



FLOOD RISK ASSESSMENT

3A Nikau Grove, Lower Hutt

DOCUMENT CONTROL RECORD

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PROJECT	3A Nikau Grove, Lower Hutt
PROJECT NO.	2424-01
DOCUMENT TYPE	R001-v1-2424-01 Flood Risk Assessment
DATE ISSUED	5 August 2026
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ISSUE AND REVISION RECORD

DATE OF ISSUE	5 August 2026
STATUS	Issued
ORIGINATOR	 Louis Freeland – Wellington Civil Manager, CPEng
REVIEWED	 Alan Blyde – Director, Civil
APPROVED FOR ISSUE	 Louis Freeland – Wellington Civil Manager, CPEng



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1.0 INTRODUCTION

The site is located at 3A Nikau Grove Road, Woburn, Lower Hutt (Figure 1). This report provides comment on Flood Risk to support a submission on the Hutt City Council Proposed District Plan (PDP) provisions relating to Natural Hazards.

As part of this work, Envelope met with Alistair Osbourne at the site (Tiaki Wai) and conducted additional hydraulic modelling, which is outlined in this report.



Figure 1. Site locality plan (Grip Maps).

2.0 MODEL BUILD

2.1 MODEL BUILD SUMMARY

The Eastern Lower Hutt model has been provided by Tiaki Wai (TW). The model build report has been provided and we understand that the model is aligned with the TW modelling guidelines and specifications.

2.2 MODEL SOFTWARE

The model has been run utilising ICM modelling software (version 2025.5.4).

2.3 MODEL SCENARIOS

The model was provided with a base scenario, which accounts for the existing catchment. This allows for climate change modelled as a 20% increase with 1 m sea level rise. The model was also run with a 35% increase from existing rainfall, with 1.59 m modelled sea level rise to align with the PDP approach. Table 1 shows the scenarios that have been simulated.



Table 1. Model Scenarios.

No	Storm Event	Hutt Inflow [l/s]	Climate Change Pathway	Sea Level Increase
1	100yr [12hr]	1345	HIRDSv4 20% Climate Nested	1.0 m
2	100yr [12hr]	1345	HIRDSv4 35% Climate Nested	1.59 m

2.4 COORDINATE SYSTEM AND DATUM

The coordinate system used in the model is New Zealand Transverse Mercator 2000 (NZTM 2000). The heights used in the model and referenced in this report are in terms of Wellington 1953 Datum (WGN53). Care should be taken when referencing these results and comparing them to designs within different datums.

2.5 LIMITATIONS

Any flooding depths +/- 20 mm have not been shown as these are considered by Envelope to be minor discrepancies outside the tolerances of the model.

Envelope have reviewed the PDP model within the immediate area of the development but have not undertaken a full review of the PDP flood model.

3.0 MODEL UPDATES

The base PDP model was checked in the immediate vicinity of the development against site-specific information. Limited changes were made to the model, as outlined in the following sections.

3.1 TOPOGRAPHY

The PDP model topography has been updated based on site-specific survey undertaken in July 2026 and shown in Figure 2. The provided PDP model surface used 2016 LiDAR in the extent of the site. However, more recent LiDAR surveys have been flown for the wider area in 2025 and we consider that these are more appropriate to use as they are more closely aligned to the topographical survey. In addition to the site specific survey, the provided model was updated to the 2025 LiDAR in a limited area adjacent to the site (Figure 2).



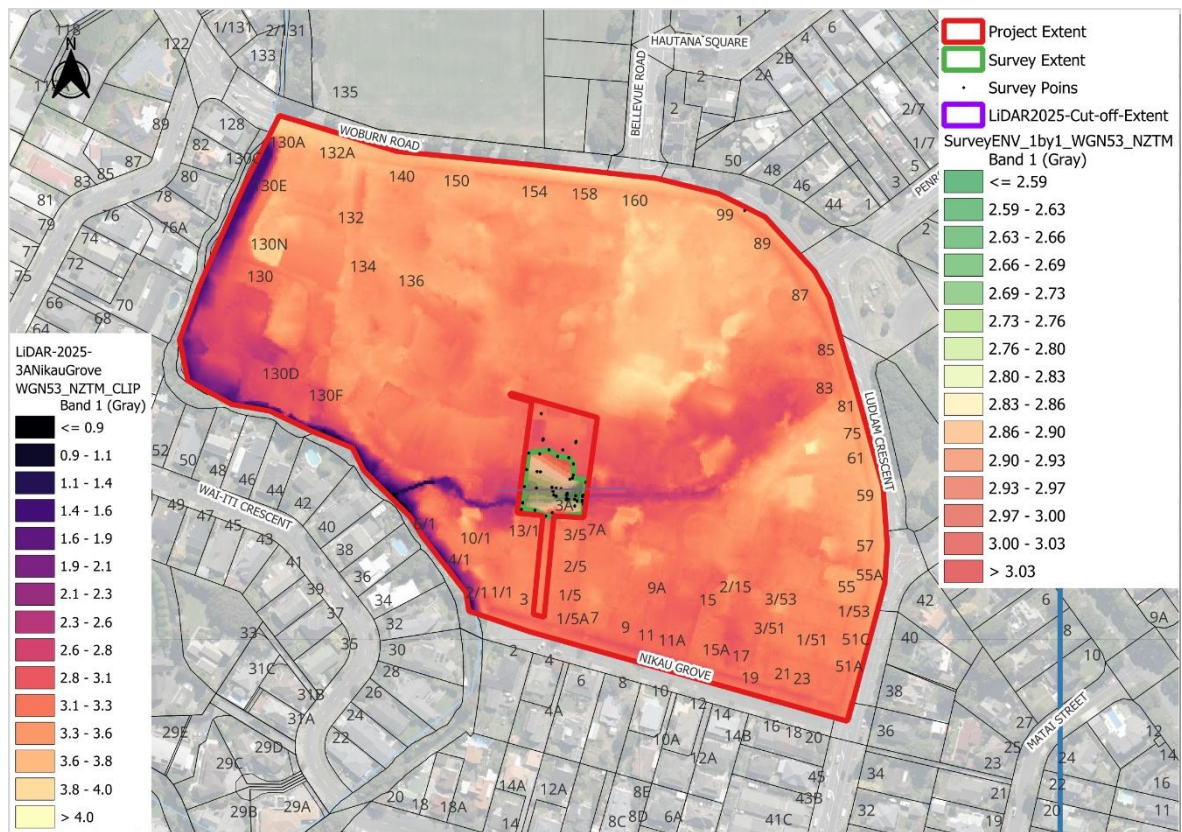


Figure 2. Area of survey and LiDAR changes.

3.2 DRAINAGE

The original PDP model does not represent the culvert system that is currently in place underneath the site, and modelled portions of this as open channel. The model was therefore adjusted to reflect the configuration and invert levels confirmed through site-specific survey consisting of a rectangular culvert transitioning to a circular pipe.

4.0 FLOOD HAZARD ASSESSMENT

4.1 EXISTING MAPPED HAZARD

There is an identified current flood hazard across parts of the site. This is shown in the current Hutt City Council web hazard map (Figure 3). We note that the flood depths in Figure 3 include the results generated in sensitivity testing, where other results in this report do not (an approach consistent with industry standards).



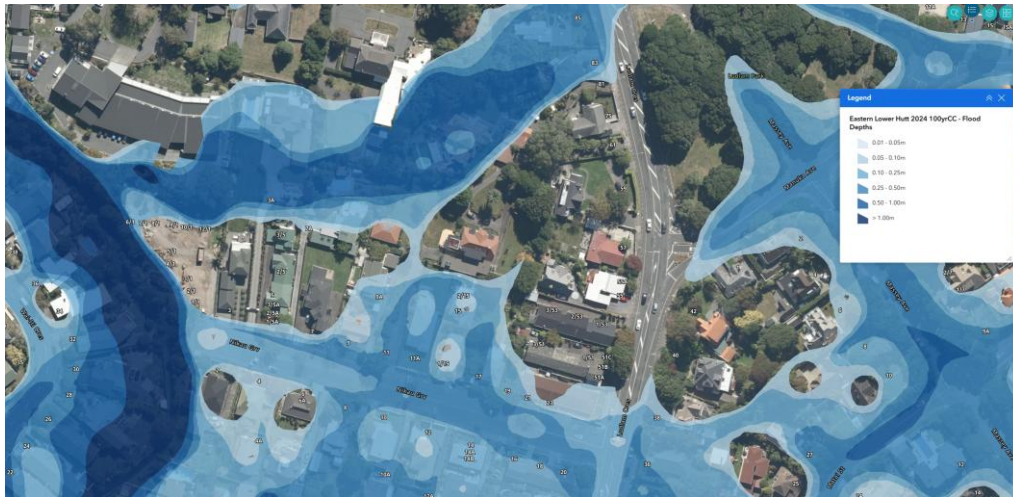


Figure 3. HCC Flood Hazard Web-Maps.

4.2 MODELLED EXISTING FLOOD HAZARD

Changes were made to the base model as outlined within Section 3 of this report. The flood model results for the site are shown in Figure 4 and 5, and Appendix 1. The flood model results show that the flood depth has slightly decreased within the site as a result of the changes made to the model when compared to the provided PDP model. As described above, the changes made to the model were to reflect the more accurate site specific survey, as well as the use of more recent 2025 LiDAR survey info, and also inclusion of surveyed information of configuration and levels for the culvert passing beneath the site.

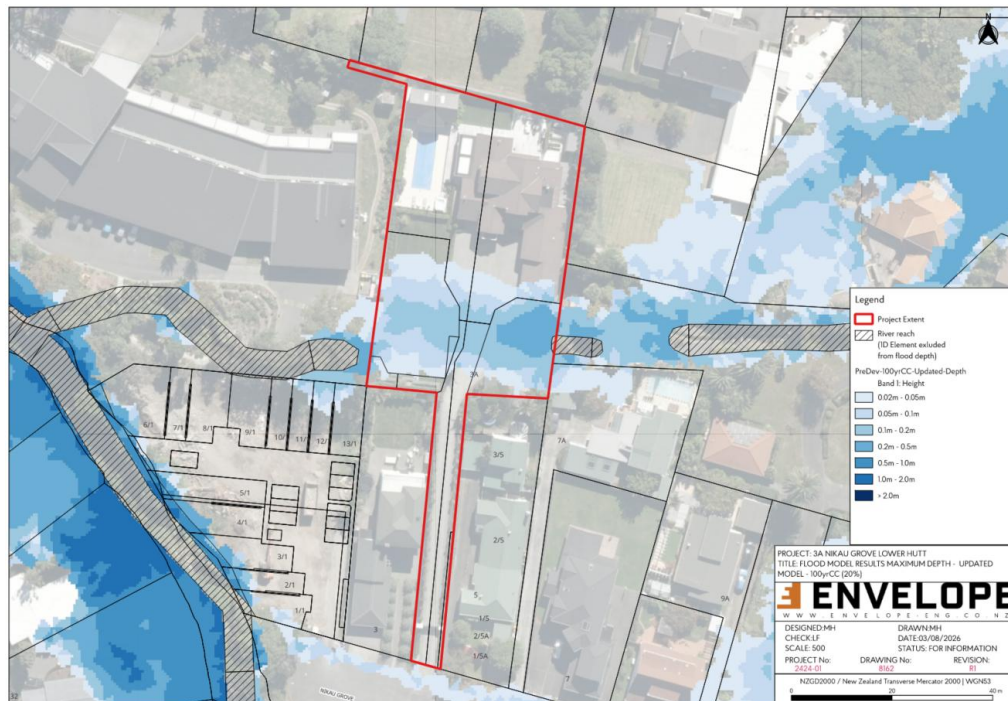


Figure 4. Flood hazard, updated model 100-year event (20% climate change).



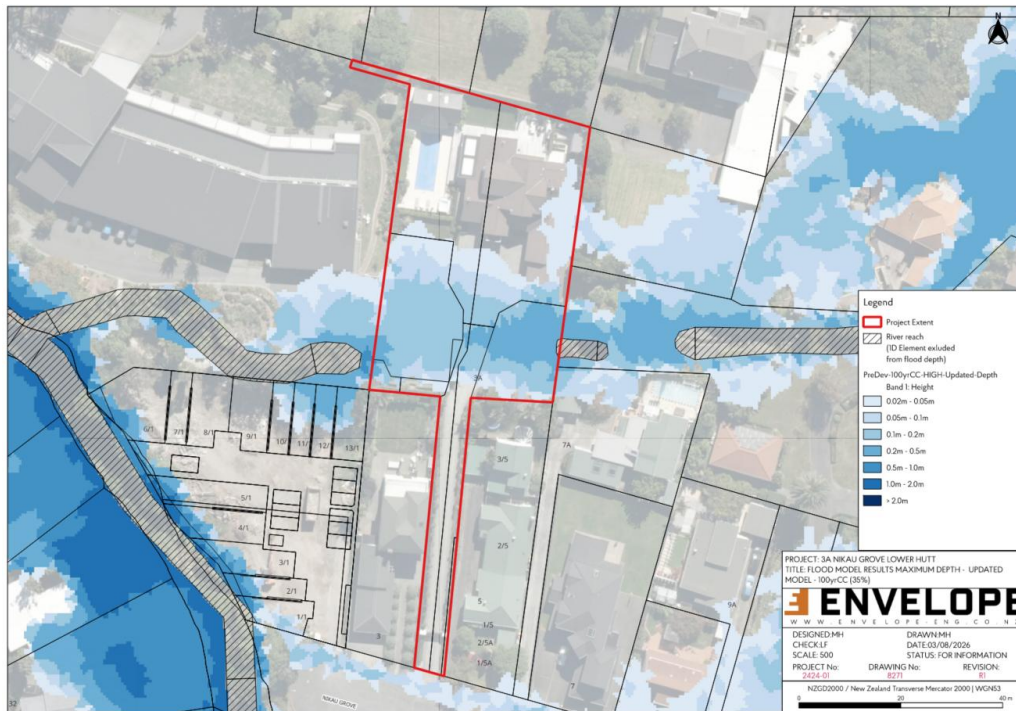


Figure 5. Flood hazard, updated model 100-year event (35% climate change).

4.3 FLOOD RISK

Flooding at the site was characterised against the PDP criteria for the 20% and 35% climate change scenarios. The results for this are shown in Appendix 1.

No areas of the site are classified as *High Hazard* (as defined by the PDP) as the velocity or depth criteria (>0.5 m depth or >2 m/s velocity) are not exceeded anywhere within the site and there is no stream or river corridor as this is culverted through the site. This agrees with the on-site assessment by Alistair Osbourne (Tiaki Wai Principal Stormwater Modeller) and in his evidence on submissions and further submissions to the PDP.

There are small and isolated pockets of *Medium Hazard* (as defined by the PDP) in the east of the site in both the 20% and 35% climate change scenarios (Figure 6 and 7).

The balance of flooded area on the site would be mapped as *Low Hazard* (as defined by the PDP), by default where flood depths are greater than 50 mm.

Small and non-contiguous areas of flooding effects are often excluded from results to filter out model noise. This aligns with the approach that we understand TW has taken based on discussions with Alistair Osbourne.

The areas of *Medium Hazard* are small and not connected to other areas of *Medium Hazard*. Based on this, the flood hazard at the site is considered to be *Low Hazard* across the entirety of the site in either climate change scenario.



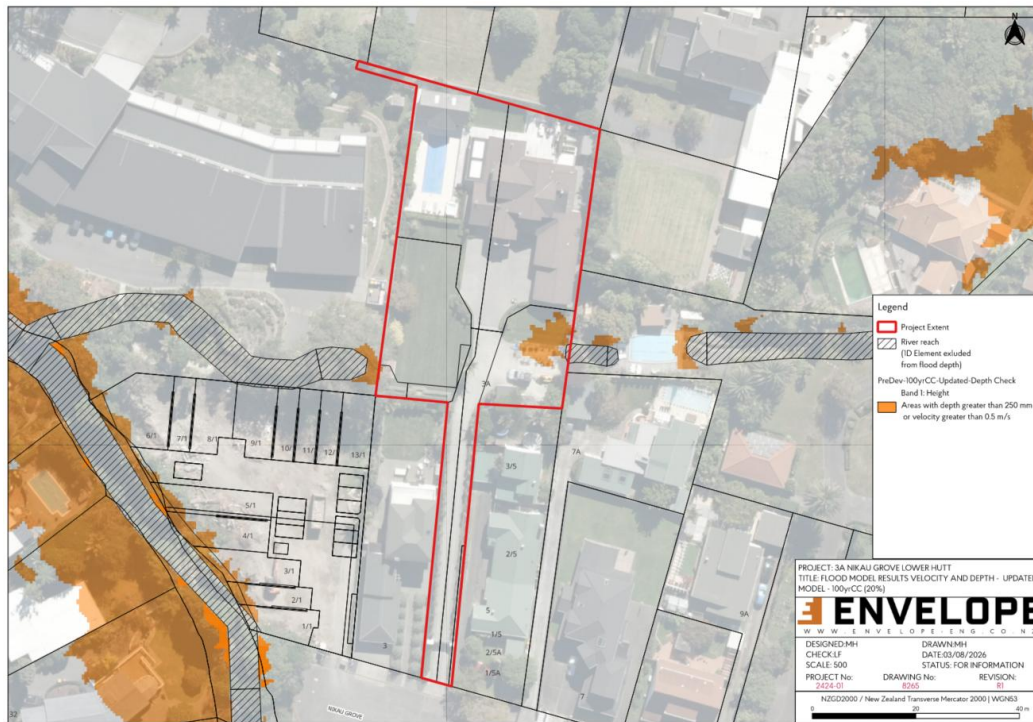


Figure 6. Areas meeting *Medium Hazard* criteria, 100-year event (20% climate change).

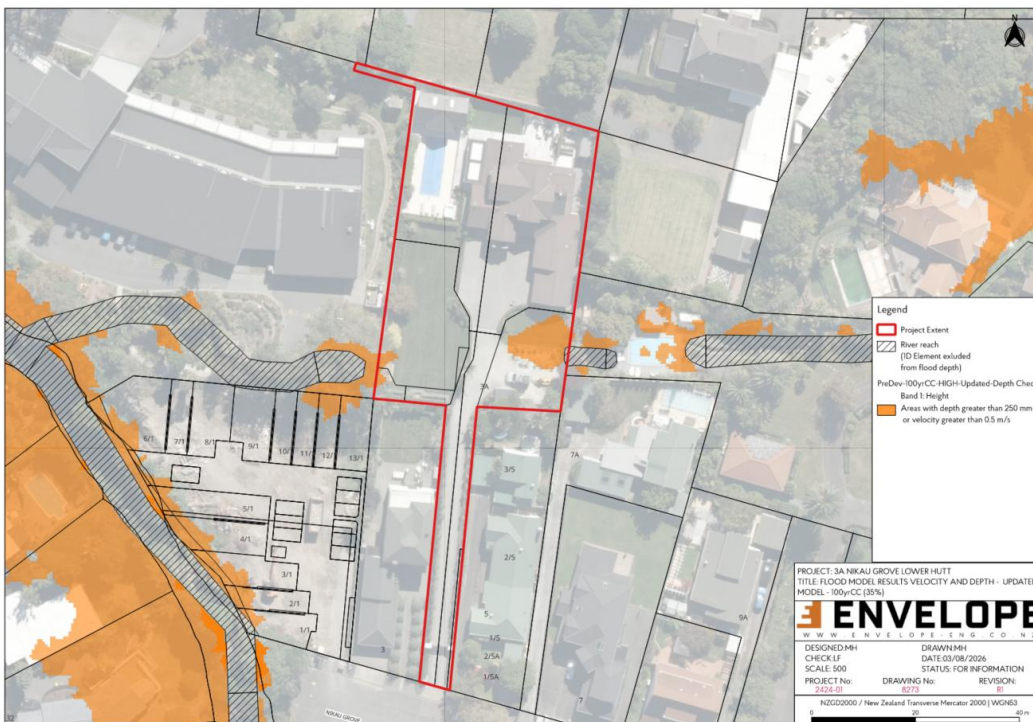


Figure 7. Areas meeting *Medium Hazard* criteria, 100-year event (35% climate change).

4.4 CLIMATE CHANGE SCENARIOS

The modelling in this report has considered two climate change scenarios – 20% and 35%. The 20% scenario is what Tiaki Wai uses for other hydraulic models in the Wellington Region. The 35% increase aligns with a climate change scenario which recent scientific research has considered unlikely. This aligns with the recommendation of Hutt City Council within the Section 42A report (paragraphs 843 – 849). Although the climate change scenarios (20% or 35%) do not affect our conclusions for this specific site, we note that “unlikely” scenarios are typically used for testing the sensitivity of a model and setting freeboard levels rather than for setting base flood risk.



5.0 RECOMMENDATIONS

Based on the completed modelling and the information provided within this report, we make the following recommendations:

- That flooding areas on the site greater than 50 mm depth are classified as *Low Hazard* in line with the updated modelling undertaken.
- That flood extents from sensitivity testing are not included within mapped flood depth areas as these do not represent a specific, modelled event. It is standard practice to include these as “flood sensitive” areas or similar.
- That Hutt City Council update the LiDAR survey to more recent LiDAR surveys for the hydraulic model and include the site-specific survey information undertaken for this specific site in any future model updates to ensure that flood extents are modelled using best available information.
- That Hutt City Council adopts a climate change scenario of 20% increase. This would bring the model in line with other Tiaki Wai hydraulic models in the Wellington Region and be more in line with recent climate change research. This aligns with the recommendation of Hutt City Council within the Section 42A report (paragraphs 843 – 849).

6.0 CONCLUSION

This report provides comment on Flood Risk to support a submission on the Hutt City Council Proposed District Plan (PDP) provisions relating to Natural Hazards.

As part of this work, Envelope met with Alistair Osbourne at the site (Tiaki Wai) and conducted additional hydraulic modelling, which is outlined in this report.

Based on the modelling undertaken, we suggest that the flood hazard (as defined in the PDP) should be characterised as *Low Hazard* for the site and that Hutt City Council adopts updates to the LiDAR and Climate Change scenarios for future modelling.

7.0 LIMITATIONS

7.1 GENERAL

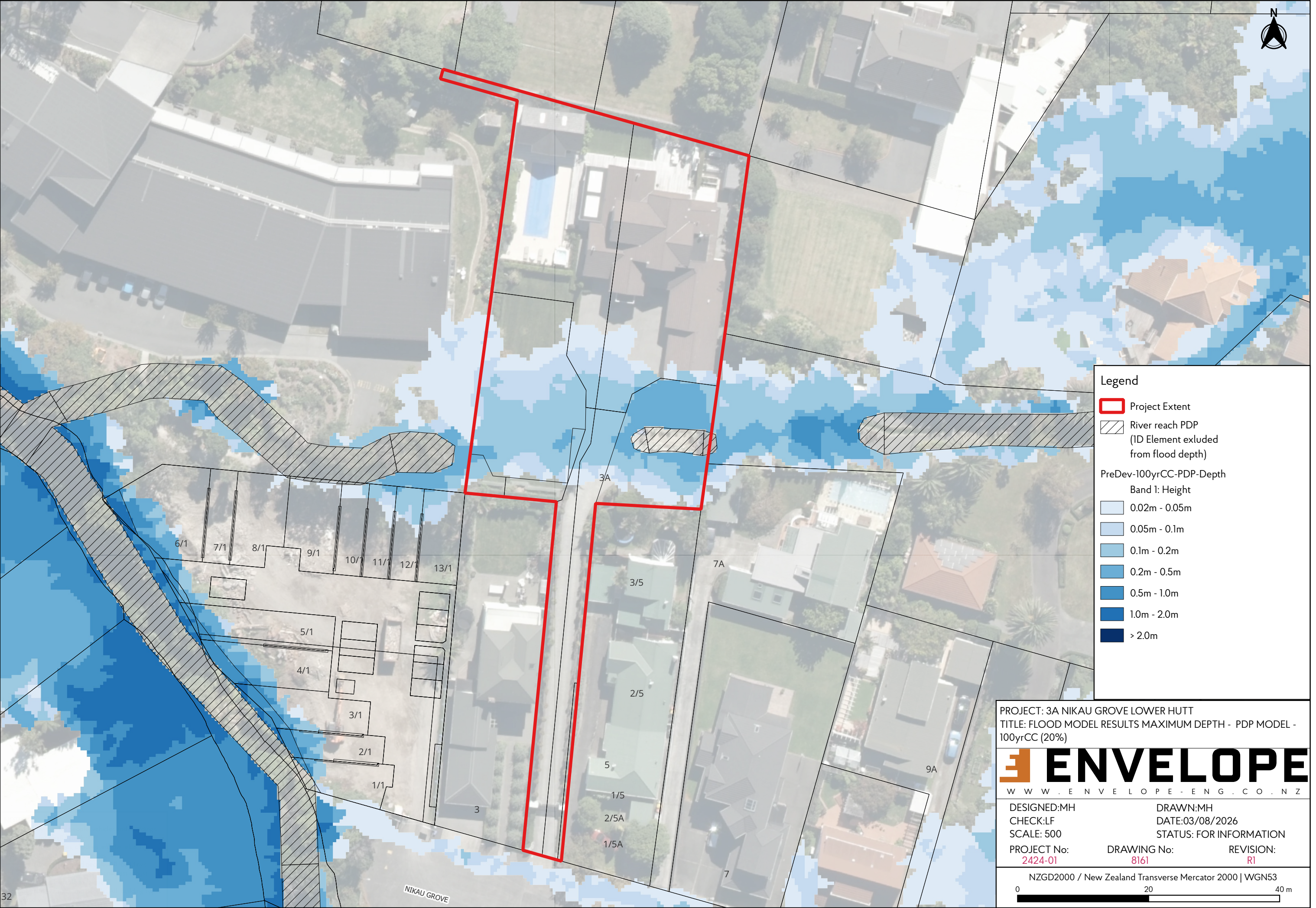
This report is for the use of Chris Moore only and should not be used or relied upon by any other person or entity or for any other project.

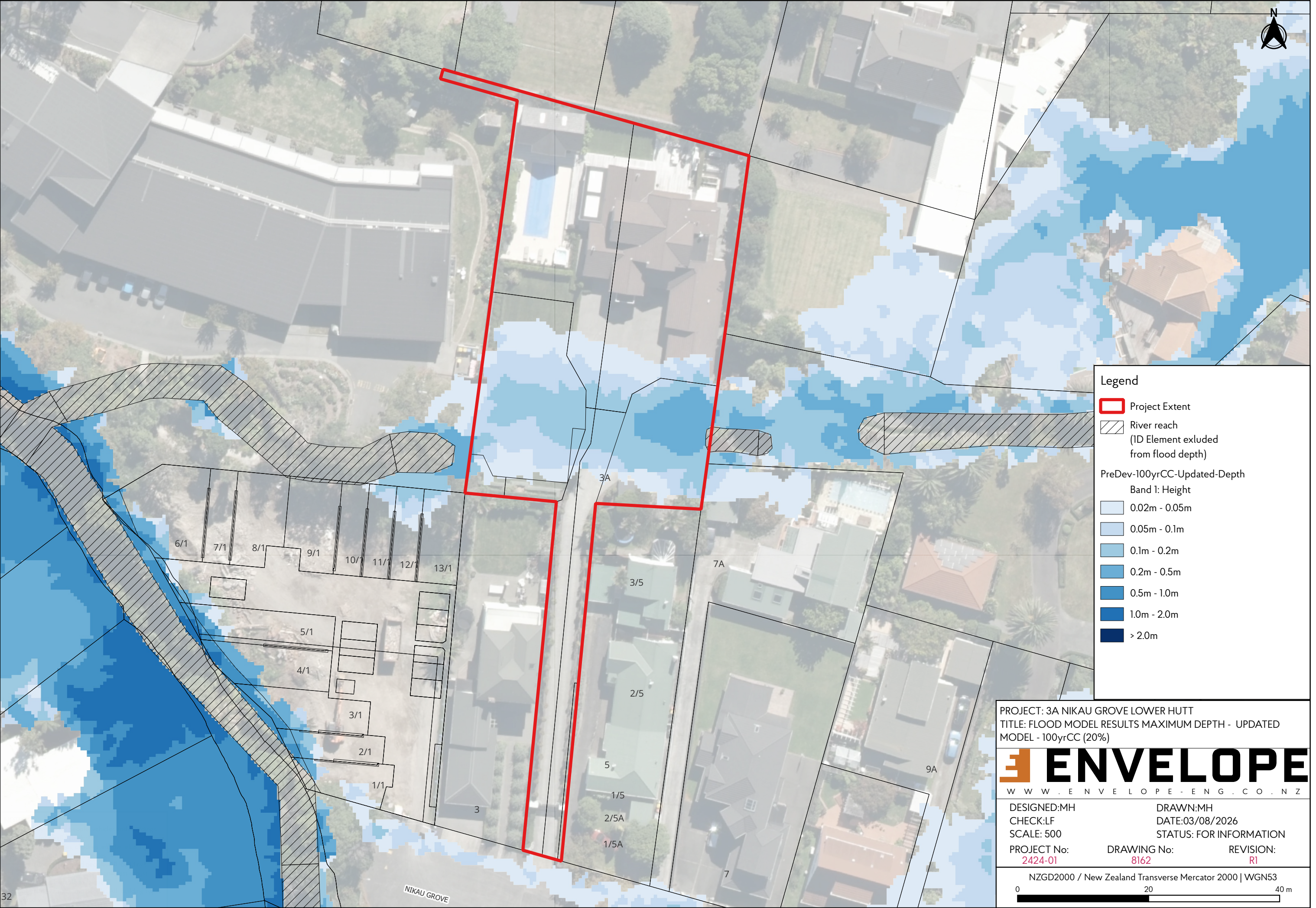
This report has been prepared for the project described to us and its extent is limited to the scope of work agreed between the client and Envelope Engineering Limited. No responsibility is accepted by Envelope Engineering Limited or its directors, servants, agents, staff or employees for the accuracy of information provided by third parties and/or the use of any part of this report in any other context or for any other purposes.



APPENDICES

APPENDIX 1 FLOOD MODEL RESULTS





Legend

Project Extent

River reach
(1D Element exluded
from flood depth)

PreDev-100yrCC-Updated-Depth

Band 1: Height

	0.02m - 0.05m
	0.05m - 0.1m
	0.1m - 0.2m
	0.2m - 0.5m
	0.5m - 1.0m
	1.0m - 2.0m
	> 2.0m

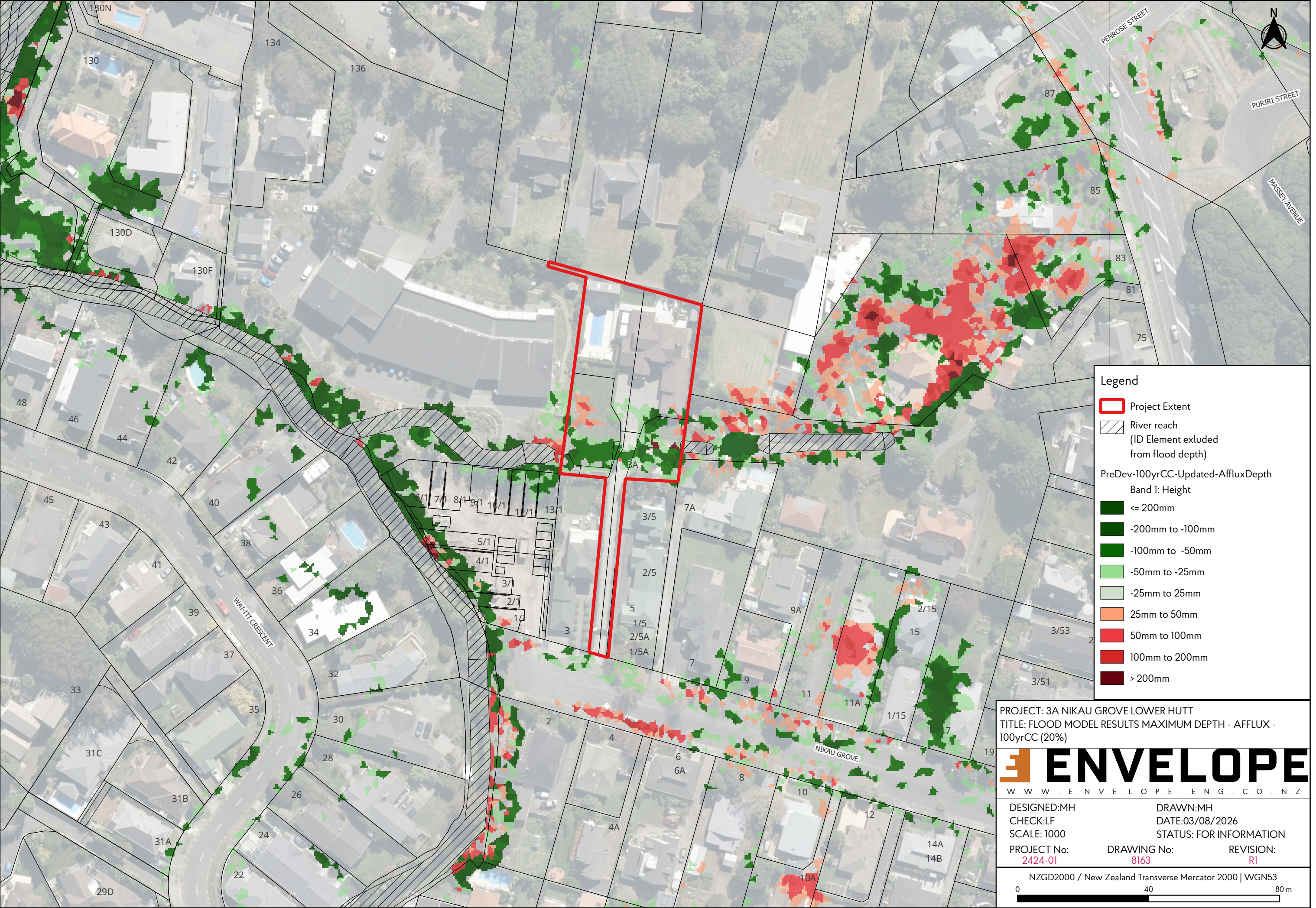
PROJECT: 3A NIKAU GROVE LOWER HUTT
TITLE: FLOOD MODEL RESULTS MAXIMUM DEPTH - UPDATED
MODEL - 100yrCC (20%)

ENVELOPE
W W W . E N V E L O P E - E N G . C O . N Z

DESIGNED:MH	DRAWN:MH	
CHECK:LF	DATE:03/08/2026	
SCALE: 500	STATUS: FOR INFORMATION	
PROJECT No: 2424-01	DRAWING No: 8162	REVISION: R1

NZGD2000 / New Zealand Transverse Mercator 2000 | WGN53

0 20 40 m



Legend

- Project Extent
- River reach
(1D Element excluded from flood depth)

PreDev-100yrCC-Updated-AffluxDepth

Band 1: Height

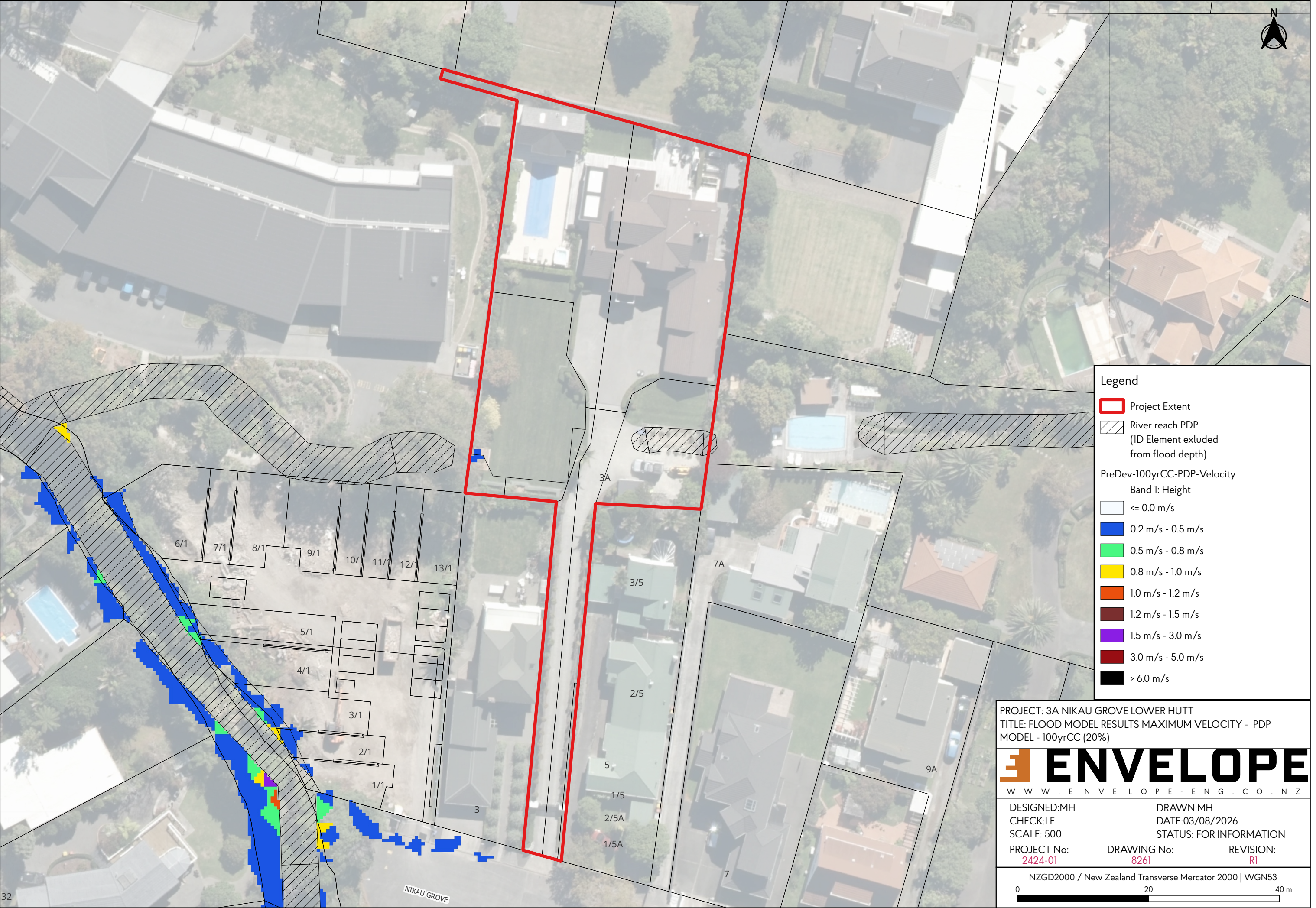
- ≤ 200mm
- 200mm to -100mm
- 100mm to -50mm
- 50mm to -25mm
- 25mm to 25mm
- 25mm to 50mm
- 50mm to 100mm
- 100mm to 200mm
- > 200mm

PROJECT: 3A NIKAU GROVE LOWER HUTT
TITLE: FLOOD MODEL RESULTS MAXIMUM DEPTH - AFFLUX - 100yrCC (20%)



DESIGNED:MH	DRAWN:MH	
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PROJECT No: 2424-01	DRAWING No: 8163	REVISION: R1

NZGD2000 / New Zealand Transverse Mercator 2000 | WGN53



Legend

Project Extent

River reach PDP
(1D Element excluded from flood depth)

PreDev-100yrCC-PDP-Velocity
Band 1: Height

<= 0.0 m/s

0.2 m/s - 0.5 m/s

0.5 m/s - 0.8 m/s

0.8 m/s - 1.0 m/s

1.0 m/s - 1.2 m/s

1.2 m/s - 1.5 m/s

1.5 m/s - 3.0 m/s

3.0 m/s - 5.0 m/s

> 6.0 m/s

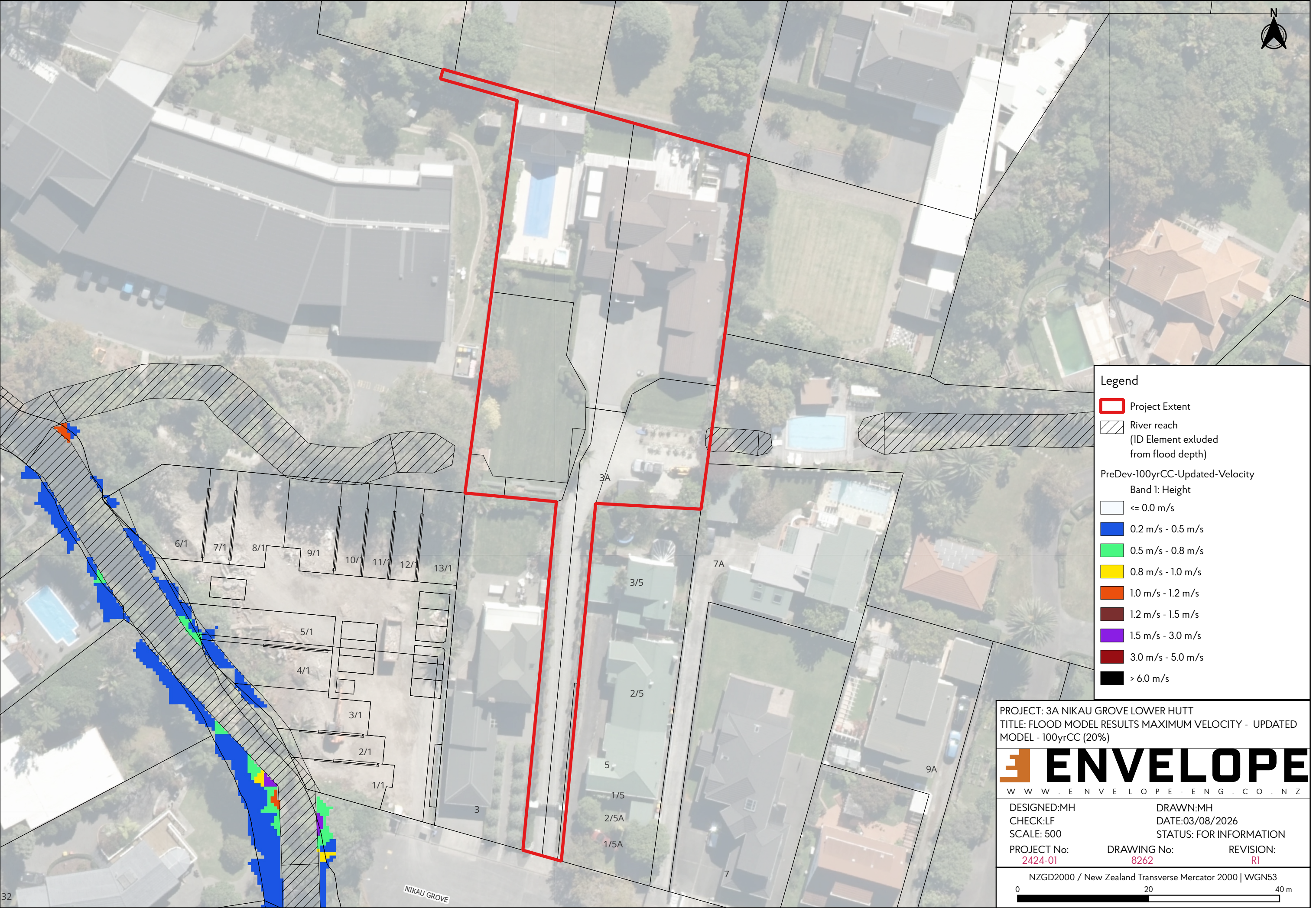
PROJECT: 3A NIKAU GROVE LOWER HUTT
TITLE: FLOOD MODEL RESULTS MAXIMUM VELOCITY - PDP
MODEL - 100yrCC (20%)

ENVELOPE
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DESIGNED:MH	DRAWN:MH	
CHECK:LF	DATE:03/08/2026	
SCALE: 500	STATUS: FOR INFORMATION	
PROJECT No: 2424-01	DRAWING No: 8261	REVISION: R1

NZGD2000 / New Zealand Transverse Mercator 2000 | WGN53

0 20 40 m



Legend

Project Extent

River reach
(1D Element exluded from flood depth)

PreDev-100yrCC-Updated-Velocity
Band 1: Height

	<= 0.0 m/s
	0.2 m/s - 0.5 m/s
	0.5 m/s - 0.8 m/s
	0.8 m/s - 1.0 m/s
	1.0 m/s - 1.2 m/s
	1.2 m/s - 1.5 m/s
	1.5 m/s - 3.0 m/s
	3.0 m/s - 5.0 m/s
	> 6.0 m/s

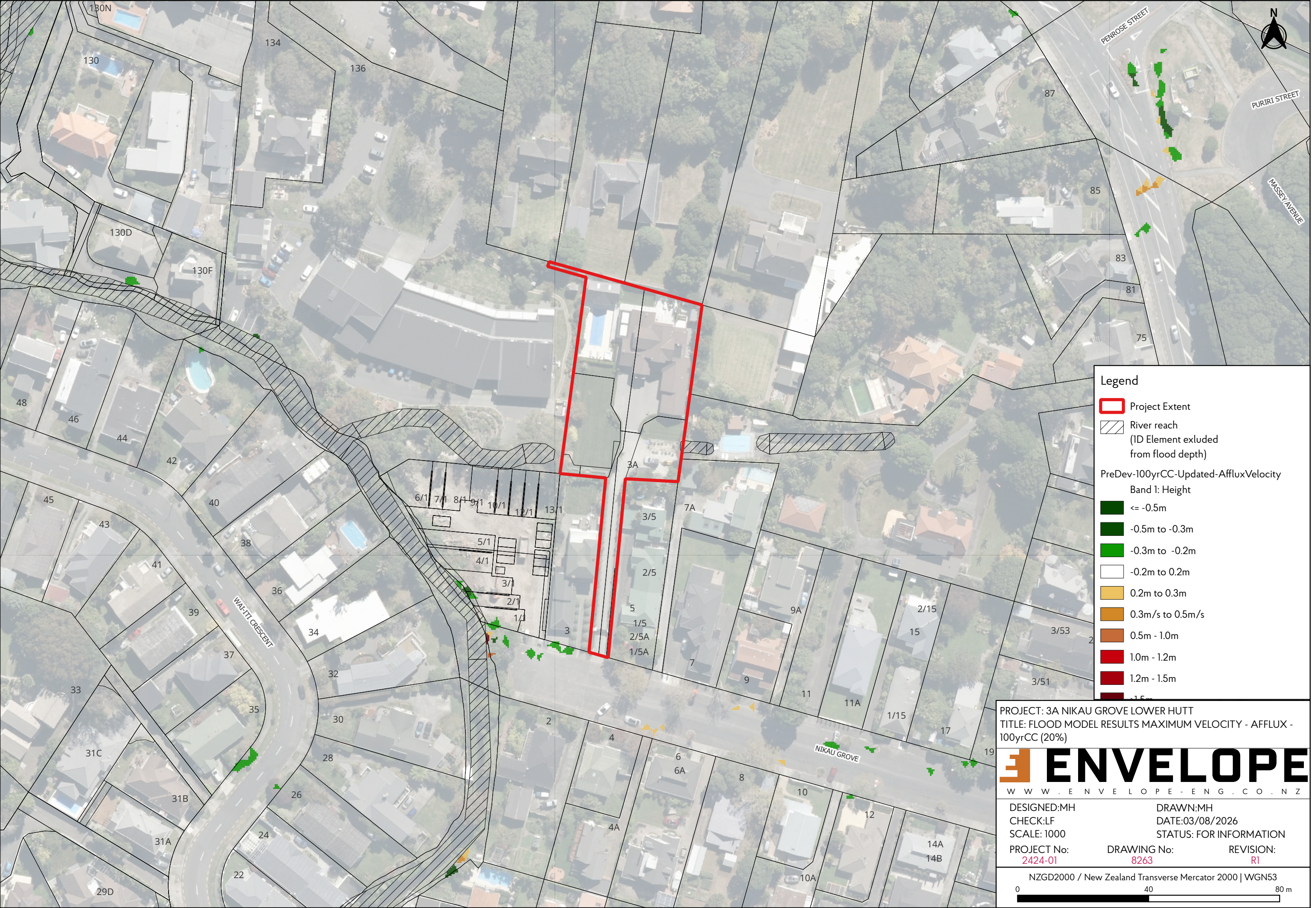
PROJECT: 3A NIKAU GROVE LOWER HUTT
TITLE: FLOOD MODEL RESULTS MAXIMUM VELOCITY - UPDATED
MODEL - 100yrCC (20%)

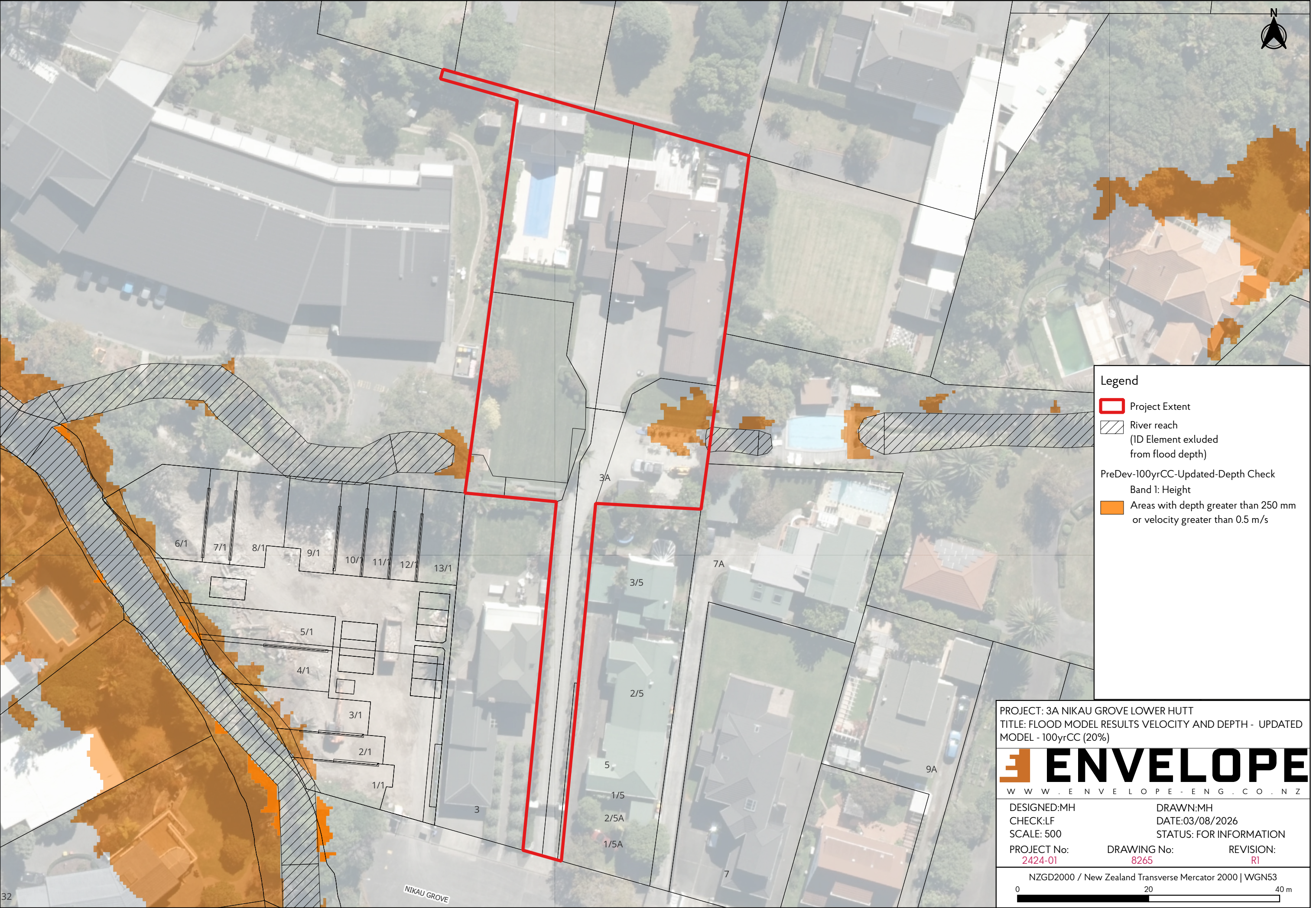
ENVELOPE
W W W . E N V E L O P E - E N G . C O . N Z

DESIGNED:MH	DRAWN:MH	
CHECK:LF	DATE:03/08/2026	
SCALE: 500	STATUS: FOR INFORMATION	
PROJECT No: 2424-01	DRAWING No: 8262	REVISION: R1

NZGD2000 / New Zealand Transverse Mercator 2000 | WGN53

0 20 40 m





Legend

Project Extent

River reach
(1D Element exluded
from flood depth)

PreDev-100yrCC-Updated-Depth Check
Band 1: Height

Areas with depth greater than 250 mm
or velocity greater than 0.5 m/s

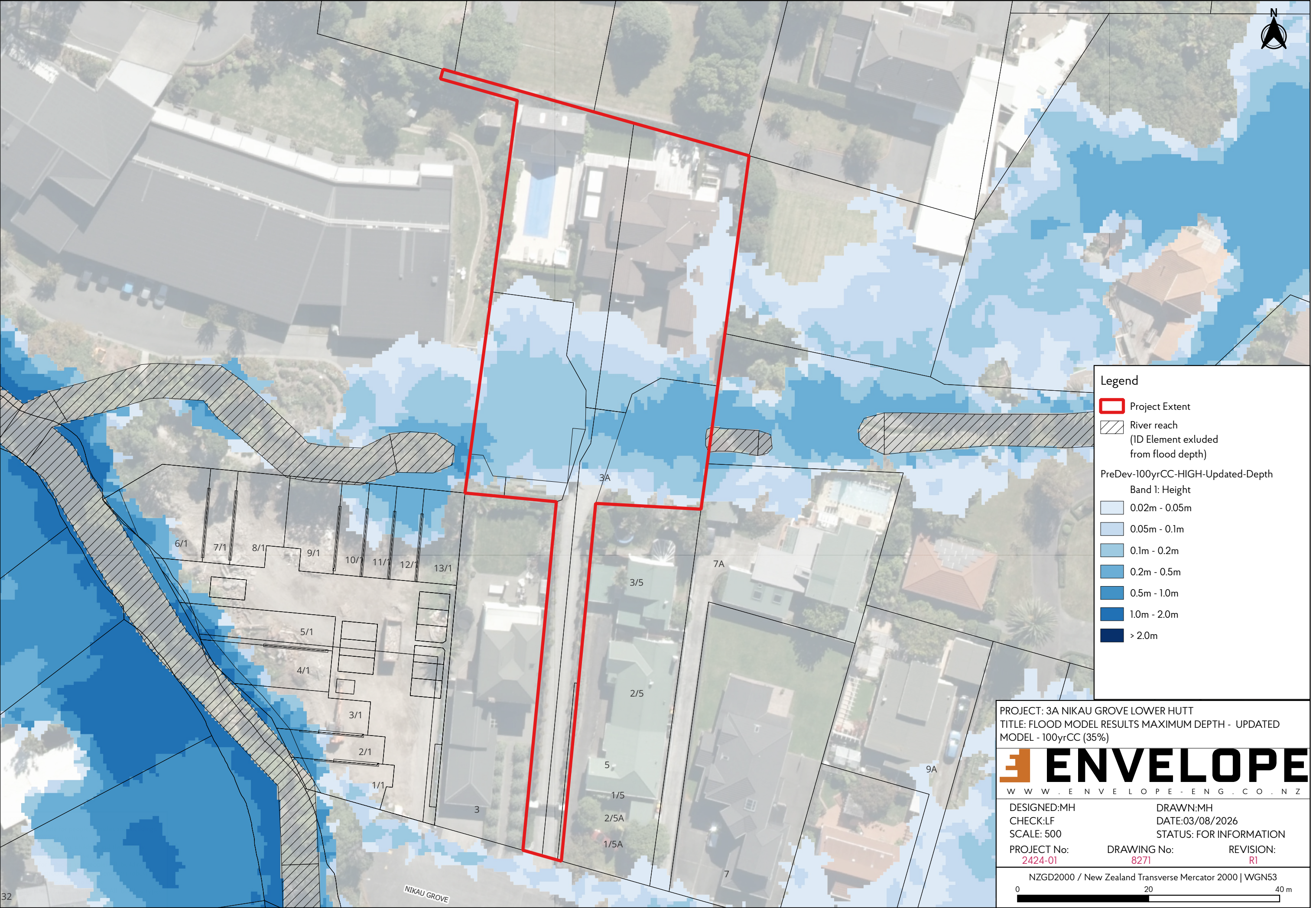
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TITLE: FLOOD MODEL RESULTS VELOCITY AND DEPTH - UPDATED
MODEL - 100yrCC (20%)

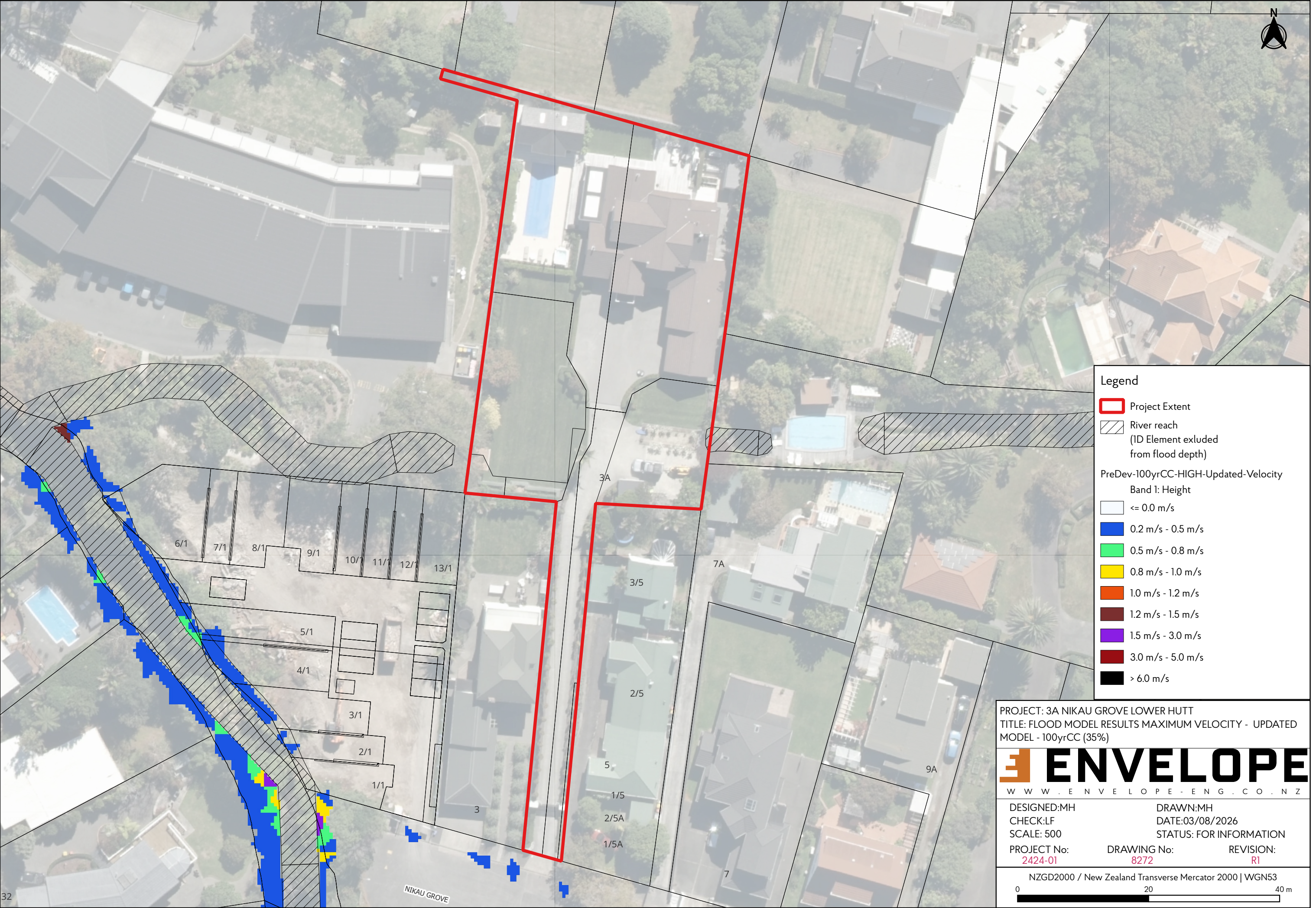
ENVELOPE
W W W . E N V E L O P E - E N G . C O . N Z

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SCALE: 500	STATUS: FOR INFORMATION	
PROJECT No: 2424-01	DRAWING No: 8265	REVISION: R1

NZGD2000 / New Zealand Transverse Mercator 2000 | WGN53

0 20 40 m





Legend

- Project Extent
- River reach (1D Element exluded from flood depth)

PreDev-100yrCC-HIGH-Updated-Velocity
Band 1: Height

- <= 0.0 m/s
- 0.2 m/s - 0.5 m/s
- 0.5 m/s - 0.8 m/s
- 0.8 m/s - 1.0 m/s
- 1.0 m/s - 1.2 m/s
- 1.2 m/s - 1.5 m/s
- 1.5 m/s - 3.0 m/s
- 3.0 m/s - 5.0 m/s
- > 6.0 m/s

PROJECT: 3A NIKAU GROVE LOWER HUTT
TITLE: FLOOD MODEL RESULTS MAXIMUM VELOCITY - UPDATED
MODEL - 100yrCC (35%)

ENVELOPE
W W W . E N V E L O P E - E N G . C O . N Z

DESIGNED:MH	DRAWN:MH
CHECK:LF	DATE:03/08/2026
SCALE: 500	STATUS: FOR INFORMATION
PROJECT No: 2424-01	DRAWING No: 8272
	REVISION: R1

NZGD2000 / New Zealand Transverse Mercator 2000 | WGN53
0 20 40 m

