Part Lot 2 DP 6024	-0.02	-0.05	1	1
1747460		0.01	0.03	1	1
1748236	Lot 2 DP 28750	-0.08	-0.12	1	1
1749615	Lot 4 DEEDS 493	-0.08	0.00	1	1
1749622	Lot 2 DP 18562, Lot 2 DP 329407, Lot 2 DP 532547	-0.24	0.00	1	1
1748238	Lot 2 DP 28750	-0.05	-0.08	1	1
1749301	Lot 16 DEEDS 493	-0.01	0.04	1	1
1749620	Lot 1 DP 329407	-0.01	0.01	1	1
1749613	Lot 1 DP 18562	-0.33	-0.02	1	0
1750028	Lot 1 DP 10154	-0.29	-0.09	1	0
1749511	Part Lot 23 DEEDS 165	-0.28	-0.73	1	0
1749511	Part Lot 23 DEEDS 165	-0.28	-0.73	1	0

1749511	Part Lot 23 DEEDS 165	-0.28	-0.73	1	0
1748902	Lot 2 DP 16843	-0.28	-0.03	1	0
5008420	Lot 2 DP 354017	-0.28	-0.40	1	0
1854569	Lot 16 DP 10306	-0.26	-0.15	1	0
1748932	Lot 1 DP 460806	-0.26	-0.45	1	0
1749484	Lot 2 DP 12698	-0.25	-0.82	1	0
1749482	Lot 2 DP 12698	-0.24	-0.71	1	0
1749490	Lot 4 DP 12698	-0.24	-0.49	1	0
4991678	Lot 6 DP 9597	-0.24	-0.13	1	0
1748935	Lot 1 DP 460806	-0.24	-0.37	1	0
1750025	Lot 1 DP 10154	-0.24	-0.09	1	0
1749262	Lot 1A DEEDS 165, Lot 7A DEEDS 165	-0.23	-0.13	1	0
1749529	Lot 1 DP 374733	-0.23	-0.24	1	0
5008349	Lot 2 DP 27865	-0.23	-0.35	1	0
4991293	Section 24 Block XII Heretaunga SD	-0.23	-0.22	1	0
1749516	Lot 8 DP 9597	-0.23	-0.02	1	0
4991488	Lot 4 DP 12698	-0.23	-0.47	1	0
1749231	Part Lot 17 DEEDS 165	-0.23	-0.32	1	0
1748934	Lot 1 DP 460806	-0.22	-0.37	1	0
5008475	Lot 13 DP 10306	-0.22	-0.29	1	0
4991490	Part Lot 23 DEEDS 165	-0.22	-0.76	1	0
4991490	Part Lot 23 DEEDS 165	-0.22	-0.76	1	0
4991490	Part Lot 23 DEEDS 165	-0.22	-0.76	1	0
1749446	Lot 1 DP 24674	-0.22	-0.29	1	0
4991290	Part Lot 2 DEEDS 474	-0.22	-0.22	1	0
1749667	Lot 3A DEEDS 165	-0.20	-0.19	1	0
1750026	Lot 1 DP 10154	-0.20	-0.07	1	0
1749488	Lot 3 DP 12698	-0.20	-0.65	1	0
5008214	Part Lot 17 DEEDS 165	-0.20	-0.25	1	0
1750023	Lot 8 DP 9597	-0.20	-0.17	1	0
1749526	Lot 1 DP 374733	-0.20	-0.22	1	0

1749295	Lot 3 DP 12698	-0.20	-0.80	1	0
5008416	Part Lot 2 DEEDS 474	-0.20	-0.09	1	0
1749232	Part Lot 17 DEEDS 165	-0.19	-0.26	1	0
4991496	Section 13 Block XI Heretaunga SD	-0.19	-0.22	1	0
1748925	Lot 1 DP 309041	-0.19	-0.17	1	0
5008474	Lot 13 DP 10306	-0.19	-0.33	1	0
5008354	Lot 3 DP 12698	-0.19	-0.54	1	0
1749230	Part Lot 17 DEEDS 165	-0.19	-0.29	1	0
1749658	Lot 2A DEEDS 165	-0.19	-0.20	1	0
1749481	Lot 2 DP 12698	-0.19	-0.59	1	0
1747926	Part Lot 8 DEEDS 632	-0.19	-0.17	1	0
1748979	Lot 1 DP 460806	-0.19	-0.33	1	0
5008351	Lot 3 DP 12698	-0.19	-0.63	1	0
4991295	Section 24 Block XII Heretaunga SD	-0.19	-0.25	1	0
1749487	Lot 3 DP 12698	-0.19	-0.70	1	0
1749530	Lot 1 DP 374733	-0.19	-0.26	1	0
1749233	Part Lot 17 DEEDS 165	-0.19	-0.26	1	0
1749612	Lot 1 DP 18562	-0.18	-0.05	1	0
1854824	Lot 2 DP 16843	-0.18	-0.01	1	0
4991557	Lot 6A DEEDS 165	-0.18	-0.18	1	0
1854566	Lot 14 DP 10306	-0.18	-0.31	1	0
1749489	Lot 3 DP 12698	-0.18	-0.53	1	0
1749666		-0.18	-0.31	1	0
1749664	Lot 2A DEEDS 165	-0.17	-0.20	1	0
1749661	Lot 2A DEEDS 165	-0.17	-0.17	1	0
1748933	Lot 1 DP 460806	-0.16	-0.40	1	0
1747922	Lot 2 DP 450556	-0.16	-0.16	1	0
1749226	Lot 6A DEEDS 165	-0.16	-0.25	1	0
1748928	Lot 1 DP 309041	-0.15	-0.28	1	0
1749298	Section 2 SO 9810	-0.15	-0.01	1	0
1750019	Lot 2 DP 10154, Lot 3 DP 10154	-0.15	-0.13	1	0

	Part Section 10 Block XI Heretaunga SD, Section 12 Block XI				
1748907	Heretaunga SD	-0.15	-0.30	1	0
5008473	Part Lot 1 DP 7097	-0.15	-0.11	1	0
1749668	Lot 3A DEEDS 165	-0.14	-0.18	1	0
1749492	Lot 2 DP 10154, Lot 3 DP 10154	-0.14	-0.15	1	0
1749656	Lot 3A DEEDS 165	-0.14	-0.31	1	0
1748980		-0.14	-0.27	1	0
1748973	Lot 1 DP 28436, Section 9 SO 10979	-0.14	-0.03	1	0
4991493	Lot 39 DEEDS 80, Lot 40 DEEDS 80	-0.14	-0.07	1	0
1749263	Lot 1A DEEDS 165, Lot 7A DEEDS 165	-0.14	-0.10	1	0
1749448	Part Lot 2 DEEDS 474	-0.14	-0.19	1	0
1749646	Part Lot 26 DEEDS 80, Part Lot 27A DEEDS 80	-0.14	-0.49	1	0
1749296	Lot 1 DP 374733	-0.14	-0.21	1	0
1749599	Lot 14 DP 9597	-0.13	-0.04	1	0
1749665	Lot 2A DEEDS 165	-0.13	-0.15	1	0
1749509	Part Lot 23 DEEDS 165	-0.13	-0.49	1	0
1749509	Part Lot 23 DEEDS 165	-0.13	-0.49	1	0
1749509	Part Lot 23 DEEDS 165	-0.13	-0.49	1	0
1749663	Lot 2A DEEDS 165	-0.13	-0.15	1	0
1748920	Part Lot 1 DP 7097	-0.13	-0.11	1	0
5014935	Part Lot 1 DP 7097	-0.12	-0.12	1	0
1749525	Lot 15 DEEDS 165, Lot 16 DEEDS 165	-0.12	-0.13	1	0
1750015	Lot 2 DP 10154, Lot 3 DP 10154	-0.12	-0.20	1	0
4991291	Section 24 Block XII Heretaunga SD	-0.12	-0.12	1	0
1749268	Lot 8A DEEDS 165	-0.12	-0.12	1	0
1749653	Part Lot 1 DP 8531	-0.12	-0.13	1	0
1749244	Lot 1 DP 389718	-0.12	-0.09	1	0
	Part Lot 29 DEEDS 80, Part Lot 30 DEEDS 80, Part Lot 31				
1749652	DEEDS 80	-0.11	-0.36	1	0
1749510	Part Lot 23 DEEDS 165	-0.11	-0.42	1	0
1749510	Part Lot 23 DEEDS 165	-0.11	-0.42	1	0

1749510	Part Lot 23 DEEDS 165	-0.11	-0.42	1	0
1749267	Lot 8A DEEDS 165	-0.11	-0.16	1	0
5008414	Part Lot 2 DEEDS 474	-0.11	-0.06	1	0
4991294	Section 24 Block XII Heretaunga SD	-0.11	-0.12	1	0
4991497	Section 13 Block XI Heretaunga SD	-0.11	-0.18	1	0
4991560	Lot 3A DEEDS 165	-0.11	-0.18	1	0
1854547	Lot 15 DP 10306	-0.11	-0.12	1	0
1749251	Lot 2 DP 389718	-0.11	-0.09	1	0
1749648	Part Lot 26 DEEDS 80, Part Lot 28 DEEDS 80	-0.11	-0.19	1	0
1747999	Lot 10 DEEDS 632	-0.10	-0.57	1	0
5000335	Section 2 SO 9810	-0.10	-0.03	1	0
1748916	Lot 3 DP 309041	-0.10	-0.15	1	0
1748916	Lot 3 DP 309041	-0.10	-0.15	1	0
1748916	Lot 3 DP 309041	-0.10	-0.15	1	0
1749308	Lot 1 DP 374733	-0.10	-0.17	1	0
1749662	Lot 2A DEEDS 165	-0.10	-0.21	1	0
1749497	Lot 4 DP 12698	-0.10	-0.41	1	0
1750016	Lot 2 DP 10154, Lot 3 DP 10154	-0.10	-0.15	1	0
1748915	Lot 3 DP 309041	-0.10	-0.13	1	0
1748915	Lot 3 DP 309041	-0.10	-0.13	1	0
1748915	Lot 3 DP 309041	-0.10	-0.13	1	0
1748950	Lot 1 DP 28436, Section 9 SO 10979	-0.10	-0.11	1	0
1854565	Lot 14 DP 10306	-0.10	-0.26	1	0
1854564	Lot 14 DP 10306	-0.10	-0.07	1	0
5008296		-0.09	-0.15	1	0
5008451	Part Section 10 Block XI Heretaunga SD	-0.09	-0.20	1	0
1748927	Lot 1 DP 309041	-0.09	-0.18	1	0
1748926	Lot 1 DP 309041	-0.09	-0.19	1	0
1748970	Section 17 Block XI Heretaunga SD	-0.09	-0.15	1	0
1749647	Part Lot 26 DEEDS 80, Part Lot 27A DEEDS 80	-0.09	-0.69	1	0
4991491	Lot 22 DEEDS 165	-0.09	-0.53	1	0

4991491	Lot 22 DEEDS 165	-0.09	-0.53	1	0
1748239	Lot 2 DP 28750	-0.08	-0.09	1	0
1854834	Part Section 10 Block XI Heretaunga SD	-0.08	-0.14	1	0
1749299	Lot 2 DP 10514	-0.08	-0.03	1	0
1749264	Lot 8A DEEDS 165	-0.08	-0.18	1	0
1748913	Lot 3 DP 309041	-0.08	-0.26	1	0
1748913	Lot 3 DP 309041	-0.08	-0.26	1	0
1748913	Lot 3 DP 309041	-0.08	-0.26	1	0
1854822	Section 2 SO 491891	-0.08	-0.03	1	0
1748914	Lot 3 DP 309041	-0.08	-0.36	1	0
1748914	Lot 3 DP 309041	-0.08	-0.36	1	0
1748914	Lot 3 DP 309041	-0.08	-0.36	1	0
1750020	Lot 2 DP 10154, Lot 3 DP 10154	-0.08	-0.23	1	0
1749650	Part Lot 29 DEEDS 80, Part Lot 30 DEEDS 80, Part Lot 31 DEEDS 80	-0.08	-0.13	1	0
1854543	Lot 15 DP 10306	-0.08	-0.06	1	0
5008417	Lot 1 DEEDS 474	-0.08	-0.11	1	0
1749260	Lot 1A DEEDS 165, Lot 7A DEEDS 165	-0.08	-0.11	1	0
4985382	Part Lot 29 DEEDS 80, Part Lot 30 DEEDS 80, Part Lot 31 DEEDS 80	-0.08	-0.04	1	0
1750022	Lot 2 DP 10154, Lot 3 DP 10154	-0.07	-0.09	1	0
1747928	Lot 10 DEEDS 632	-0.07	-0.15	1	0
1749644	Part Lot 26 DEEDS 80, Part Lot 27A DEEDS 80	-0.07	-0.50	1	0
4991830	Lot 10 DEEDS 632	-0.07	-0.25	1	0
1749297	Lot 2 DP 10154, Lot 3 DP 10154	-0.06	-0.21	1	0
1749228	Lot 6A DEEDS 165	-0.06	-0.10	1	0
5008293	Lot 32 DEEDS 80, Lot 33 DEEDS 80	-0.06	-0.16	1	0

4991399	Lot 2 DEEDS 200, Part Bordered Green DEEDS 195, Part Lot 30 DEEDS 165, Part Lot 31 DEEDS 165, Part Lot 32 DEEDS 165, Part Lot 34 DEEDS 165, Part Lot 35 DEEDS 165, Part Lot 36 DEEDS 165, Part Lot 37 DEEDS 165	-0.06	-0.12	1	0
4991399	Lot 2 DEEDS 200, Part Bordered Green DEEDS 195, Part Lot 30 DEEDS 165, Part Lot 31 DEEDS 165, Part Lot 32 DEEDS 165, Part Lot 34 DEEDS 165, Part Lot 35 DEEDS 165, Part Lot 36 DEEDS 165, Part Lot 37 DEEDS 165	-0.06	-0.12	1	0
4991399	Lot 1 DEEDS 929, Lot 2 DEEDS 200, Lot 2 DP 16966, Lot 3 DP 6882, Lot 37 DEEDS 114, Part Bordered Green DEEDS 195, Part Lot 1 DEEDS 619, Part Lot 1 DEEDS 633, Part Lot 1 DP 5259, Part Lot 1 DP 6744, Part Lot 1 DP 6882, Part Lot 30 DEEDS 114, Part Lot 30 D	-0.06	-0.12	1	0
1855096	Lot 1 DEEDS 474	-0.06	-0.04	1	0
1855094	Lot 1 DEEDS 474	-0.06	-0.09	1	0
4991681	Lot 4A DEEDS 165	-0.06	-0.30	1	0
1749238	Lot 4A DEEDS 165	-0.06	-0.15	1	0
1749515	Lot 8 DP 9597	-0.06	-0.02	1	0
1747992	Lot 9 DEEDS 632, Lot 11 DEEDS 632	-0.06	-0.03	1	0
5008415	Lot 1 DEEDS 474	-0.06	-0.21	1	0
1749246	Lot 1 DP 389718	-0.05	-0.15	1	0
5008294	Lot 4A DEEDS 165	-0.05	-0.08	1	0
1748949	Lot 1 DP 28436, Section 9 SO 10979	-0.05	-0.09	1	0
5008418	Part Lot 2 DEEDS 474	-0.05	-0.03	1	0
1854835	Part Section 10 Block XI Heretaunga SD	-0.05	-0.10	1	0
1748908	Part Section 10 Block XI Heretaunga SD, Section 12 Block XI Heretaunga SD	-0.05	-0.10	1	0
1750021	Lot 2 DP 10154, Lot 3 DP 10154	-0.05	-0.10	1	0
1854548	Lot 15 DP 10306	-0.05	-0.08	1	0

1749449	Part Lot 2 DEEDS 474	-0.04	-0.11	1	0
1749225	Lot 6A DEEDS 165	-0.04	-0.08	1	0
4991829	Lot 2 DP 28750	-0.04	-0.05	1	0
1749249	Lot 2 DP 389718	-0.04	-0.06	1	0
1749243	Part Lot 26 DEEDS 80	-0.04	-0.01	1	0
1749252	Lot 2 DP 389718	-0.04	-0.21	1	0
1749229	Lot 19 DEEDS 165	-0.04	-0.07	1	0
1748991	Section 17 Block XI Heretaunga SD	-0.04	-0.10	1	0
1749250	Lot 2 DP 389718	-0.04	0.00	1	0
1748906	Part Section 10 Block XI Heretaunga SD, Section 12 Block XI Heretaunga SD	-0.04	-0.07	1	0
1749287	Lot 1 DP 389718	-0.03	-0.07	1	0
1747927	Lot 10 DEEDS 632	-0.03	-0.13	1	0
1749474	Lot 1 DP 27865	-0.03	-0.06	1	0
1747989	Lot 9 DEEDS 632, Lot 11 DEEDS 632	-0.03	-0.08	1	0
1855097	Lot 2 DEEDS 200, Part Bordered Green DEEDS 195, Part Lot 30 DEEDS 165, Part Lot 31 DEEDS 165, Part Lot 32 DEEDS 165, Part Lot 34 DEEDS 165, Part Lot 35 DEEDS 165, Part Lot 36 DEEDS 165, Part Lot 37 DEEDS 165	-0.03	-0.07	1	0
1855097	Lot 2 DEEDS 200, Part Bordered Green DEEDS 195, Part Lot 30 DEEDS 165, Part Lot 31 DEEDS 165, Part Lot 32 DEEDS 165, Part Lot 34 DEEDS 165, Part Lot 35 DEEDS 165, Part Lot 36 DEEDS 165, Part Lot 37 DEEDS 165	-0.03	-0.07	1	0
1855097	Lot 1 DEEDS 929, Lot 2 DEEDS 200, Lot 2 DP 16966, Lot 3 DP 6882, Lot 37 DEEDS 114, Part Bordered Green DEEDS 195, Part Lot 1 DEEDS 619, Part Lot 1 DEEDS 633, Part Lot 1 DP 5259, Part Lot 1 DP 6744, Part Lot 1 DP 6882, Part Lot 30 DEEDS 114, Part Lot 30 D	-0.03	-0.07	1	0
1749310	Part Lot 26 DEEDS 80	-0.03	-0.01	1	0

4991828	Lot 1 DP 7850	-0.03	-0.02	1	0
1749219	Lot 4A DEEDS 165	-0.03	-0.26	1	0
1749224	Lot 5A DEEDS 165	-0.03	-0.05	1	0
1749248	Lot 1 DP 389718	-0.03	-0.04	1	0
1749245	Lot 1 DP 389718	-0.02	-0.05	1	0
1750024	Lot 8 DP 9597	-0.02	-0.01	1	0
5008295	Lot 1 DP 374026	-0.02	-0.04	1	0
1749591	Lot 1 DEEDS 381, Lot 14 DEEDS 80	-0.02	-0.12	1	0
	Part Lot 29 DEEDS 80, Part Lot 30 DEEDS 80, Part Lot 31				
4991567	DEEDS 80	-0.02	-0.13	1	0
1748967	Section 17 Block XI Heretaunga SD	-0.02	-0.06	1	0
1749472	Lot 1 DP 27865	-0.02	-0.03	1	0
4991564	Lot 1 DP 389718	-0.02	-0.05	1	0
4991397	Lot 1 DEEDS 474	-0.01	0.00	1	0
1749473	Lot 1 DP 27865	-0.01	-0.04	1	0
1749304	Lot 9A DEEDS 165, Lot 10A DEEDS 165	-0.01	0.00	1	0
1749621	Lot 1 DP 329407	-0.01	0.00	1	0
1747219	Lot 35 DEEDS 493, Lot 40 DEEDS 493	0.53	0.68	0	3
1749300	Lot 35 DEEDS 493, Lot 40 DEEDS 493	0.49	0.79	0	2
1747218	Lot 35 DEEDS 493, Lot 40 DEEDS 493	0.41	0.79	0	2
1747611	Lot 3 DP 473320	0.39	0.74	0	2
4991632	Lot 1 DP 473320	0.35	0.75	0	2
1747613	Lot 3 DP 473320	0.35	0.70	0	2
1747612	Lot 3 DP 473320	0.33	0.77	0	2
1747614	Lot 3 DP 473320	0.33	0.83	0	2
1747610	Lot 1 DP 473320	0.30	0.77	0	2
4991631	Lot 1 DP 473320	0.29	0.99	0	1
1747217	Lot 2 DP 6071, Lot 3 DP 6071	0.29	0.12	0	1
1749011	Lot 2 DP 543135, Lot 3 DP 543135, Lot 4 DP 543135	0.27	0.03	0	1
1747615	Lot 15 DEEDS 493	0.16	0.64	0	1
1748040	Lot 1 DP 8728	0.14	0.16	0	1

1747735	Lot 1 DP 8728	0.14	0.11	0	1
1747725	Part Lot 1 DEEDS 841	0.14	0.10	0	1
5008266	Lot 1 DP 8728	0.14	0.14	0	1
1747722	Lot 15 DEEDS 493	0.12	0.05	0	1
5008263	Lot 1 DP 8728	0.11	0.14	0	1
4991604	Lot 1 DP 8728	0.10	0.09	0	1
1747736	Lot 1 DP 8728	0.10	0.11	0	1
1747616	Lot 15 DEEDS 493	0.09	0.47	0	1
1747734	Lot 1 DP 8728	0.09	0.11	0	1
5008262	Lot 1 DP 8728	0.08	0.19	0	1
1747726	Part Lot 1 DEEDS 841	0.08	0.13	0	1
5008291	Lot 2 DP 543135, Lot 3 DP 543135, Lot 4 DP 543135	0.05	0.04	0	1
1747220	Lot 35 DEEDS 493, Lot 40 DEEDS 493	0.04	0.09	0	1
1747212	Lot 35 DEEDS 493, Lot 40 DEEDS 493	0.04	0.05	0	1
1747223	Part Lot 2 DEEDS 376	0.04	0.16	0	1
1747723	Lot 15 DEEDS 493	0.04	0.36	0	1
1747732	Part Lot 1 DEEDS 841	0.03	0.10	0	1
1748027	Lot 1 DP 8728	0.03	0.04	0	1
1747730	Part Lot 1 DEEDS 841	0.02	0.00	0	1
1747729	Part Lot 1 DEEDS 841	0.02	0.05	0	1
4991630	Lot 11 DEEDS 493, Lot 12 DEEDS 493, Lot 14 DEEDS 493	0.01	0.04	0	1
1747731		0.01	0.00	0	1
1748896	Part Lot 1 DP 15678	0.01	0.01	0	1
1747216	Lot 2 DP 6071, Lot 3 DP 6071	0.00	0.00	0	0
1747929	Lot 1 DP 8830	0.00	0.00	0	0
1747931		0.00	0.00	0	0
1747934	Lot 1 DP 8830	0.00	0.00	0	0
1747980	Part Lot 12 DEEDS 632	0.00	0.00	0	0
1747983	Part Lot 12 DEEDS 632	0.00	0.00	0	0
1748000	Lot 14 DEEDS 632, Lot 15 DEEDS 632	0.00	0.00	0	0

1748001	Lot 14 DEEDS 632, Lot 15 DEEDS 632	0.00	0.00	0	0
1748003	Lot 14 DEEDS 632, Lot 15 DEEDS 632	0.00	0.00	0	0
5008094	Part Lot 12 DEEDS 632	0.00	0.00	0	0
1748953	Lot 1 DP 28436, Section 9 SO 10979	0.00	0.00	0	0
1748996	Lot 2 DP 20869, Lot 2 DP 512396	0.00	0.00	0	0
1749462	Lot 1 DP 354017, Lot 5 DEEDS 80	0.00	0.00	0	0
1749465	Lot 1 DP 354017, Lot 5 DEEDS 80	0.00	0.00	0	0
1749518	Lot 22 DEEDS 165	0.00	0.00	0	0
1749518	Lot 22 DEEDS 165	0.00	0.00	0	0
1749521		0.00	0.00	0	0
1749524	Lot 15 DEEDS 165, Lot 16 DEEDS 165	0.00	0.00	0	0
1749607	Lot 1 DEEDS 437, Lot 2 DEEDS 437	0.00	0.00	0	0
1750013	Lot 1 DEEDS 437, Lot 2 DEEDS 437	0.00	0.00	0	0
1854217	Accretion Survey Office Plan 4409, Part Accretion Survey Office Plan 4409, Part Waiohiki 1D2B11 Block, Part Waiohiki 1D2B15 Block, Part Waiohiki 1D2B16 Block, Part Waiohiki 1D2B17 Block, Part Waiohiki 1D2B18 Block, Part Waiohiki 1E3 Block, Part Waiohiki	0.00	0.00	0	0
1854519	Lot 1 DP 16366, Lot 2 DP 16366	0.00	0.00	0	0
1854527	Lot 3 DP 16366	0.00	0.00	0	0
1855098	Lot 2 DEEDS 200, Part Bordered Green DEEDS 195, Part Lot 30 DEEDS 165, Part Lot 31 DEEDS 165, Part Lot 32 DEEDS 165, Part Lot 34 DEEDS 165, Part Lot 35 DEEDS 165, Part Lot 36 DEEDS 165, Part Lot 37 DEEDS 165	0.00	0.00	0	0
1855098	Lot 2 DEEDS 200, Part Bordered Green DEEDS 195, Part Lot 30 DEEDS 165, Part Lot 31 DEEDS 165, Part Lot 32 DEEDS 165, Part Lot 34 DEEDS 165, Part Lot 35 DEEDS 165, Part Lot 36 DEEDS 165, Part Lot 37 DEEDS 165	0.00	0.00	0	0

	Lot 1 DEEDS 929, Lot 2 DEEDS 200, Lot 2 DP 16966, Lot 3 DP 6882, Lot 37 DEEDS 114, Part Bordered Green DEEDS 195, Part Lot 1 DEEDS 619, Part Lot 1 DEEDS 633, Part Lot 1 DP 5259, Part Lot 1 DP 6744, Part Lot 1 DP 6882, Part Lot 30				
1855098	DEEDS 114, Part Lot 30 D	0.00	0.00	0	0
4985387	Lot 1 DP 354017, Lot 5 DEEDS 80	0.00	0.00	0	0
4991394	Part Lot 17 DP 10306	0.00	0.00	0	0
4991395	Part Lot 17 DP 10306	0.00	0.00	0	0
4991396	Part Lot 17 DP 10306	0.00	0.00	0	0
1854252	Waiohiki 1D2B6B2A Block	0.00	0.00	0	0
1854737		0.00	0.00	0	0
1854769	Lot 1 DP 486088, Lot 2 DP 25313	0.00	0.00	0	0
1854773	Lot 1 DP 17662	0.00	0.00	0	0
1854774	Lot 1 DP 17662	0.00	0.00	0	0
1854780	Part Lot 1 DP 11339	0.00	0.00	0	0
1854789	Part Lot 1 DP 11339	0.00	0.00	0	0
1854831	Part Lot 13 DP 74	0.00	0.00	0	0
1854856	Lot 1 DP 17662	0.00	0.00	0	0
1855080	Waiohiki 1D2B6A2 Block	0.00	0.00	0	0
1855085	Waiohiki 1A1A Block	0.00	0.00	0	0
1855090	Lot 2 DP 486088	0.00	0.00	0	0
1855529	Waiohiki 3 Block ML 2698	0.00	0.00	0	0
4991307	Part Waiohiki 1D2B6A3 Block	0.00	0.00	0	0
4991307	Part Waiohiki 1D2B6A3 Block	0.00	0.00	0	0
4991386	Waiohiki 1D2B10C Block	0.00	0.00	0	0
5008468	Waiohiki 1D2B6A1 Block	0.00	0.00	0	0
5008470	Waiohiki 1D2B6A1 Block	0.00	0.00	0	0
1854501	Lot 2 DP 25387	0.00	0.00	0	0
1749272	Lot 5 DEEDS 493, Lot 6 DEEDS 493	0.00	0.00	0	0

1749467	Lot 2 DEEDS 200, Part Bordered Green DEEDS 195, Part Lot 30 DEEDS 165, Part Lot 31 DEEDS 165, Part Lot 32 DEEDS 165, Part Lot 34 DEEDS 165, Part Lot 35 DEEDS 165, Part Lot 36 DEEDS 165, Part Lot 37 DEEDS 165	0.00	0.00	0	0
1749467	Lot 2 DEEDS 200, Part Bordered Green DEEDS 195, Part Lot 30 DEEDS 165, Part Lot 31 DEEDS 165, Part Lot 32 DEEDS 165, Part Lot 34 DEEDS 165, Part Lot 35 DEEDS 165, Part Lot 36 DEEDS 165, Part Lot 37 DEEDS 165	0.00	0.00	0	0
1749467	Lot 1 DEEDS 929, Lot 2 DEEDS 200, Lot 2 DP 16966, Lot 3 DP 6882, Lot 37 DEEDS 114, Part Bordered Green DEEDS 195, Part Lot 1 DEEDS 619, Part Lot 1 DEEDS 633, Part Lot 1 DP 5259, Part Lot 1 DP 6744, Part Lot 1 DP 6882, Part Lot 30 DEEDS 114, Part Lot 30 D	0.00	0.00	0	0
4991674	Lot 5 DEEDS 493, Lot 6 DEEDS 493	0.00	0.00	0	0
4991677	Lot 9A DEEDS 165, Lot 10A DEEDS 165	0.00	0.00	0	0
1749261	Lot 5 DEEDS 493, Lot 6 DEEDS 493	0.00	0.00	0	0
1749637	Part Lot 8 DEEDS 493	0.00	0.00	0	0
1749638	Part Lot 8 DEEDS 493	0.00	0.00	0	0
4991679	Lot 5 DEEDS 493, Lot 6 DEEDS 493	0.00	0.00	0	0
4991680	Part Lot 8 DEEDS 493	0.00	0.00	0	0
1747215	Lot 2 DP 6071, Lot 3 DP 6071	0.00	0.00	0	0
1747930	Lot 1 DP 8830	0.00	0.00	0	0
1747932	Lot 1 DP 8830	0.00	0.00	0	0
1747933	Lot 1 DP 8830	0.00	0.00	0	0
1747935	Part Lot 12 DEEDS 632	0.00	0.00	0	0
1747982	Part Lot 12 DEEDS 632	0.00	0.00	0	0
1747984		0.00	0.00	0	0
1747985	Lot 13 DEEDS 632	0.00	0.00	0	0
1747993	Lot 9 DEEDS 632, Lot 11 DEEDS 632	0.00	0.00	0	0

1747994	Lot 9 DEEDS 632, Lot 11 DEEDS 632	0.00	0.00	0	0
1747996	Part Pakowhai Maori Reserve 1 Block, Section 1 SO 10742, Section 2 SO 10742, Section 3 SO 10742	0.00	0.00	0	0
1747997	Part Pakowhai Maori Reserve 1 Block, Section 1 SO 10742, Section 2 SO 10742, Section 3 SO 10742	0.00	0.00	0	0
1748002	Lot 14 DEEDS 632, Lot 15 DEEDS 632	0.00	0.00	0	0
1748004	Lot 14 DEEDS 632, Lot 15 DEEDS 632	0.00	0.00	0	0
1749005	Lot 2 DP 543135, Lot 3 DP 543135, Lot 4 DP 543135	0.00	0.00	0	0
1749241	Section 1 SO 9810	0.00	0.00	0	0
1749256	Lot 2 DP 6071, Lot 3 DP 6071	0.00	0.00	0	0
1749273	Lot 1 DP 374026	0.00	0.00	0	0
1749275	Lot 39 DEEDS 80, Lot 40 DEEDS 80	0.00	0.00	0	0
1749278	Lot 39 DEEDS 80, Lot 40 DEEDS 80	0.00	0.00	0	0
1749279	Lot 39 DEEDS 80, Lot 40 DEEDS 80	0.00	0.00	0	0
1749636	Lot 7 DEEDS 493	0.00	0.00	0	0
1749642	Lot 1 DP 8603, Lot 2 DP 8603	0.00	0.00	0	0
1749657	Lot 2 DP 6071, Lot 3 DP 6071	0.00	0.00	0	0
1749671	Part Lot 26 DEEDS 80	0.00	0.00	0	0
4991561	Lot 2 DP 10514	0.00	0.00	0	0
4991568	Lot 2 DP 543135, Lot 3 DP 543135, Lot 4 DP 543135	0.00	0.00	0	0
4991831	Lot 1 DP 8830	0.00	0.00	0	0
5008093	Part Lot 12 DEEDS 632	0.00	0.00	0	0
5008297	Lot 1 DP 374026	0.00	0.00	0	0
1748900	Part Lot 1 DP 15678	0.00	0.00	0	0
1853693	Part Waiohiki 1D2B6A3 Block	0.00	0.00	0	0
1853693	Part Waiohiki 1D2B6A3 Block	0.00	0.00	0	0
1854715	Waiohiki 1D2B8Lot3 Block	0.00	0.00	0	0
1854721	Waiohiki 1D2B8Lot5C Block	0.00	0.00	0	0
1854725		0.00	0.00	0	0
1854739	Waiohiki 1D2B6B1 Block	0.00	0.00	0	0
1854742	Lot 5 DP 16175	0.00	0.00	0	0

1854747	Waiohiki 1D1 Block	0.00	0.00	0	0
1854751	Waiohiki 1D1 Block	0.00	0.00	0	0
1854752	Waiohiki 1D1 Block	0.00	0.00	0	0
1854758	Waiohiki 1D2B9A Block	0.00	0.00	0	0
1854766	Lot 1 DP 2039, Lot 1 DP 28285	0.00	0.00	0	0
1854777	Lot 1 DP 2039, Lot 1 DP 28285	0.00	0.00	0	0
1854826	Lot 2 DP 20523	0.00	0.00	0	0
1855538	Waiohiki 1D2B6B2A Block	0.00	0.00	0	0
4991297	Lot 1 DP 8277	0.00	0.00	0	0
4991305	Part Waiohiki 1D2B6A3 Block	0.00	0.00	0	0
4991305	Part Waiohiki 1D2B6A3 Block	0.00	0.00	0	0
4991306	Part Waiohiki 1D2B6A3 Block	0.00	0.00	0	0
4991306	Part Waiohiki 1D2B6A3 Block	0.00	0.00	0	0
4991310	Waiohiki 1D2B8Lot5C Block	0.00	0.00	0	0
4991317	Part Waiohiki 1D2B7 Block	0.00	0.00	0	0
4991340	Waiohiki 1D1 Block	0.00	0.00	0	0
4991344	Lot 5 DP 16175	0.00	0.00	0	0
5008466	Part Waiohiki 1D2B7 Block	0.00	0.00	0	0
5008467	Waiohiki 1D2B8Lot5B Block	0.00	0.00	0	0
5008472	Lot 1 DP 8277	0.00	0.00	0	0
1854047	Lot 1 DP 21295	0.00	0.00	0	0
1854062	Part Lot 1 DP 2459	0.00	0.00	0	0
1854063	Part Lot 1 DP 2459	0.00	0.00	0	0
1854064	Part Lot 1 DP 2459	0.00	0.00	0	0
1854072	Lot 2 DP 468391, Lot 3 DP 468391	0.00	0.00	0	0
1854073	Lot 2 DP 468391, Lot 3 DP 468391	0.00	0.00	0	0
1854080	Lot 2 DP 588217	0.00	0.00	0	0
1854085	Lot 13 DP 28232	0.00	0.00	0	0
1854087	Lot 2 DP 471639	0.00	0.00	0	0
1854089	Lot 5 DP 309629, Lot 10 DP 309629, Lot 11 DP 309629, Lot 12 DP 309629	0.00	0.00	0	0

1854090	Lot 4 DP 309629, Lot 10 DP 309629, Lot 11 DP 309629	0.00	0.00	0	0
1854095	Lot 2 DP 309629, Lot 10 DP 309629, Lot 11 DP 309629	0.00	0.00	0	0
1854096	Lot 1 DP 449539	0.00	0.00	0	0
1854097	Lot 3 DP 471639	0.00	0.00	0	0
1854098	Lot 2 DP 8496	0.00	0.00	0	0
1854099	Lot 2 DP 28285	0.00	0.00	0	0
1854230	Lot 5 DP 309629, Lot 10 DP 309629, Lot 11 DP 309629, Lot 12 DP 309629	0.00	0.00	0	0
4991343	Part Lot 1 DP 15678	0.00	0.00	0	0
4991351	Lot 1 DP 418872	0.00	0.00	0	0
4991441	Lot 1 DP 449539	0.00	0.00	0	0
4991449	Lot 1 DP 449539	0.00	0.00	0	0
4991450	Lot 1 DP 418872	0.00	0.00	0	0
4991451		0.00	0.00	0	0
4991452	Lot 3 DP 309629, Lot 10 DP 309629, Lot 11 DP 309629	0.00	0.00	0	0
5008384	Lot 3 DP 309629, Lot 10 DP 309629, Lot 11 DP 309629	0.00	0.00	0	0
5008385	Lot 3 DP 309629, Lot 10 DP 309629, Lot 11 DP 309629	0.00	0.00	0	0
1748899	Part Lot 1 DP 15678	0.00	0.00	0	0
1749367	Lot 1 DP 16776, Lot 1 DP 21289	0.00	0.00	0	0
1854046	Lot 1 DP 21295	0.00	0.00	0	0
1854061	Part Lot 1 DP 2459	0.00	0.00	0	0
1854075	Lot 3 DP 24821, Lot 3 DP 468391	0.00	0.00	0	0
1854076	Lot 2 DP 24821, Lot 3 DP 468391	0.00	0.00	0	0
1854077	Lot 1 DP 24821, Lot 3 DP 468391	0.00	0.00	0	0
1854079	Lot 2 DP 588217	0.00	0.00	0	0
1854083	Lot 1 DP 588217, Lot 4 DP 28865	0.00	0.00	0	0
1854084	Lot 1 DP 588217, Lot 4 DP 28865	0.00	0.00	0	0
1854088	Lot 6 DP 309629, Lot 10 DP 309629, Lot 11 DP 309629, Lot 12 DP 309629	0.00	0.00	0	0
1854094	Lot 3 DP 309629, Lot 10 DP 309629, Lot 11 DP 309629	0.00	0.00	0	0
1854101	Part Lot 1 DP 15678	0.00	0.00	0	0

1854227	Lot 2 DP 468391, Lot 3 DP 468391	0.00	0.00	0	0
1854775	Lot 1 DP 2039, Lot 1 DP 28285	0.00	0.00	0	0
1854776	Waiohiki 2C Block	0.00	0.00	0	0
4985386	Lot 1 DP 471639	0.00	0.00	0	0
4991341	Lot 2 DP 471639	0.00	0.00	0	0
4991346	Lot 1 DP 2039, Lot 1 DP 28285	0.00	0.00	0	0
4991347	Lot 1 DP 418872	0.00	0.00	0	0
4991439	Lot 1 DP 21295	0.00	0.00	0	0
1749384	Part Lot 1 DP 12018	0.00	0.00	0	0
1747608	Lot 11 DEEDS 493, Lot 12 DEEDS 493, Lot 14 DEEDS 493	0.00	0.00	0	0
1747609	Lot 11 DEEDS 493, Lot 12 DEEDS 493, Lot 14 DEEDS 493	0.00	0.00	0	0
1750027	Part Lot 8 DEEDS 493	0.00	0.00	0	0
4991558	Lot 7 DEEDS 493	0.00	0.00	0	0
4991562	Part Lot 8 DEEDS 493	0.00	0.00	0	0
5008292	Lot 7 DEEDS 493	0.00	0.00	0	0
1854799	Lot 1 DP 387649	0.00	0.00	0	0
1854801	Lot 5 DP 10306	0.00	0.00	0	0
1854802	Lot 6 DP 10306	0.00	0.00	0	0
1854803	Lot 6 DP 10306	0.00	0.00	0	0
1854832	Lot 3 DP 10306	0.00	0.00	0	0
1854839	Lot 4 DP 10306	0.00	0.00	0	0
1854840	Lot 4 DP 10306	0.00	0.00	0	0
4991338	Lot 3 DP 10306	0.00	0.00	0	0
1748897	Lot 2 DP 8277, Section 11 Block XI Heretaunga SD	0.00	0.00	0	0
1748903	Lot 2 DP 8277, Section 11 Block XI Heretaunga SD	0.00	0.00	0	0
1748958	Lot 2 DP 8277, Section 11 Block XI Heretaunga SD	0.00	0.00	0	0
1748962	Lot 1 DP 12012	0.00	0.00	0	0
1854255	Lot 2 DP 20523	0.00	0.00	0	0
1854779	Lot 1 DP 16843	0.00	0.00	0	0

1854790	Lot 2 DP 11339	0.00	0.00	0	0
1854796	Lot 2 DP 387649, Lot 3 DP 11273	0.00	0.00	0	0
1854807	Lot 1 DP 16843	0.00	0.00	0	0
1854809	Lot 2 DP 20523	0.00	0.00	0	0
1854813	Lot 1 DP 8277	0.00	0.00	0	0
1854815	Lot 2 DP 17662	0.00	0.00	0	0
1854816	Lot 2 DP 17662	0.00	0.00	0	0
1854820	Lot 2 DP 11273	0.00	0.00	0	0
1854825	Lot 2 DP 20523	0.00	0.00	0	0
1854829	Part Lot 13 DP 74	0.00	0.00	0	0
1854830	Part Lot 13 DP 74	0.00	0.00	0	0
1854216	Accretion Survey Office Plan 4409, Part Accretion Survey Office Plan 4409, Part Waiohiki 1D2B11 Block, Part Waiohiki 1D2B15 Block, Part Waiohiki 1D2B16 Block, Part Waiohiki 1D2B17 Block, Part Waiohiki 1D2B18 Block, Part Waiohiki 1E3 Block, Part Waiohiki	0.00	0.00	0	0
4991382		0.00	0.00	0	0
1853688	Waiohiki 1E4F Block	0.00	0.00	0	0
1853691		0.00	0.00	0	0
1853697	Waiohiki 1A2 Block	0.00	0.00	0	0
1854129	Part Waiohiki 1E5 Block	0.00	0.00	0	0
1854251	Part Waiohiki 1D2B8Lot2 Block	0.00	0.00	0	0
1854254	Lot 1 DP 486088, Lot 2 DP 25313	0.00	0.00	0	0
1854717	Waiohiki 1D2B8Lot6 Block	0.00	0.00	0	0
1854722	Waiohiki 1D2B8Lot2A Block	0.00	0.00	0	0
1854731	Part Waiohiki 1D2B7 Block	0.00	0.00	0	0
1854732	Waiohiki 1D2B8Lot4B Block	0.00	0.00	0	0
1854738	Waiohiki 1D2B6B1 Block	0.00	0.00	0	0
1854746	Waiohiki 1D1 Block	0.00	0.00	0	0
1854753		0.00	0.00	0	0

1854754	Waiohiki 1D1 Block	0.00	0.00	0	0
1854756	Waiohiki 1D1 Block	0.00	0.00	0	0
1854757	Waiohiki 1D2B9A Block	0.00	0.00	0	0
1854760	Waiohiki 1D2B9A Block	0.00	0.00	0	0
1854762	Waiohiki 1D2B8Lot1 Block	0.00	0.00	0	0
1854765	Waiohiki 1D2B8Lot1 Block	0.00	0.00	0	0
1854865		0.00	0.00	0	0
1855084		0.00	0.00	0	0
1855088	Lot 1 DP 25313, Part Lot 1 DP 22784	0.00	0.00	0	0
1855089	Lot 2 DP 486088	0.00	0.00	0	0
1855092	Waiohiki 1D2B8Lot3 Block	0.00	0.00	0	0
1855093	Waiohiki 1D2B8Lot3 Block	0.00	0.00	0	0
1855518	Waiohiki 1E3C3 Block	0.00	0.00	0	0
1855518	Waiohiki 1E3C3 Block	0.00	0.00	0	0
1855518	Waiohiki 1E3C3 Block	0.00	0.00	0	0
4991298	Waiohiki 1D2B20 Block	0.00	0.00	0	0
4991299	Part Waiohiki 1D2B6A3 Block	0.00	0.00	0	0
4991299	Part Waiohiki 1D2B6A3 Block	0.00	0.00	0	0
4991300	Waiohiki 1D2B10C Block	0.00	0.00	0	0
4991302		0.00	0.00	0	0
4991308	Waiohiki 1D2B6B1 Block	0.00	0.00	0	0
4991312	Waiohiki 1D2B8Lot6 Block	0.00	0.00	0	0
4991316	Part Waiohiki 1D2B7 Block	0.00	0.00	0	0
4991342	Waiohiki 1D2B9A Block	0.00	0.00	0	0
4991345		0.00	0.00	0	0
5008449	Waiohiki 1D1 Block	0.00	0.00	0	0
5008464	Waiohiki 1D2B8Lot4A Block	0.00	0.00	0	0
5008465	Part Waiohiki 1D2B7 Block	0.00	0.00	0	0
5008469	Waiohiki 1E4B Block	0.00	0.00	0	0
1748995	Lot 2 DP 20869, Lot 2 DP 512396	0.00	0.00	0	0
1748997	Lot 2 DP 20869, Lot 2 DP 512396	0.00	0.00	0	0

1748998	Lot 2 DP 20869, Lot 2 DP 512396	0.00	0.00	0	0
1748999	Lot 2 DP 20869, Lot 2 DP 512396	0.00	0.00	0	0
1749012	Lot 2 DP 543135, Lot 3 DP 543135, Lot 4 DP 543135	0.00	0.00	0	0
1749013	Lot 1 DP 543135	0.00	0.00	0	0
1749015	Lot 1 DP 543135	0.00	0.00	0	0
5008290	Lot 2 DP 543135, Lot 3 DP 543135, Lot 4 DP 543135	0.00	0.00	0	0
1748894	Lot 2 DP 8277, Section 11 Block XI Heretaunga SD	0.00	0.00	0	0
1748904	Lot 2 DP 8277, Section 11 Block XI Heretaunga SD	0.00	0.00	0	0
1748905	Lot 2 DP 8277, Section 11 Block XI Heretaunga SD	0.00	0.00	0	0
1748952		0.00	0.00	0	0
1748965	Lot 1 DP 12012	0.00	0.00	0	0
1748966	Lot 1 DP 12012	0.00	0.00	0	0
1749002	Lot 2 DP 543135, Lot 3 DP 543135, Lot 4 DP 543135	0.00	0.00	0	0
1749443	Lot 1 DP 12012	0.00	0.00	0	0
1854130	Part Waiohiki 1E5 Block	0.00	0.00	0	0
1854131	Part Waiohiki 1E6 Block	0.00	0.00	0	0
1854132	Part Waiohiki 1E7 Block	0.00	0.00	0	0
1854135	Accretion Survey Office Plan 4409, Part Accretion Survey Office Plan 4409, Part Waiohiki 1D2B11 Block, Part Waiohiki 1D2B15 Block, Part Waiohiki 1D2B16 Block, Part Waiohiki 1D2B17 Block, Part Waiohiki 1D2B18 Block, Part Waiohiki 1E3 Block, Part Waiohiki	0.00	0.00	0	0
1854237	Part Waiohiki 1E6 Block	0.00	0.00	0	0
1854238	Waiohiki 1E2 Block	0.00	0.00	0	0
1854239	Waiohiki 1E4E1 Block	0.00	0.00	0	0
1854242		0.00	0.00	0	0
1854243	Waiohiki 1D2B10D Block ML 2694	0.00	0.00	0	0
1854245	Waiohiki 1E4C Block	0.00	0.00	0	0
1854718	Waiohiki 1D2B8Lot6 Block	0.00	0.00	0	0
1854720	Waiohiki 1D2B8Lot5C Block	0.00	0.00	0	0

1854723	Waiohiki 1D2B8Lot2A Block	0.00	0.00	0	0
1854724	Part Waiohiki 1D2B8Lot2 Block	0.00	0.00	0	0
1854730	Waiohiki 1D2B8Lot4B Block	0.00	0.00	0	0
1854741	Lot 5 DP 16175	0.00	0.00	0	0
1854745	Waiohiki 1D1 Block	0.00	0.00	0	0
1854759	Waiohiki 1D2B9A Block	0.00	0.00	0	0
1854764	Lot 2 DP 16843	0.00	0.00	0	0
1854786	Part Lot 1 DP 11339	0.00	0.00	0	0
1854787	Part Lot 1 DP 11339	0.00	0.00	0	0
1854788	Part Lot 1 DP 11339	0.00	0.00	0	0
1854791	Lot 2 DP 11339	0.00	0.00	0	0
1854792	Lot 2 DP 11339	0.00	0.00	0	0
1854793	Lot 2 DP 17662	0.00	0.00	0	0
1854794	Lot 2 DP 387649, Lot 3 DP 11273	0.00	0.00	0	0
1854810	Lot 2 DP 20523	0.00	0.00	0	0
1854814	Lot 1 DP 8277	0.00	0.00	0	0
1854817	Lot 2 DP 387649, Lot 3 DP 11273	0.00	0.00	0	0
1854819	Lot 2 DP 11273	0.00	0.00	0	0
1854836	Lot 3 DP 10306	0.00	0.00	0	0
1854838	Lot 3 DP 10306	0.00	0.00	0	0
1854846	Lot 4 DP 10306	0.00	0.00	0	0
1854847	Lot 4 DP 10306	0.00	0.00	0	0
1854855	Lot 1 DP 17662	0.00	0.00	0	0
1855078	Waiohiki 1E2 Block	0.00	0.00	0	0
1855079	Waiohiki 1D2B6A2 Block	0.00	0.00	0	0
1855086	Waiohiki 1D2B12A Block	0.00	0.00	0	0
1855087	Waiohiki 1D2B12A Block	0.00	0.00	0	0
1855091	Lot 2 DP 486088	0.00	0.00	0	0
1855483	Waiohiki 1E4F Block	0.00	0.00	0	0
1855519	Waiohiki 1E3C3 Block	0.00	0.00	0	0
1855519	Waiohiki 1E3C3 Block	0.00	0.00	0	0

1855519	Waiohiki 1E3C3 Block	0.00	0.00	0	0
1855520	Waiohiki 1E4B Block	0.00	0.00	0	0
1855521	Waiohiki 1E4C Block	0.00	0.00	0	0
1855527	Waiohiki 1E4E1 Block	0.00	0.00	0	0
1855533	Waiohiki 1E4F Block	0.00	0.00	0	0
1855537	Waiohiki 1E1B2 Block	0.00	0.00	0	0
1855540	Waiohiki 1D2B20 Block	0.00	0.00	0	0
1855542	Waiohiki 1E1C1 Block	0.00	0.00	0	0
1855543	Waiohiki 1E1C1 Block	0.00	0.00	0	0
4985399		0.00	0.00	0	0
4991303		0.00	0.00	0	0
4991314		0.00	0.00	0	0
4991318	Waiohiki 1D2B8Lot3 Block	0.00	0.00	0	0
4991339	Lot 1 DP 12012	0.00	0.00	0	0
4991383	Part Waiohiki 1E7 Block	0.00	0.00	0	0
4991385	Waiohiki 1E3C3 Block	0.00	0.00	0	0
4991385	Waiohiki 1E3C3 Block	0.00	0.00	0	0
4991385	Waiohiki 1E3C3 Block	0.00	0.00	0	0
4991392	Waiohiki 1D2B10B Block ML 512834	0.00	0.00	0	0
5008450	Lot 1 DP 387649	0.00	0.00	0	0
5008471	Lot 1 DP 387649	0.00	0.00	0	0
1854545	Lot 1 DP 16366, Lot 2 DP 16366	0.00	0.00	0	0
1854572	Part Lot 17 DP 10306	0.00	0.00	0	0
1854573		0.00	0.00	0	0
4991398	Part Lot 17 DP 10306	0.00	0.00	0	0
4991401	Lot 2 DEEDS 200, Part Bordered Green DEEDS 195, Part Lot 30 DEEDS 165, Part Lot 31 DEEDS 165, Part Lot 32 DEEDS 165, Part Lot 34 DEEDS 165, Part Lot 35 DEEDS 165, Part Lot 36 DEEDS 165, Part Lot 37 DEEDS 165	0.00	0.00	0	0

4991401	Lot 2 DEEDS 200, Part Bordered Green DEEDS 195, Part Lot 30 DEEDS 165, Part Lot 31 DEEDS 165, Part Lot 32 DEEDS 165, Part Lot 34 DEEDS 165, Part Lot 35 DEEDS 165, Part Lot 36 DEEDS 165, Part Lot 37 DEEDS 165	0.00	0.00	0	0
4991401	Lot 1 DEEDS 929, Lot 2 DEEDS 200, Lot 2 DP 16966, Lot 3 DP 6882, Lot 37 DEEDS 114, Part Bordered Green DEEDS 195, Part Lot 1 DEEDS 619, Part Lot 1 DEEDS 633, Part Lot 1 DP 5259, Part Lot 1 DP 6744, Part Lot 1 DP 6882, Part Lot 30 DEEDS 114, Part Lot 30 D	0.00	0.00	0	0
4991389	Part Waiohiki 1E6 Block	0.00	0.00	0	0
1749307	Lot 1 DP 354017, Lot 5 DEEDS 80	0.00	0.00	0	0
1749463	Lot 1 DP 354017, Lot 5 DEEDS 80	0.00	0.00	0	0
1749464	Lot 1 DP 354017, Lot 5 DEEDS 80	0.00	0.00	0	0
1749466	Lot 1 DP 354017, Lot 5 DEEDS 80	0.00	0.00	0	0
1749519	Lot 22 DEEDS 165	0.00	0.00	0	0
1749519	Lot 22 DEEDS 165	0.00	0.00	0	0
4991489	Lot 22 DEEDS 165	0.00	0.00	0	0
4991489	Lot 22 DEEDS 165	0.00	0.00	0	0
1749276	Lot 39 DEEDS 80, Lot 40 DEEDS 80	0.00	0.00	0	0
1749523	Lot 15 DEEDS 165, Lot 16 DEEDS 165	0.00	0.00	0	0
4991563	Lot 39 DEEDS 80, Lot 40 DEEDS 80	0.00	0.00	0	0
1749240	Section 2 SO 9810	0.00	0.00	0	0
1749242	Section 1 SO 9810	0.00	0.00	0	0
1749254	Lot 2 DP 6071, Lot 3 DP 6071	0.00	0.00	0	0
1749255	Lot 2 DP 6071, Lot 3 DP 6071	0.00	0.00	0	0
1749640	Part Lot 1 DEEDS 483	0.00	0.00	0	0
1749641	Part Lot 1 DEEDS 483	0.00	0.00	0	0
1749660	Lot 2 DP 6071, Lot 3 DP 6071	0.00	0.00	0	0
1749672	Part Lot 1 DEEDS 483	0.00	0.00	0	0
4991565	Section 1 SO 9810	0.00	0.00	0	0

Appendix C Roads assessed

T:\Auckland\Archive\WaterModels\3_WORKING\1017353.2403_Pakowhai\Pakowhai_TUFLOW\2_models\model_v1\QGIS_Working_LEBA.qgz Layout: Auguest A3 Appendix Roads Drawn by LEBA

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LOCATION PLAN

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CLIENT HAWKE'S BAY REGIONAL COUNCIL
PROJECT PAKOWHAI STOPBANK
TITLE ROADS ASSESSED WITHIN MODEL DOMAIN

SCALE (A3) 1:12,500 FIG No. FIGURE C1. REV 0

T:\Auckland\Archive\WaterModels\3_WORKING\1017353.2403_Pakowhai\Pakowhai_TUFLOW\2_models\model_v1\QGIS_Working_LEBA.qgz Layout: Auguest A3 Appendix Roads Drawn by LEBA

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CLIENT **HAWKE'S BAY REGIONAL COUNCIL**
PROJECT **PAKOWHAI STOPBANK**
TITLE ROADS ASSESSED WITHIN MODEL DOMAIN
SCALE (A3) 1:12,500 FIG No. FIGURE C2. REV 0

Appendix D Flood maps – 200 m^3/s (sensitivity)

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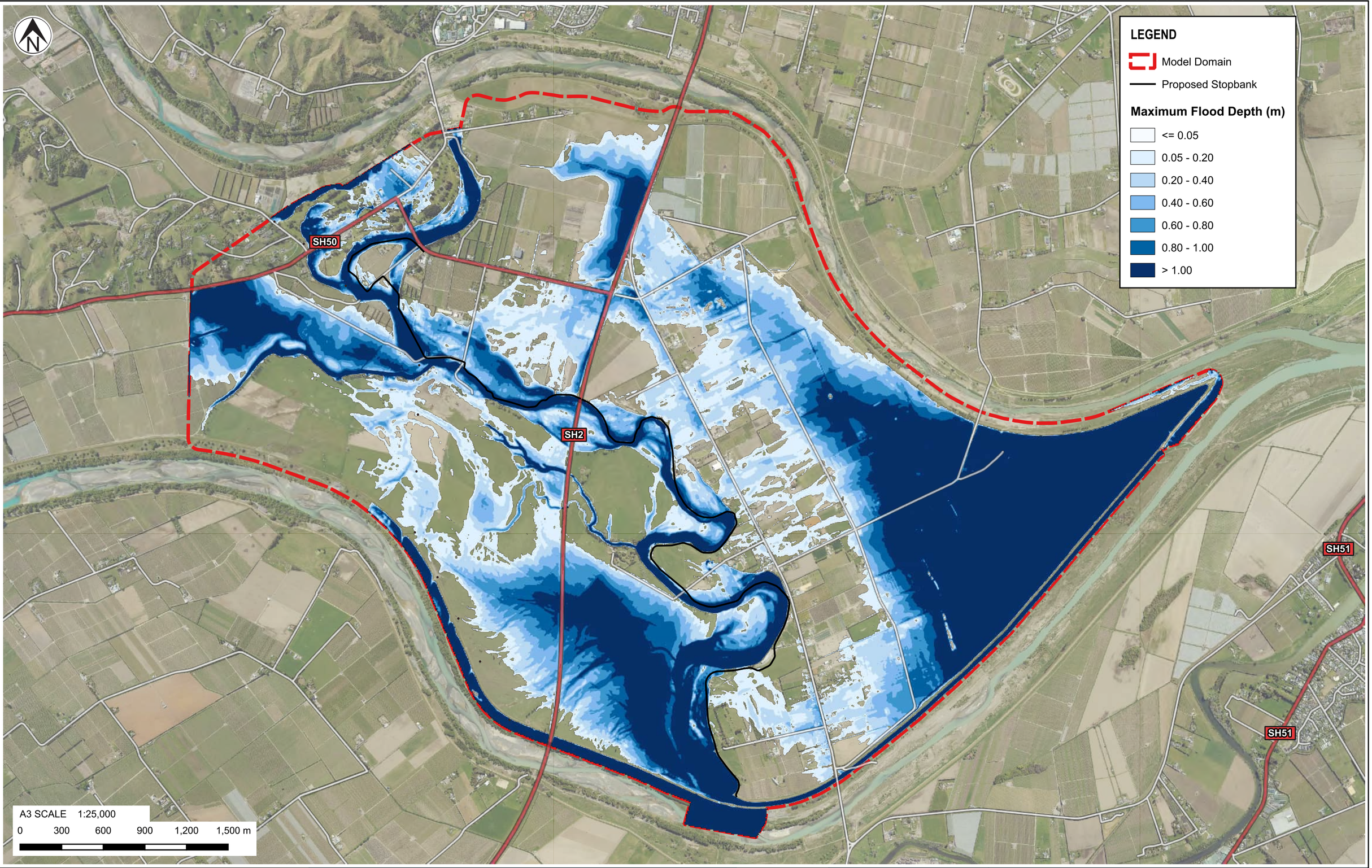

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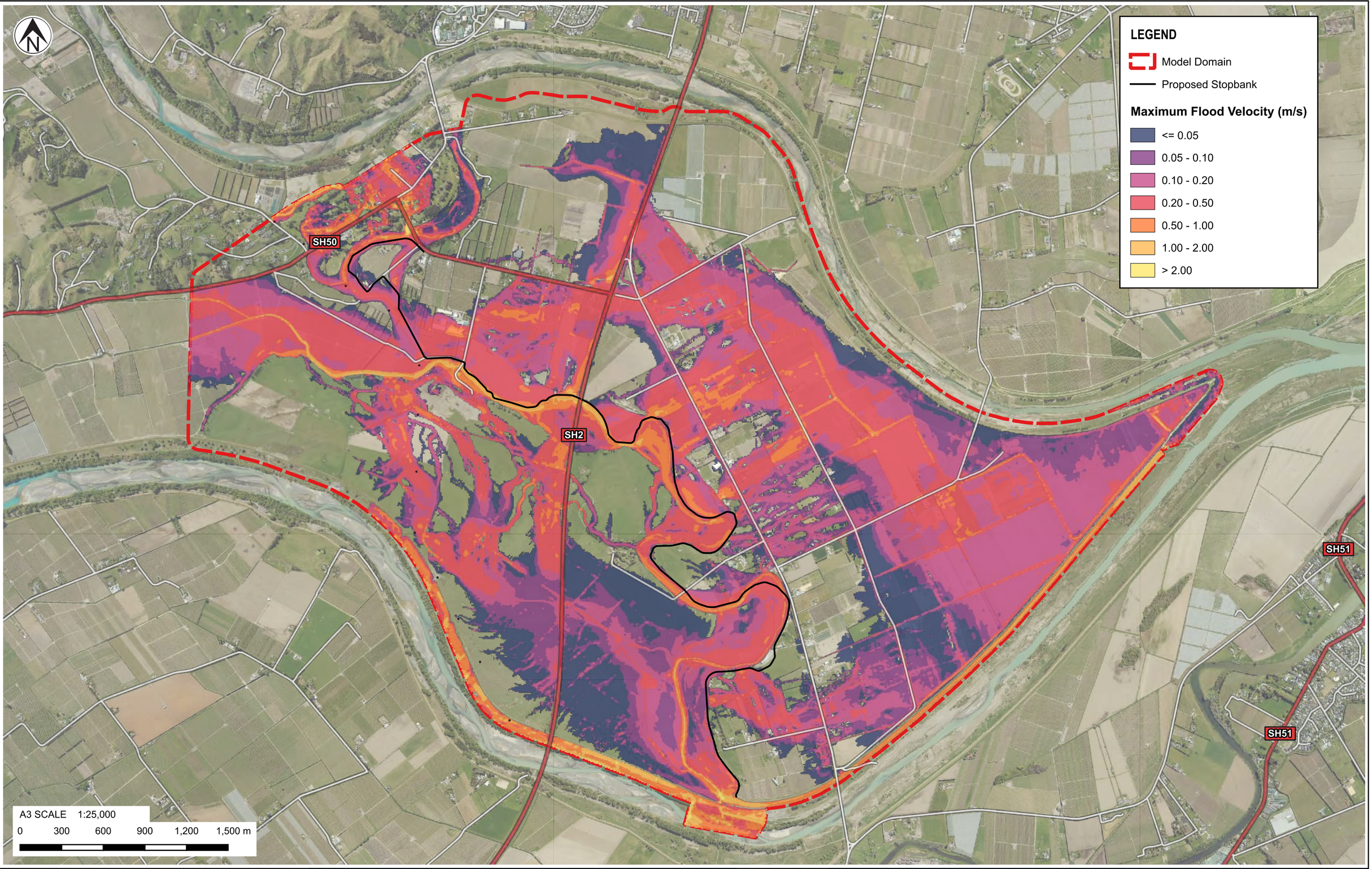
CLIENT **HAWKE'S BAY REGIONAL COUNCIL**
PROJECT **PAKOWHAI STOPBANK**
TITLE DOUBLE INFLOW EVENT (BASE) - 200 M3/S MAXIMUM FLOOD DEPTH
SCALE (A3) 1:25,000 FIG No. FIGURE D1. REV 0

T:\Auckland\Archive\WaterModels\3_WORKING\1017353.2403_Pakowhai\Pakowhai_TUFLOW\2_models\model_v1\QGIS_Working_LEBA.qgz Layout: Auguest A3 Appendix Template Drawn by LEBA



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LOCATION PLAN

PROJECT No.	1017353.2403	
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CLIENT **HAWKE'S BAY REGIONAL COUNCIL**
PROJECT **PAKOWHAI STOPBANK**
TITLE DOUBLE INFLOW EVENT (BASE) - 200 M3/S MAXIMUM FLOOD VELOCITY

SCALE (A3) 1:25,000 FIG No. FIGURE D2. REV 0

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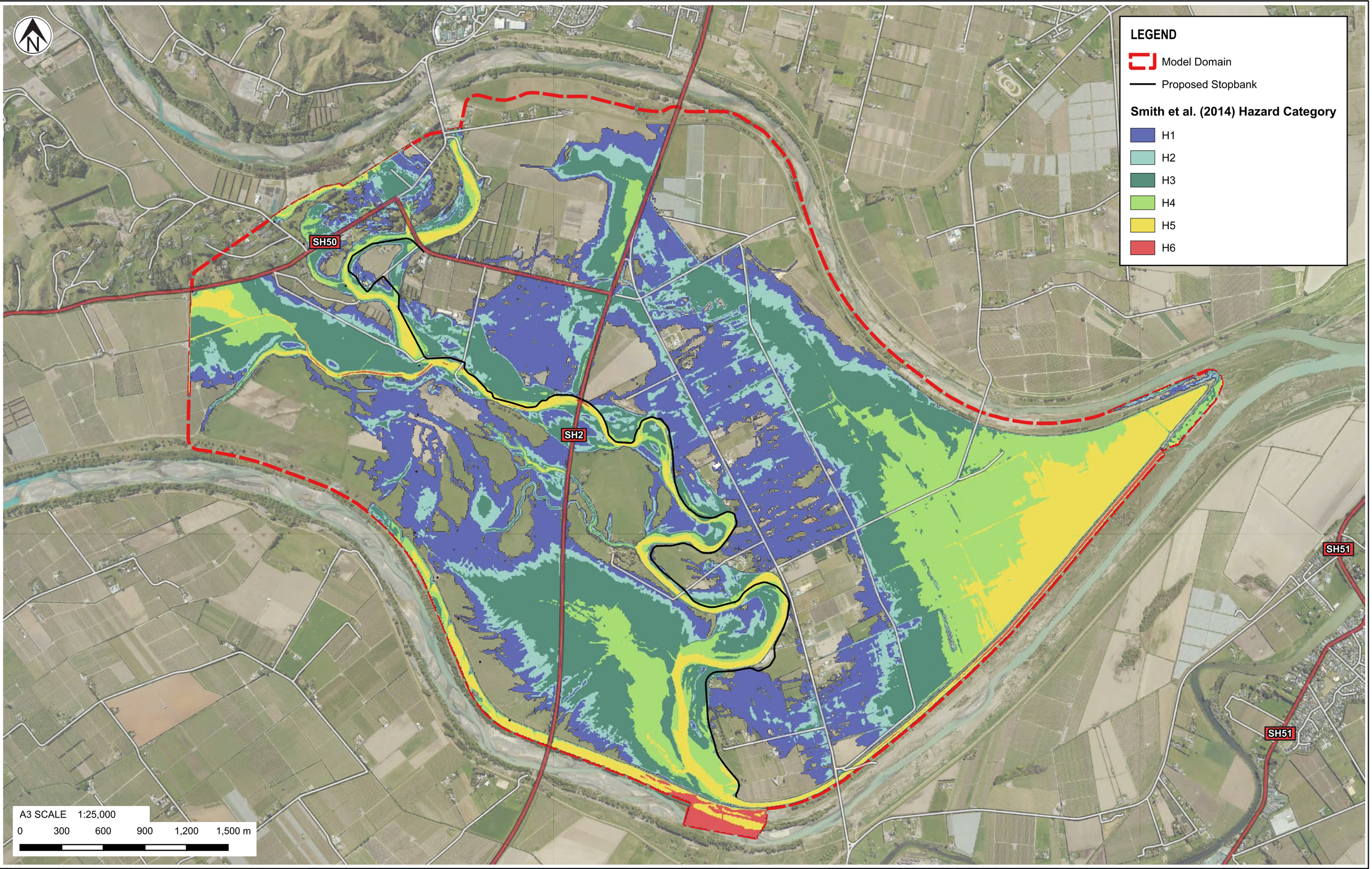

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PROJECT **PAKOWHAI STOPBANK**
TITLE DOUBLE INFLOW EVENT (BASE) - 200 M3/S MAXIMUM FLOOD HAZARD
SCALE (A3) 1:25,000 FIG No. FIGURE D3. REV 0

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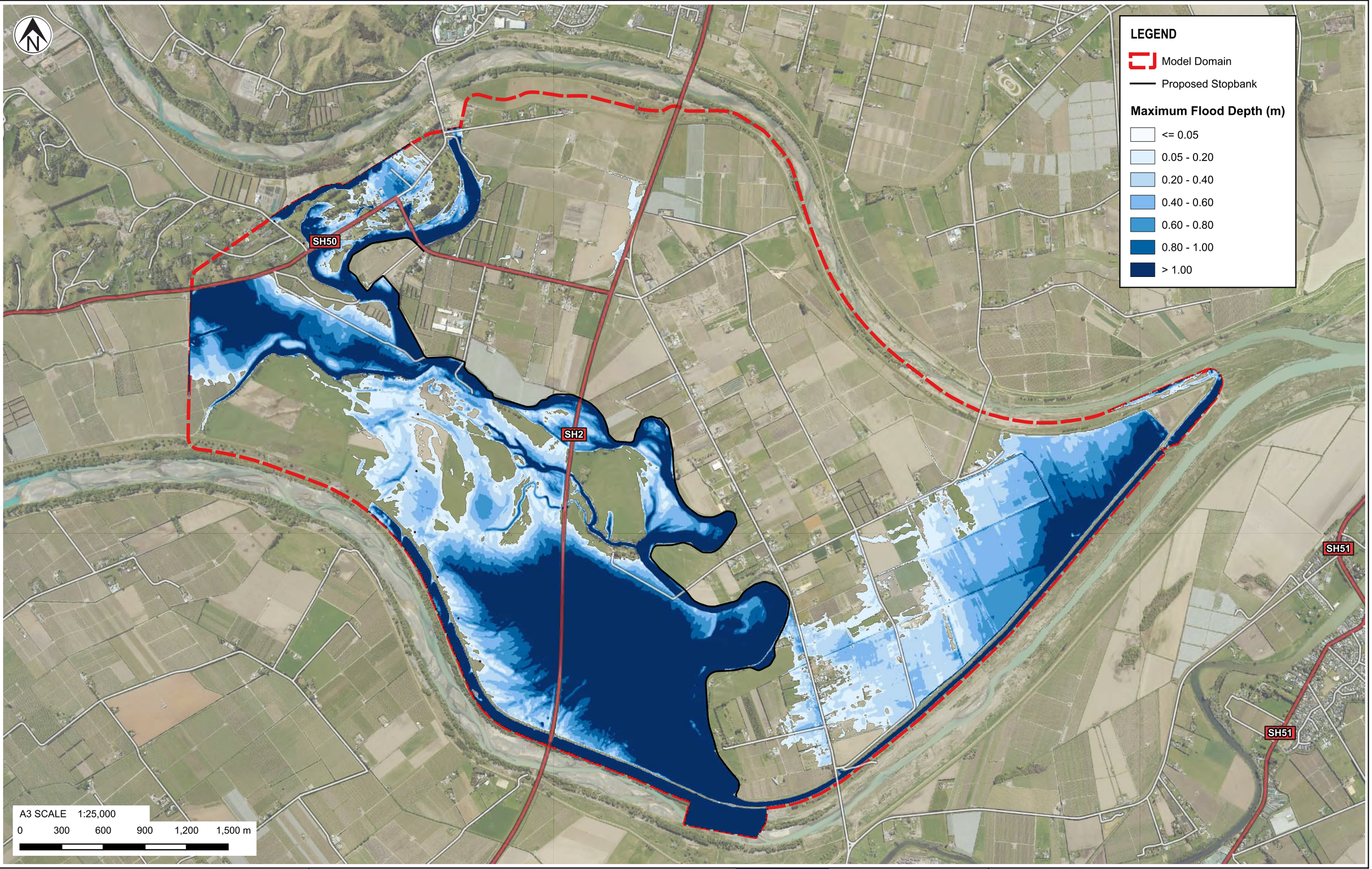

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CLIENT **HAWKE'S BAY REGIONAL COUNCIL**
PROJECT **PAKOWHAI STOPBANK**
TITLE DOUBLE INFLOW EVENT (STOPBANK) - 200 M3/S MAXIMUM FLOOD DEPTH
SCALE (A3) 1:25,000 FIG No. FIGURE D4. REV 0

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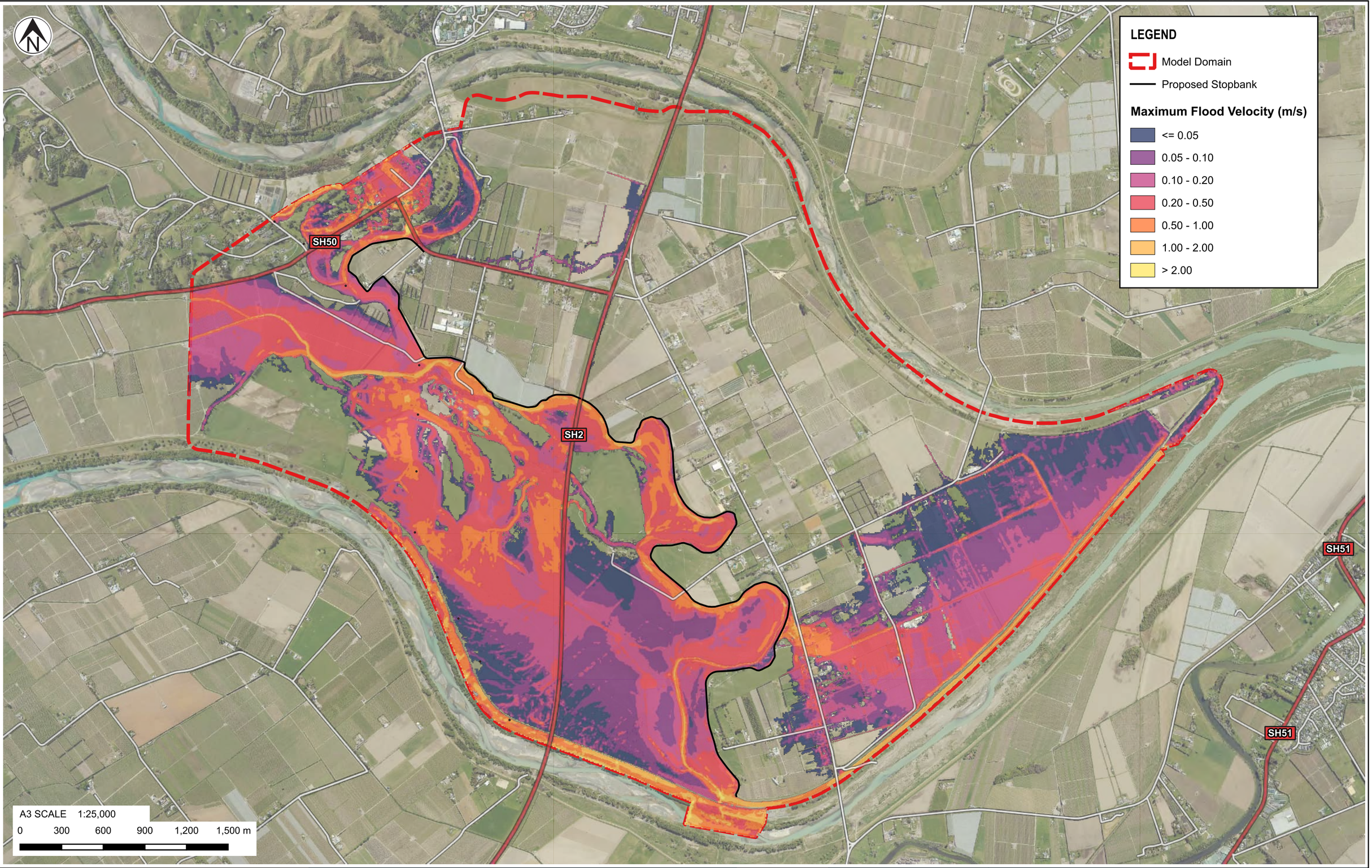

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PROJECT **PAKOWHAI STOPBANK**
TITLE DOUBLE INFLOW EVENT (STOPBANK) - 200 M3/S MAXIMUM FLOOD VELOCITY
SCALE (A3) 1:25,000 FIG No. FIGURE D5. REV 0

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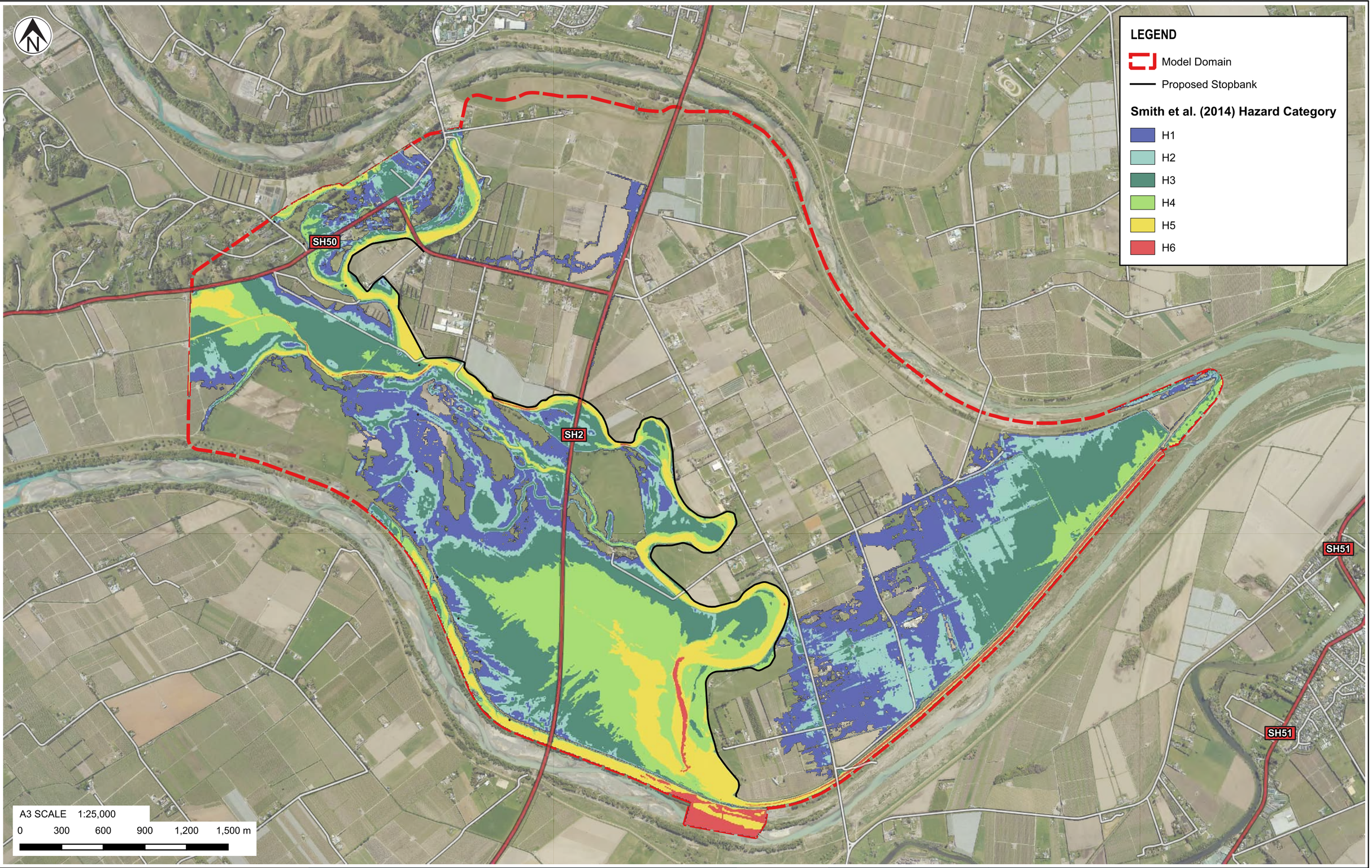

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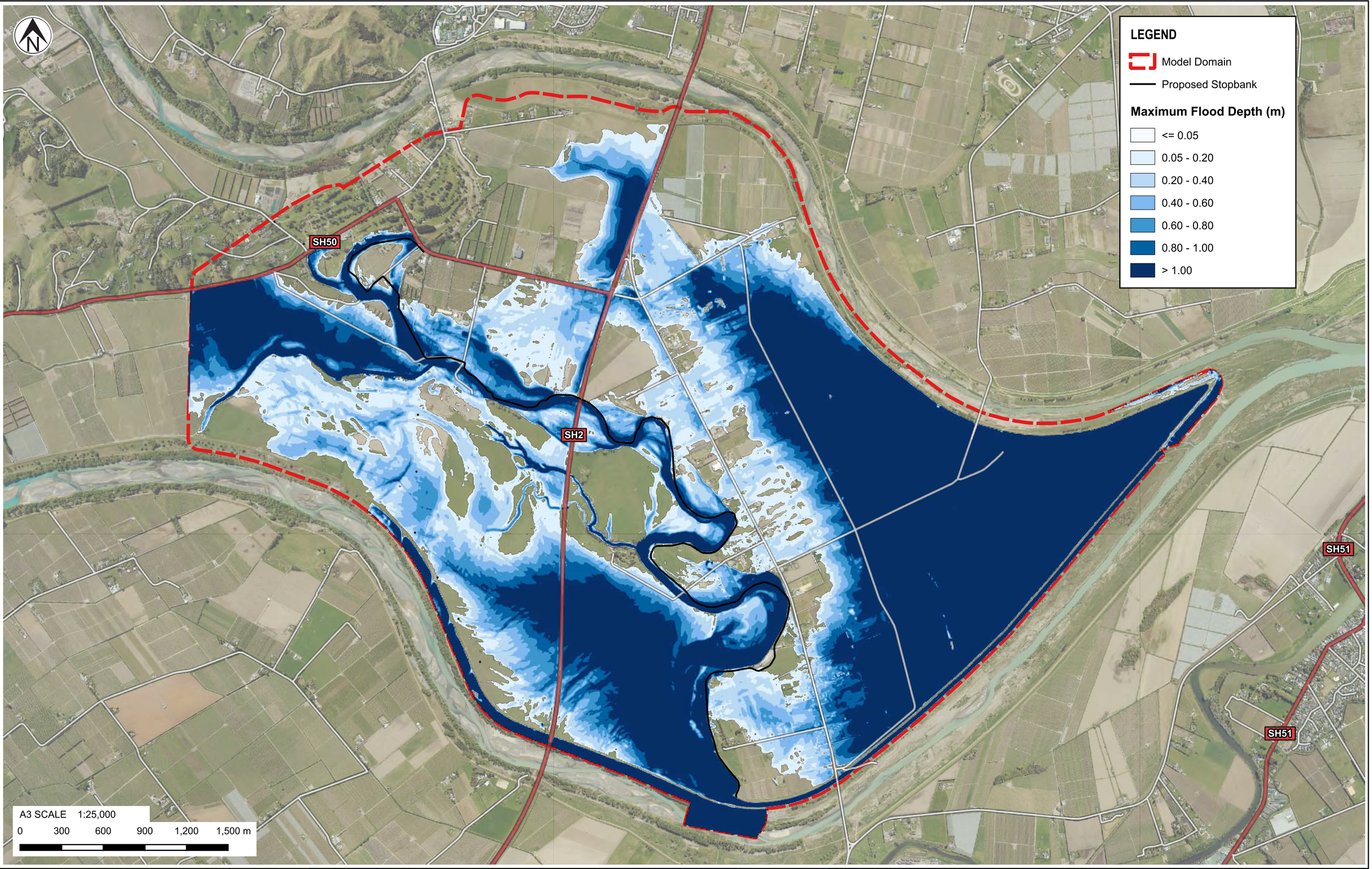
PROJECT **PAKOWHAI STOPBANK**
TITLE DOUBLE INFLOW EVENT (STOPBANK) - 200 M3/S MAXIMUM FLOOD HAZARD
SCALE (A3) 1:25,000 FIG No. FIGURE D6. REV 0

Appendix E Flood maps – 300 m^3/s (overdesign)

T:\Auckland\Archive\WaterModels\3_WORKING\1017353.2403_Pakowhai\Pakowhai_TUFLOW\2_models\model_v1\QGIS_Working_LEBA.qgz Layout: Auguest A3 Appendix Template Drawn by LEBA



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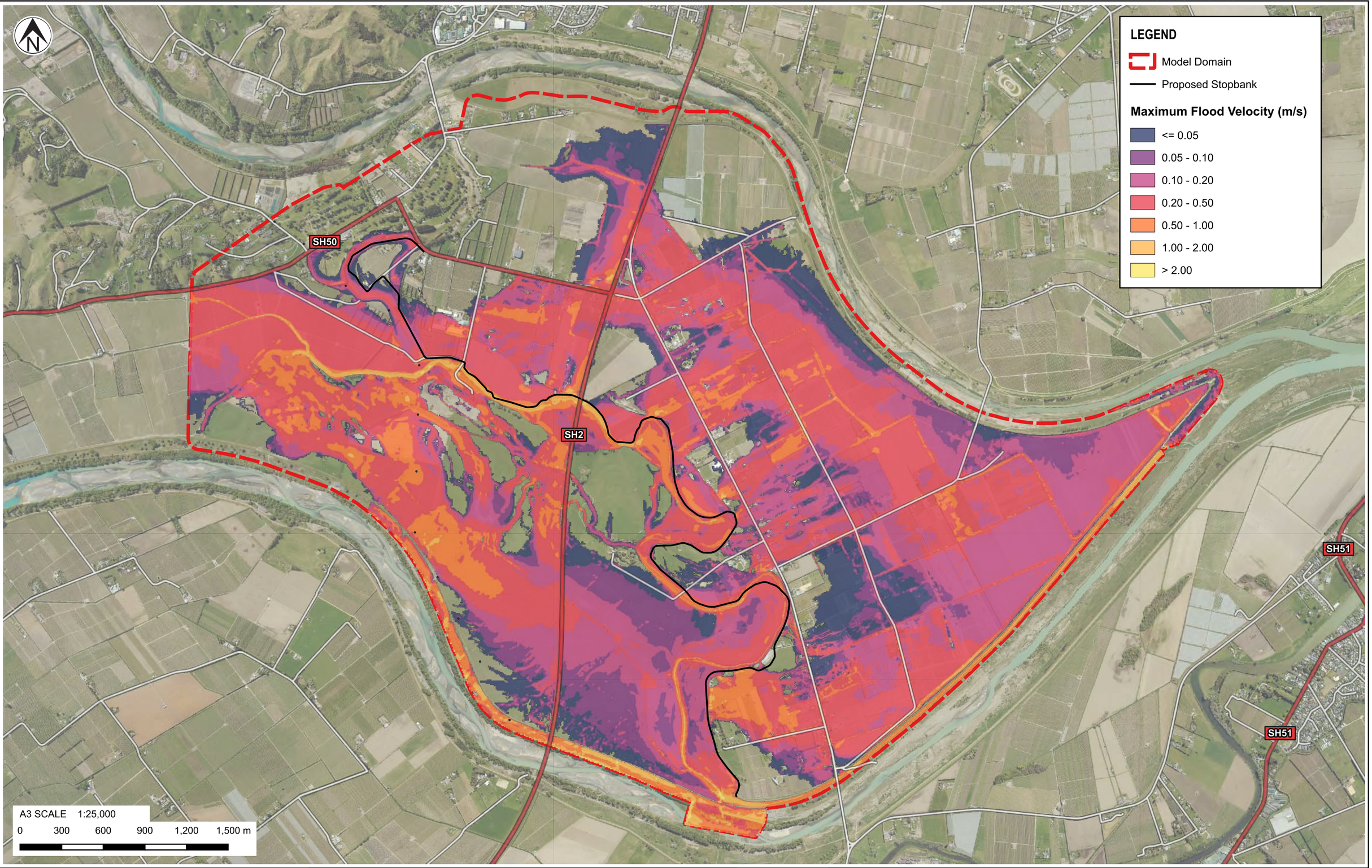
CLIENT **HAWKE'S BAY REGIONAL COUNCIL**
PROJECT **PAKOWHAI STOPBANK**
TITLE OVERDESIGN EVENT (BASE) - 300 M3/S MAXIMUM FLOOD DEPTH
SCALE (A3) 1:25,000 FIG No. FIGURE E1. REV 0

T:\Auckland\Archive\WaterModels\3_WORKING\1017353.2403_Pakowhai\Pakowhai_TUFLOW\2_models\model_v1\QGIS_Working_LEBA.qgz Layout: Auguest A3 Appendix Template Drawn by LEBA



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REV	DESCRIPTION	GIS	CHK	DATE
0	First version			AUG.25

LOCATION PLAN

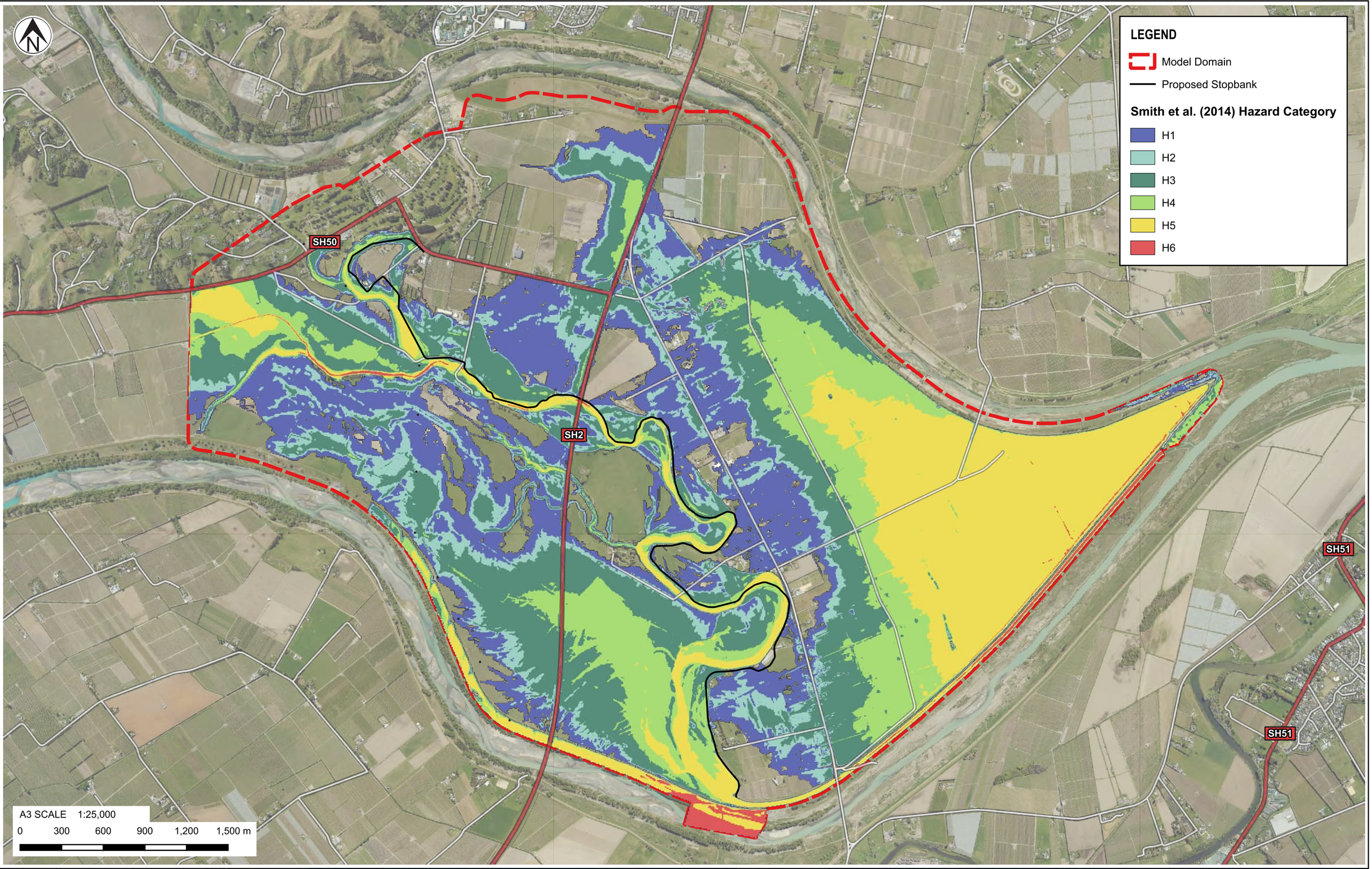
			APPROVED	DATE
PROJECT No.	1017353.2403			
DESIGNED	LEBA	AUG.25		
DRAWN	LEBA	AUG.25		
CHECKED				

CLIENT **HAWKE'S BAY REGIONAL COUNCIL**

PROJECT **PAKOWHAI STOPBANK**

TITLE OVERDESIGN EVENT (BASE) - 300 M3/S MAXIMUM FLOOD VELOCITY

SCALE (A3) 1:25,000 FIG No. FIGURE E2. REV 0



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LOCATION PLAN

PROJECT No.	1017353.2403		
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DRAWN	LEBA	AUG.25	
CHECKED			
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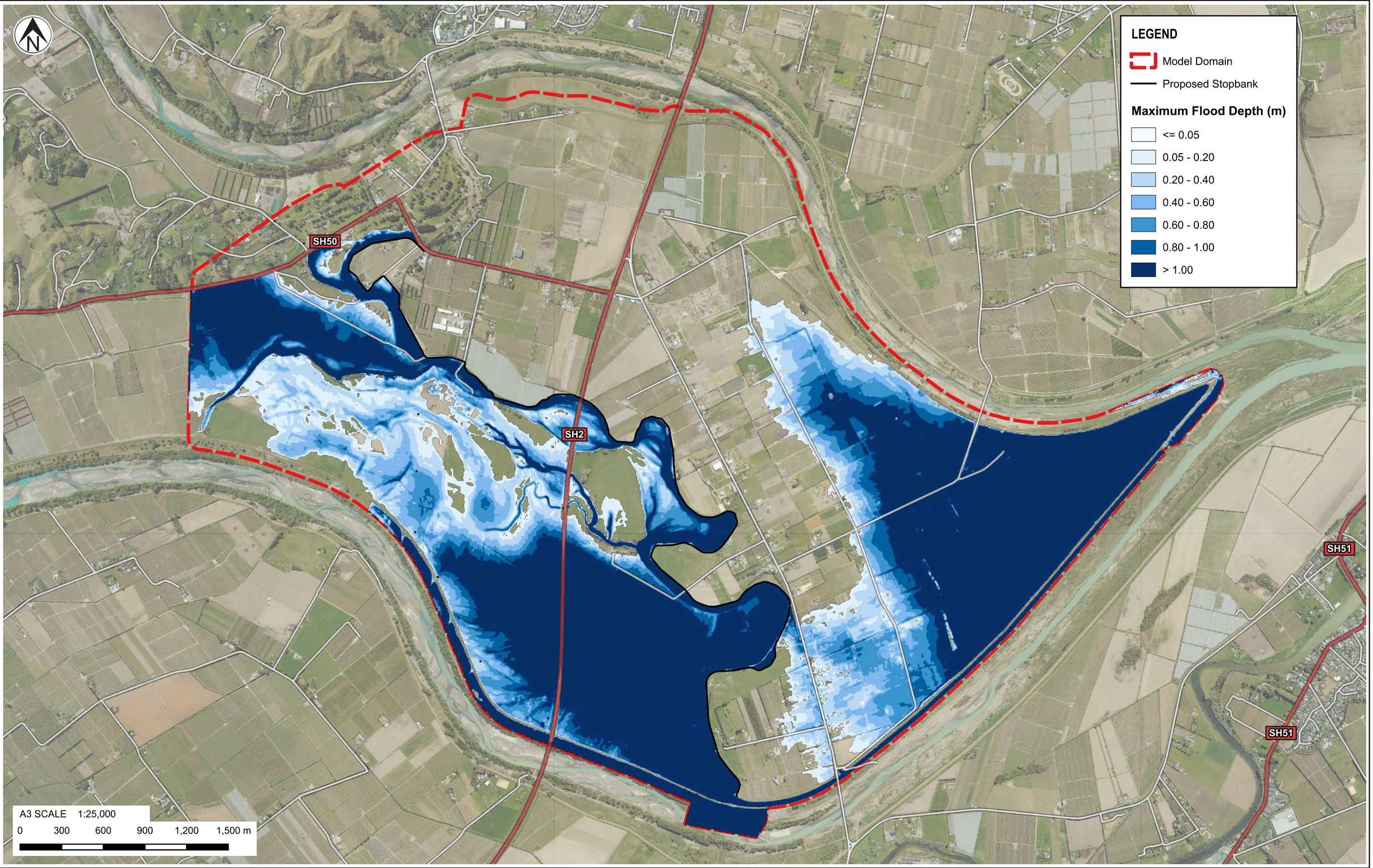
CLIENT **HAWKE'S BAY REGIONAL COUNCIL**
PROJECT **PAKOWHAI STOPBANK**
TITLE OVERDESIGN EVENT (BASE) - 300 M3/S MAXIMUM FLOOD HAZARD
SCALE (A3) 1:25,000 FIG No. FIGURE E3. REV 0

T:\Auckland\Archive\WaterModels\3_WORKING\1017353.2403_Pakowhai\Pakowhai_TUFLOW\2_models\model_v1\QGIS_Working_LEBA.qgz Layout: Auguest A3 Appendix Template Drawn by LEBA



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LOCATION PLAN

PROJECT No.	1017353.2403		
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CLIENT **HAWKE'S BAY REGIONAL COUNCIL**
PROJECT **PAKOWHAI STOPBANK**
TITLE OVERDESIGN EVENT (STOPBANK) - 300 M3/S MAXIMUM FLOOD DEPTH
SCALE (A3) 1:25,000 FIG No. FIGURE E4. REV 0

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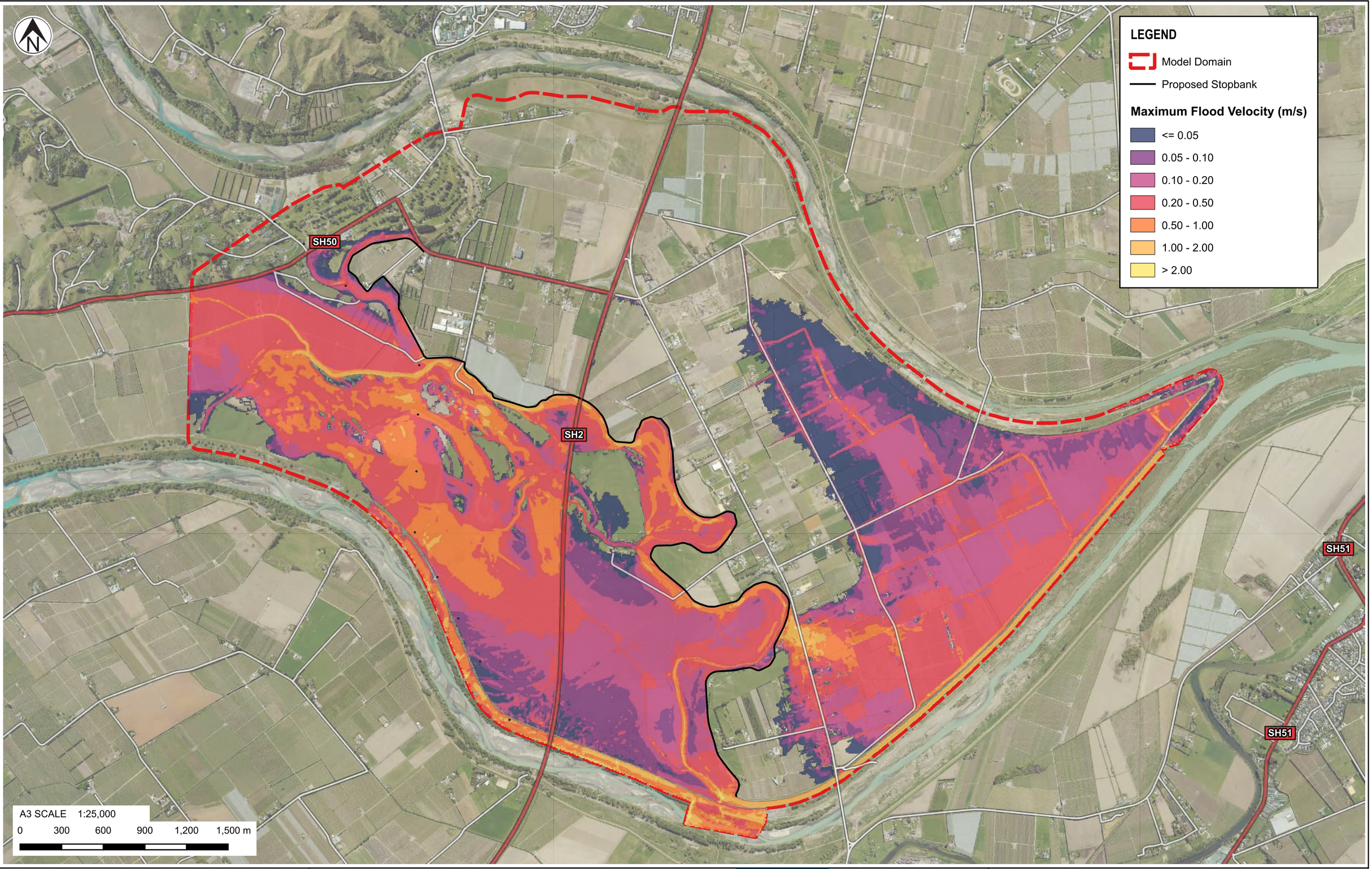

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SCALE (A3) 1:25,000 FIG No. FIGURE E5. REV 0

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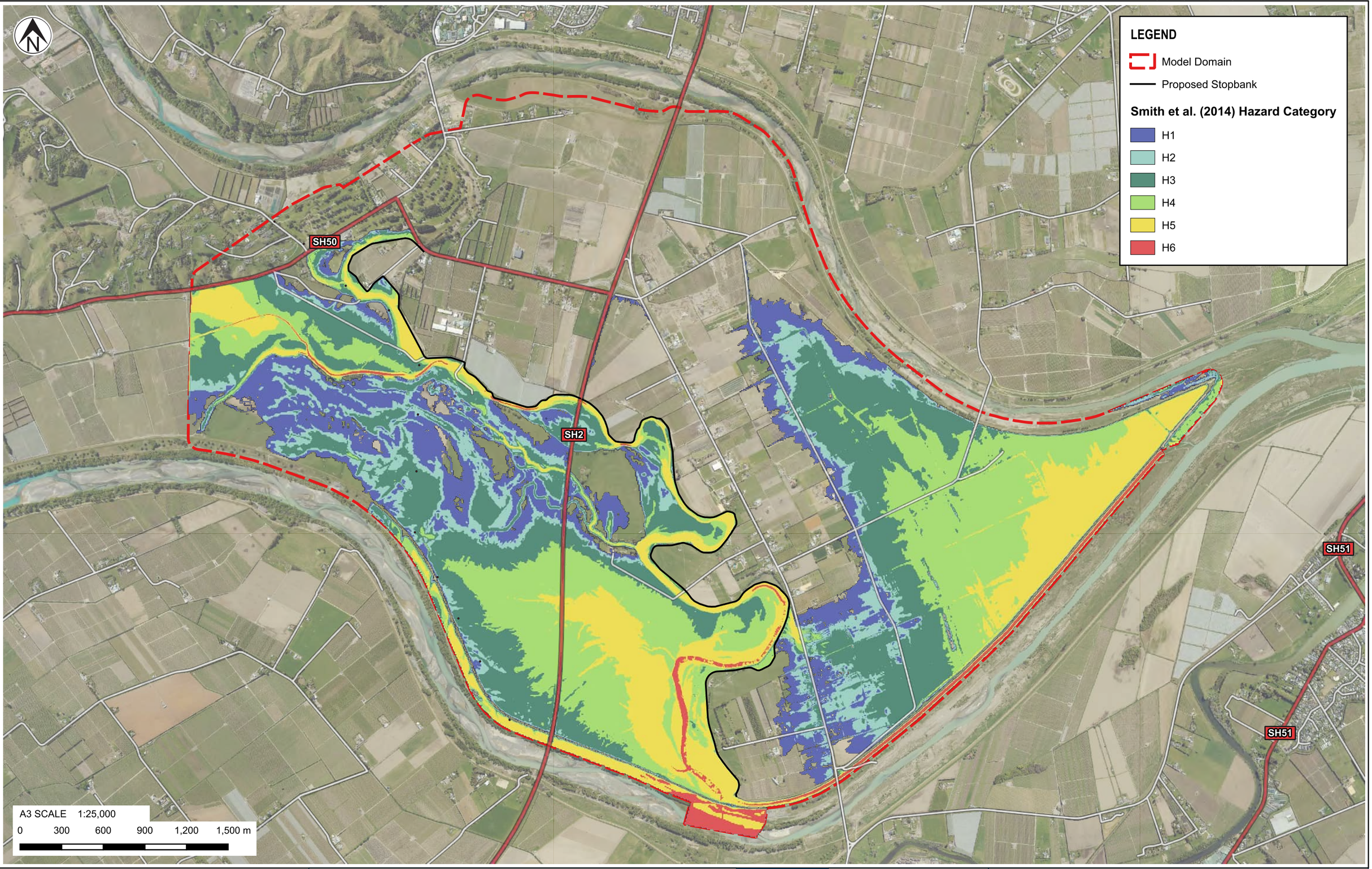

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SCALE (A3) 1:25,000 FIG No. FIGURE E6. REV 0

Appendix F Flood maps – 30 m^3/s (local catchment)

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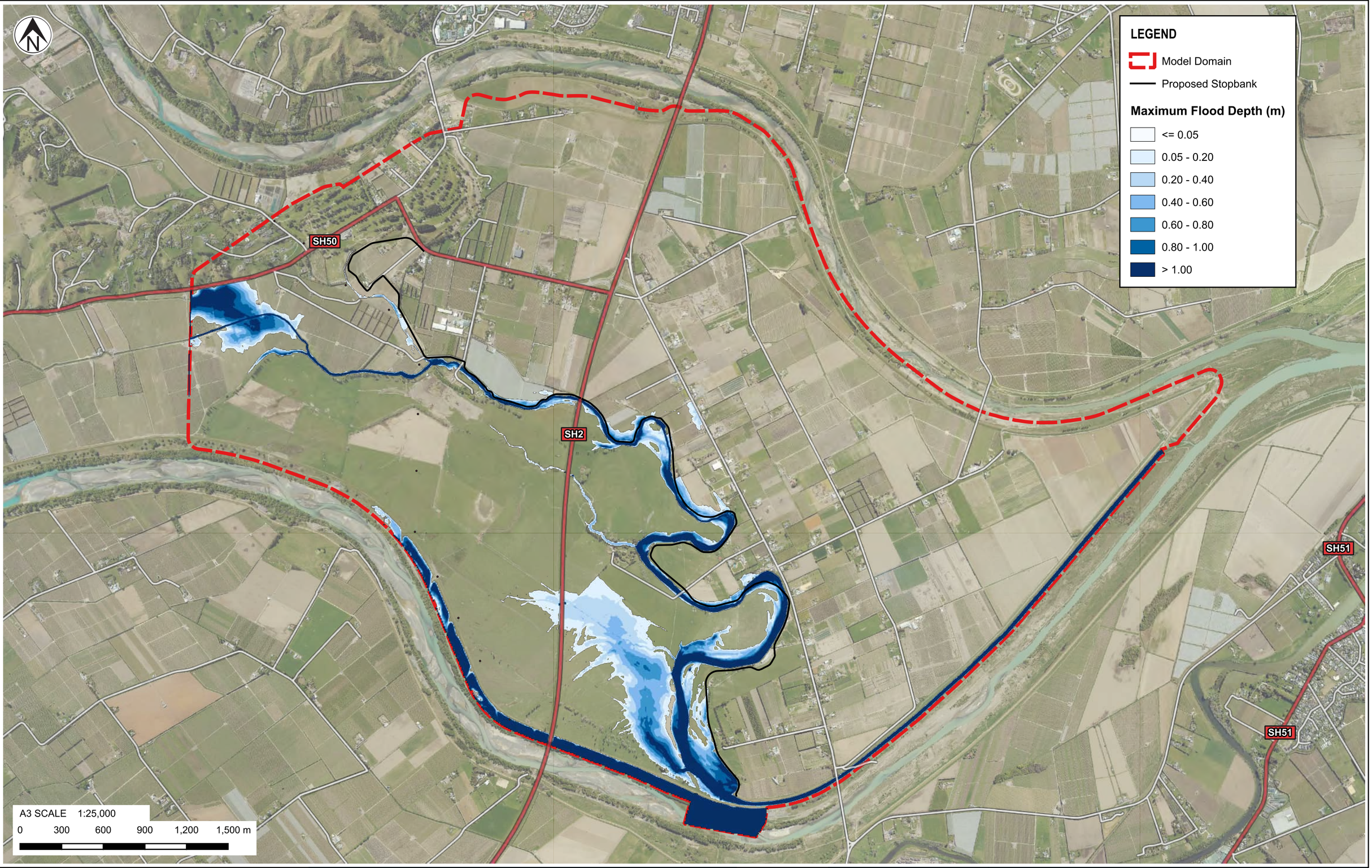

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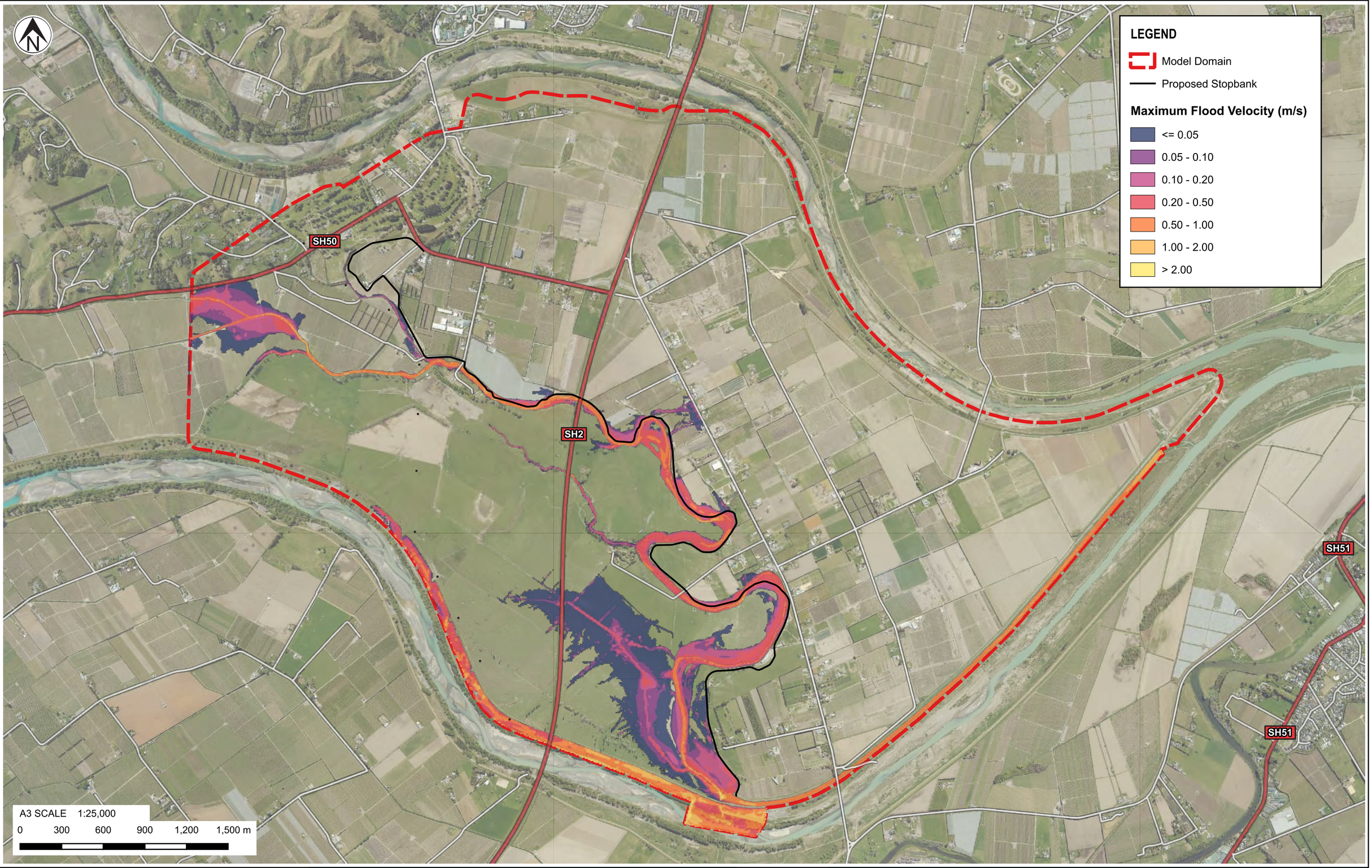
SCALE (A3) 1:25,000 FIG No. FIGURE F1. REV 0



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SCALE (A3) 1:25,000 FIG No. FIGURE F2. REV 0

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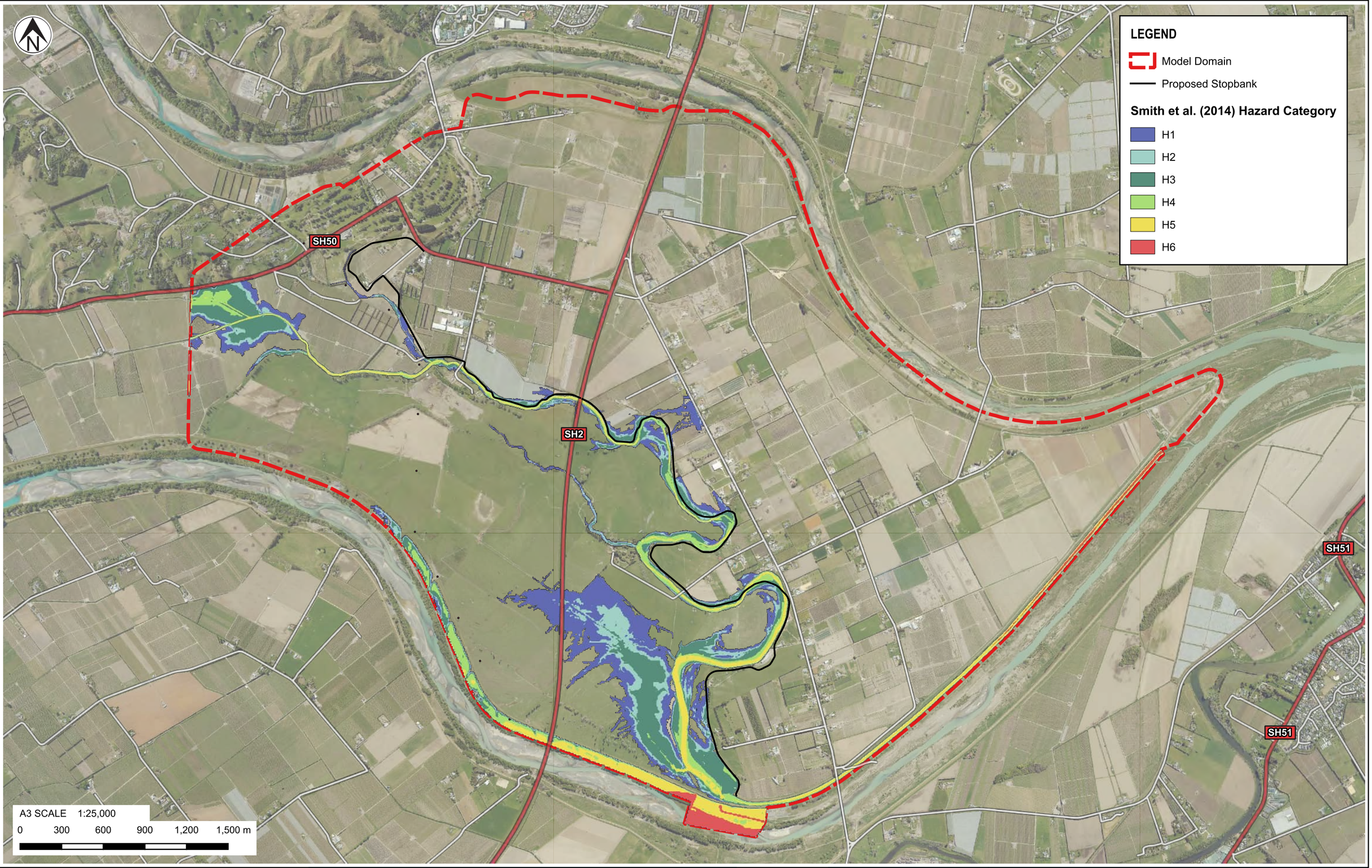

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SCALE (A3) 1:25,000 FIG No. FIGURE F3. REV 0

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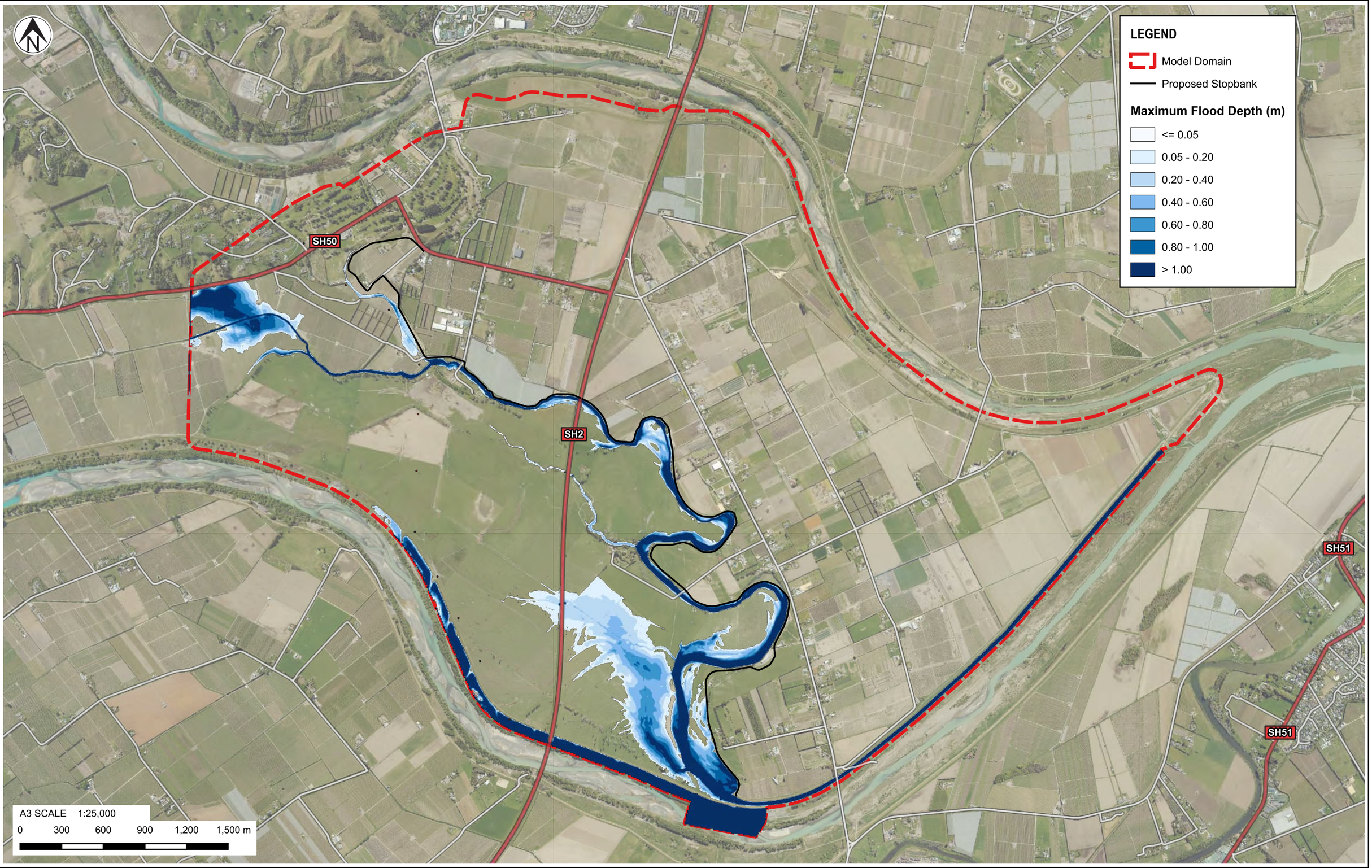

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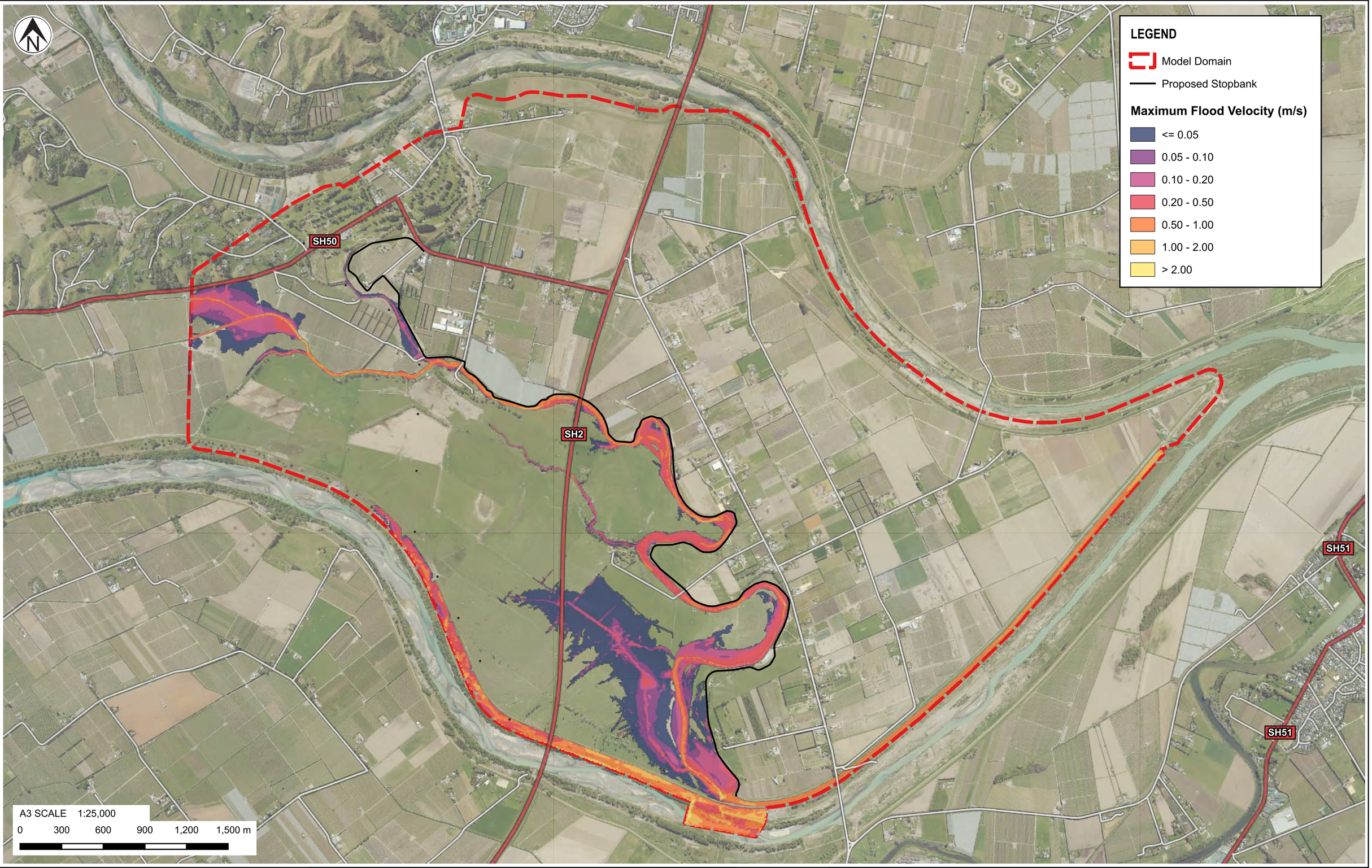

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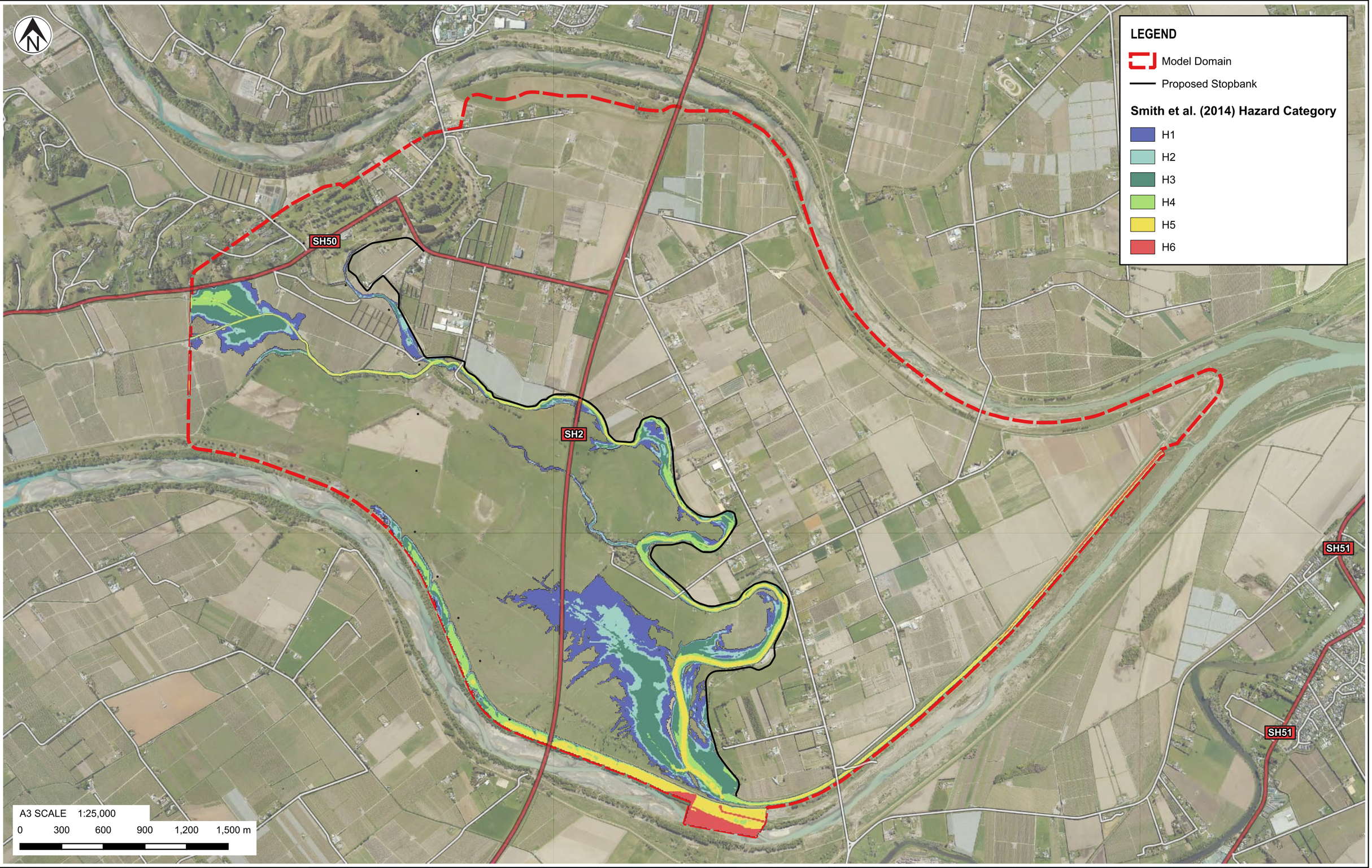
SCALE (A3) 1:25,000 FIG No. FIGURE F5. REV 0



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TITLE CATCHMENT EVENT (STOPBANK) - 30 M3/S MAXIMUM FLOOD HAZARD
SCALE (A3) 1:25,000 FIG No. FIGURE F6. REV 0

Appendix G Tonkin & Taylor Ltd: Tūtaekurī-Waimate Stream hydrology memo

Memo

To:	Richard Brunton	**Job No:**	1017353.2301
From:	John Hansford	**Date:**	20 March 2024
cc:			
Subject:	Tutaekuri Waimate Stream hydrology		

1 Introduction

This memo presents a summary of the hydrological analyses undertaken to generate flood hydrograph estimates for the Tutaekuri Waimate Stream for input to a hydraulic model of the Pakowhai area.

2 Streamflow frequency analysis

The only streamflow gauge on the Tutaekuri Waimate Stream is the Tutaekuri Waimate at Goods Bridge site shown on Figure 3.1. The gauge record starts on 31 July 1978 and is currently in operation (as of January 2024). There are short periods of missing data between 1978 and the end of August 1994. From September 1994 to December 2011 there are no data. From December 2011 to date there are short periods of missing data.

Clarification on the quality of the data was requested from Hawkes Bay Regional Council (HBRC) who responded in an email from Rob Waldron: "…*the site was not in operation for the period between 1994 in 2011. The site was reinstated in 2011 primarily for the purposes of low flow monitoring (in relation to consented water abstractions) as opposed to high flows/floods. Although the site is rated to provide flow, maintaining a rating at the site has always been challenging, due to extensive aquatic weed growth mostly during the warmer months. Due to high flows not being the focus at this site, there is definitely some uncertainty in the upper end of the ratings*."

Frequency analysis of the gauge data was carried out using the annual maxima for the years 1978 to 1994 and 2011 to 2023 (total of 26 years of data). The results are summarised in Table 2.1 and the frequency distributions are shown in Figure 2.1. Confidence in the flood peaks is not high because of uncertainty in the observed flows as indicated by HBRC above.

Table 2.1: Tutaekuri Waimate at Goods Bridge: frequency analysis results

ARI (years)	Peak discharge (m^3/s)					
	Log Normal	Log Normal 3	General Extreme Value	Extreme Value 1	Pearson 3	Log Pearson 3
5	15.0	15.0	15.2	14.9	15.1	15.2
10	19.2	18.6	18.1	18.2	17.7	18.5
20	23.4	22.2	20.7	21.4	20.0	21.6
50	29.4	27.0	23.8	25.5	22.6	25.4
100	34.2	30.8	25.9	28.6	24.4	28.1
250	40.9	35.9	28.4	32.6	26.6	31.4

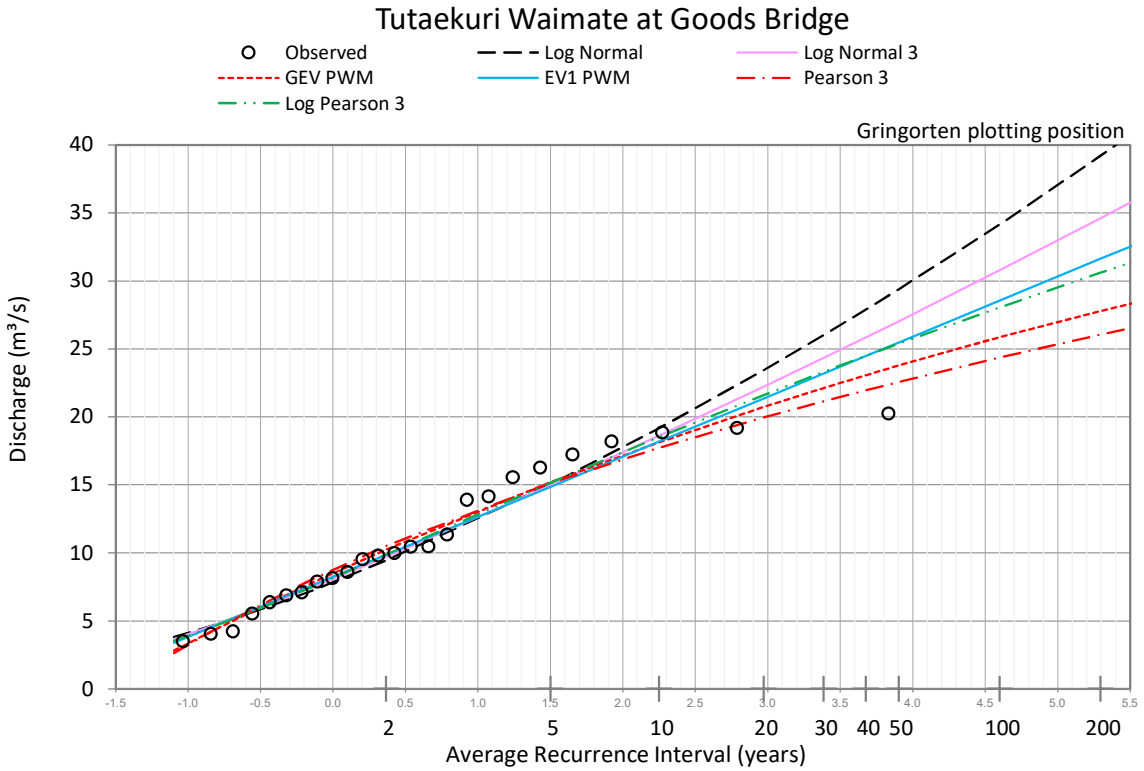


Figure 2.1: Tutaekuri Waimate at Goods Bridge: frequency distributions

The Pearson 3 distribution provides the best statistical fit to the gauge data. However, based on inspection of the annual maxima in Figure 2.1, confidence in the estimated discharge at ARI greater than 10 to 20-years is low. This is because of the limited available gauge data for high/flood flows above these ARI. Furthermore, since 2011 the primary purpose of the Goods Bridge gauge site is to record low flows as opposed to high/flood flows. HBRC have also indicated that maintaining ratings at the site is difficult due to aquatic weed growth.

3 Rainfall-runoff model

3.1 Model catchments

A rainfall-runoff model of the Tutaekuri Waimate Stream catchment was developed in HEC-HMS software[1] to estimate discharge from HIRDSv4[2] rainfall during several Average Return Interval (ARI) events. The model was calibrated against the frequency analysis estimates for the Goods Bridge gauge as described in Section 2.

The Tutaekuri Waimate Stream catchment was divided into three sub-catchments as shown in Figure 3.1. Each of the three sub-catchments was assigned its own catchment parameters and HIRDS V4 rainfall data point as shown in Figure 3.1.

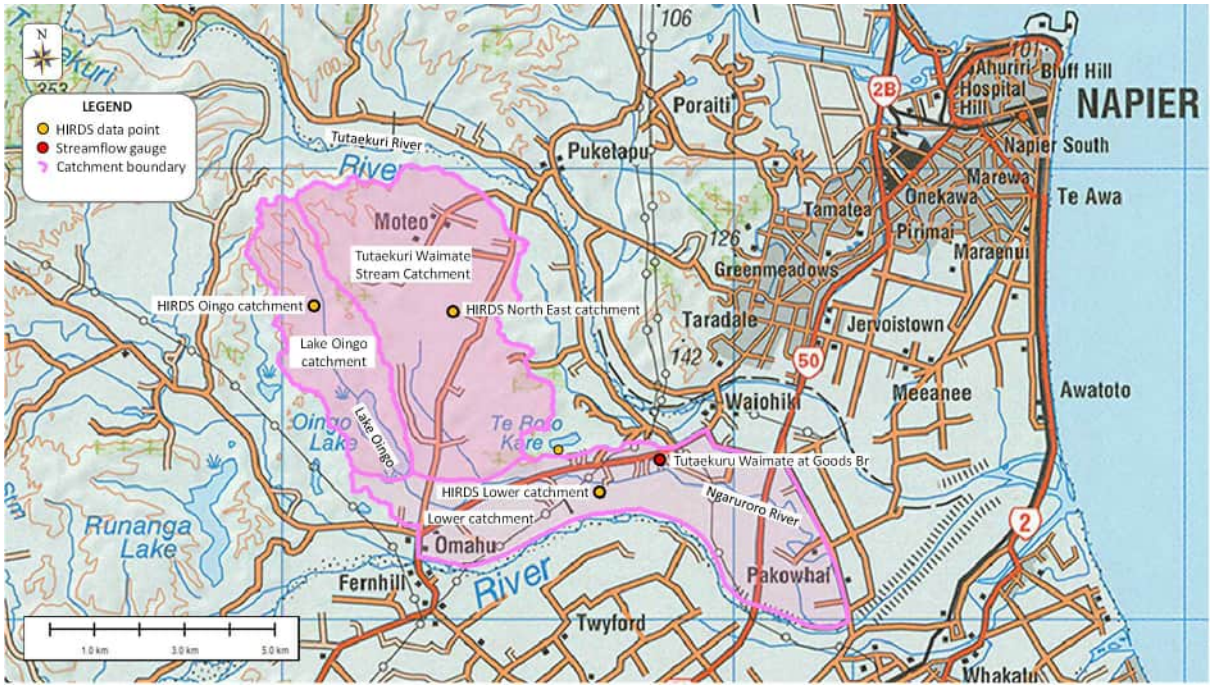


Figure 3.1: Tutaekuri Waimate Stream sub-catchment, streamflow gauge and HIRDS rainfall locations

The HEC-HMS model was set up to simulate flows into Lake Oingo and from the eastern and lower catchments. Flows were routed through Lake Oingo using available data for the weir overflow supplied by HBRC as a dimensioned sketch sent by email. A schematic of the HEC-HMS model is shown in Figure 3.2.

[1] The Hydrologic Modeling System (HEC-HMS) from the US Army Corps of Engineers
[2] High Intensity Rainfall Design System V4 (https://hirds.niwa.co.nz/)

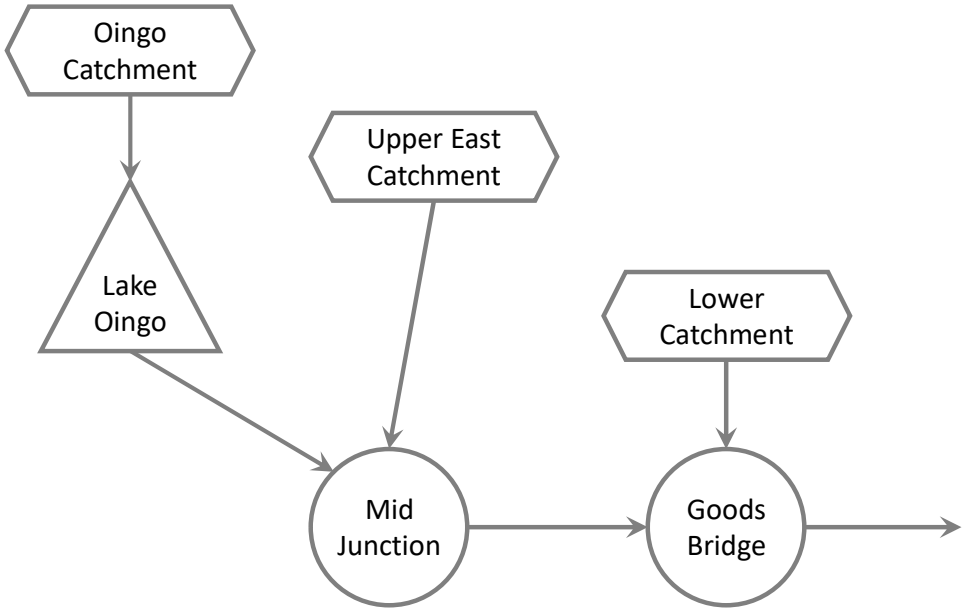


Figure 3.2: Mode schematic

The sub-catchment area, equal area slope along the longest watercourse and time of concentration (Tc) calculated using the USBR formula and the storage coefficient are summarised in Table 3.1.

Table 3.1: Sub-catchment characteristics

Characteristic	Sub-catchment			
	Oingo	Upper east	Lower	
			to Goods Bridge gauge	to flood model boundary
Area (km^2)	10.0	23.1	8.7	20.3
Longest watercourse (km)	7.43	8.21	7.86	16.67
Equal area slope (m/m)	0.0052	0.0032	0.0008	0.0008
Tc (hours)	3.5	4.0	7.5	11.5
R (hours)	5.3	6.0	11.5	17.5

The land use in the catchment is predominantly for agriculture with a small amount of forest as shown in Figure 3.3.

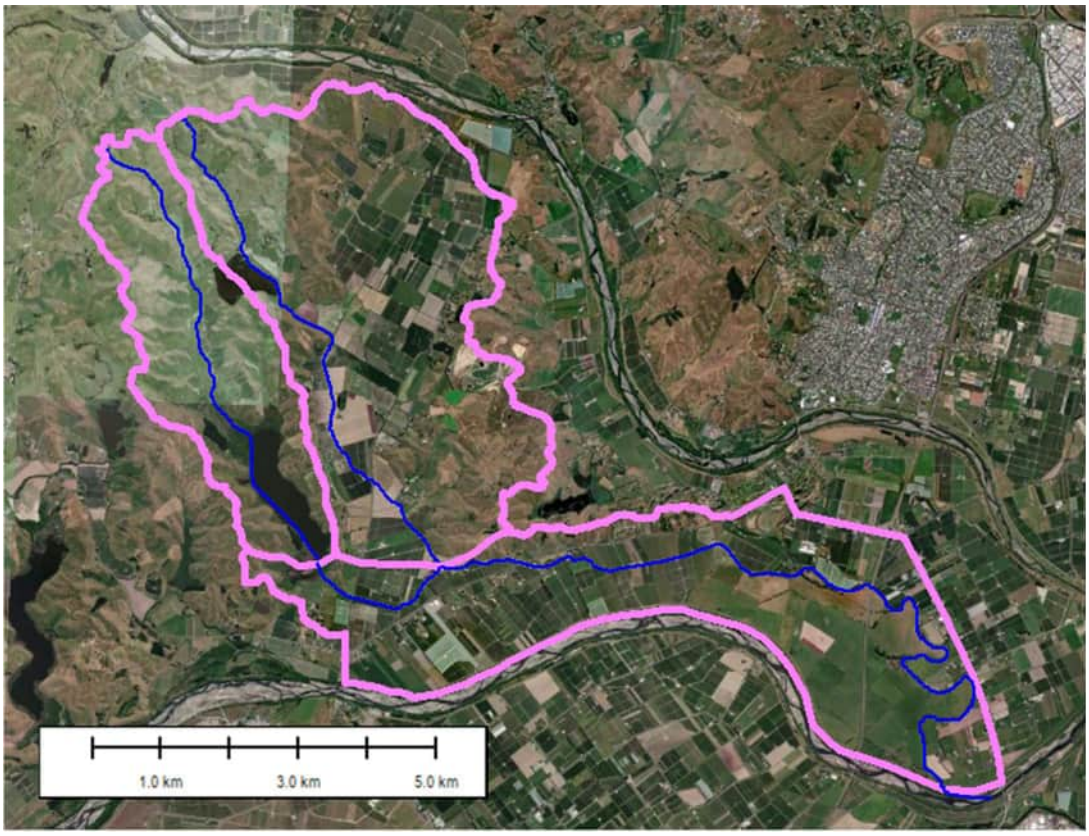


Figure 3.3: Land use in the Tutaekuri Waimate catchment

Figure 3.4 shows the Landcare Research soil permeability map for the catchment.

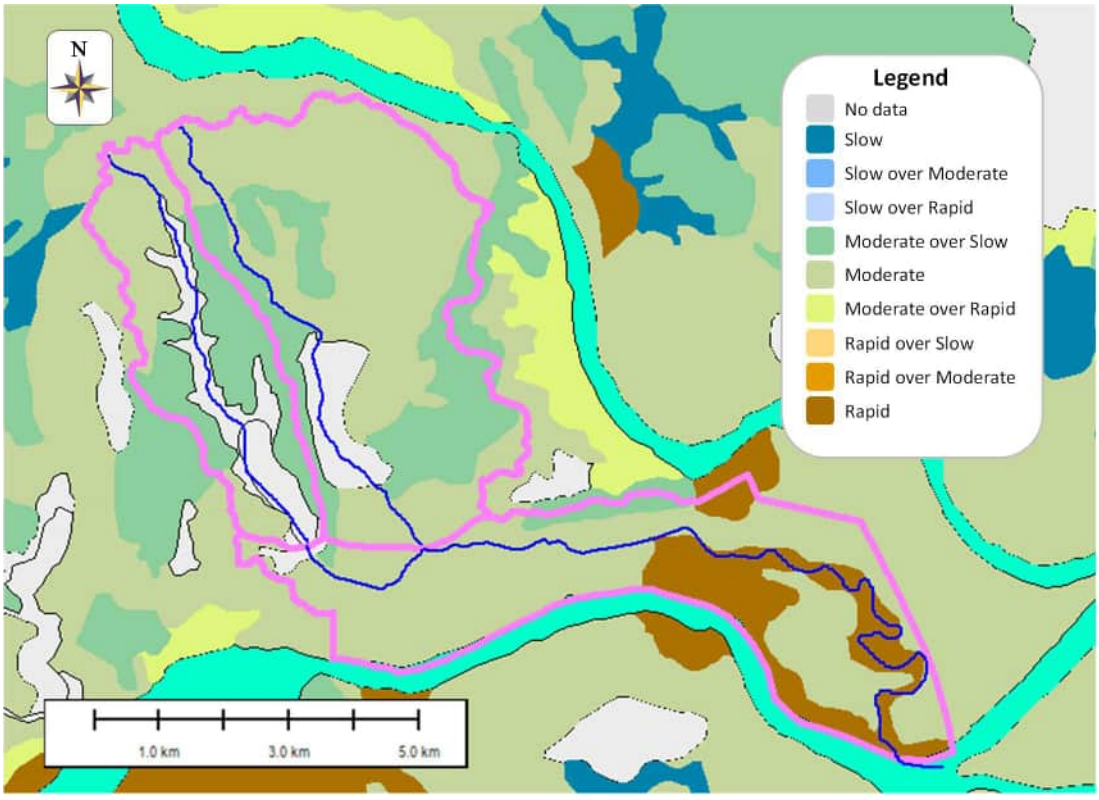


Figure 3.4: Landcare Research soil permeability in the catchment

3.2 Rainfall data

Design rainfall for the three sub-catchments was sourced from HIRDS v4 for input to the HEC-HMS model. The data were extracted for locations near the centroid od the Oingo, Upper East and Lower catchments (as shown in Figure 3.1). The HIRDS rainfall is listed in Table 3.2.

Table 3.2: HIRDS version 4 data

Oingo Catchment							
ARI (y)	**1h**	**2h**	**3h**	**6h**	**12h**	**24h**	**48h**
2	17.4	24.2	29.2	39.9	53.8	71.5	93.6
5	23.9	33.0	39.6	53.6	71.6	94.3	122.4
10	29.0	39.8	47.6	64.1	85.1	111.5	143.9
20	34.6	47.1	56.2	75.2	99.3	129.3	166.0
50	42.6	57.6	68.4	90.8	119.1	154.0	196.2
100	49.1	66.1	78.2	103.3	134.7	173.2	219.6
250	58.3	77.9	91.8	120.4	155.8	198.9	250.4
500	65.5	87.1	102.3	133.4	171.7	218.1	272.9
1000	72.8	96.2	112.7	146.2	187.2	236.4	294.3
Upper East Catchment							
ARI (y)	**1h**	**2h**	**3h**	**6h**	**12h**	**24h**	**48h**
2	16.8	23.5	28.5	39.1	52.9	70.3	91.7
5	23.1	32.1	38.7	52.7	70.5	92.9	120.2
10	28.1	38.8	46.6	63.0	84.0	109.9	141.4
20	33.5	46.0	55.0	74.0	98.0	127.7	163.2
50	41.2	56.3	67.1	89.6	117.7	152.2	193.2
100	47.6	64.6	76.8	101.9	133.3	171.4	216.4
250	56.6	76.2	90.2	118.9	154.3	197.0	246.9
500	63.6	85.2	100.5	131.8	170.2	216.0	269.3
1000	70.7	94.2	110.8	144.5	185.6	234.3	290.5
Lower Catchment							
ARI (y)	**1h**	**2h**	**3h**	**6h**	**12h**	**24h**	**48h**
2	15.9	22.4	27.0	36.9	49.3	64.7	83.2
5	22.0	30.5	36.7	49.6	65.7	85.4	108.8
10	26.7	36.9	44.2	59.3	78.2	101.0	127.8
20	31.8	43.7	52.2	69.6	91.2	117.1	147.4
50	39.2	53.5	63.6	84.2	109.4	139.5	174.2
100	45.3	61.4	72.7	95.8	123.8	156.9	194.8
250	53.8	72.4	85.4	111.6	143.2	180.1	222.0
500	60.5	80.9	95.1	123.7	157.7	197.3	241.8
1000	67.3	89.5	104.9	135.5	171.9	213.7	260.5

The total rainfall depths from HIRDSv4 were converted into rainfall hyetographs using the HIRDS temporal distributions using the East of NI profile.

The catchment area to Tutaekuri Waimate at Goods Bridge is 42 km^2 and the catchment area to the hydraulic flood model domain is 53 km^2. For model calibration, rainfall depths were adjusted to the Goods Bridge (42 km^2) catchment area and to generate inflow time series, to the hydraulic flood model domain (53 km^2) catchment using the areal reduction formula from HIRDS[3].

3.3 Model calibration

The HEC-HMS model was calibrated against the frequency analysis estimates for the Goods Bridge gauge as described in Section 2. The simulated peak discharge estimates from the HEC-HMS model for the range of ARI rainfall events along with the gauge frequency distribution estimates are shown in Figure 3.5.

Several different loss methods were tested in the HEC-HMS model to identify the most suitable method for the catchment. Using the initial and constant loss and the Green and Ampt loss methods, the slope of the simulated frequency distribution was much steeper than the gauge frequency distributions and these loss methods were discarded. Using the "Exponential loss method", simulated discharge peaks corresponded reasonably with the Log Normal 3 frequency distribution. The "Exponential loss method" is an empirical loss method available in HEC-HMS. Based on these results, the "Exponential loss method" was adopted for the HEC-HMS model.

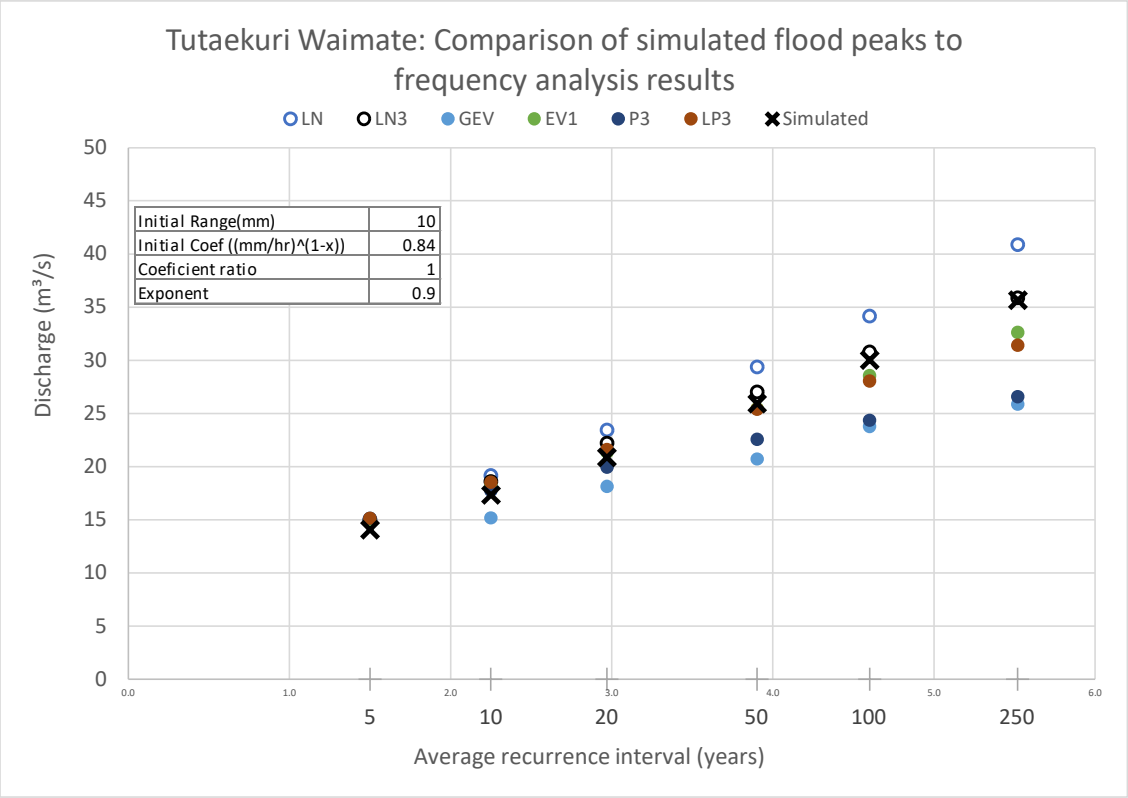


Figure 3.5: Tutaekuri Waimate at Goods Bridge: Comparison of simulated discharge estimates to frequency distribution estimates.

[3] https://niwa.co.nz/sites/niwa.co.nz/files/2018022CH_HIRDSv4_Final.pdf, ARF equation: $ARF = 1 - 0.023\ Area^{0.43}\ Duration^{-0.52}\ (LN(ARI))^{0.23}$

The adopted model “Exponential loss method” parameters for the HEC-HMS model are shown in Table 3.3.

Table 3.3: Adopted HEC-HMS model parameters

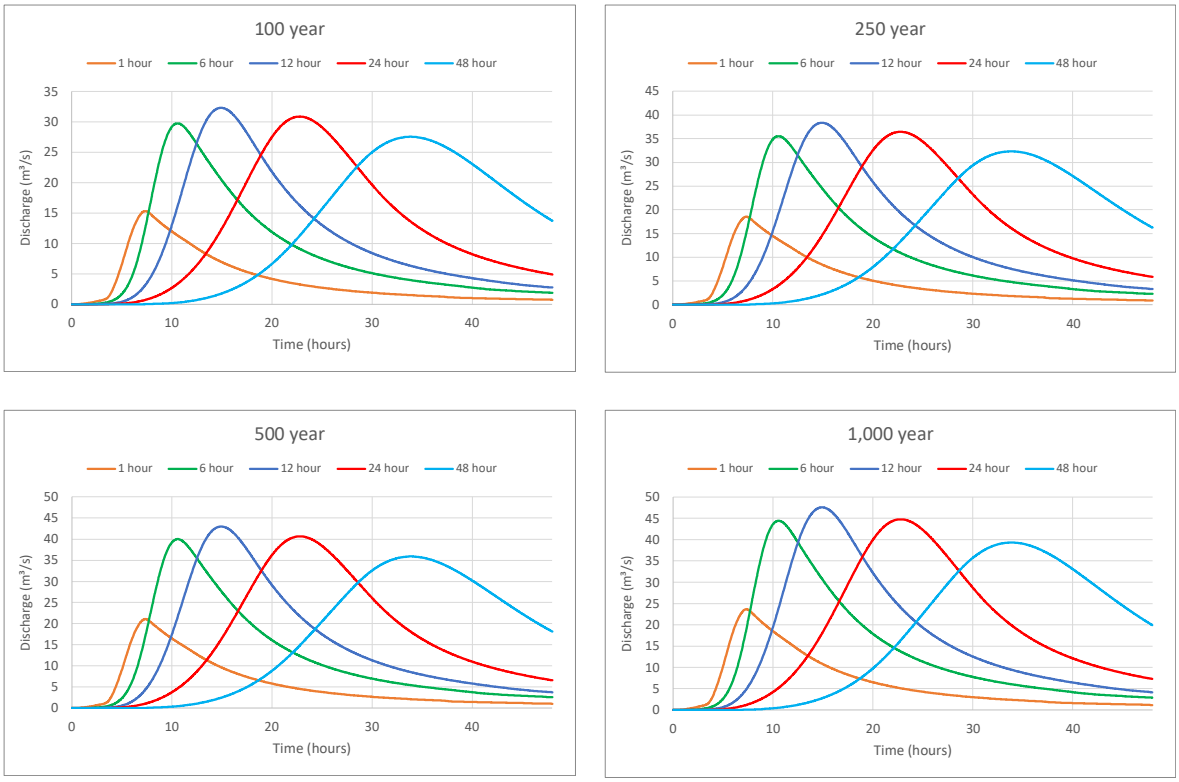
Parameter	Catchment		
	Oingo	Upper East	Lower
Initial Range(mm)	10		
Initial Coefficient ((mm/hr)^(1-x))	0.84		
Coefficient ratio	1		
Exponent	0.9		
Impervious percentage	8[4]	0	0

4 Streamflow time series

The calibrated HEC-HMS model was used to generate flood hydrograph estimates at the hydraulic flood model domain by adjusting the lower catchment area, Tc and R, and the lag applied to discharge from lake Oingo and the Upper East catchment.

Flood hydrographs were generated for the 100-year, 250-year, 500-year and 1000-year ARI rainfall events with present day climate conditions. The resulting hydrograph are shown in Figure 4.1.

Figure 4.1 shows that the 12-hour and 24-hour storm durations result in the highest peak flows.



[4] Lake Oingo surface area treated as impervious area

Figure 4.1: Flood hydrograph estimates.

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