AW Holdings 2021 Ltd
Attn: Jody Jubber

Email [redacted]

Woods
Rahul Nair – Associate Engineer
Shakti Singh – 3 Waters Engineer
Pranil Wadan –Technical Consultant (Flowstate Consulting LP)

Reviewers:
Pranil Wadan –Technical Consultant (Flowstate Consulting LP)

W-REF: P25-662 Surf Park
4 June 2026

Auckland Surf Park Community Stage 2 – Flood assessment

1. Statement of Qualifications and Experience

The following is a statement of the qualifications and experience of the engineers involved in preparing this flood assessment memorandum.

1.1. Rahul Nair

I am an Associate Three Waters Engineer at Wood and Partners Consultants Limited. I hold a Bachelor of Technology in Civil Engineering and a Master of Technology in Civil Engineering (Environmental Engineering). I have over 11 years of professional experience in stormwater and wastewater modelling, flood investigations, and three waters infrastructure design across New Zealand, the United Kingdom, the Middle East, and India.

I specialise in the development, calibration, and validation of hydrological and hydrodynamic models for stormwater and wastewater networks, flood risk assessment, and optioneering to support land development and infrastructure projects. My experience includes the preparation of detailed catchment-scale and site-specific flood models, stormwater network models, and technical reporting in support of land development, planning approvals, and infrastructure design.

In my capacity as author of this report, I confirm that I have read and comply with the Environment Court of New Zealand's Code of Conduct for Expert Witnesses Practice Note 2023.

1.2. Shakti Singh

I am a Senior Stormwater Engineer at Flowstate Consulting LP. I hold a Bachelor in Engineering Technology degree from Unitec, completed in 2019. I am a Chartered Professional Engineer, a Chartered Member of Engineering New Zealand, and a member of Water New Zealand.

I have more approximately 6 years of experience in the field of Water engineering. I have been largely involved with devising stormwater management strategy and developing flood management solutions for land development projects. I am proficient in designing stormwater management devices, urban drainage infrastructure including culverts, bridges and stormwater network. I have also been extensively involved in the carrying out flood modelling using 1D/2D hydrological and hydraulic software and analysing flood modelling results to develop flood management strategies and optioneering.

In my capacity as approver of this report, I confirm that I have read and comply with the Environment Court of New Zealand's Code of Conduct for Expert Witnesses Practice Note 2023.

1.3. Pranil Wadan

I am a Director of Flowstate Consulting LP and act as a Technical Consultant to Wood and Partners Consultants Limited, trading as Woods.

I hold a Bachelor of Engineering from the University of Auckland, completed in 2007. I am a Chartered Professional Engineer and a member of Engineering New Zealand and Water New Zealand. My additional professional qualifications and appointments include International Professional Engineer (IntPE(NZ)), Certified Independent Hearing Commissioner, and a Certificate in Company Direction and Governance.

I have more than 18 years' experience in stormwater design, hydrodynamic modelling, flood risk assessment, water infrastructure, and stormwater management for land development projects. I have acted as principal author and lead stormwater engineer for a wide range of stormwater management plans and flood modelling assessments prepared for projects across New Zealand.

My experience includes the development of catchment-scale flood models, detailed stormwater network models, and integrated catchment management plans for both private sector clients and territorial and regional authorities.

In my role as reviewer and approver of this report, I confirm that I have read and comply with the Environment Court of New Zealand's Code of Conduct for Expert Witnesses Practice Note 2023.

2. Introduction

This memorandum has been prepared in support of the substantive application for fast-track consenting of the proposed Auckland Surf Park Community (ASPC) Stage 2 development. The application comprises of:

- The expansion of the ASPC to include a hyperscale artificial intelligence data centre campus, three residential precincts, subdivision, a village centre, work-live precinct, infrastructure and ancillary activities; and,
- Variation to Stage 1 of the development consented under the COVID-19 Fast-track Consenting Act 2020.

This report assesses whether the proposed development gives rise to any adverse off-site flood effects.

The assessment is based on the flood models developed in response to queries raised by Auckland Council Healthy Waters during Stage 1 of the project. Details of the model build, including parameters, assumptions, and discussion of results, are documented in the report prepared by Woods, *Surf Park Fast Track Referral Application – Flood Model Build* (dated 15 June 2024) and is included as Appendix A to this memorandum.

Since completion of the original analysis, the ASPC masterplan has been updated. An updated flood assessment has therefore been undertaken. This memorandum outlines the model updates implemented to reflect the revised masterplan and presents the latest modelling results, including an assessment of any potential adverse off-site flood effects.

Internal flood routing within the proposed development is not considered as part of this memorandum. These matters are addressed separately in the assessment prepared by McKenzie & Co as part of the substantive application.

Consistent with the previous flood modelling, the following scenarios have been assessed:

- **Pre-development scenario:** representing existing site conditions.
- **Post-development scenario:** representing conditions with the proposed development in place.

All scenarios were simulated for the 2, 10, and 100-year ARI storm events using existing rainfall conditions and with an allowance for a 3.8°C future temperature increase by 2110. In addition, the 2 and 10-year ARI events were simulated with an allowance for a 2.1°C future temperature increase by 2090.

The latest site masterplan used for this assessment is shown in Figure 1.

Figure 1. Site Masterplan (Source: Studio Pacific Architecture; dated 03/06/2026)

3. Model updates

A flood model build document was previously prepared by Woods titled Surf Park Fast Track Referral Application – Flood Model Build (dated 15 June 2024). This document sets out the model build parameters, assumptions, and results for Stage 1 of the development and is included as Appendix A to this report.

The current assessment generally adopts the methodology described in the earlier report, with the inclusion of the proposed Stage 2 development and amendments to Stage 1. Any updates or refinements to the modelling undertaken for this assessment are outlined below.

3.1. Modelling software

The flood modelling has been undertaken using InfoWorks ICM version 2024.5.

3.2. Topography

Topographical information for both the pre- and post-development model scenarios has been updated using data provided by McKenzie & Co.

- Pre-development: The model scenario uses LiDAR 2024 data to represent topographical information.
- Post-development: The model scenario uses the topographical information consistent with the pre-development model scenario outside the proposed development extent. While the proposed design surface information has been used to represent topography within the development extent.

Topographical inputs for both the pre-development and post-development model scenarios have been updated using information provided by McKenzie & Co.

- **Pre-development scenario:** LiDAR 2024 data has been used to represent existing site topography.
- **Post-development scenario:** Existing LiDAR 2024 data has been retained outside the proposed development extent. Within the development area, the proposed design surface has been used to represent post-development topography.

3.3. Model extent

The flood model extent was amended and revised to incorporate additional upstream and downstream catchment areas, reflecting changes in the updated topographical information.

Figure 2 shows the latest modelled extent.

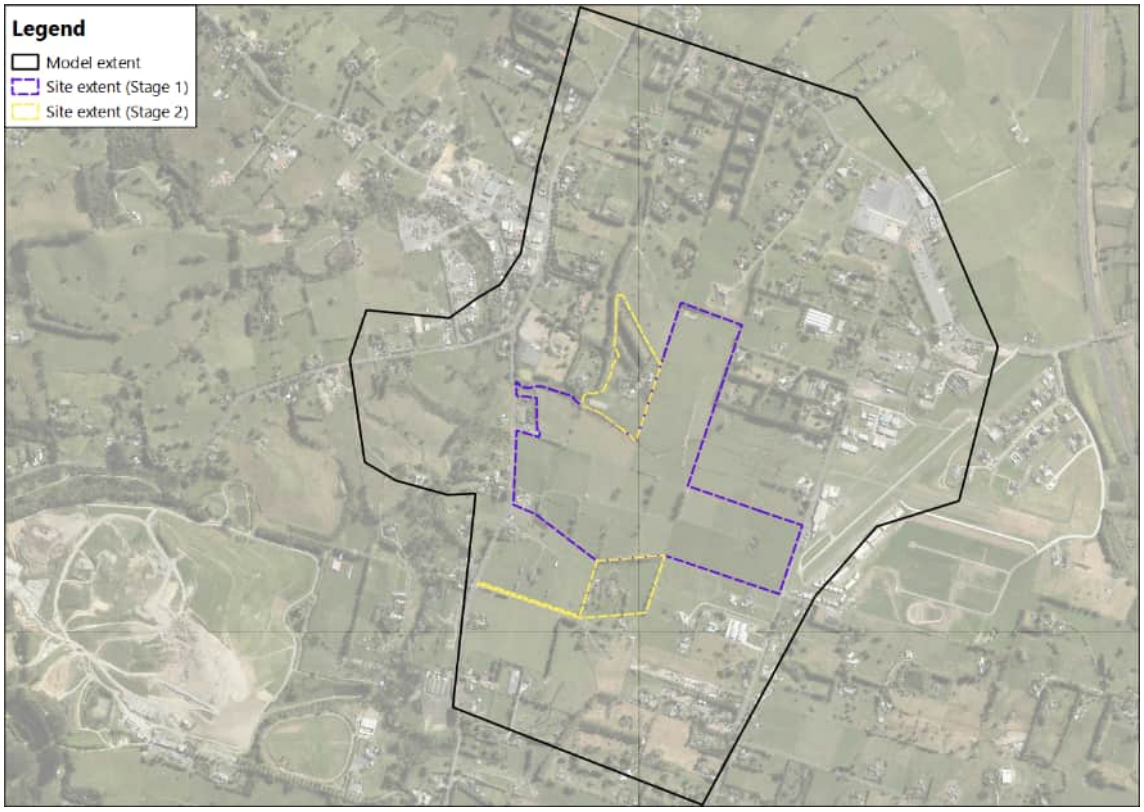


Figure 2. Flood model extent

3.4. Hydrological model updates

3.4.1. Impervious coverage assumptions

Impervious coverage assumptions for the Existing Development (ED) scenario were derived from Auckland Council GeoMaps landcover data, including the 2017 impervious coverage layer.

For the proposed scenario, impervious coverage within the site was calculated based on the masterplan. Areas outside the site extent were derived from Auckland Council GeoMaps land-cover data, including the 2017 impervious coverage layer.

3.4.2. Subcatchment delineation

Figure 3Figure 4Subcatchment delineation was revised and updated for both the pre-development and post-development model scenarios to align with the latest topographical information adopted in the current modelling. The updated pre-development subcatchment delineation is shown in Figure 3, while the updated post-development subcatchment delineation is shown in Figure 4.

Figure 3. Pre-development modelled catchments

Figure 4. Post-development modelled catchments

3.4.3. Time of concentration

The time of concentration for each subcatchments has been calculated in accordance with Auckland Council's TP108 (1999). In line with the guidance in TP108, a minimum time of concentration of 10 minutes

has been adopted for the majority of subcatchments. Across the study area, the modelled times of concentrations range between 10 and 15 minutes.

3.5. Hydraulic model updates

3.5.1. 1D components – culverts

The pre-development model includes three existing 900 mm diameter circular culverts beneath Dairy Flat Highway and a single 600 mm diameter circular culvert at 1314 Dairy Flat Highway.

As part of the proposed reticulation system and flood mitigation measures, three additional culverts are planned along the southern boundary of Stage 1, where it interfaces with Stage 2. All modelled culverts are shown in Figure 5, with a summary of the proposed culverts provided in Table 1. In the hydraulic model, all culverts have been represented using a 1D approach with a Manning's roughness coefficient of 0.013.

Figure 5. Culvert locations

Table 1. Existing and proposed culvert details

Model culverts	Culvert location	Dimension	Comment
Existing	1314 Dairy Flat	Circular culvert, 600mm diameter	Updated as per survey data
	Dairy Flat Highway	Three circular culverts, each 900 mm diameter	
Proposed	Proposed culvert 1	Rectangular culvert 3000 mm × 1000 mm	Updated as per survey data
	Proposed culvert 2	Rectangular culvert 3000 mm × 1000 mm	
	Proposed culvert 3	Rectangular culvert 3000 mm × 1500 mm	

3.5.2. 2D components – roughness

The Manning's roughness values adopted in the hydraulic model were selected in accordance with Auckland Council Stormwater Modelling Specifications (December 2023, Final Issue 1) and are intended to represent the range of surface conditions within the study area. Roughness values were assigned based on land cover type, aerial imagery, and engineering judgement. Lower values applied to smooth surfaces such as sand, open water and well-defined stream channels (0.02 to 0.04) and progressively higher values applied to roads, grassed areas, scrub, and densely vegetated surfaces to reflect increased flow resistance during overland flooding. A high roughness value of 0.5 was applied to building footprints to represent their function as solid obstructions that block and divert flood flows.

The Manning's roughness values adopted for the pre and post development scenarios are listed in Table 2.

Table 2 : Manning's Roughness adopted

Landuse	2D Manning's Roughness adopted in Model
Building	0.5
Grass	0.1
High Vegetation	0.15
Land Parcel	0.1
Road	0.05
Sand	0.02
Scrub	0.06
Stream	0.02 - 0.04

4. Model scenarios

4.1.1. Climate change

Climate change scenarios have been assessed by applying temperature increases of 2.1°C and 3.8°C, in accordance with the Auckland Council Code of Practice (Version 4, March 2024).

The corresponding 24-hour design rainfall depths adopted for each scenario are summarised in Table 3.

Table 3. Design rainfall

ARI	24hr Rainfall Depth (mm)	24hr Rainfall Depth+ 2.1°C CC (mm)	24hr Rainfall Depth+ 3.8°C CC (mm)
2-year	80	87	102
10-year	135	153	177
100-year	200	-	265

4.2. Model scenario summary

Two flood model scenarios were developed for this assessment, as outlined below.

4.2.1. Scenario 1 – Pre-development

This scenario represents existing flood conditions. Existing development (ED) coverage has been assumed both within and beyond the development area. This scenario provides the baseline against which post-development flood effects are assessed.

4.2.2. Scenario 2 – Post-development

This scenario represents future flood conditions assuming maximum probable development (MPD) coverage within the development area, in accordance with the Auckland Unitary Plan. Existing development coverage has been retained outside the development area, with MPD coverage applied within the site. Table 4 provides a summary of the model scenarios.

Table 4. Modelled scenario summary

Model Scenario	Description	Landuse	ARI	Climate change (°C)
Scenario 1 – Pre-development	Pre-development model scenario understanding existing flooding	ED – all modelled areas	2 10 100	No climate change
			2 10	2.1°C
			2 10 100	3.8°C
Scenario 2 – Post development	Post-development model scenario to understand flood effects upstream and downstream because of proposed development	MPD – areas within the development extent ED – areas outside the development extent	2 10 100	No climate change
			2 10	2.1°C
			2 10 100	3.8°C

5. Flood Modelling Results

All model scenarios were simulated for the 2, 10, and 100-year ARI storm events under both existing rainfall conditions (no climate change) and with an allowance for a 3.8°C temperature increase by 2110. Additional simulations were completed for the 2 and 10-year ARI events with an allowance for a 2.1°C temperature increase by 2090.

Appendix B presents the full set of results for all model scenarios, including flood depth plots and water level difference plots for each storm event.

5.1. Flood Extents and Depths

Flood depth maps for the 10 and 100-year ARI pre-development and post-development scenarios are shown in Figures 6-9 respectively.

An effects assessment was undertaken by generating water level difference (afflux) plots for all the modelled 3.8°C scenarios. The model results show that the overall flood level outside of the site extent remains largely unchanged when comparing the pre and post development scenarios.

5.2. Assessment of Water Level Changes (Afflux)

The afflux plots for all 2, 10 and 100-year ARI 3.8°C scenarios are included in Appendix B. The water level difference plot for the 10 and 100-year ARI 3.8°C scenarios are shown in Figure 10 and Figure 11, respectively.

Minor increases in water levels are observed outside the development extent at two locations (encircled in red in Figures 10 and 11). Across all scenarios, these increases are highly localised and generally do not exceed 30mm. The increases remain within the pre-development flood extents and occur in isolated areas, posing no additional risk to people, property or infrastructure.

The observed increases remain within the existing pre-development flood extents and do not result in changes to flood pathways or flood hazard classification. On this basis, the modelled water level changes upstream and downstream of the proposed development are assessed as having effects that are less than minor.

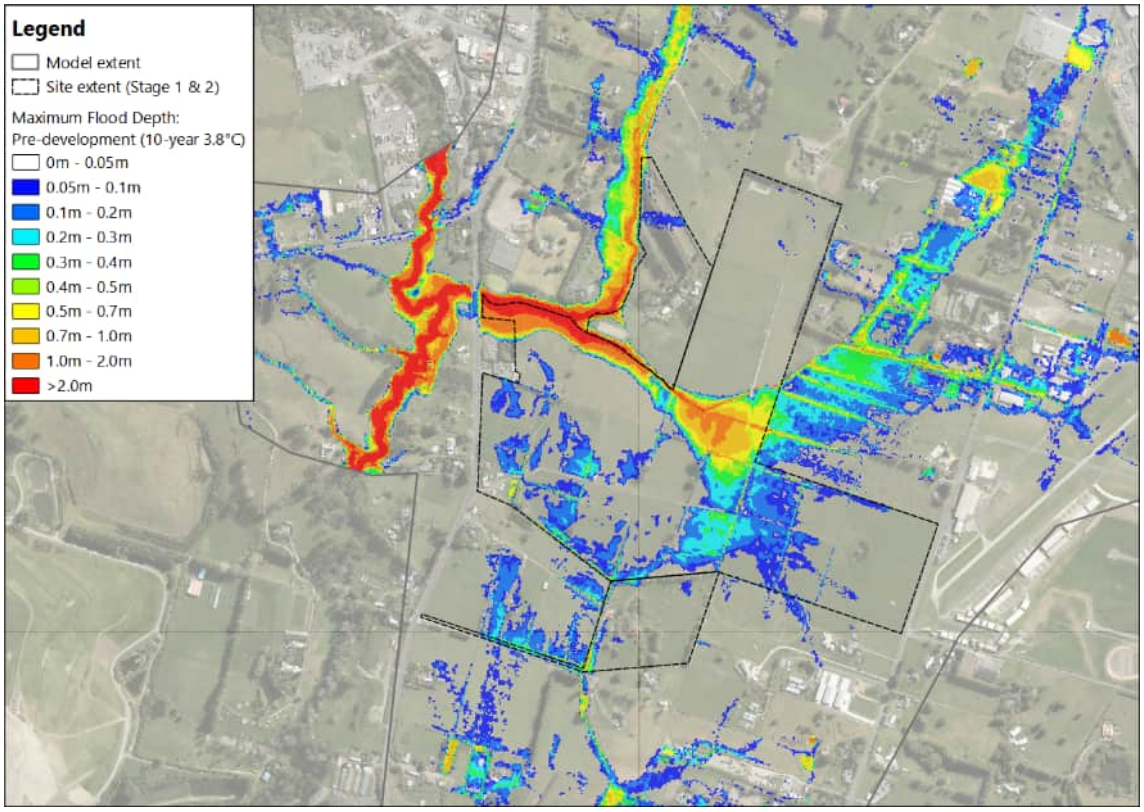


Figure 6. Maximum Flood Depth - Pre-development 10-year (3.8°C)

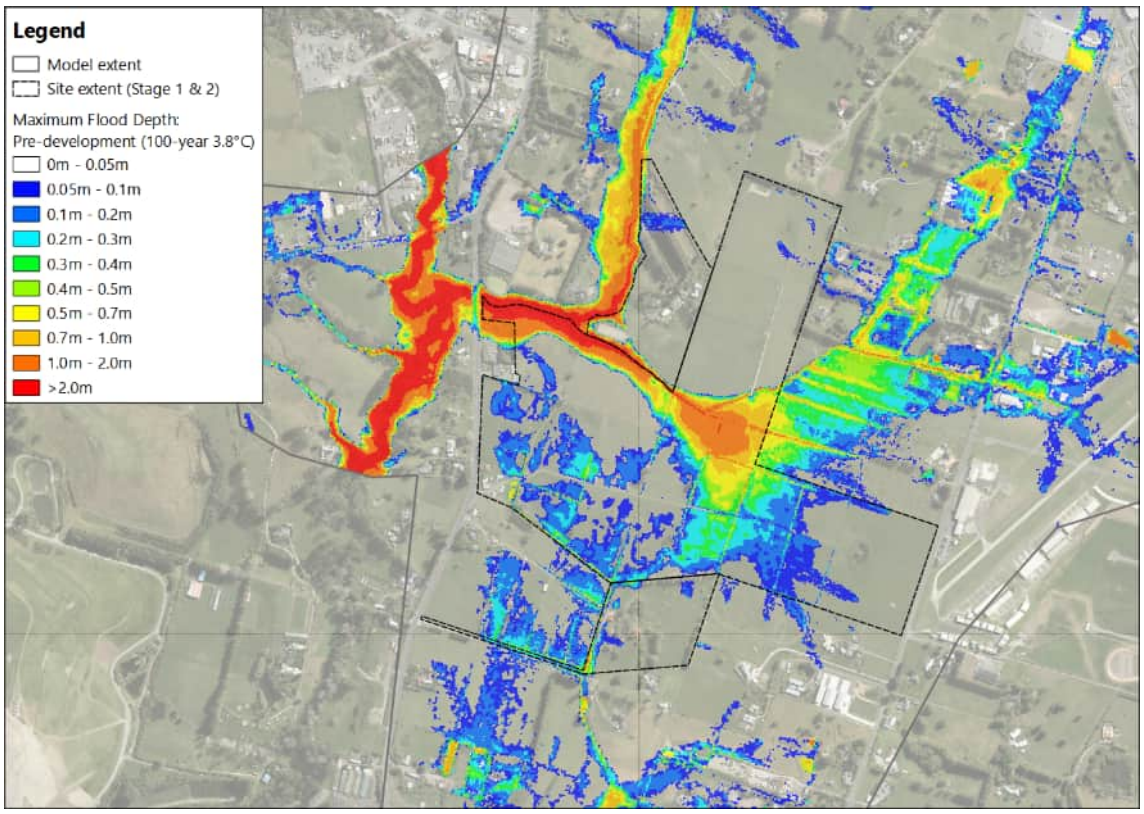


Figure 7. Maximum Flood Depth - Pre-development 100-year (3.8°C)

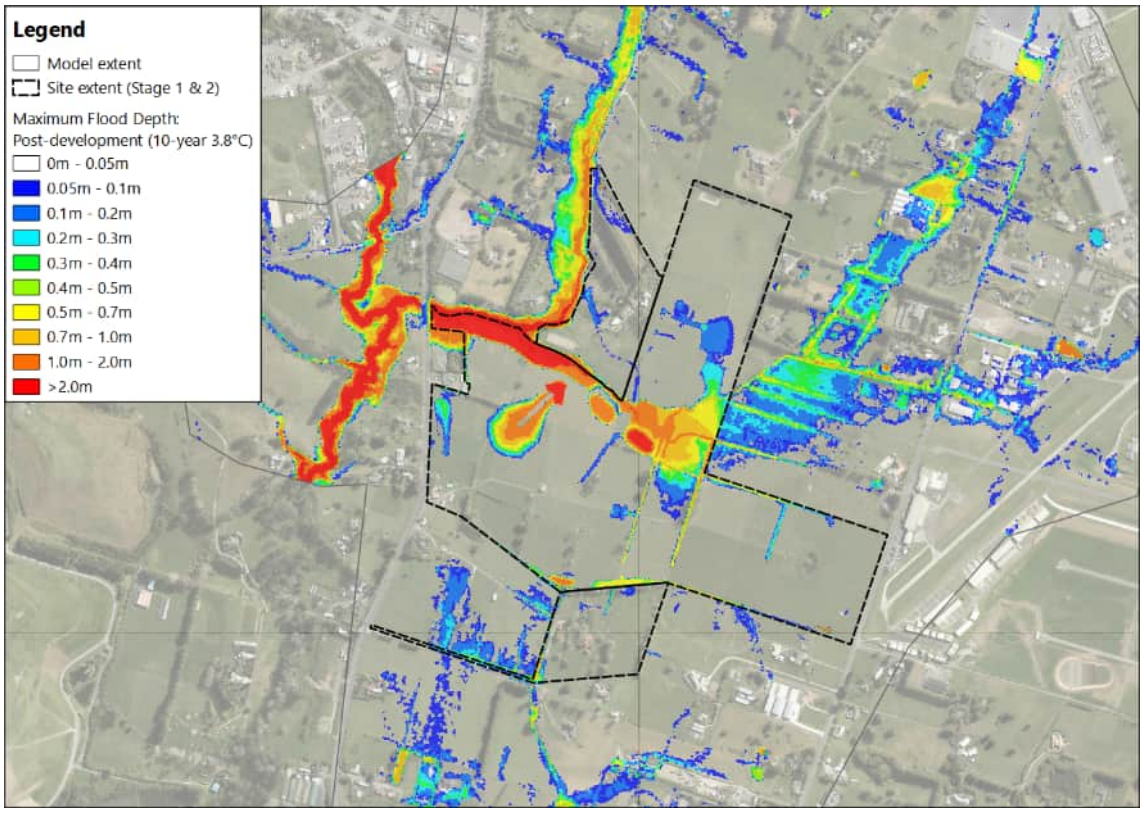


Figure 8. Maximum Flood Depth - Post-development 10-year (3.8°C)

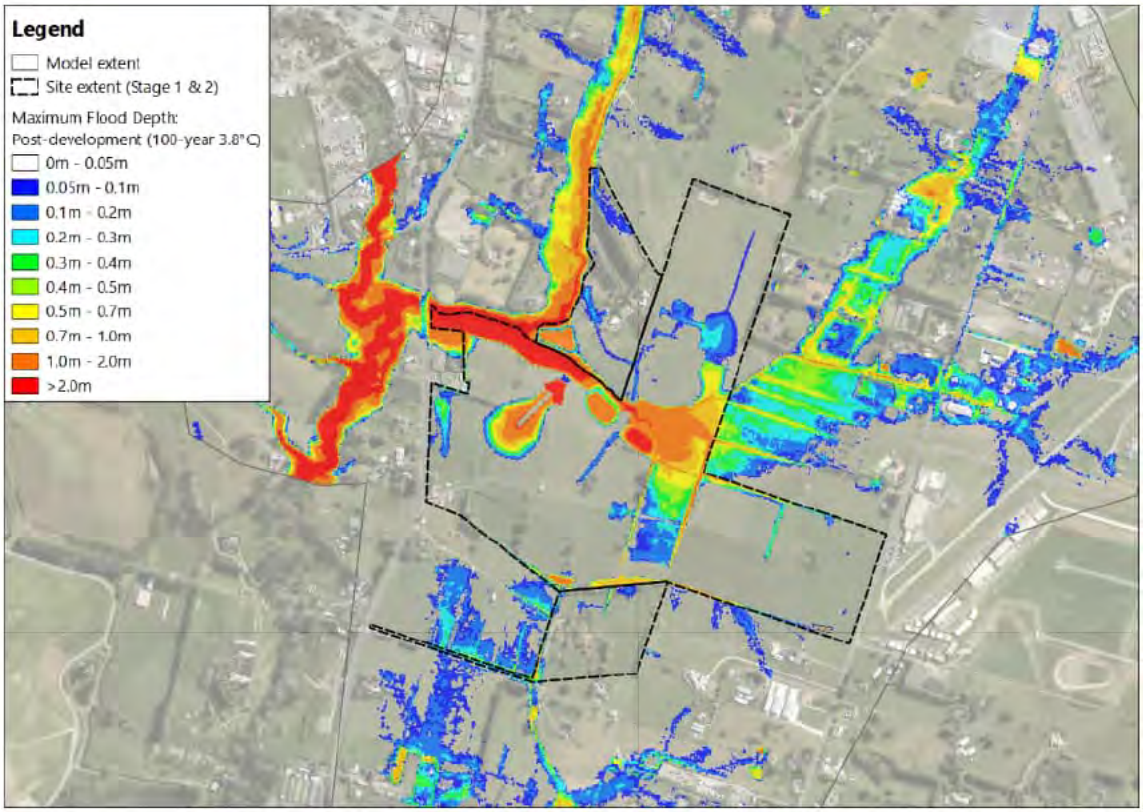


Figure 9. Maximum Flood Depth - Post-development 100-year (3.8°C)

Figure 10. Water Level Difference - 10-year ARI 3.8°C

Figure 11. Water Level Difference - 100-year ARI 3.8°C

6. Proposed Plan Change 120 / Hazard Assessment

Proposed Plan Change 120 (PC120) to the Auckland Unitary Plan was publicly notified on 3 November 2025 and introduces an updated natural hazards framework, including revised flood hazard definitions, hazard categories, and assessment criteria set out in Chapter J1. These provisions apply to development located within areas identified as being subject to natural hazards.

Flood modelling has been undertaken to assess flood behaviour across the site in accordance with the PC120 framework. Under PC120, flood hazard is classified into four categories:

- Very High Hazard: Depth equal or greater than 1200mm or depth * velocity product greater than or equal to 0.8m^2/s.
- High Hazard: Depth between 500mm and 1200mm or depth * velocity product between 0.4m^2/s and 0.8m^2/s
- Moderate Hazard: Depth between 300mm and 500mm or depth * velocity product between 0.24m^2/s and 0.4m^2/s.
- Low Hazard: Depth equal to or less than 300mm or depth * velocity product between less than or equal to 0.24m^2/s.

The modelling results have been reviewed against the PC120 hazard classification thresholds. The assessment indicates that the areas proposed for development are generally not located within zones classified as moderate, high, or very high flood hazard under PC120, where there is vertical separation is proposed and therefore will not be located within the hazard area. Modelled flood depths and depth–velocity products within the site are generally within the low hazard category or below the applicable PC120 thresholds.

Figure 12 and Figure 13 present the modelled flood hazard extents for the pre-development and post-development 100-year event with a 3.8 °C climate change allowance. Comparison of these scenarios

indicates that the proposed development does not result in a material change to flood hazard classification, and does not give rise to increased flood risk on third-party properties or downstream areas.

Any limited areas shown within mapped flood hazard extents are anticipated to be appropriately managed through the proposed development. This includes the integration of site layout, finished floor levels, overland flow path provision, and stormwater management measures to ensure flood hazards are addressed appropriately.

Based on the assessment undertaken, the proposed development is considered to be consistent with the intent and assessment framework of PC120, with flood hazard effects assessed as less than minor under the updated natural hazards provisions.

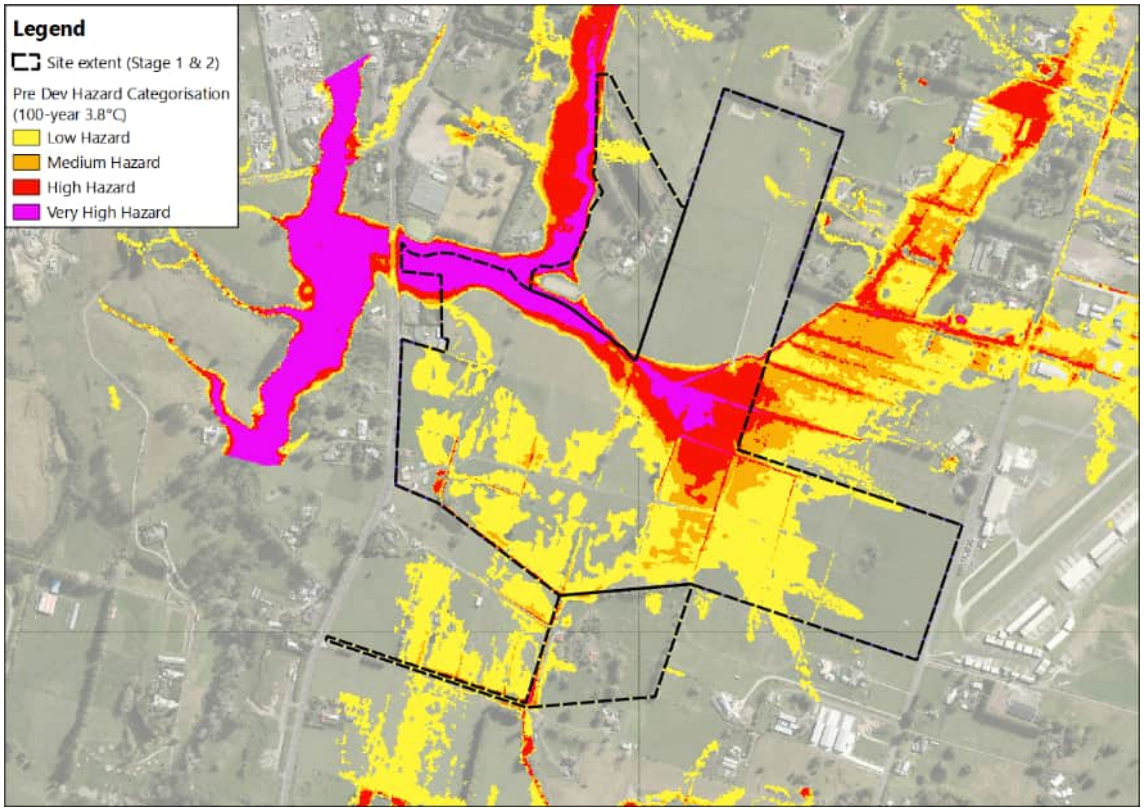


Figure 12. Flood hazard areas (pre-development 100-year ARI 3.8°C)

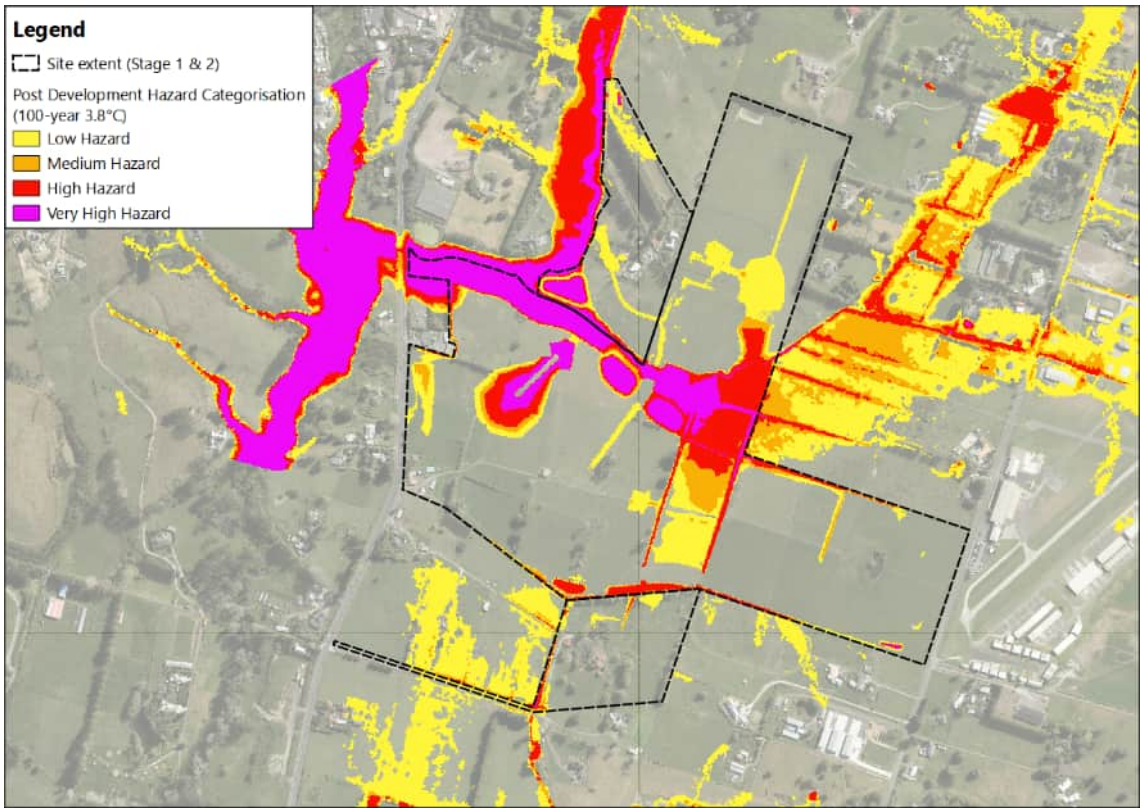


Figure 13. Flood hazard areas (post-development 100-year ARI 3.8°C)

7. Conclusion

Flood modelling has been undertaken for Stages 1 and 2 of the proposed Auckland Surf Park Community development using updated model scenarios that reflect the latest site masterplan dated 3 June 2026. The assessment has considered pre-development and post-development conditions across a range of storm events, including existing rainfall conditions and future climate change allowances, to evaluate potential off-site flood effects.

The modelling results indicate that changes in flood behaviour beyond the development site are limited. Predicted changes in flood levels on third-party land are generally less than 30 mm and remain contained within existing floodplains. These changes do not result in a change to flood hazard classification or flood risk, and no new flooding pathways are created. Flood extents are generally consistent with existing conditions.

Assessment of the modelling outcomes against the flood hazard framework introduced by Proposed Plan Change 120 (PC120) confirms that the proposed development does not give rise to new or increased flood hazards beyond the site. Any areas shown within mapped flood hazard extents are anticipated to be appropriately managed through the proposed development, consistent with the intent and assessment criteria of PC120.

On this basis, the potential off-site flood effects associated with the proposed Surf Park development are assessed as less than minor. The updated modelling supports the conclusion that the proposed development can proceed without resulting in adverse flooding effects on third-party properties or downstream areas.

Appendix A

Flood Model Build Memorandum

To

AW Holdings 2021 Ltd
Attn: Dave Lang / Nick Roberts

From

Woods
T.Wang / R.Nair – 3 Waters Engineers

W-REF: P22-194
15 June 2024
Reviewer: A.Desai / P.Wadan

Memorandum

Surf Park Fast Track Referral Application – Flood Model Build

1. Introduction

This flood model build memorandum has been prepared to respond to the concerns raised by Ms. Kedan Li (Healthy Waters, Auckland Council) in the assessment on flood assessment report memorandum prepared by McKenzie & Co dated May 28, 2024. This memo provides responses to the following key issues raised by Ms. Kedan Li:

- *Low confidence regarding culvert capacity assessment and flood hazard assessment across Dairy Flat Highway.*
- *Unclear whether 2D modelling approaches have been applied for 'existing scenarios', therefore based on the limited information/results presented, the effect on downstream properties is unclear.*
- *The Flood Assessment Report Revision G Submitted by McKenzie & Co Dated 22/05/2024 contradicts itself*

Due to the reasons outlined above, the conclusions (listed below) drawn from the hazard risk assessment provided by McKenzie & Co. were not agreed upon.

- *The additional modelling scenarios demonstrate that the flood level differences post-development flows remain similar, if not less than, pre-development flows during all events.*
- *The conclusions drawn within the Revised Hazard Risk Assessment indicate that the risk is low in relation to all categories.*
- *The additional modelling scenarios demonstrate that the flooding effects are less than minor, and no additional mitigation measures are required.*

To address the raised issues, 2D flood model has been developed using InfoWorks ICM and used to undertake flood effects assessments for the proposed development. This memo details the model build approach, scenarios modelled, key assumptions, and a summary of the model results. This flood model build memorandum has been prepared to support the application for the referred project.

An indicative site plan showing the proposed development is presented in Figure 1.

Figure 1: Site Plan (Source: McKenzie & Co)

2. Model Parameters Overview

Table 1 provides a summary of the pre-development and post-development model parameters adopted.

Table 1. Summary of model changes

Item	Information	Model scenario specific changes
Hydrology		
Subcatchments	75 subcatchments have been modelled for the pre-development situation and 85 subcatchments have been modelled for the post-development situation.	***Scenario 1 (Pre-development model)*** 75 subcatchments delineated within the model extent. Subcatchments delineated based on LiDAR 2016 DEM data (as per AC GeoMaps). ***Scenario 2 (Development only model) and Scenario 3 (Catchment development model)*** 85 subcatchments delineated within the model extent. Subcatchments delineation revised within the proposed development extent based on proposed landform including flood mitigation option (discussed in the later sections of this memo).
Rainfall	The model scenarios have been simulated for 24-hour existing and future climate change (3.8°C to 2110) rainfall as per TP108 guidelines.	***All Scenarios*** All pre- and post-development model (with preferred option) scenarios have been simulated for 2-, 5-, 10-,20-, 50- and 100-year ARI with existing rainfall (no climate change) and future rainfall (inclusive of 3.8°C climate change).

Item	Information	Model scenario specific changes
Imperviousness	Imperviousness has been included based on the respective model scenarios. Existing impervious coverage has been calculated based on the impervious layer shown on AC GeoMaps. Maximum Probable Development (MPD) impervious coverage is based on Auckland Unitary Plan (AUP) zoning.	***Scenario 1 (Pre-development model)*** The pre-development scenario adopted Existing Development (ED) impervious coverage within and outside the development extent. ***Scenario 2 (Development only model)*** The post-development scenario 1 adopted Maximum Probable Development (MPD) impervious coverage within the development extent and ED impervious coverage outside the development extent. ***Scenario 3 (Catchment development model)*** The post-development scenario 1 adopted MPD impervious coverage within and outside the development extent.
Hydrological parameters	The subcatchments have been modelled with hydrological parameters (Curve Numbers, Initial abstraction, lag times) as per TP108 document.	***All Scenarios*** Curve Numbers (CN): Pervious – 74; Impervious – 98 Initial abstraction (Ia): Pervious – 5mm; Impervious – 0mm Time of concentration (Tc): 10minutes as subcatchments are smaller than 3ha
Topography		
Topography	Existing Surface based on LiDAR 2016. from McKenzie & Co dated 06/06/2024 Design surface from McKenzie & Co. dated 11/06/2024 with minor modifications for proposed channel	***Scenario 1*** Topographical survey with LiDAR 2016. ***Scenario 2 and Scenario 3*** Design Layout with LiDAR 2016
Roughness		
Roughness and surface	Refer to Section 5.2.3 of this memorandum.	***Scenario 1:*** Roughness modelled for ▪ Building = 0.5 ▪ Road =0.02 ▪ Streams =0.035 ▪ All other areas = 0.1 ***Scenario 2 and Scenario 3*** No changes adopted at this stage.
Boundary Conditions		
Inflow and water levels	A time-series of upstream flows and downstream water levels for Rangitopuni stream supplied by Healthy Waters on the 4th of June 2024 and applied in the model.	***Scenario 1 - Scenario 3*** No changes.

3. Hydrological Model

The design parameters adopted in the hydrological model are discussed in this section.

3.1. Rainfall

The site has been modelled using a delineated catchment approach. TP108 rainfall contours were used to calculate additional unit hydrographs for different rainfall events using the same approach.

3.1.1. Climate change

A temperature increase of 3.8°C has been applied to the Climate Change (CC) scenarios. This approach is in accordance with the Auckland Council Code of Practice V4, March 2024. Table 2 shows the 24-hour rainfall depth used in the model.

Table 2: Design Rainfall

ARI	24hr Rainfall Depth (mm)	24hr Rainfall Depth+ 3.8°C CC (mm)
100-year	200	265
50-year	180	237
20-year	155	203
10-year	135	177
5-year	115	149
2-year	80	102

3.2. Land Use

Land use assumptions for areas within and outside the development site have been modelled based on the model scenario as detailed below:

- The pre-development model scenario assumes existing development (ED) impervious coverage within and outside the development extent. ED impervious coverage is calculated from the impervious layer information shown in AC GeoMaps.
- The post-development model scenario 1 assumes ED impervious coverage within the development extent and MPD impervious coverage outside the development extent. The MPD impervious coverage assumed the maximum probable development (MPD) as per AUP.
- The post-development model scenario 2 assumes MPD impervious coverage within and outside the development extent.

The impervious coverage adopted in the model is shown in Table 3.

Table 3: Impervious Coverage

Land Use Coverage	*Scenario 1 (Pre-development model)*	*Scenario 2 (Development only model)*	*Scenario 3 (Catchment model)*
Within development extent	4%	27%	27%
Outside development extent	12%	12%	60%

4. Terrain Data

Topographical survey and LiDAR 2016 DEM data have been used for the model in the pre-development scenarios. The combined pre-development surface was provided by McKenzie & Co on 6 June 2024.

For the post-development scenarios, a combination of the design surface with LiDAR 2016 DEM data has been used with minor channel modification. The combined post-development surface was provided by McKenzie & Co on 11 June 2024.

4.1. Coordinate System and Vertical Datum

The Coordinate System for this model is New Zealand Transverse Mercator 2000 (NZTM 2000) and the vertical datum for this model is Auckland Vertical Datum 1946 (AUK1946).

5. Hydraulic Model

The assumptions and hydraulic parameters adopted in the model are discussed in this section.

5.1. 1D Model

5.1.1. 1D culverts

The Scenario 1 (pre-development model) includes three existing 900mm diameter circular culverts under Dairy Flat Highway represented in 1D at the downstream end of the development extent.

As part of the proposed reticulation system and flood mitigation, three culverts as shown in Figure 2 are proposed along the southern boundary of the development. A summary of the proposed culverts has been provided in Table 4which shows the upstream and downstream invert levels, size/diameter and the source of information used.

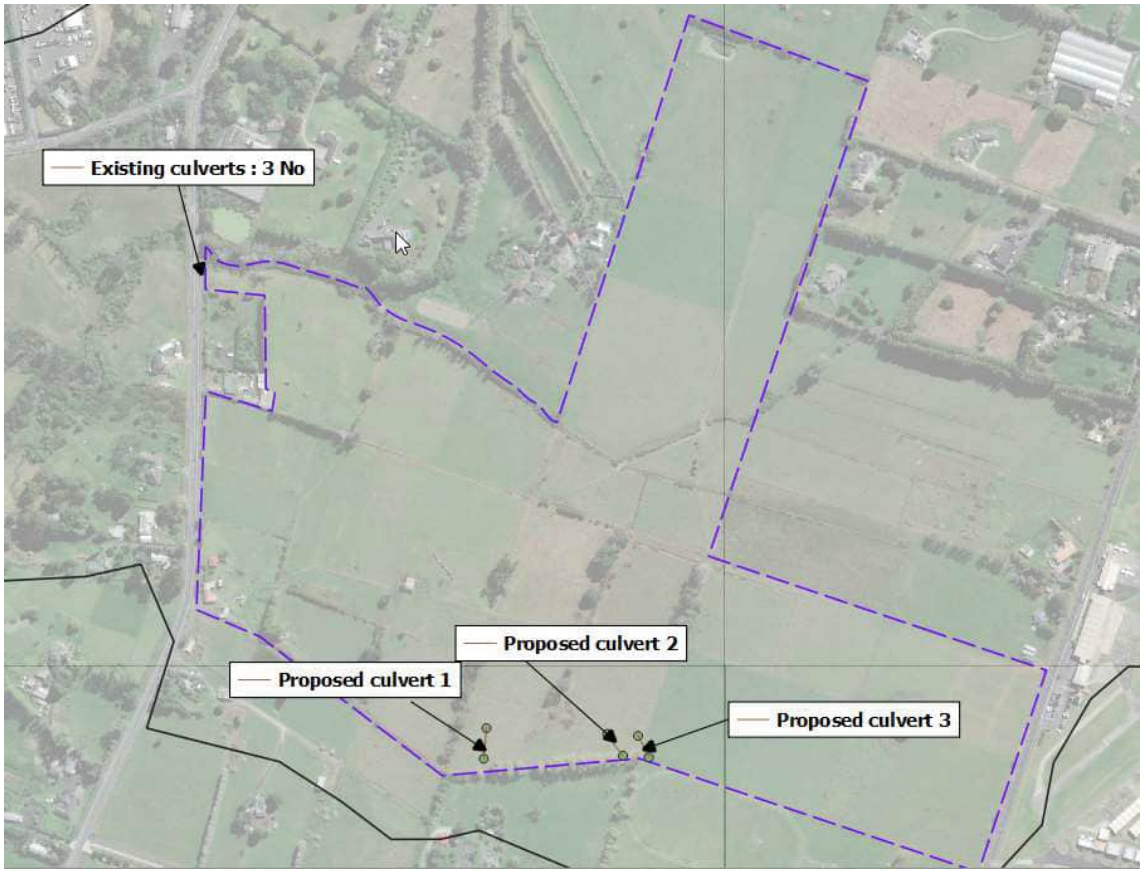


Figure 2: Culvert Locations

Table 4: Proposed Culvert Details

#	Asset name	Asset type	Dimension (mm)	Upstream invert level (m RL)	Downstream invert level (m RL)	Source of information
1	Proposed Culvert 1	Culvert Box	3000 x 1000 mm	52.8	52.7	McKenzie & Co
2	Proposed Culvert 2	Circular Culvert	1350mm Dia	52.96	53.2	McKenzie & Co
3	Proposed Culvert 3	Circular Culvert	1350mm Dia	53.0	53.3	McKenzie & Co

5.2. 2D Model

A 2D zone with a flexible mesh approach was created using the terrain data. The mesh resolution was set to a maximum triangle area of 20m^2, and a minimum triangle area of 10m^2. Higher resolution has been adopted for areas along Rangitopuni stream, major overland flow paths and proposed development extent with two mesh zones. The details of the mesh zones are provided in Table 5.

Table 5 : Mesh zone details

Mesh zone name	Purpose	Area (ha)	Maximum triangle area (m2)	Minimum triangle area (m2)
MeshZone1	Rangitopuni stream and tributaries/major overland flow paths	71.59	5	2
MeshZone2	Project area extent	9.40	10	5

Details of roughness values adopted are provided in Section 2.

5.3. Boundary Condition

Figure 3 shows the locations of the inflow boundary conditions applied to the flood model. The Healthy Waters correspondence is included in Appendix A for information.

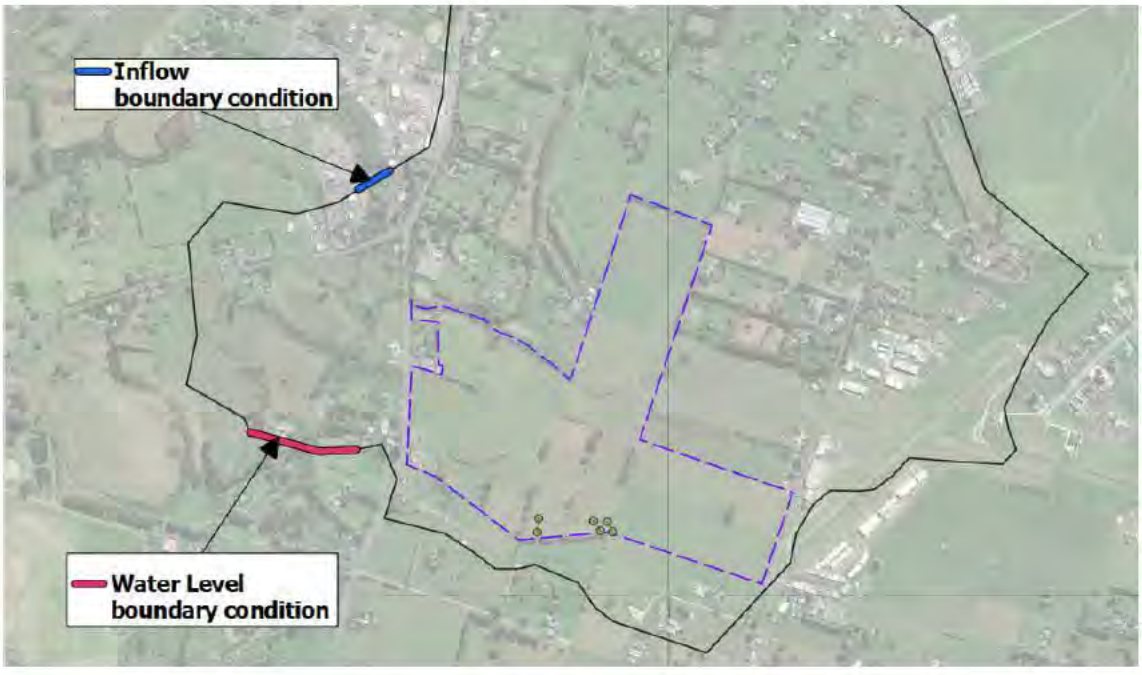


Figure 3: Boundary conditions

6. Modelled Scenarios

There were three flood model scenarios prepared as part of this assessment. A brief description of these have been provided below:

1. **Scenario 1 - Pre-development model**
   This scenario was modelled to understand existing flood extents. This scenario forms the basis for assessing future flooding conditions and the suitability of flood mitigation options. This model scenario assumes existing development (ED) impervious coverage within and outside the development extent.
2. **Scenario 2 – Development only model**
   This model scenario was modelled to assess the flood effects on areas upstream and downstream of the development site as a result of the change in imperviousness caused by the proposed development. It assumes ED impervious coverage outside the development extent and MPD impervious coverage, based on AUP, within the development extent.
3. **Scenario 3 – Catchment development model**
   This model scenario was modelled to assess the flood resilience for the proposed development site with full MPD development.

Table 6 provides a summary of the model scenarios. The information presented in the table provides a detailed description of the key scenarios and model inputs.

Table 6: Modelled scenarios

Model scenario	Description	Land use	Climate Change (^{0}C)	ARI
Scenario 1 (Pre-development)	Pre-development model scenario to understand existing flooding	ED - areas within and outside the development extent	3.8°C CC, No CC	2-year 5-year 10-year 20-year 50-year 100-year
Scenario 2 (Development only)	Development only model scenario to understand upstream and downstream flood effect as a result of the change in imperviousness due to the proposed development	MPD - areas within the development ED – areas outside the development extent	3.8°C CC, No CC	2-year 5-year 10-year 20-year 50-year 100-year
Scenario 3 (MPD)	Catchment development model scenario to understand flood resilience for the proposed development site with Full MPD development	MPD - areas within and outside the development extent	3.8°C CC	100-year

7. Model Results

As stated in Table 6, the models have been simulated for no climate change and with climate change considerations based on 3.8°C temperature increase to 2110 for various storm events. The water level results of each Scenario 2 (development only model) were compared with the Scenario 1 (Pre-development model) to assess the differences in the water levels upstream and downstream of the development.

Appendix B provides a copy of results for all modelled scenarios. This includes flood depth plots and water level difference plots for all simulated events. For purposes of the memo, results of the 10-year and 100-year scenarios with no climate change and inclusive of 3.8°C CC have been presented and discussed in the following sections.

7.1. Pre-development Model Results

7.1.1. Scenario 1- Pre-development model

The pre-development flood depths within the modelled catchment are shown in Figure 4 and Figure 5.

The flood depth maps indicate that the flooding within proposed development extent (data centre and surf park) is limited along the existing overland flow paths for all the modelled scenarios including the 100-year ARI with 3.8°C CC storm event.

The maps show that the average flood depth within flood extents at the proposed data centre is approximately 300mm for the 10-year ARI 3.8°C CC rainfall event and 400mm for the 100-year ARI 3.8°C CC rainfall event. It is also noted that the existing channel along the site's northern boundary is deep and incised, with flooding within the channel potentially exceeding 2m for the 100-year ARI 3.8°C CC rainfall event.

7.2. Post-development model results

7.2.1. Scenario 2 – Development only model

The Scenario 2 flood depths within the modelled catchment are shown in Figure 6 and Figure 7.

The results show that the modelled flood extents for Scenario 2 (development only model) are no greater than the Scenario 1 (pre-development model). This is a result to the flood mitigation provided within the site including flood channels and flood attenuation which are incorporated into the design surface and earthworks.

The results also indicate that the modelled flood extent for the existing channel adjacent to the site's northern boundary is comparable to the base model. This is due to the existing incised channel, which mostly contains the flood flows.

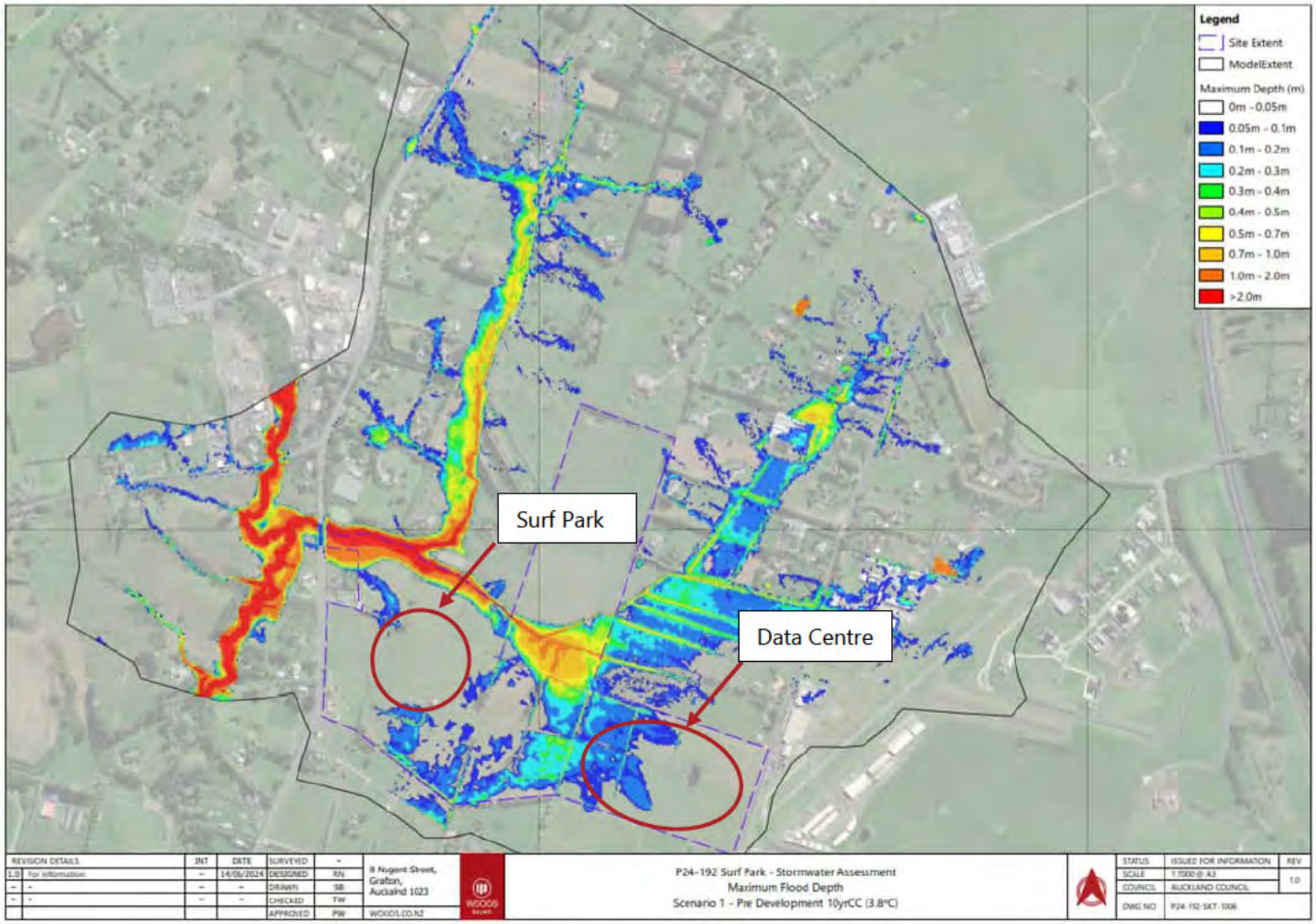


Figure 4: Maximum Flood Depth – Scenario 1 Pre-Development 10-year CC (3.8°C)

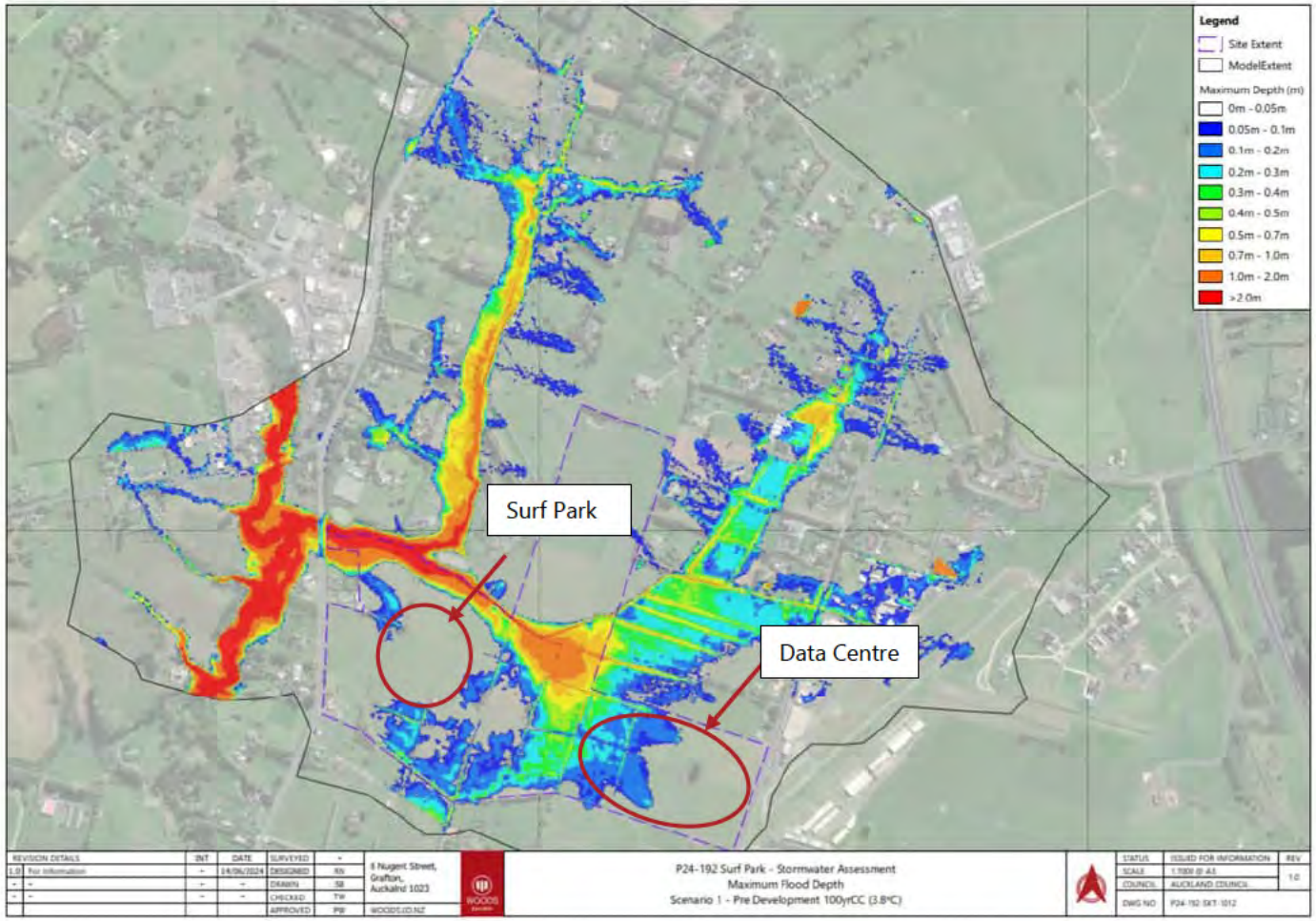


Figure 5: Maximum Flood Depth – Scenario 1 Pre-Development 100-year CC (3.8°C)

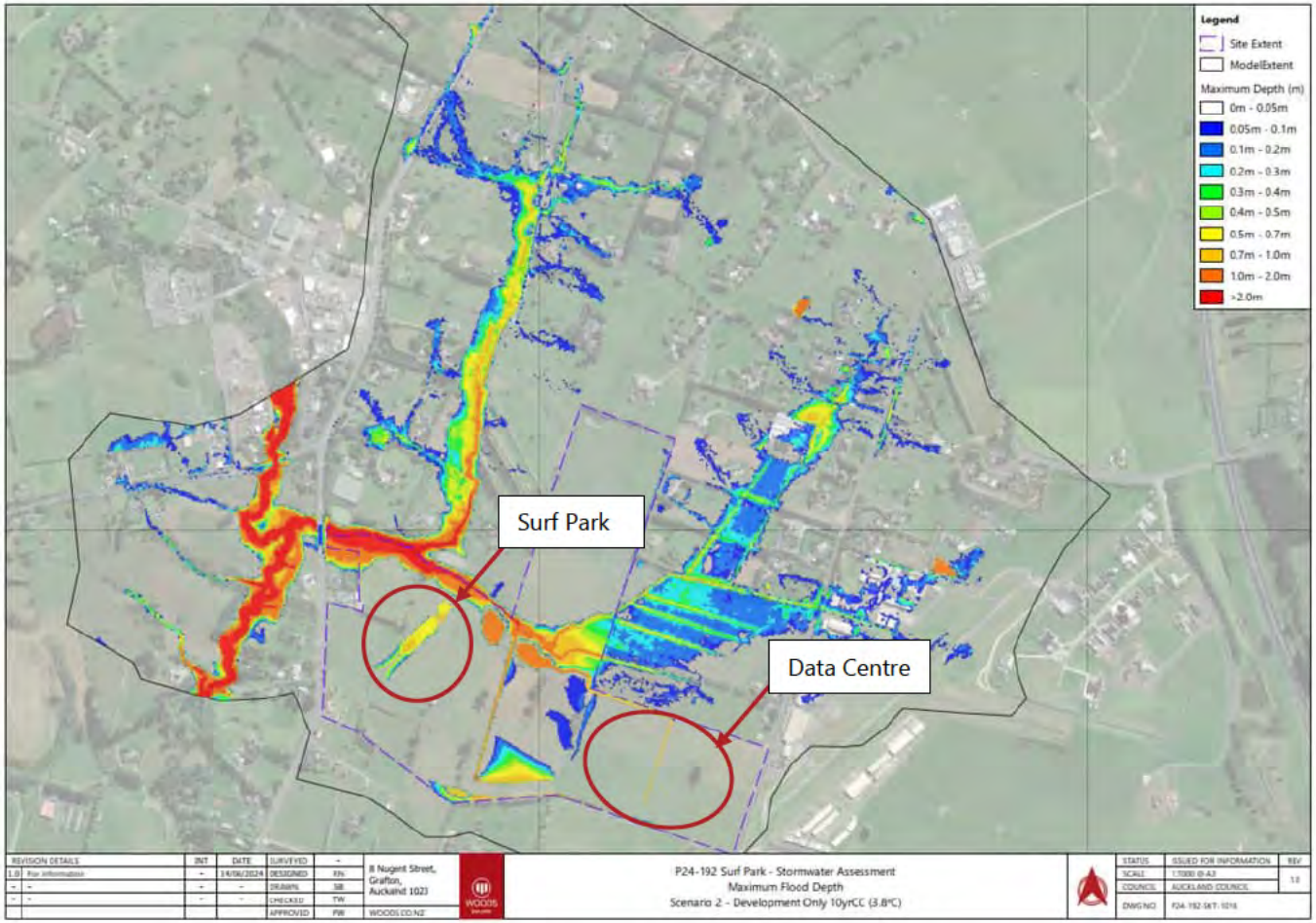


Figure 6: Maximum Flood Depth –Scenario 2 Development only 10-year CC (3.8°C)

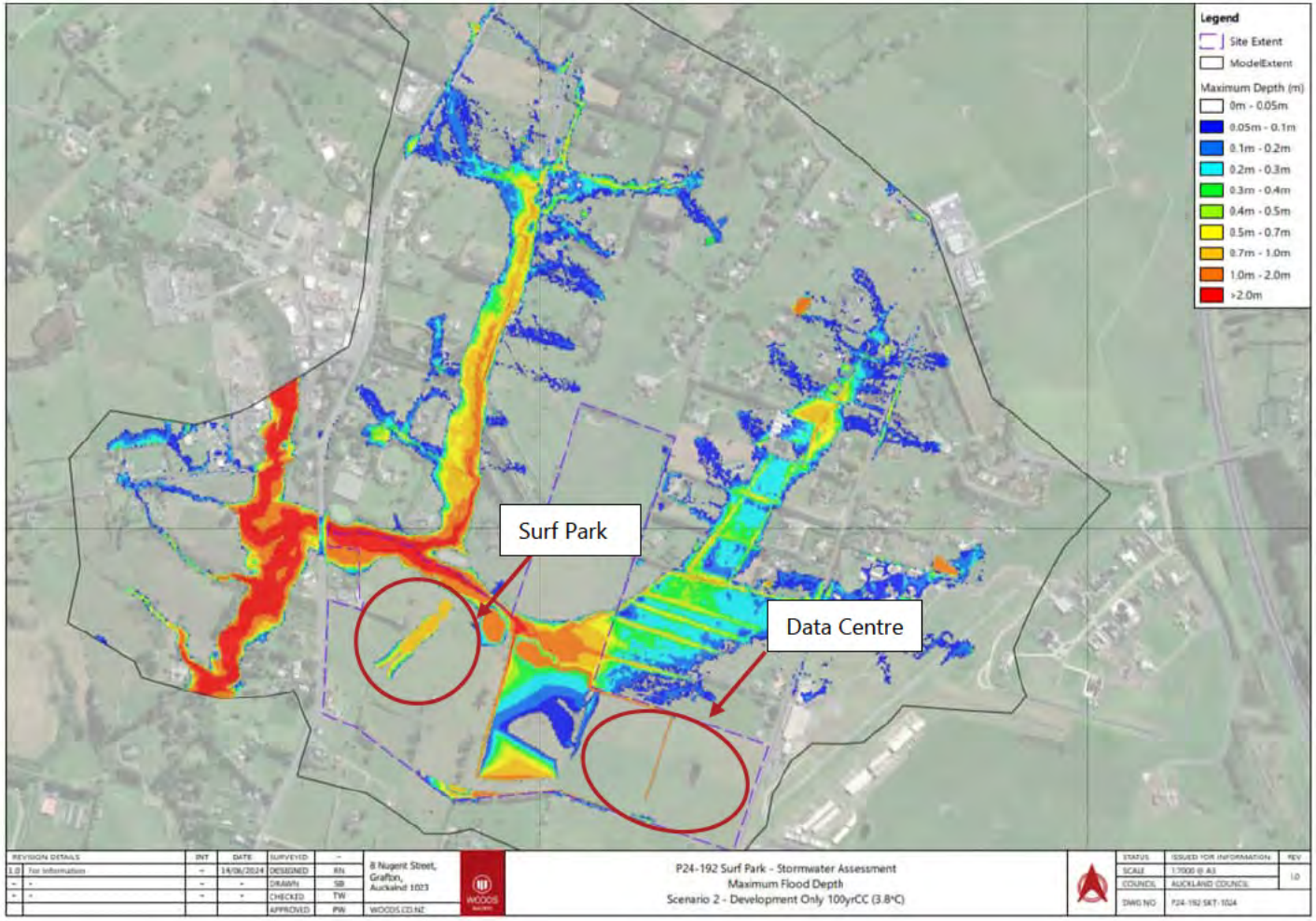


Figure 7: Maximum Flood Depth – Scenario 2 Development only 100-year CC (3.8°C)

8. Effects Assessment

For the purposes of this assessment, the post development model results discussion focusses on the water level difference plots between Scenario 2 (development only model) and Scenario 1 (pre-development model). The water level difference plot shows the change in flood extents and levels as a result of the development.

Figure 8 and Figure 9 shows the water level difference plot (water level differences) for Scenario 2 with Scenario 1 for 10-year and 100-year ARI storm event (3.8°C CC) respectively.

The water level difference plot shows that there are no flood effects upstream or downstream of the proposed development with the proposed development. The water level difference plots are included in Appendix C for information.

Based on the water level difference plots, the following conclusions can be drawn for the Scenario 2 (development only model):

- No water level increases upstream or downstream of the proposed development
- No water level increases along the Dairy Flat Road Highway

During the 100-year 3.8°C climate change (CC) scenario, the assessment showed that the increased flood depth within the surf park is greater than 300mm. This increase is due to the proposed surfing structure. The assessment also indicates a minor increase in flood depth within the development, which is mostly associated with the conveyance of the proposed internal channel. The design of the proposed internal channel will be refined during the detailed design stage.

Figure 8: Water level difference – Scenario 2 vs Scenario 1 10-year ARI 3.8°C CC

Figure 9: Water level difference – Scenario 2 vs Scenario 1 100-year ARI 3.8°C CC

8.1.1. Outflow Assessment

The flows at Dairy Flat Highway were assessed for Scenario 1 (pre-development model) and Scenario 2 (development only model). The outflow through these three 900mm culverts are shown in Figure 10, with results shown in Figure 11 and Figure 12 respectively.

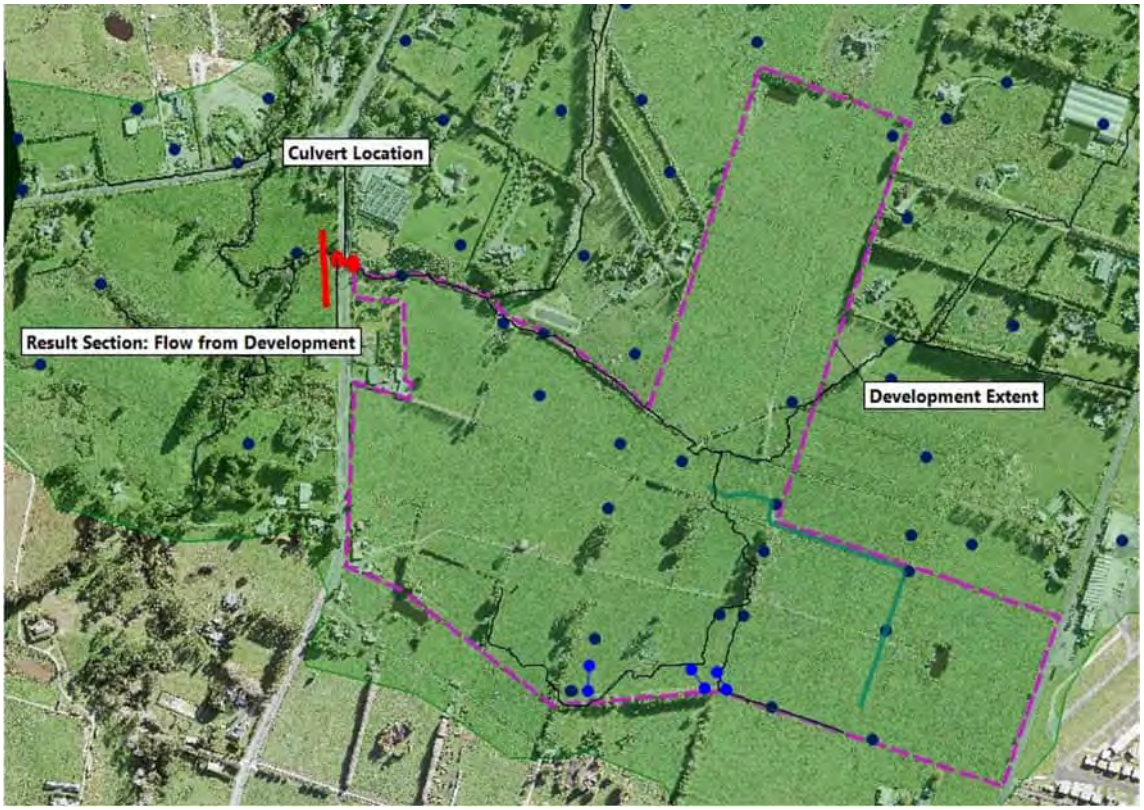


Figure 10: Assessment locations

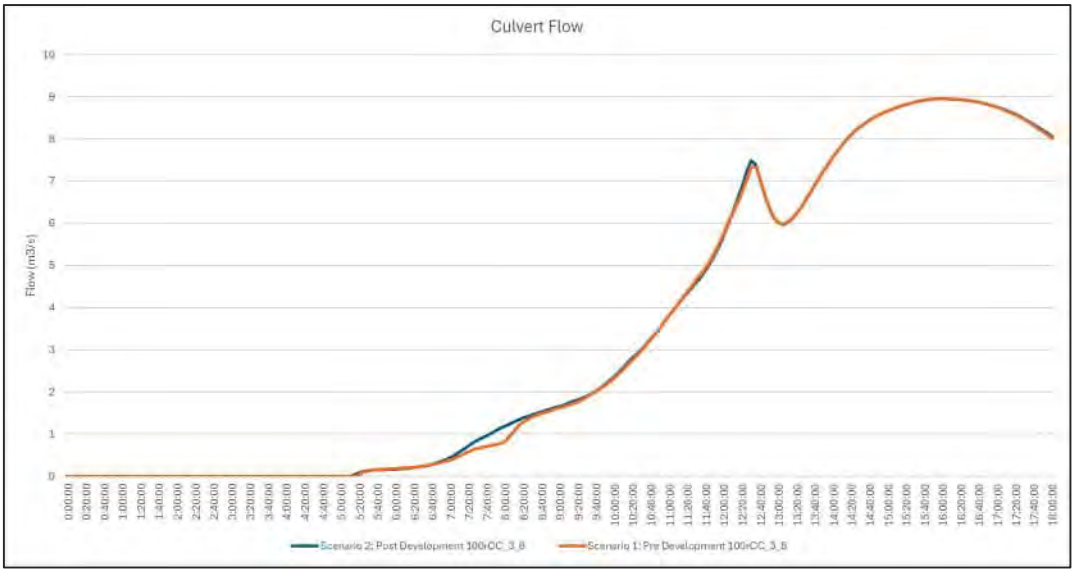
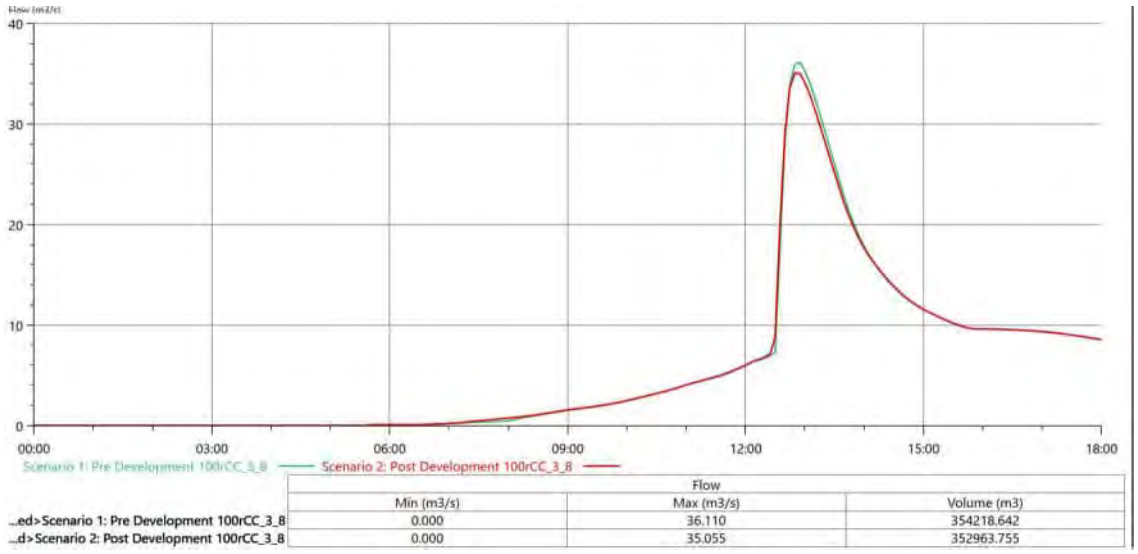


Figure 11: Outflow through 3x 900mm Dia culvert – 100-year ARI 3.8°C CC ARI Events



	Flow		
	Min (m3/s)	Max (m3/s)	Volume (m3)
...ed>Scenario 1: Pre Development 100rCC_3_8	0.000	36.110	354218.642
...d>Scenario 2: Post Development 100rCC_3_8	0.000	35.055	352963.755

Figure 12: Extracted Outflow from the development

As shown in Figure 11, for both Scenario 1 (pre-development model) and Scenario 2 (development-only model), the flow through the three culverts is approximately 9m³/s.

As shown in Figure 12, Scenario 2 (development only model) has a slightly lower peak flow compared to Scenario 1 (pre-development model). This is due to the temporary storage and conveyance provided onsite as part of the development. The 24-hour flow volume for Scenario 1 is 354,219m³, and the flow volume for Scenario 2 is 352,964m³. It is to be noted that storage is being provided within the proposed wetlands, and therefore the overall flow volumes are considered balanced.

9. Flood Resilience

Flood depth plots were generated for Scenario 3 (catchment development model), with results shown in Figure 13. The proposed surf park and data centre are resilient to flooding with catchment MPD development. The secondary flows are contained within the existing channel adjacent to the northern boundary of the development.

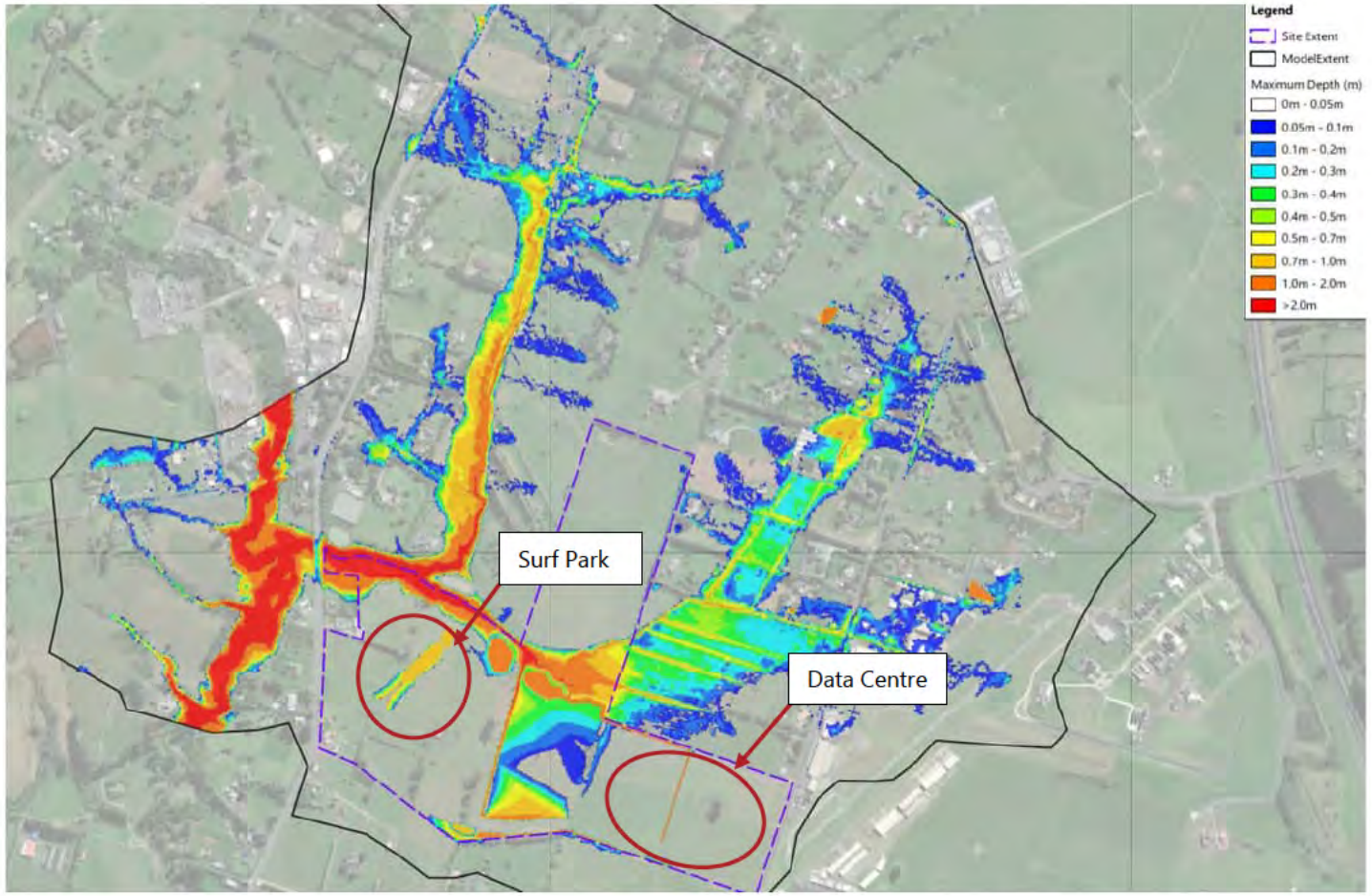


Figure 13: Maximum Flood Depth –Scenario 3 Catchment Development 100-year CC (3.8°C)

10. Conclusion

The additional modelling results demonstrate that :

- There are no increases in flood level with the proposed development within neighbouring properties for all modelled events.
- The flows discharging to the Dairy Flat Highway culverts downstream of the proposed development are slightly lower with the proposed development as a result of flood mitigations adopted within the site for the 100-year ARI 3.8°C CC event.
- The cumulative flows through the three 900mm diameter culverts is approximately 9m^3/s for with and without the proposed development for the 100-year ARI 3.8°C CC event.
- The flood resilience assessment undertaken with the 100-year ARI 3.8°C CC event shows that the proposed surf park and data centre are resilient to flooding with catchment MPD development.

In conclusion, the modelling indicates that there are flood effects to third-party land upstream or downstream of the proposed development site and no additional mitigation measures are required beyond those currently proposed.

11. Limitations and Assumptions

The following assumptions and limitations are noted:

- This model has been used to undertake flood effects assessment for the proposed development and develop flood mitigation options to achieve flood neutrality outside of the proposed development.
- The runoff flows calculated by the hydrological model are loaded in the hydraulic model at specified nodes inside the two-dimensional model extents (structured mesh). Inside the two-dimensional model extents, water can flow in all directions from the loading node. The extents of the flow paths may vary based on the location of the loading node, the elevation of the two-dimensional grid cells (from LiDAR data) and other model assumptions. The location of the loading determines the origin of the overland flow path.
- No sedimentation or blockage has been allowed for in any watercourses or culverts.
- Modelling process relies on a range of assumptions and simplifications and may be subject to errors and inaccuracies. The compounding effects of the uncertainties in the TP108 rainfall model (ARC, 1999), the uncertainties in the LiDAR data and the uncertainties in hydraulic parameters such as roughness could result in the water level varying from the mapped levels.
- The LiDAR data has an absolute vertical accuracy of +/- 0.10m. Deviations in vertical accuracy can occur in areas of dense vegetation. Below water, ground levels are not reliably represented in the LiDAR data. As a result of the water level variability, the flood extent may vary from that shown on the plans. This can have a compounding effect with other uncertainties.
- There is no measured flow data considered in this assessment; therefore, it is not possible to validate the peak water levels or flows.

Appendix A

Healthy Waters Correspondence

From: Kedan Li [redacted]
Sent: Tuesday, June 4, 2024 2:03 PM
To: James Kitchen <j[redacted]
Cc: Magdalena Regnault [redacted] nickr [redacted]; Charlotte Peyroux [redacted] Jodie Hansen [redacted] Warwick Pascoe [redacted]>; Susan Andrews [redacted]
Subject: RE: Surf Park post conferencing memo and updated flood report

Hi All,

Please find the attached spreadsheet that includes data extracted from the current Regionwide Rapid flood assessment, which may aid to boundary condition set up for the modelling purposes.

Disclaimer: Please note that the data has been provided based on Auckland Council's Regionwide Model ID 1392 as a good will for supporting the assessment proposed at Auckland Surf Park - 1350 Dairy Flat Highway. Please note that the flow and level data provided were based on our Regionwide Rapid Flood Assessment, it is a rapid modelling study to identify areas that may have flooding risks, the results are in high level scale as it was developed for high level regional scale planning and flood risk prediction purposes. Modelling has been carried out based on the datasets available at the time of model build.
Whilst due care has been taken in producing the flood results, Auckland Council gives no warranty as to the accuracy and completeness of any information given and accepts no liability for any error, omission or use of the information. The information provided does not preclude the need for an appropriate site-specific assessment and cannot be construed as an endorsement or approval of any development by Auckland Council.

Thanks,
Kedan

Kedan Li | Senior Healthy Waters Specialist
Healthy Waters | Infrastructure & Environmental Services
Auckland Council, Level 17, Auckland House, 135 Albert Street, Auckland
Visit our website: www.aucklandcouncil.govt.nz

Appendix B

Model Results

REVISION DETAILS		INT	DATE	SURVEYED	-
1.0	For Information	-	14/06/2024	DESIGNED	RN
-	-	-	-	DRAWN	SB
-	-	-	-	CHECKED	TW
				APPROVED	PW

8 Nugent Street,
Grafton,
Auckalnd 1023

WOODS.CO.NZ

WOODS Est.1970

P24-192 Surf Park - Stormwater Assessment
Maximum Flood Depth
Scenario 1 - Pre Development 2yr No CC

STATUS	ISSUED FOR INFORMATION	REV
SCALE	1:7000 @ A3	1.0
COUNCIL	AUCKLAND COUNCIL	
DWG NO	P24-192-SKT-1001	

REVISION DETAILS		INT	DATE	SURVEYED	-
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-	-	-	-	DRAWN	SB
-	-	-	-	CHECKED	TW
				APPROVED	PW

8 Nugent Street,
Grafton,
Auckalnd 1023

WOODS.CO.NZ

WOODS Est.1970

P24-192 Surf Park - Stormwater Assessment
Maximum Flood Depth
Scenario 1 - Pre Development 2yrCC (3.8°C)

STATUS	ISSUED FOR INFORMATION	REV
SCALE	1:7000 @ A3	1.0
COUNCIL	AUCKLAND COUNCIL	
DWG NO	P24-192-SKT-1002	

REVISION DETAILS		INT	DATE	SURVEYED	-
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-	-	-	-	DRAWN	SB
-	-	-	-	CHECKED	TW
				APPROVED	PW

8 Nugent Street,
Grafton,
Auckalnd 1023

WOODS.CO.NZ

WOODS Est.1970

P24-192 Surf Park - Stormwater Assessment
Maximum Flood Depth
Scenario 1 - Pre Development 5yr No CC

STATUS	ISSUED FOR INFORMATION	REV
SCALE	1:7000 @ A3	1.0
COUNCIL	AUCKLAND COUNCIL	
DWG NO	P24-192-SKT-1003	

Legend

- Site Extent
- ModelExtent

Maximum Depth (m)

- 0m - 0.05m
- 0.05m - 0.1m
- 0.1m - 0.2m
- 0.2m - 0.3m
- 0.3m - 0.4m
- 0.4m - 0.5m
- 0.5m - 0.7m
- 0.7m - 1.0m
- 1.0m - 2.0m
- >2.0m

REVISION DETAILS		INT	DATE	SURVEYED	-
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-	-	-	-	DRAWN	SB
-	-	-	-	CHECKED	TW
				APPROVED	PW

8 Nugent Street,
Grafton,
Auckalnd 1023

WOODS Est.1970

WOODS.CO.NZ

P24-192 Surf Park - Stormwater Assessment
Maximum Flood Depth
Scenario 1 - Pre Development 5yrCC (3.8°C)

STATUS	ISSUED FOR INFORMATION	REV
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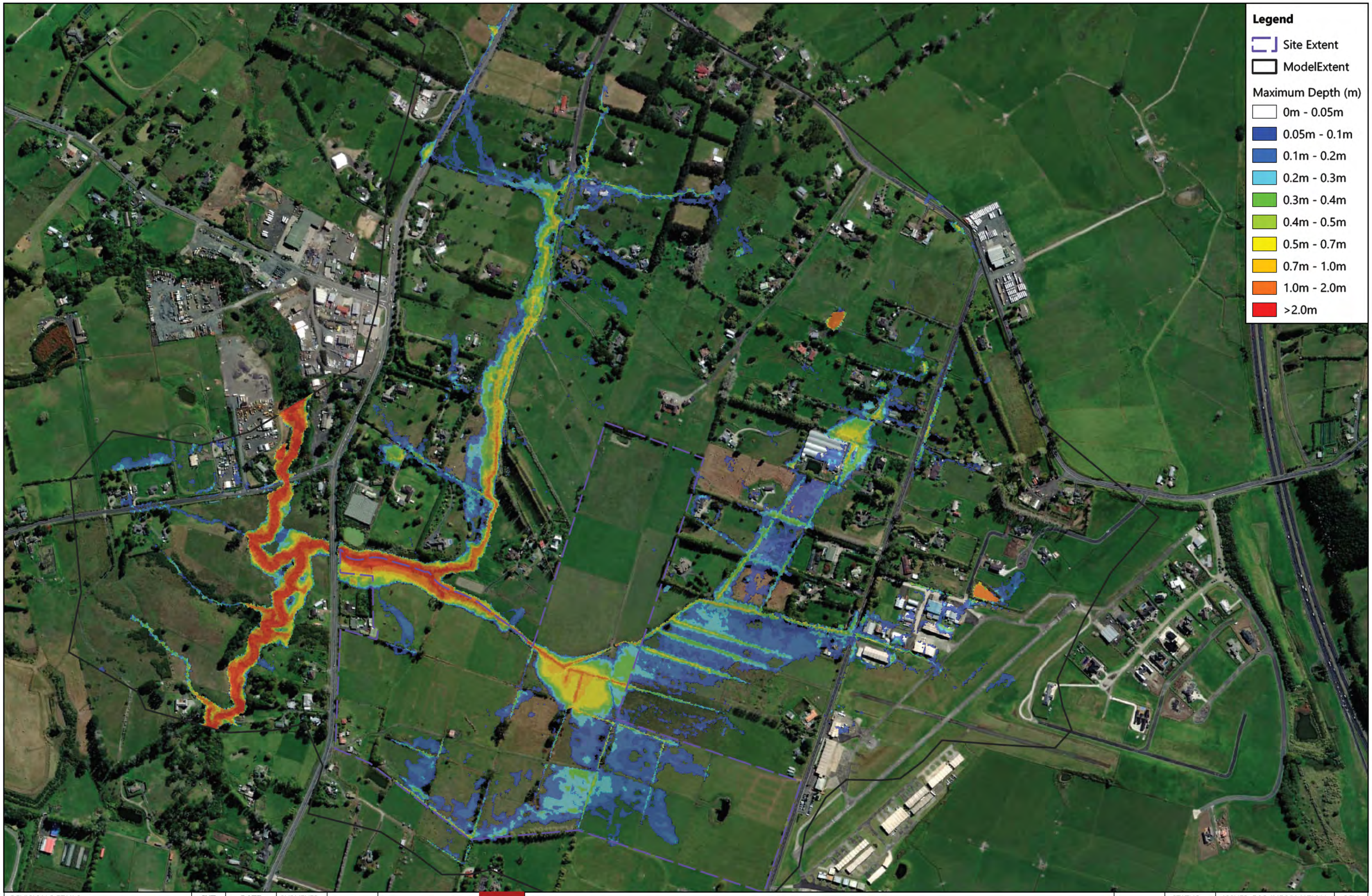
DWG NO	P24-192-SKT-1004	



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-	-	-	-	CHECKED	TW
				APPROVED	PW

8 Nugent Street,
Grafton,
Auckalnd 1023

WOODS.CO.NZ

WOODS Est.1970

P24-192 Surf Park - Stormwater Assessment
Maximum Flood Depth
Scenario 1 - Pre Development 10yr No CC

STATUS	ISSUED FOR INFORMATION	REV
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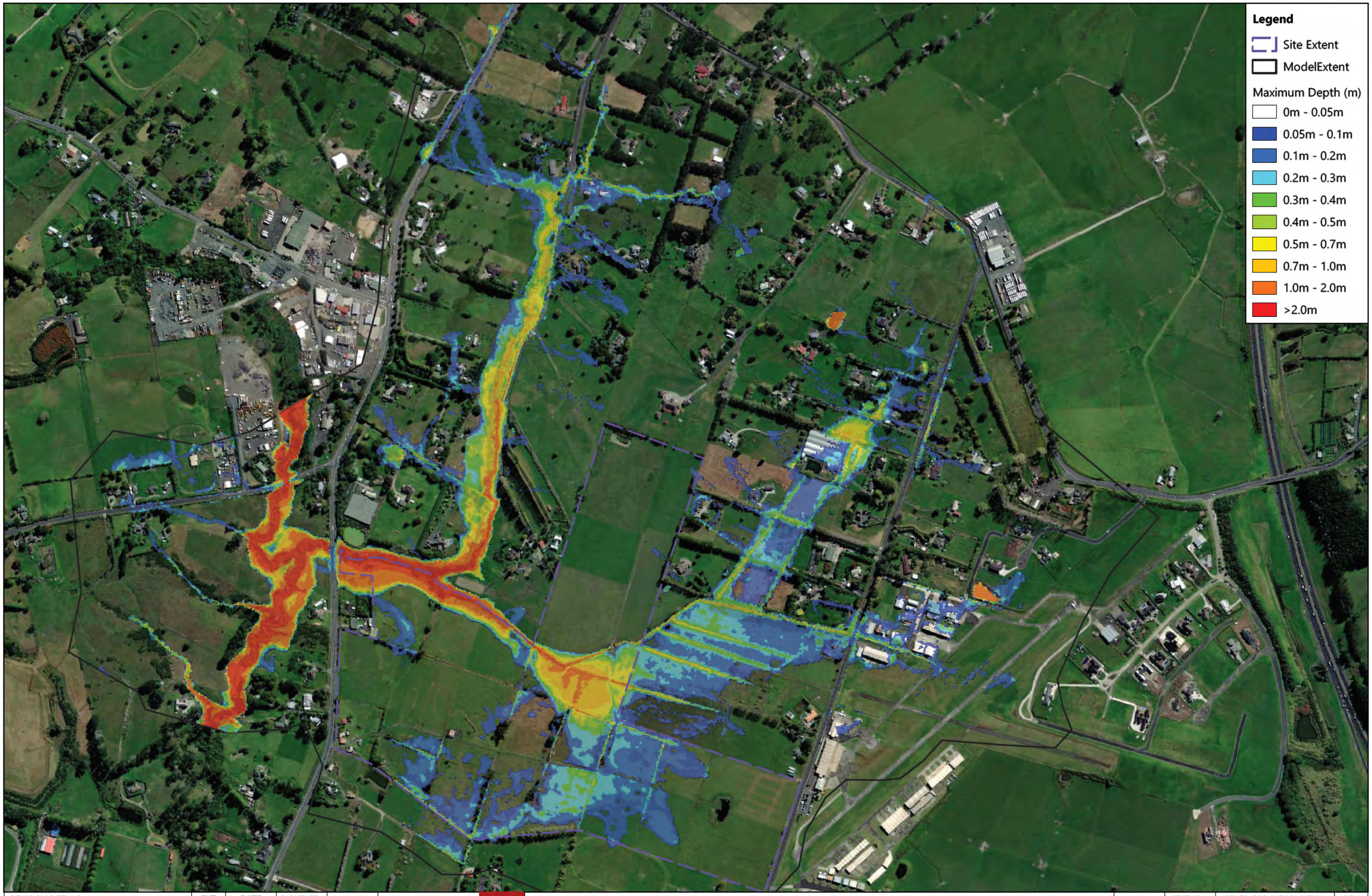
COUNCIL	AUCKLAND COUNCIL	
DWG NO	P24-192-SKT-1005	



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-	-	-	-	CHECKED	TW
				APPROVED	PW

8 Nugent Street,
Grafton,
Auckalnd 1023

WOODS.CO.NZ

WOODS Est.1970

P24-192 Surf Park - Stormwater Assessment
Maximum Flood Depth
Scenario 1 - Pre Development 10yrCC (3.8°C)

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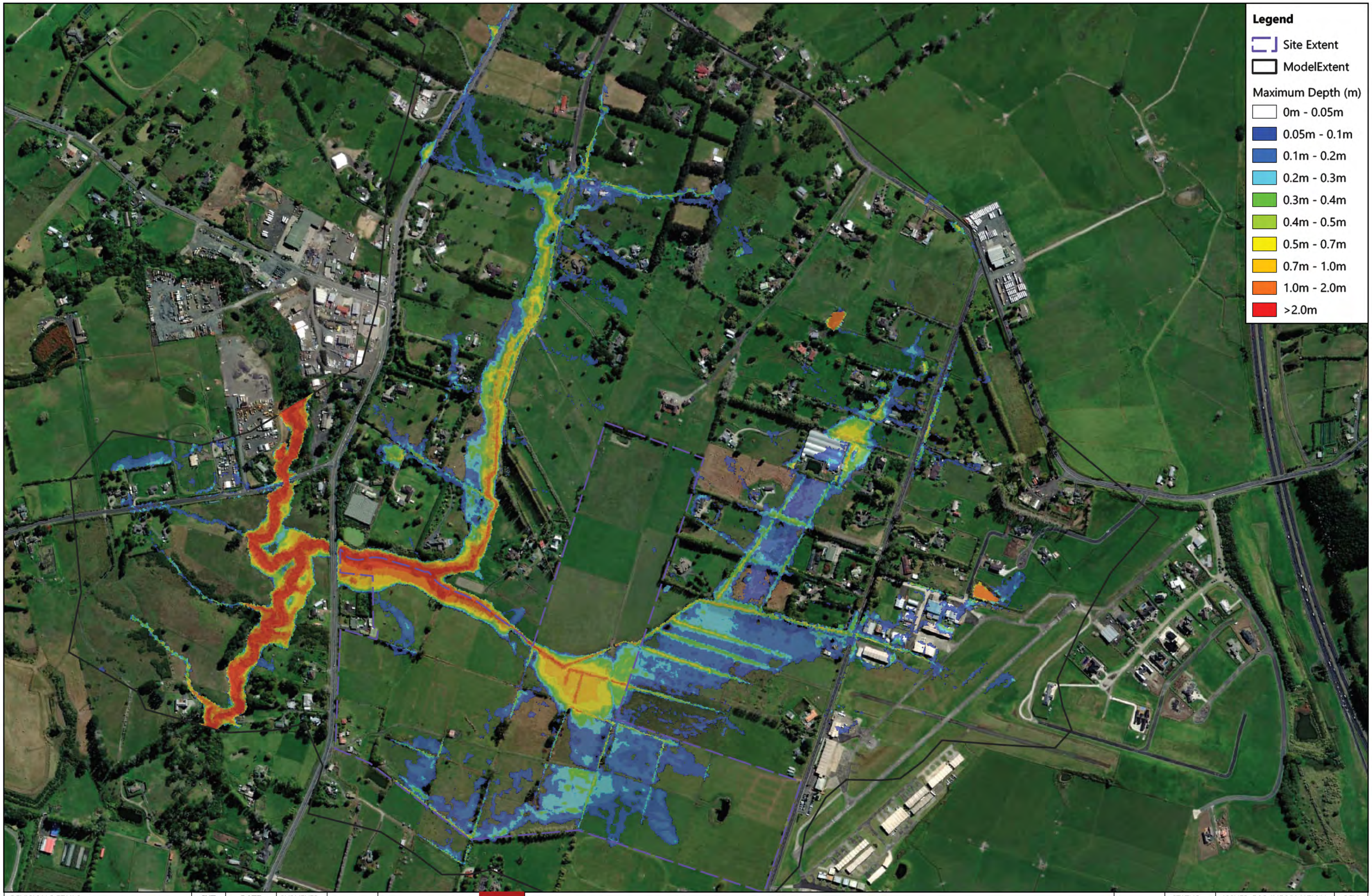
DWG NO	P24-192-SKT-1006	



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-	-	-	-	CHECKED	TW
				APPROVED	PW

8 Nugent Street,
Grafton,
Auckalnd 1023

WOODS
Est.1970

WOODS.CO.NZ

P24-192 Surf Park - Stormwater Assessment
Maximum Flood Depth
Scenario 1 - Pre Development 20yr No CC

STATUS	ISSUED FOR INFORMATION	REV
SCALE	1:7000 @ A3	1.0
COUNCIL	AUCKLAND COUNCIL	
DWG NO	P24-192-SKT-1007	

Legend

- Site Extent
- ModelExtent

Maximum Depth (m)

- 0m - 0.05m
- 0.05m - 0.1m
- 0.1m - 0.2m
- 0.2m - 0.3m
- 0.3m - 0.4m
- 0.4m - 0.5m
- 0.5m - 0.7m
- 0.7m - 1.0m
- 1.0m - 2.0m
- >2.0m

REVISION DETAILS		INT	DATE	SURVEYED	-
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-	-	-	-	CHECKED	TW
				APPROVED	PW

8 Nugent Street,
Grafton,
Auckalnd 1023

WOODS.CO.NZ

WOODS Est.1970

P24-192 Surf Park - Stormwater Assessment
Maximum Flood Depth
Scenario 1 - Pre Development 20yrCC (3.8°C)

STATUS	ISSUED FOR INFORMATION	REV
SCALE	1:7000 @ A3	1.0
COUNCIL	AUCKLAND COUNCIL	
DWG NO	P24-192-SKT-1008	

Legend

- Site Extent
- ModelExtent

Maximum Depth (m)

- 0m - 0.05m
- 0.05m - 0.1m
- 0.1m - 0.2m
- 0.2m - 0.3m
- 0.3m - 0.4m
- 0.4m - 0.5m
- 0.5m - 0.7m
- 0.7m - 1.0m
- 1.0m - 2.0m
- >2.0m

REVISION DETAILS		INT	DATE	SURVEYED	-
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-	-	-	-	CHECKED	TW
				APPROVED	PW

8 Nugent Street,
Grafton,
Auckalnd 1023

WOODS Est.1970

WOODS.CO.NZ

P24-192 Surf Park - Stormwater Assessment
Maximum Flood Depth
Scenario 1 - Pre Development 50yr No CC

STATUS	ISSUED FOR INFORMATION	REV
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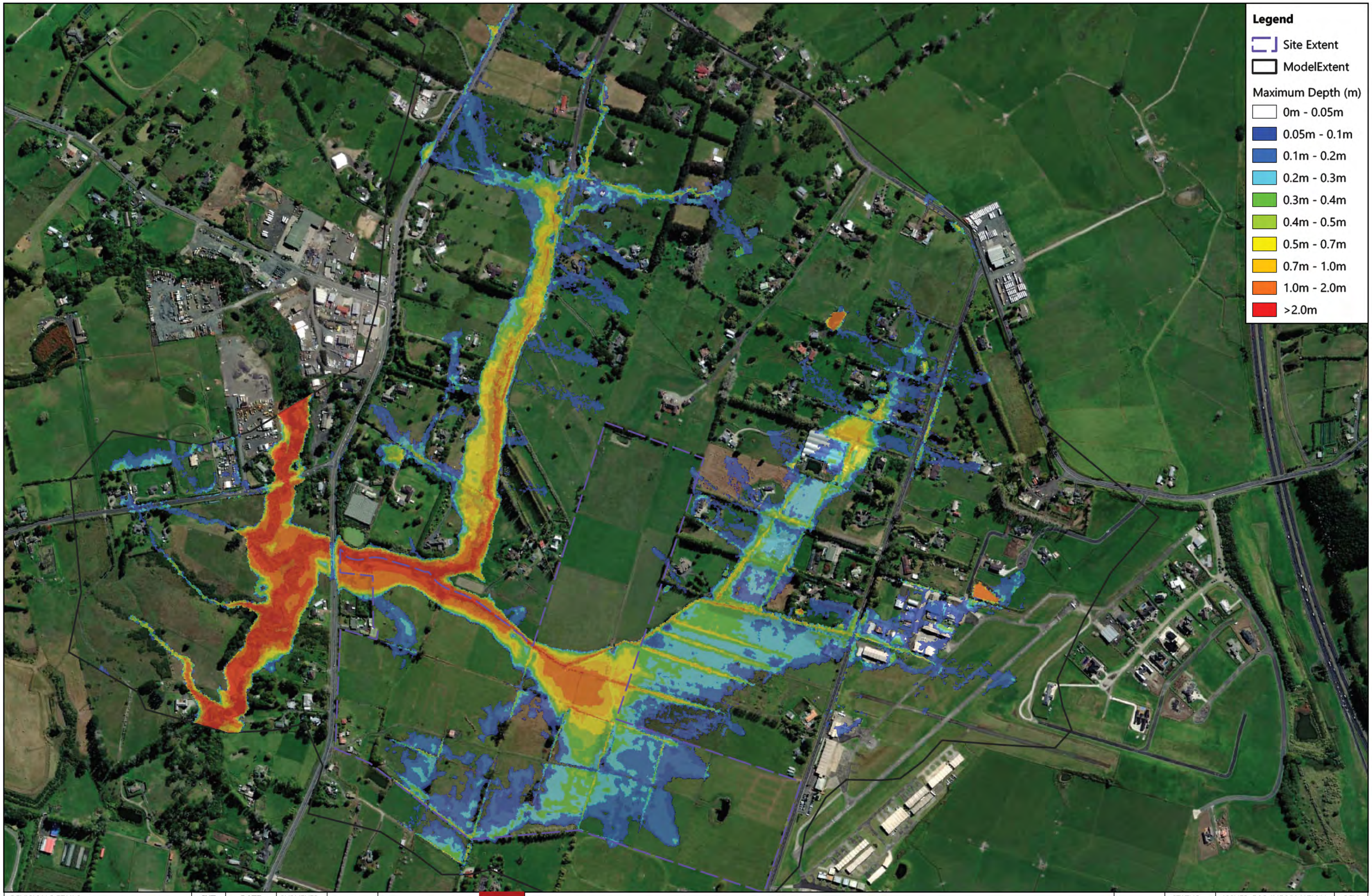
DWG NO	P24-192-SKT-1009	



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-	-	-	-	CHECKED	TW
				APPROVED	PW

8 Nugent Street,
Grafton,
Auckalnd 1023

WOODS.CO.NZ

WOODS Est.1970

P24-192 Surf Park - Stormwater Assessment
Maximum Flood Depth
Scenario 1 - Pre Development 50yrCC (3.8°C)

STATUS	ISSUED FOR INFORMATION	REV
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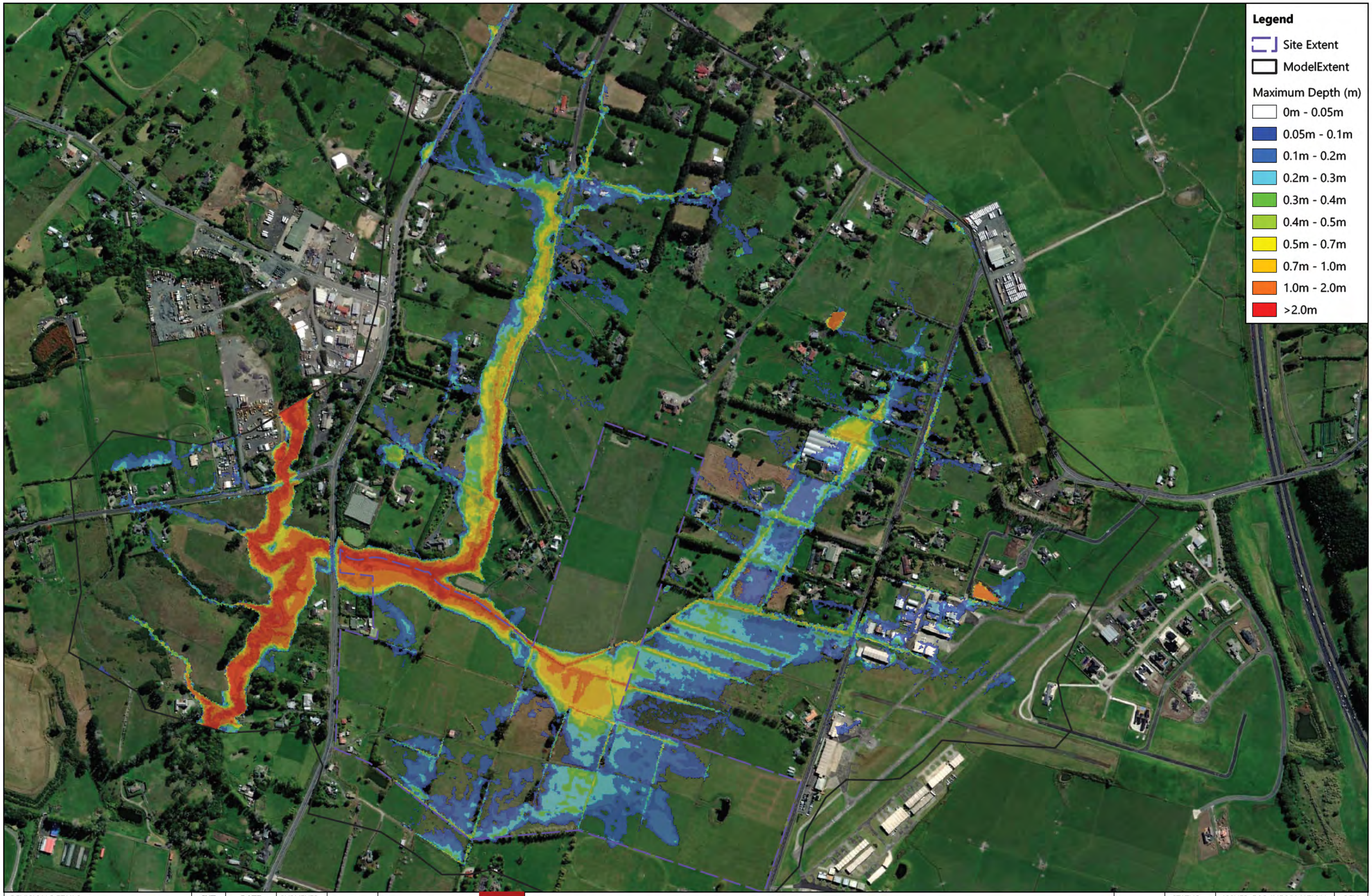
DWG NO	P24-192-SKT-1010	



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-	-	-	-	CHECKED	TW
				APPROVED	PW

8 Nugent Street,
Grafton,
Auckalnd 1023

WOODS Est.1970

WOODS.CO.NZ

P24-192 Surf Park - Stormwater Assessment
Maximum Flood Depth
Scenario 1 - Pre Development 100yr No CC

STATUS	ISSUED FOR INFORMATION	REV
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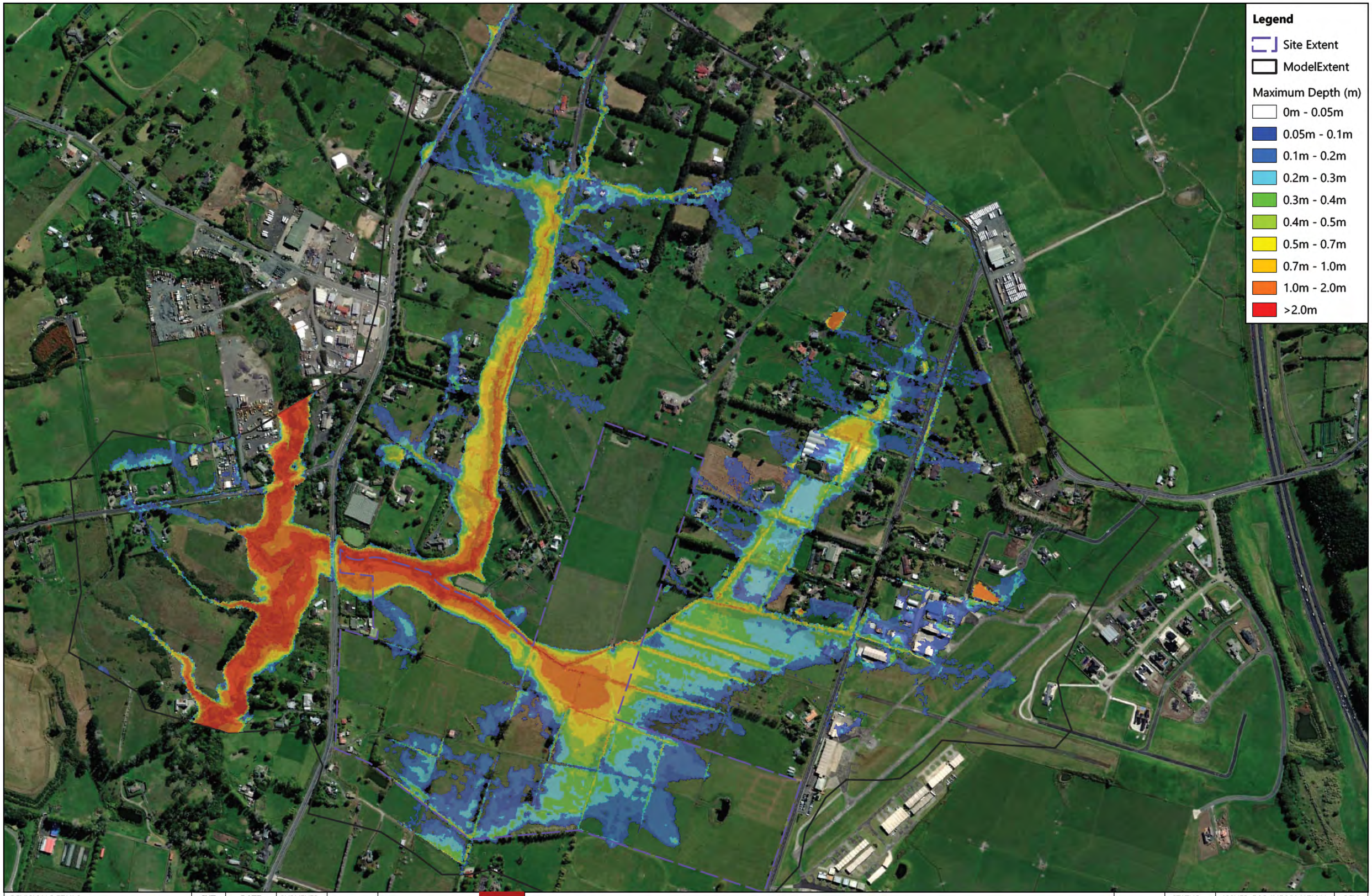
COUNCIL	AUCKLAND COUNCIL	
DWG NO	P24-192-SKT-1011	



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-	-	-	-	CHECKED	TW
				APPROVED	PW

8 Nugent Street,
Grafton,
Auckalnd 1023

WOODS.CO.NZ

WOODS Est.1970

P24-192 Surf Park - Stormwater Assessment
Maximum Flood Depth
Scenario 1 - Pre Development 100yrCC (3.8°C)

STATUS	ISSUED FOR INFORMATION	REV
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COUNCIL	AUCKLAND COUNCIL	
DWG NO	P24-192-SKT-1012	

Legend

- Site Extent
- ModelExtent

Maximum Depth (m)

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- 0.05m - 0.1m
- 0.1m - 0.2m
- 0.2m - 0.3m
- 0.3m - 0.4m
- 0.4m - 0.5m
- 0.5m - 0.7m
- 0.7m - 1.0m
- 1.0m - 2.0m
- >2.0m

REVISION DETAILS		INT	DATE	SURVEYED	-
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-	-	-	-	CHECKED	TW
				APPROVED	PW

8 Nugent Street,
Grafton,
Auckalnd 1023

WOODS.CO.NZ

WOODS Est.1970

P24-192 Surf Park - Stormwater Assessment
Maximum Flood Depth
Scenario 2 - Development Only 2yr No CC

STATUS	ISSUED FOR INFORMATION	REV
SCALE	1:7000 @ A3	1.0
COUNCIL	AUCKLAND COUNCIL	
DWG NO	P24-192-SKT-1013	

REVISION DETAILS		INT	DATE	SURVEYED	-
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-	-	-	-	CHECKED	TW
				APPROVED	PW

8 Nugent Street,
Grafton,
Auckalnd 1023

WOODS.CO.NZ

WOODS Est.1970

P24-192 Surf Park - Stormwater Assessment
Maximum Flood Depth
Scenario 2 - Development Only 2yrCC (3.8°C)

STATUS	ISSUED FOR INFORMATION	REV
SCALE	1:7000 @ A3	1.0
COUNCIL	AUCKLAND COUNCIL	
DWG NO	P24-192-SKT-1014	

Legend

- Site Extent
- ModelExtent

Maximum Depth (m)

- 0m - 0.05m
- 0.05m - 0.1m
- 0.1m - 0.2m
- 0.2m - 0.3m
- 0.3m - 0.4m
- 0.4m - 0.5m
- 0.5m - 0.7m
- 0.7m - 1.0m
- 1.0m - 2.0m
- >2.0m

REVISION DETAILS		INT	DATE	SURVEYED	-
1.0	For Information	-	14/06/2024	DESIGNED	RN
-	-	-	-	DRAWN	SB
-	-	-	-	CHECKED	TW
				APPROVED	PW

8 Nugent Street,
Grafton,
Auckalnd 1023

WOODS.CO.NZ

WOODS Est.1970

P24-192 Surf Park - Stormwater Assessment
Maximum Flood Depth
Scenario 2 - Development Only 5yr No CC

STATUS	ISSUED FOR INFORMATION	REV
SCALE	1:7000 @ A3	1.0
COUNCIL	AUCKLAND COUNCIL	
DWG NO	P24-192-SKT-1015	

Legend

- Site Extent
- ModelExtent

Maximum Depth (m)

- 0m - 0.05m
- 0.05m - 0.1m
- 0.1m - 0.2m
- 0.2m - 0.3m
- 0.3m - 0.4m
- 0.4m - 0.5m
- 0.5m - 0.7m
- 0.7m - 1.0m
- 1.0m - 2.0m
- >2.0m

REVISION DETAILS		INT	DATE	SURVEYED	-
1.0	For Information	-	14/06/2024	DESIGNED	RN
-	-	-	-	DRAWN	SB
-	-	-	-	CHECKED	TW
				APPROVED	PW

8 Nugent Street,
Grafton,
Auckalnd 1023

WOODS
Est.1970

WOODS.CO.NZ

P24-192 Surf Park - Stormwater Assessment
Maximum Flood Depth
Scenario 2 - Development Only 5yrCC (3.8°C)

STATUS	ISSUED FOR INFORMATION	REV
SCALE	1:7000 @ A3	1.0
COUNCIL	AUCKLAND COUNCIL	
DWG NO	P24-192-SKT-1016	

Legend

- Site Extent
- ModelExtent

Maximum Depth (m)

- 0m - 0.05m
- 0.05m - 0.1m
- 0.1m - 0.2m
- 0.2m - 0.3m
- 0.3m - 0.4m
- 0.4m - 0.5m
- 0.5m - 0.7m
- 0.7m - 1.0m
- 1.0m - 2.0m
- >2.0m

REVISION DETAILS		INT	DATE	SURVEYED	-
1.0	For Information	-	14/06/2024	DESIGNED	RN
-	-	-	-	DRAWN	SB
-	-	-	-	CHECKED	TW
				APPROVED	PW

8 Nugent Street,
Grafton,
Auckalnd 1023

WOODS.CO.NZ

WOODS Est.1970

P24-192 Surf Park - Stormwater Assessment
Maximum Flood Depth
Scenario 2 - Development Only 10yr No CC

STATUS	ISSUED FOR INFORMATION	REV
SCALE	1:7000 @ A3	1.0
COUNCIL	AUCKLAND COUNCIL	
DWG NO	P24-192-SKT-1017	

REVISION DETAILS		INT	DATE	SURVEYED	-
1.0	For Information	-	14/06/2024	DESIGNED	RN
-	-	-	-	DRAWN	SB
-	-	-	-	CHECKED	TW
				APPROVED	PW

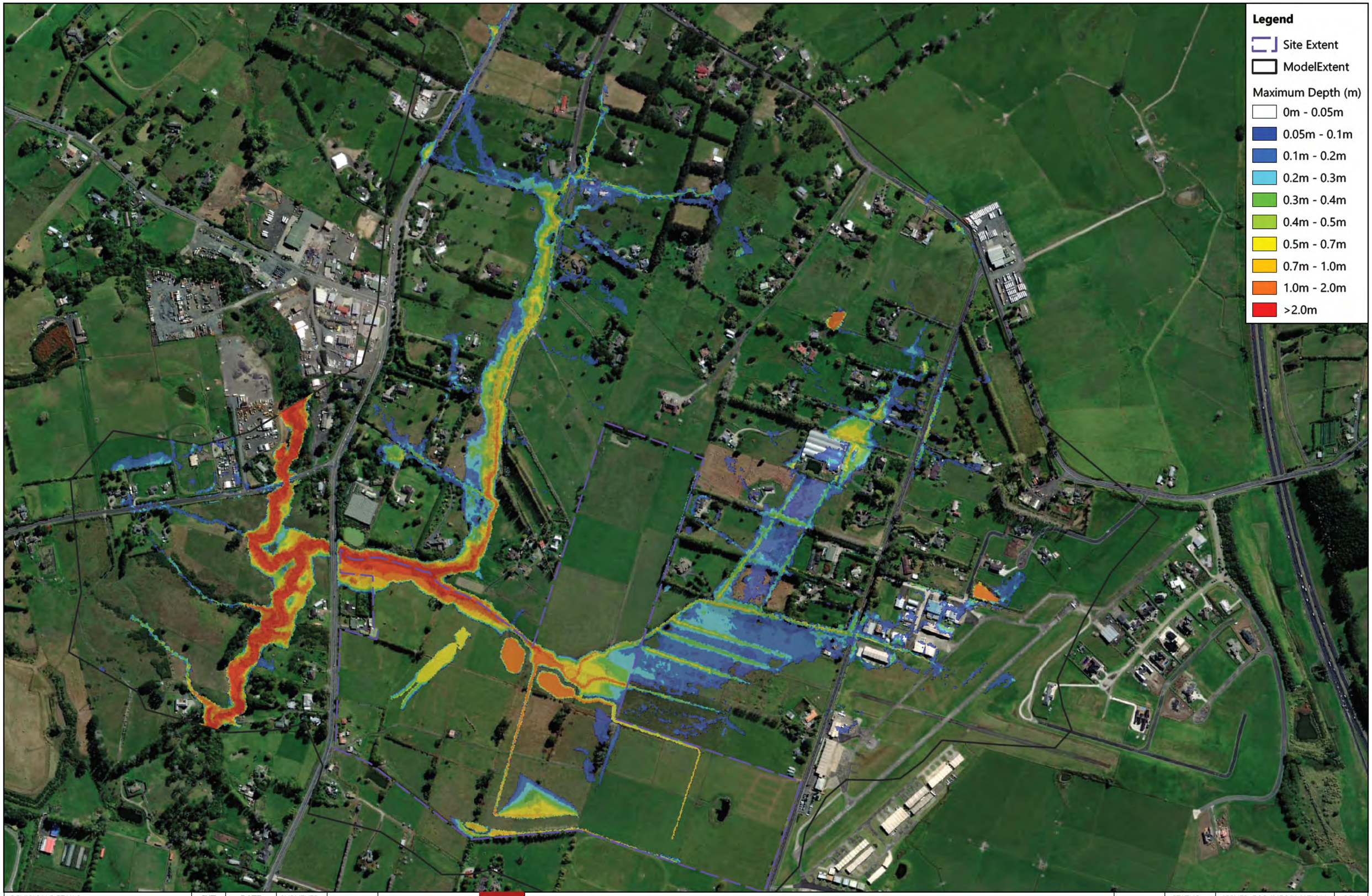
8 Nugent Street,
Grafton,
Auckalnd 1023

WOODS.CO.NZ

WOODS Est.1970

P24-192 Surf Park - Stormwater Assessment
Maximum Flood Depth
Scenario 2 - Development Only 10yrCC (3.8°C)

STATUS	ISSUED FOR INFORMATION	REV
SCALE	1:7000 @ A3	1.0
COUNCIL	AUCKLAND COUNCIL	
DWG NO	P24-192-SKT-1018	



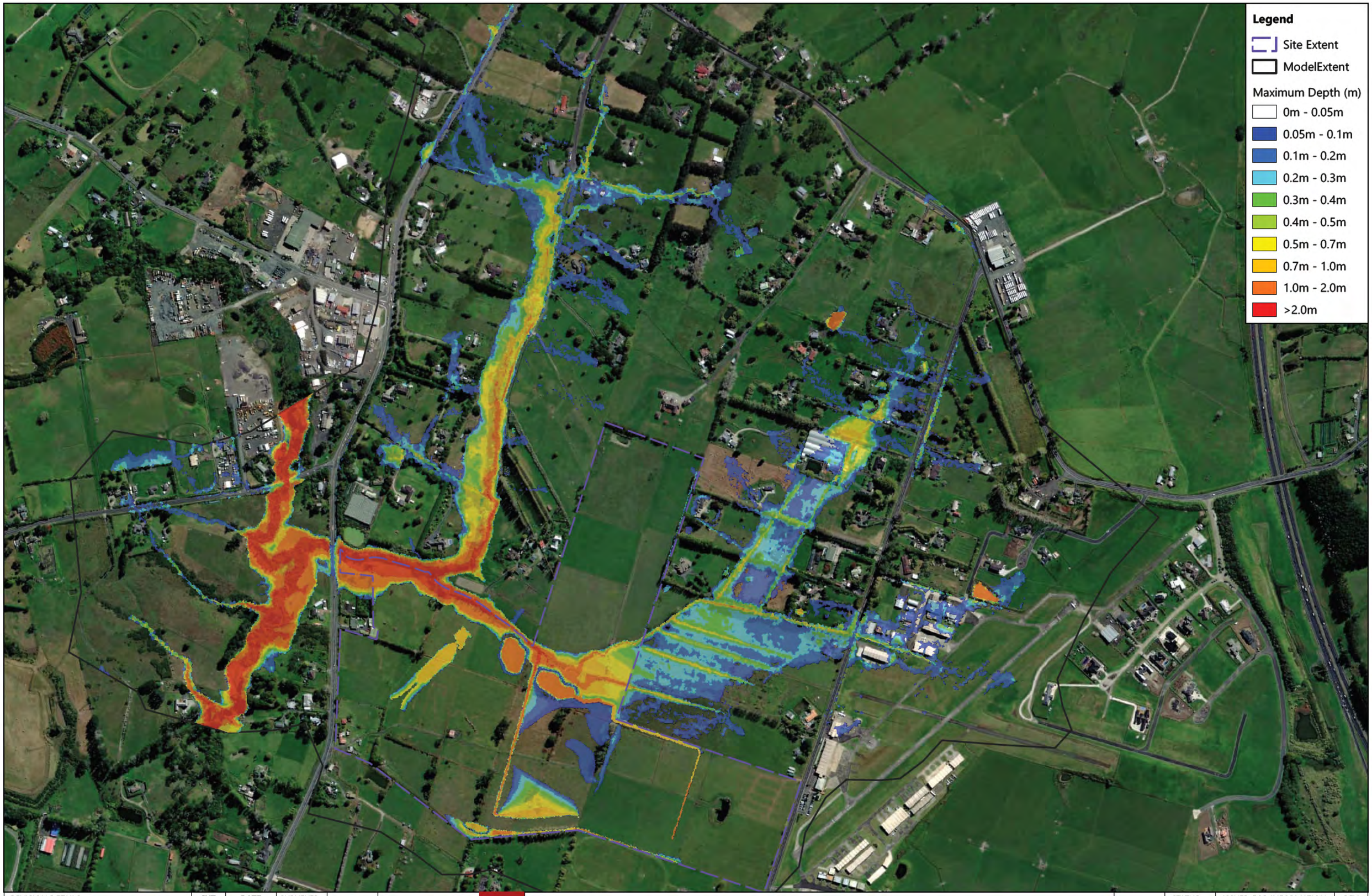
REVISION DETAILS		INT	DATE	SURVEYED	-
1.0	For Information	-	14/06/2024	DESIGNED	RN
-	-	-	-	DRAWN	SB
-	-	-	-	CHECKED	TW
				APPROVED	PW

8 Nugent Street,
Grafton,
Auckalnd 1023

WOODS.CO.NZ

P24-192 Surf Park - Stormwater Assessment
Maximum Flood Depth
Scenario 2 - Development Only 20yr No CC

STATUS	ISSUED FOR INFORMATION	REV
SCALE	1:7000 @ A3	1.0
COUNCIL	AUCKLAND COUNCIL	
DWG NO	P24-192-SKT-1019	



REVISION DETAILS		INT	DATE	SURVEYED	-
1.0	For Information	-	14/06/2024	DESIGNED	RN
-	-	-	-	DRAWN	SB
-	-	-	-	CHECKED	TW
				APPROVED	PW

8 Nugent Street,
Grafton,
Auckalnd 1023

WOODS.CO.NZ

WOODS Est.1970

P24-192 Surf Park - Stormwater Assessment
Maximum Flood Depth
Scenario 2 - Development Only 20yrCC (3.8°C)

STATUS	ISSUED FOR INFORMATION	REV
SCALE	1:7000 @ A3	1.0
COUNCIL	AUCKLAND COUNCIL	
DWG NO	P24-192-SKT-1020	

Legend

- Site Extent
- ModelExtent

Maximum Depth (m)

- 0m - 0.05m
- 0.05m - 0.1m
- 0.1m - 0.2m
- 0.2m - 0.3m
- 0.3m - 0.4m
- 0.4m - 0.5m
- 0.5m - 0.7m
- 0.7m - 1.0m
- 1.0m - 2.0m
- >2.0m

REVISION DETAILS		INT	DATE	SURVEYED	-
1.0	For Information	-	14/06/2024	DESIGNED	RN
-	-	-	-	DRAWN	SB
-	-	-	-	CHECKED	TW
				APPROVED	PW

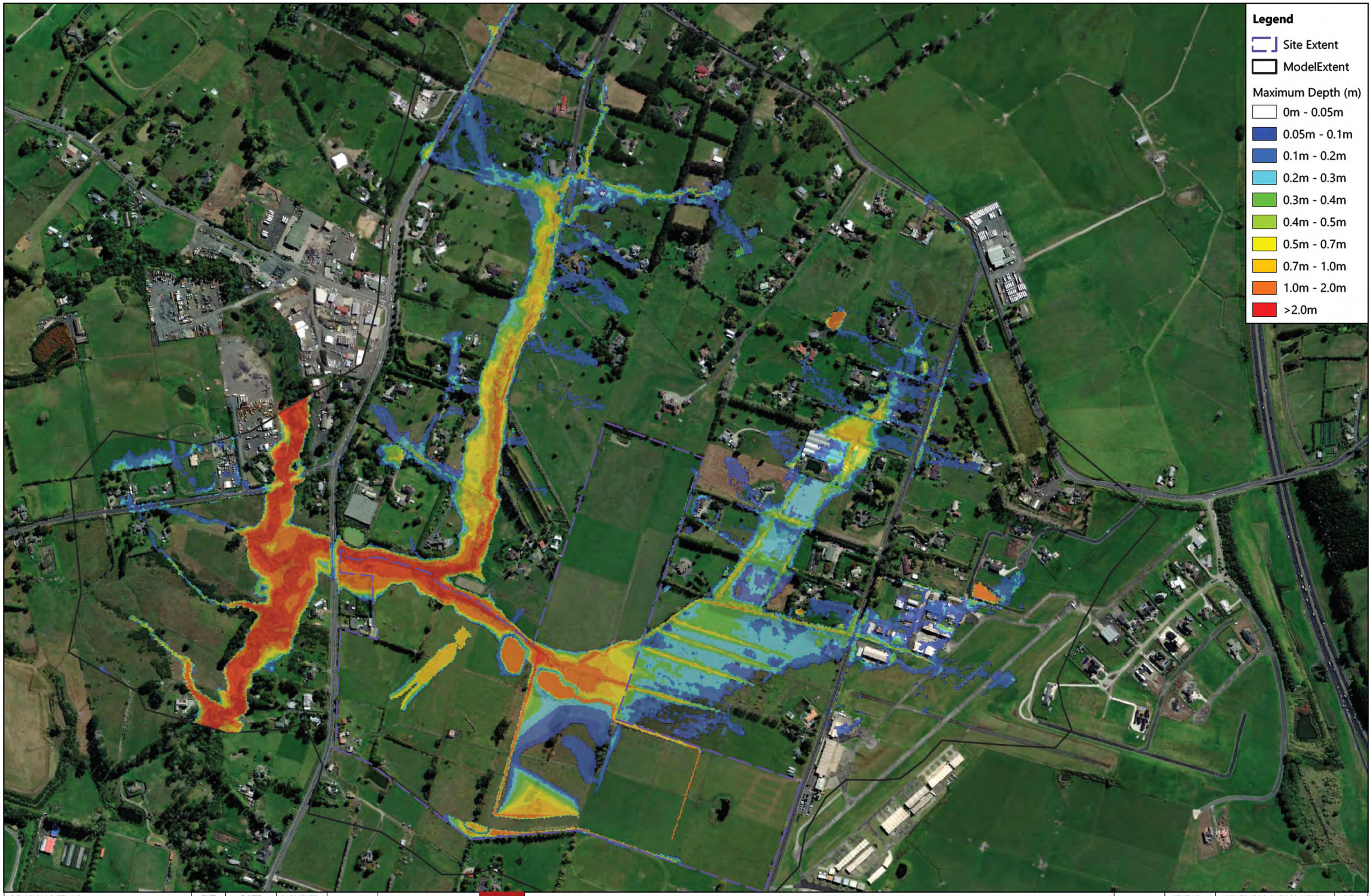
8 Nugent Street,
Grafton,
Auckalnd 1023

WOODS Est.1970

WOODS.CO.NZ

P24-192 Surf Park - Stormwater Assessment
Maximum Flood Depth
Scenario 2 - Development Only 50yr No CC

STATUS	ISSUED FOR INFORMATION	REV
SCALE	1:7000 @ A3	1.0
COUNCIL	AUCKLAND COUNCIL	
DWG NO	P24-192-SKT-1021	



REVISION DETAILS		INT	DATE	SURVEYED	-
1.0	For Information	-	14/06/2024	DESIGNED	RN
-	-	-	-	DRAWN	SB
-	-	-	-	CHECKED	TW
				APPROVED	PW

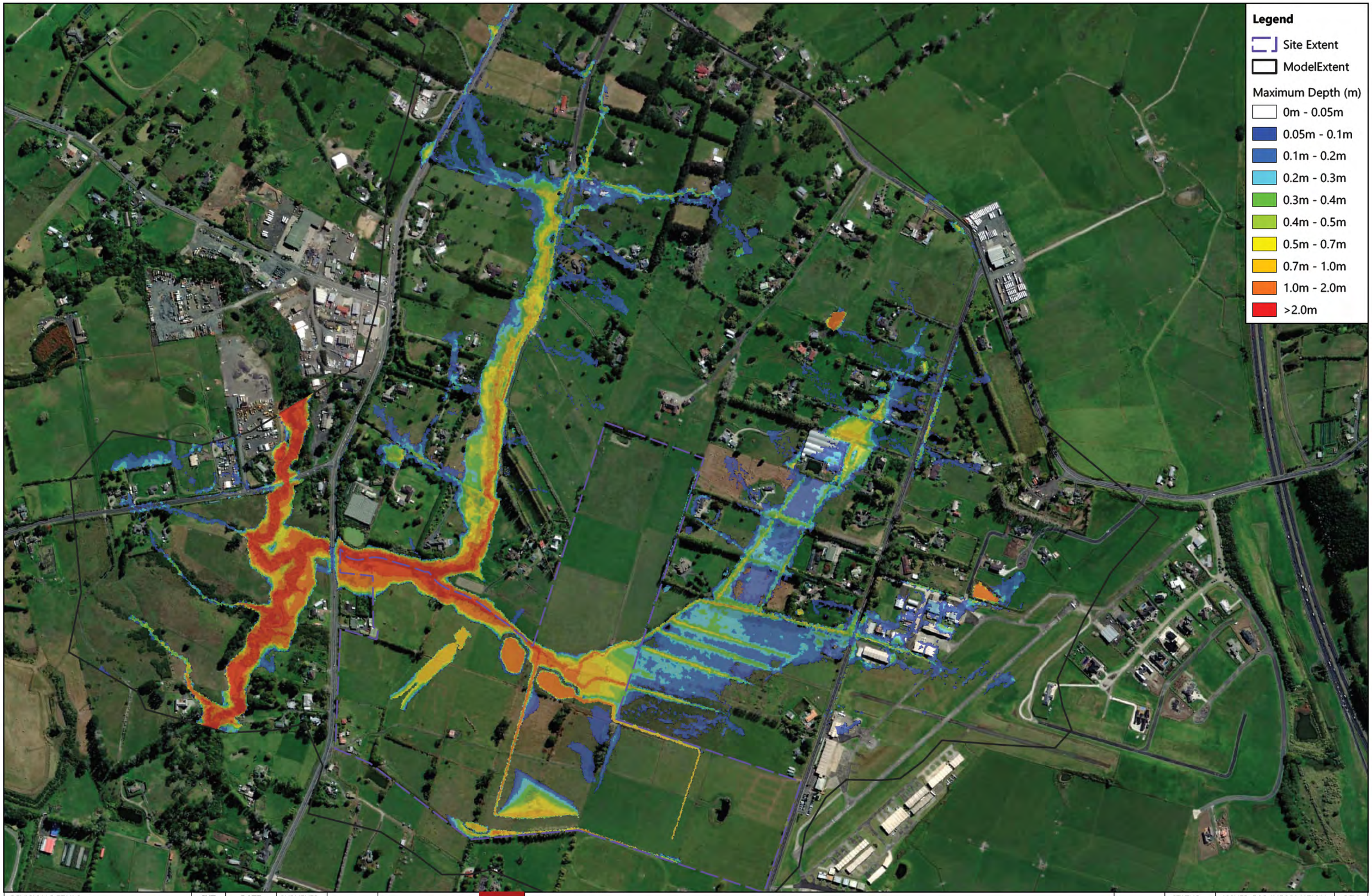
8 Nugent Street,
Grafton,
Auckalnd 1023

WOODS.CO.NZ

WOODS Est.1970

P24-192 Surf Park - Stormwater Assessment
Maximum Flood Depth
Scenario 2 - Development Only 50yrCC (3.8°C)

STATUS	ISSUED FOR INFORMATION	REV
SCALE	1:7000 @ A3	1.0
COUNCIL	AUCKLAND COUNCIL	
DWG NO	P24-192-SKT-1022	



REVISION DETAILS		INT	DATE	SURVEYED	-
1.0	For Information	-	14/06/2024	DESIGNED	RN
-	-	-	-	DRAWN	SB
-	-	-	-	CHECKED	TW
				APPROVED	PW

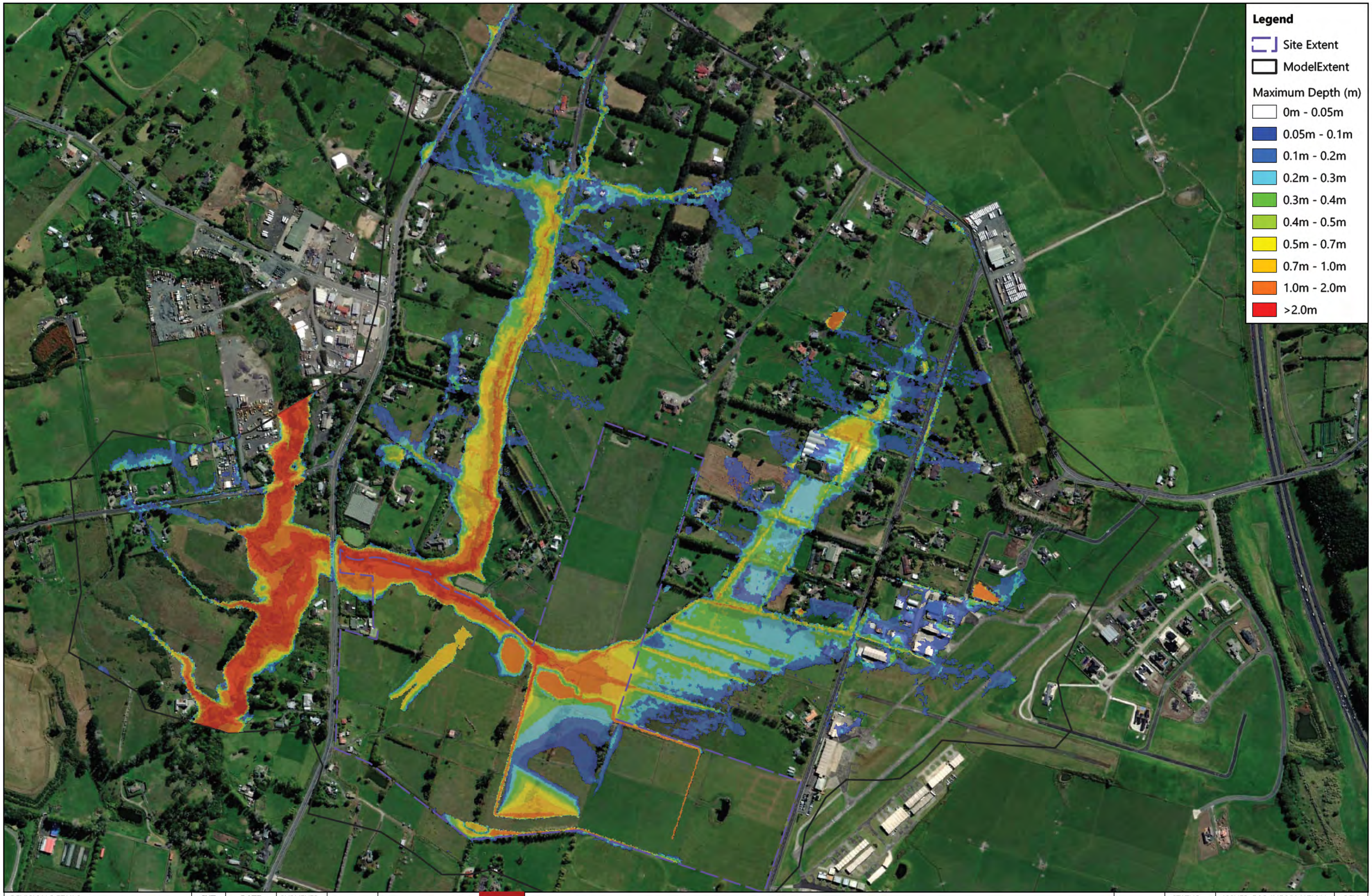
8 Nugent Street,
Grafton,
Auckalnd 1023

WOODS
Est.1970

WOODS.CO.NZ

P24-192 Surf Park - Stormwater Assessment
Maximum Flood Depth
Scenario 2 - Development Only 100yr No CC

STATUS	ISSUED FOR INFORMATION	REV
SCALE	1:7000 @ A3	1.0
COUNCIL	AUCKLAND COUNCIL	
DWG NO	P24-192-SKT-1023	



REVISION DETAILS		INT	DATE	SURVEYED	-
1.0	For Information	-	14/06/2024	DESIGNED	RN
-	-	-	-	DRAWN	SB
-	-	-	-	CHECKED	TW
				APPROVED	PW

8 Nugent Street,
Grafton,
Auckalnd 1023

WOODS.CO.NZ

WOODS Est.1970

P24-192 Surf Park - Stormwater Assessment
Maximum Flood Depth
Scenario 2 - Development Only 100yrCC (3.8°C)

STATUS	ISSUED FOR INFORMATION	REV
SCALE	1:7000 @ A3	1.0
COUNCIL	AUCKLAND COUNCIL	
DWG NO	P24-192-SKT-1024	

Legend

- Site Extent
- ModelExtent

Maximum Depth (m)

- 0m - 0.05m
- 0.05m - 0.1m
- 0.1m - 0.2m
- 0.2m - 0.3m
- 0.3m - 0.4m
- 0.4m - 0.5m
- 0.5m - 0.7m
- 0.7m - 1.0m
- 1.0m - 2.0m
- >2.0m

REVISION DETAILS		INT	DATE	SURVEYED	-
1.0	For Information	-	14/06/2024	DESIGNED	RN
-	-	-	-	DRAWN	SB
-	-	-	-	CHECKED	TW
				APPROVED	PW

8 Nugent Street,
Grafton,
Auckalnd 1023

WOODS
Est.1970

WOODS.CO.NZ

P24-192 Surf Park - Stormwater Assessment
Maximum Flood Depth
Scenario 3 - Catchment Development 100yrCC (3.8°C)

STATUS	ISSUED FOR INFORMATION	REV
SCALE	1:7000 @ A3	1.0
COUNCIL	AUCKLAND COUNCIL	
DWG NO	P24-192-SKT-1025	

Appendix C

Water Level Difference Map

REVISION DETAILS		INT	DATE	SURVEYED	-
1.0	For Information	-	14/06/2024	DESIGNED	RN
-	-	-	-	DRAWN	SB
-	-	-	-	CHECKED	TW
				APPROVED	PW

8 Nugent Street,
Grafton,
Auckalnd 1023

WOODS
Est.1970

WOODS.CO.NZ

P24-192 Surf Park - Stormwater Assessment
Water level Difference
Scenario 2 vs Scenario 1 2yr No CC

STATUS	ISSUED FOR INFORMATION	REV
SCALE	1:7000 @ A3	1.0
COUNCIL	AUCKLAND COUNCIL	
DWG NO	P24-192-SKT-2001	

REVISION DETAILS		INT	DATE	SURVEYED	-
1.0	For Information	-	14/06/2024	DESIGNED	RN
-	-	-	-	DRAWN	SB
-	-	-	-	CHECKED	TW
				APPROVED	PW

8 Nugent Street,
Grafton,
Auckalnd 1023

WOODS
Est.1970

WOODS.CO.NZ

P24-192 Surf Park - Stormwater Assessment
Water level Difference
Scenario 2 vs Scenario 1 2yrCC (3.8°C)

STATUS	ISSUED FOR INFORMATION	REV
SCALE	1:7000 @ A3	1.0
COUNCIL	AUCKLAND COUNCIL	
DWG NO	P24-192-SKT-2002	

REVISION DETAILS		INT	DATE	SURVEYED	-
1.0	For Information	-	14/06/2024	DESIGNED	RN
-	-	-	-	DRAWN	SB
-	-	-	-	CHECKED	TW
				APPROVED	PW

8 Nugent Street,
Grafton,
Auckalnd 1023

WOODS
Est.1970

WOODS.CO.NZ

P24-192 Surf Park - Stormwater Assessment
Water level Difference
Scenario 2 vs Scenario 1 5yr No CC

STATUS	ISSUED FOR INFORMATION	REV
SCALE	1:7000 @ A3	1.0
COUNCIL	AUCKLAND COUNCIL	
DWG NO	P24-192-SKT-2003	

REVISION DETAILS		INT	DATE	SURVEYED	-
1.0	For Information	-	14/06/2024	DESIGNED	RN
-	-	-	-	DRAWN	SB
-	-	-	-	CHECKED	TW
				APPROVED	PW

8 Nugent Street,
Grafton,
Auckalnd 1023

WOODS
Est.1970

WOODS.CO.NZ

P24-192 Surf Park - Stormwater Assessment
Water level Difference
Scenario 2 vs Scenario 1 5yrCC (3.8°C)

STATUS	ISSUED FOR INFORMATION	REV
SCALE	1:7000 @ A3	1.0
COUNCIL	AUCKLAND COUNCIL	
DWG NO	P24-192-SKT-2004	

REVISION DETAILS		INT	DATE	SURVEYED	-
1.0	For Information	-	14/06/2024	DESIGNED	RN
-	-	-	-	DRAWN	SB
-	-	-	-	CHECKED	TW
				APPROVED	PW

8 Nugent Street,
Grafton,
Auckalnd 1023

WOODS
Est.1970

WOODS.CO.NZ

P24-192 Surf Park - Stormwater Assessment
Water level Difference
Scenario 2 vs Scenario 1 10yr No CC

STATUS	ISSUED FOR INFORMATION	REV
SCALE	1:7000 @ A3	1.0
COUNCIL	AUCKLAND COUNCIL	
DWG NO	P24-192-SKT-2005	

REVISION DETAILS		INT	DATE	SURVEYED	-
1.0	For Information	-	14/06/2024	DESIGNED	RN
-	-	-	-	DRAWN	SB
-	-	-	-	CHECKED	TW
				APPROVED	PW

8 Nugent Street,
Grafton,
Auckalnd 1023

WOODS
Est.1970

WOODS.CO.NZ

P24-192 Surf Park - Stormwater Assessment
Water level Difference
Scenario 2 vs Scenario 1 10yrCC (3.8°C)

STATUS	ISSUED FOR INFORMATION	REV
SCALE	1:7000 @ A3	1.0
COUNCIL	AUCKLAND COUNCIL	
DWG NO	P24-192-SKT-2006	

REVISION DETAILS		INT	DATE	SURVEYED	-
1.0	For Information	-	14/06/2024	DESIGNED	RN
-	-	-	-	DRAWN	SB
-	-	-	-	CHECKED	TW
				APPROVED	PW

8 Nugent Street,
Grafton,
Auckalnd 1023

WOODS
Est.1970

WOODS.CO.NZ

P24-192 Surf Park - Stormwater Assessment
Water level Difference
Scenario 2 vs Scenario 1 20yr No CC

STATUS	ISSUED FOR INFORMATION	REV
SCALE	1:7000 @ A3	1.0
COUNCIL	AUCKLAND COUNCIL	
DWG NO	P24-192-SKT-2007	

REVISION DETAILS		INT	DATE	SURVEYED	-
1.0	For Information	-	14/06/2024	DESIGNED	RN
-	-	-	-	DRAWN	SB
-	-	-	-	CHECKED	TW
				APPROVED	PW

8 Nugent Street,
Grafton,
Auckalnd 1023

WOODS
Est.1970

WOODS.CO.NZ

P24-192 Surf Park - Stormwater Assessment
Water level Difference
Scenario 2 vs Scenario 1 20yrCC (3.8°C)

STATUS	ISSUED FOR INFORMATION	REV
SCALE	1:7000 @ A3	1.0
COUNCIL	AUCKLAND COUNCIL	
DWG NO	P24-192-SKT-2008	

REVISION DETAILS		INT	DATE	SURVEYED	-
1.0	For Information	-	14/06/2024	DESIGNED	RN
-	-	-	-	DRAWN	SB
-	-	-	-	CHECKED	TW
				APPROVED	PW

8 Nugent Street,
Grafton,
Auckalnd 1023

WOODS
Est.1970

WOODS.CO.NZ

P24-192 Surf Park - Stormwater Assessment
Water level Difference
Scenario 2 vs Scenario 1 50yr No CC

STATUS	ISSUED FOR INFORMATION	REV
SCALE	1:7000 @ A3	1.0
COUNCIL	AUCKLAND COUNCIL	
DWG NO	P24-192-SKT-2009	

REVISION DETAILS		INT	DATE	SURVEYED	-
1.0	For Information	-	14/06/2024	DESIGNED	RN
-	-	-	-	DRAWN	SB
-	-	-	-	CHECKED	TW
				APPROVED	PW

8 Nugent Street,
Grafton,
Auckalnd 1023

WOODS.CO.NZ

WOODS Est.1970

P24-192 Surf Park - Stormwater Assessment
Water level Difference
Scenario 2 vs Scenario 1 50yrCC (3.8°C)

STATUS	ISSUED FOR INFORMATION	REV
SCALE	1:7000 @ A3	1.0
COUNCIL	AUCKLAND COUNCIL	
DWG NO	P24-192-SKT-2010	

REVISION DETAILS		INT	DATE	SURVEYED	-
1.0	For Information	-	14/06/2024	DESIGNED	RN
-	-	-	-	DRAWN	SB
-	-	-	-	CHECKED	TW
				APPROVED	PW

8 Nugent Street,
Grafton,
Auckalnd 1023

WOODS
Est.1970

WOODS.CO.NZ

P24-192 Surf Park - Stormwater Assessment
Water level Difference
Scenario 2 vs Scenario 1 100yr No CC

STATUS	ISSUED FOR INFORMATION	REV
SCALE	1:7000 @ A3	1.0
COUNCIL	AUCKLAND COUNCIL	
DWG NO	P24-192-SKT-2011	

REVISION DETAILS		INT	DATE	SURVEYED	-
1.0	For Information	-	14/06/2024	DESIGNED	RN
-	-	-	-	DRAWN	SB
-	-	-	-	CHECKED	TW
				APPROVED	PW

8 Nugent Street,
Grafton,
Auckalnd 1023

WOODS.CO.NZ

WOODS Est.1970

P24-192 Surf Park - Stormwater Assessment
Water level Difference
Scenario 2 vs Scenario 1 100yrCC (3.8°C)

STATUS	ISSUED FOR INFORMATION	REV
SCALE	1:7000 @ A3	1.0
COUNCIL	AUCKLAND COUNCIL	
DWG NO	P24-192-SKT-2012	

Appendix B

Flood Results

For Information

REVISION DETAILS		INT	DATE	SURVEYED	-
1.0	For Information	-	30/01/2026	DESIGNED	-
-	-	-	-	DRAWN	RK
-	-	-	-	CHECKED	RN
				APPROVED	PW

8 NUGENT STREET
GRAFTON
AUCKLAND

WOODS.CO.NZ

WOODS Est.1970

P25-662 - SURF PARK - FLOOD ASSESSMENT
MAXIMUM FLOOD DEPTH - PRE DEVELOPMENT 2 YEAR ARI (No CC)

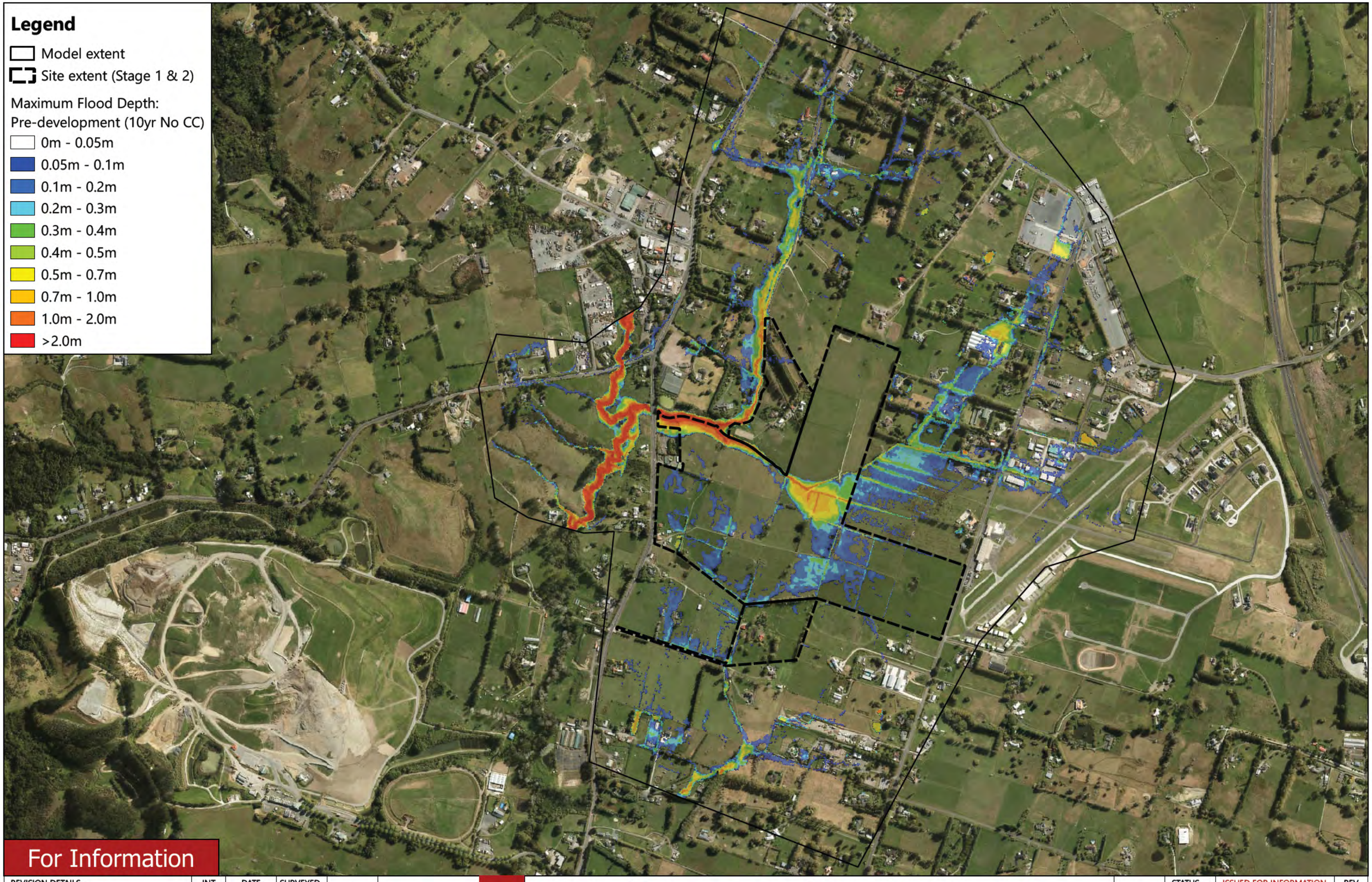
STATUS	ISSUED FOR INFORMATION	REV
SCALE	NTS	1.0
COUNCIL	AUCKLAND COUNCIL	
SHEET	SHEET 1 OF 22	

Legend

- Model extent
- Site extent (Stage 1 & 2)

Maximum Flood Depth:
Pre-development (10yr No CC)

- 0m - 0.05m
- 0.05m - 0.1m
- 0.1m - 0.2m
- 0.2m - 0.3m
- 0.3m - 0.4m
- 0.4m - 0.5m
- 0.5m - 0.7m
- 0.7m - 1.0m
- 1.0m - 2.0m
- >2.0m



For Information

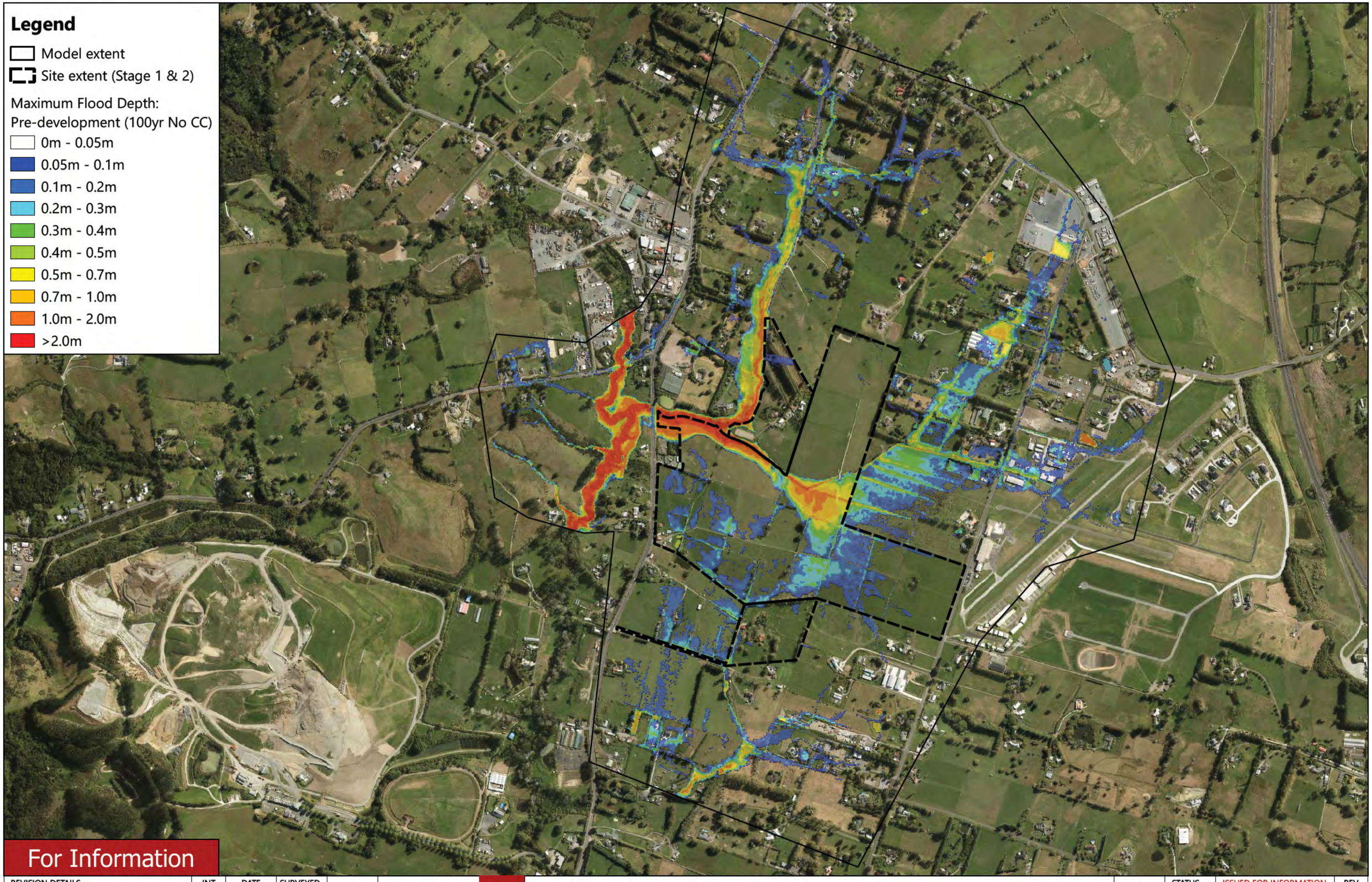
REVISION DETAILS		INT	DATE	SURVEYED	-
1.0	For Information	-	30/01/2026	DESIGNED	-
-	-	-	-	DRAWN	RK
-	-	-	-	CHECKED	RN
				APPROVED	PW

8 NUGENT STREET
GRAFTON
AUCKLAND

WOODS
EST.1970
WOODS.CO.NZ

P25-662 - SURF PARK - FLOOD ASSESSMENT
MAXIMUM FLOOD DEPTH - PRE DEVELOPMENT 10 YEAR ARI (No CC)

STATUS	ISSUED FOR INFORMATION	REV
SCALE	NTS	1.0
COUNCIL	AUCKLAND COUNCIL	
SHEET	SHEET 2 OF 22	



For Information

REVISION DETAILS		INT	DATE	SURVEYED	-
1.0	For Information	-	30/01/2026	DESIGNED	-
-	-	-	-	DRAWN	RK
-	-	-	-	CHECKED	RN
				APPROVED	PW

8 NUGENT STREET
GRAFTON
AUCKLAND

WOODS.CO.NZ

WOODS Est.1970

P25-662 - SURF PARK - FLOOD ASSESSMENT
MAXIMUM FLOOD DEPTH - PRE DEVELOPMENT 100 YEAR ARI (No CC)

STATUS	ISSUED FOR INFORMATION	REV
SCALE	NTS	1.0
COUNCIL	AUCKLAND COUNCIL	
SHEET	SHEET 3 OF 22	

For Information

REVISION DETAILS		INT	DATE	SURVEYED	-
1.0	For Information	-	30/01/2026	DESIGNED	-
-	-	-	-	DRAWN	RK
-	-	-	-	CHECKED	RN
				APPROVED	PW

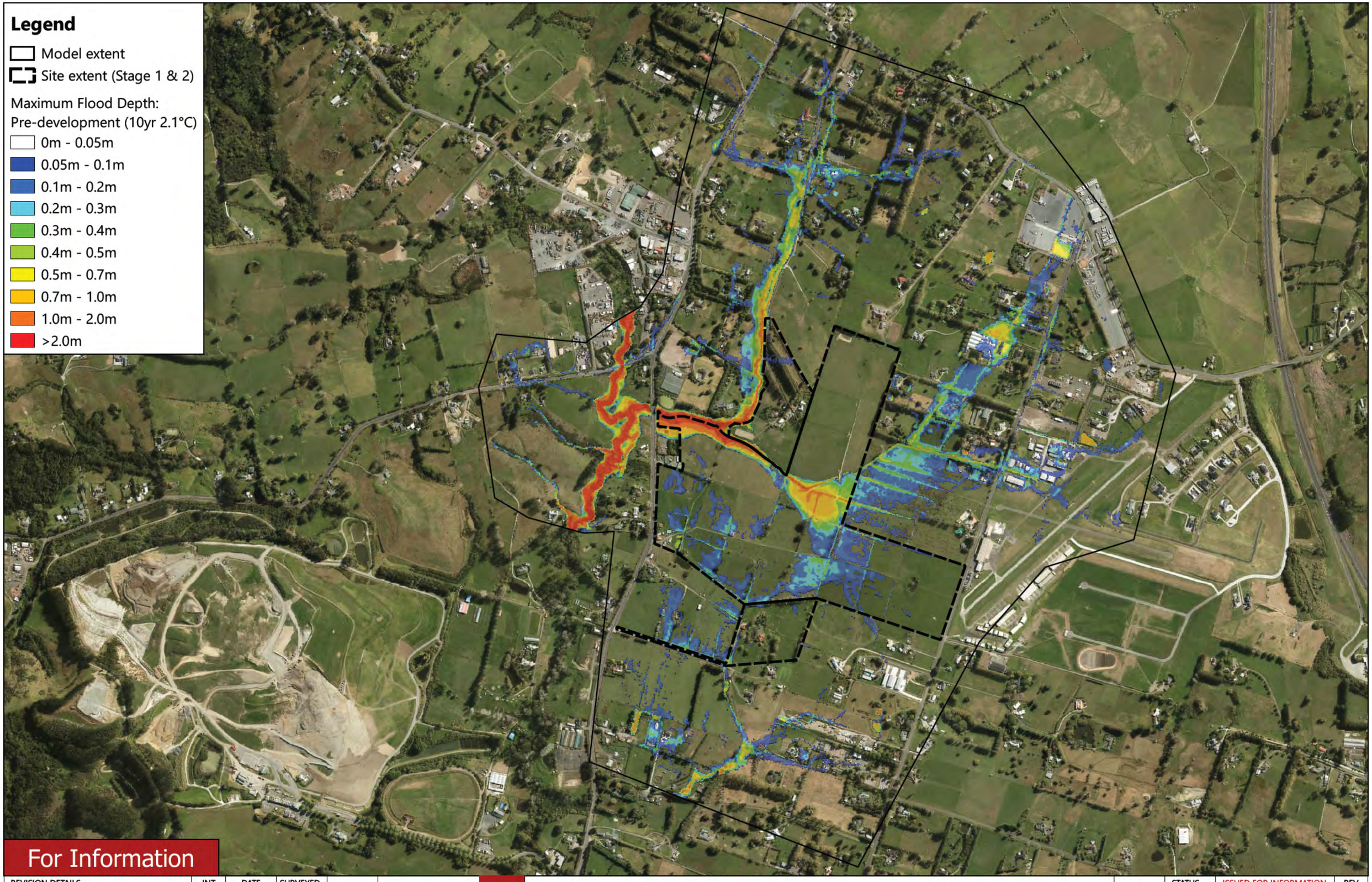
8 NUGENT STREET
GRAFTON
AUCKLAND

WOODS.CO.NZ

WOODS Est.1970

P25-662 - SURF PARK - FLOOD ASSESSMENT
MAXIMUM FLOOD DEPTH - PRE DEVELOPMENT 2 YEAR ARI (2.1°C)

STATUS	ISSUED FOR INFORMATION	REV
SCALE	NTS	1.0
COUNCIL	AUCKLAND COUNCIL	
SHEET	SHEET 4 OF 22	



For Information

REVISION DETAILS		INT	DATE	SURVEYED	-
1.0	For Information	-	30/01/2026	DESIGNED	-
-	-	-	-	DRAWN	RK
-	-	-	-	CHECKED	RN
				APPROVED	PW

8 NUGENT STREET
GRAFTON
AUCKLAND

WOODS
EST.1970
WOODS.CO.NZ

P25-662 - SURF PARK - FLOOD ASSESSMENT
MAXIMUM FLOOD DEPTH - PRE DEVELOPMENT 10 YEAR ARI (2.1°C)

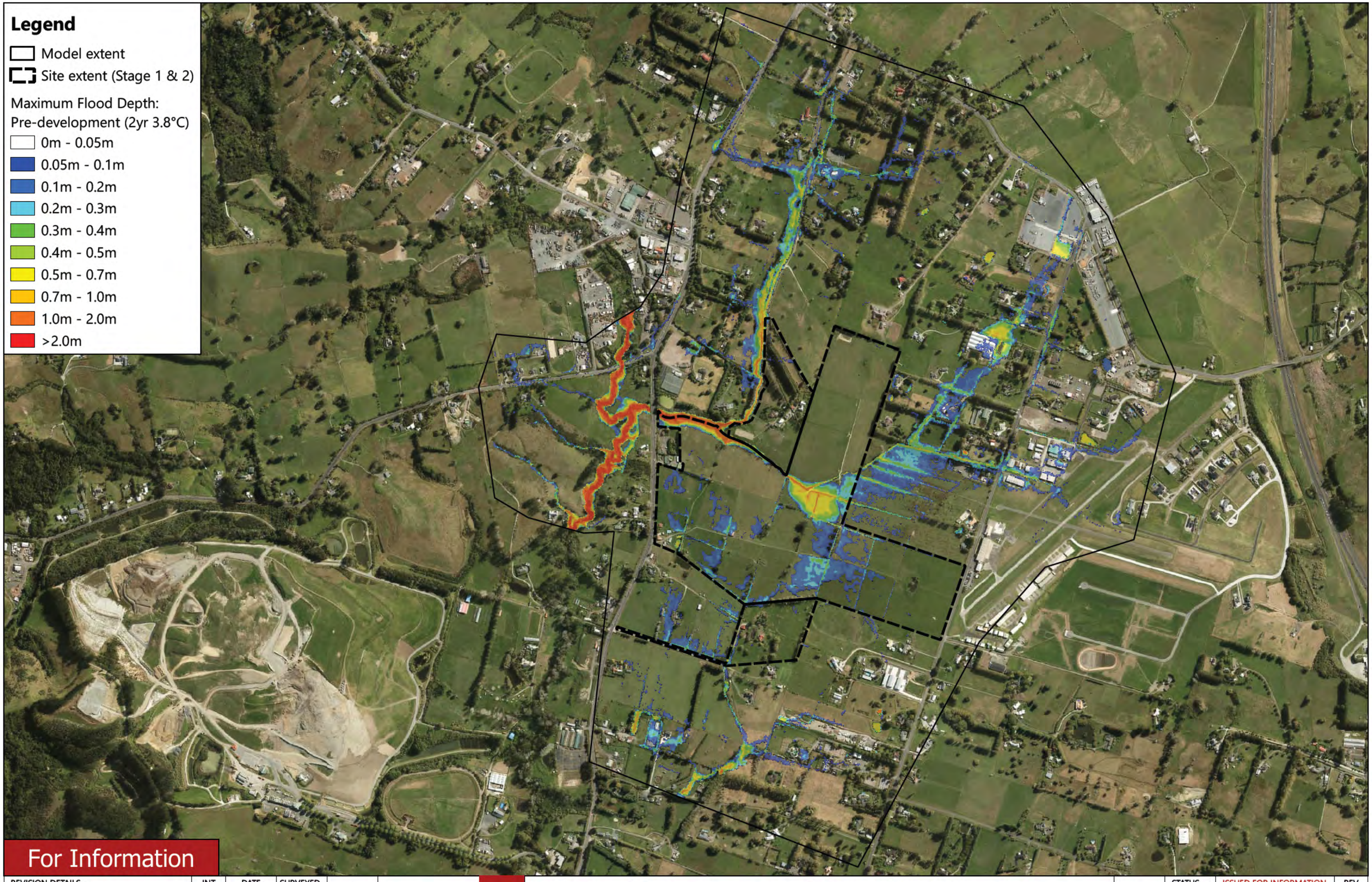
STATUS	ISSUED FOR INFORMATION	REV
SCALE	NTS	1.0
COUNCIL	AUCKLAND COUNCIL	
SHEET	SHEET 5 OF 22	

Legend

- Model extent
- Site extent (Stage 1 & 2)

Maximum Flood Depth:
Pre-development (2yr 3.8°C)

- 0m - 0.05m
- 0.05m - 0.1m
- 0.1m - 0.2m
- 0.2m - 0.3m
- 0.3m - 0.4m
- 0.4m - 0.5m
- 0.5m - 0.7m
- 0.7m - 1.0m
- 1.0m - 2.0m
- >2.0m



For Information

REVISION DETAILS		INT	DATE	SURVEYED	-
1.0	For Information	-	30/01/2026	DESIGNED	-
-	-	-	-	DRAWN	RK
-	-	-	-	CHECKED	RN
				APPROVED	PW

8 NUGENT STREET
GRAFTON
AUCKLAND

WOODS
EST.1970
WOODS.CO.NZ

P25-662 - SURF PARK - FLOOD ASSESSMENT
MAXIMUM FLOOD DEPTH - PRE DEVELOPMENT 2 YEAR ARI (3.8°C)

STATUS	ISSUED FOR INFORMATION	REV
SCALE	NTS	1.0
COUNCIL	AUCKLAND COUNCIL	
SHEET	SHEET 6 OF 22	

Legend

- Model extent
- Site extent (Stage 1 & 2)

Maximum Flood Depth:
Pre-development (10yr 3.8°C)

- 0m - 0.05m
- 0.05m - 0.1m
- 0.1m - 0.2m
- 0.2m - 0.3m
- 0.3m - 0.4m
- 0.4m - 0.5m
- 0.5m - 0.7m
- 0.7m - 1.0m
- 1.0m - 2.0m
- >2.0m

For Information

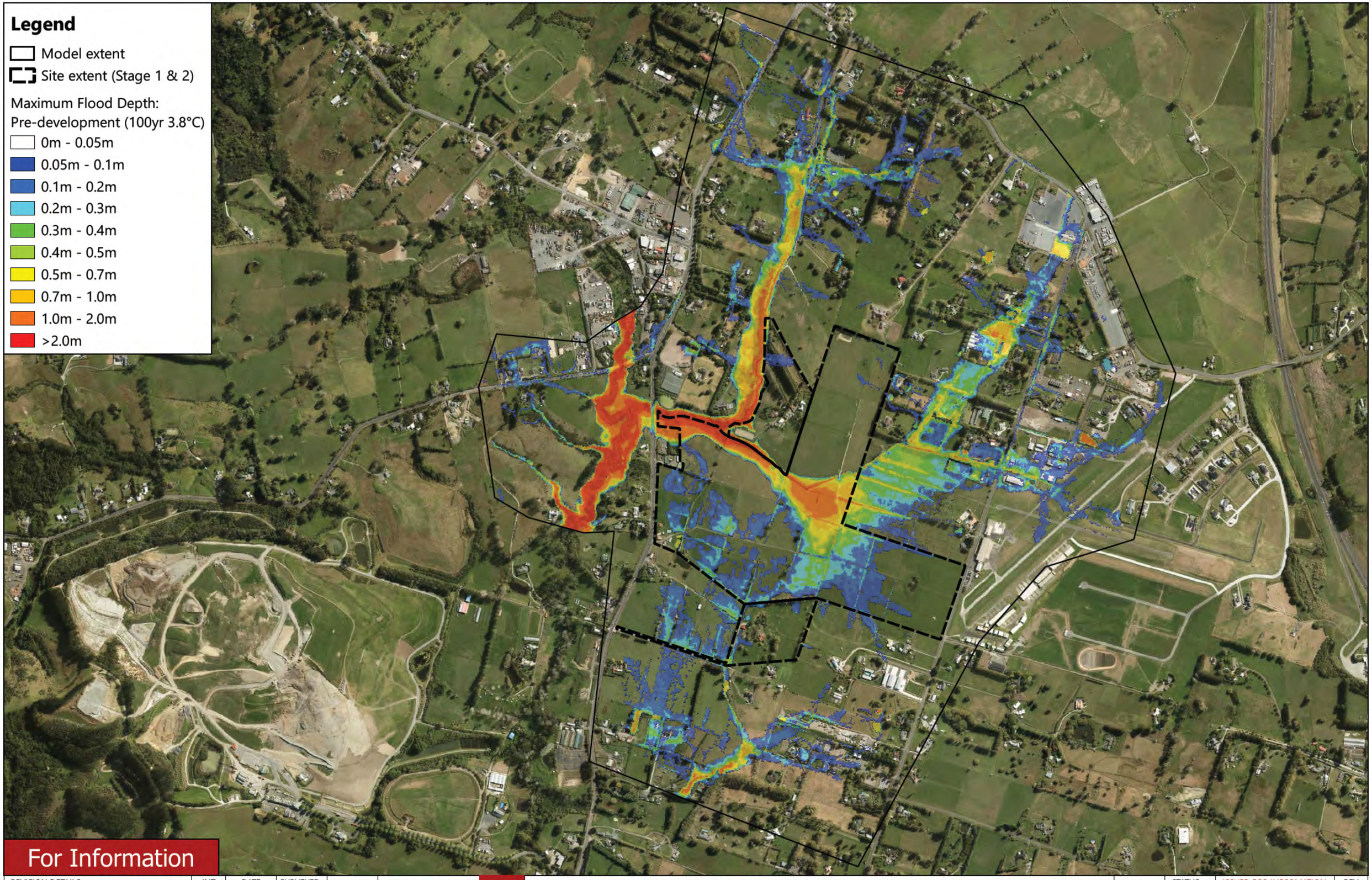
REVISION DETAILS		INT	DATE	SURVEYED	-
1.0	For Information	-	30/01/2026	DESIGNED	-
-	-	-	-	DRAWN	RK
-	-	-	-	CHECKED	RN
				APPROVED	PW

8 NUGENT STREET
GRAFTON
AUCKLAND

WOODS
EST.1970
WOODS.CO.NZ

P25-662 - SURF PARK - FLOOD ASSESSMENT
MAXIMUM FLOOD DEPTH - PRE DEVELOPMENT 10 YEAR ARI (3.8°C)

STATUS	ISSUED FOR INFORMATION	REV
SCALE	NTS	1.0
COUNCIL	AUCKLAND COUNCIL	
SHEET	SHEET 7 OF 22	



For Information

REVISION DETAILS		INT	DATE	SURVEYED	-
1.0	For Information	-	30/01/2026	DESIGNED	-
-	-	-	-	DRAWN	RK
-	-	-	-	CHECKED	RN
				APPROVED	PW

8 NUGENT STREET
GRAFTON
AUCKLAND

WOODS
Est.1970

WOODS.CO.NZ

P25-662 - SURF PARK - FLOOD ASSESSMENT
MAXIMUM FLOOD DEPTH - PRE DEVELOPMENT 100 YEAR ARI (3.8°C)

STATUS	ISSUED FOR INFORMATION	REV
SCALE	NTS	1.0
COUNCIL	AUCKLAND COUNCIL	
SHEET	SHEET 8 OF 22	

For Information

REVISION DETAILS		INT	DATE	SURVEYED	-
1.0	For Information	-	30/01/2026	DESIGNED	-
-	-	-	-	DRAWN	RK
-	-	-	-	CHECKED	RN
				APPROVED	PW

8 NUGENT STREET
GRAFTON
AUCKLAND

WOODS
EST.1970
WOODS.CO.NZ

P25-662 - SURF PARK - FLOOD ASSESSMENT
MAXIMUM FLOOD DEPTH - POST DEVELOPMENT 2 YEAR ARI (No CC)

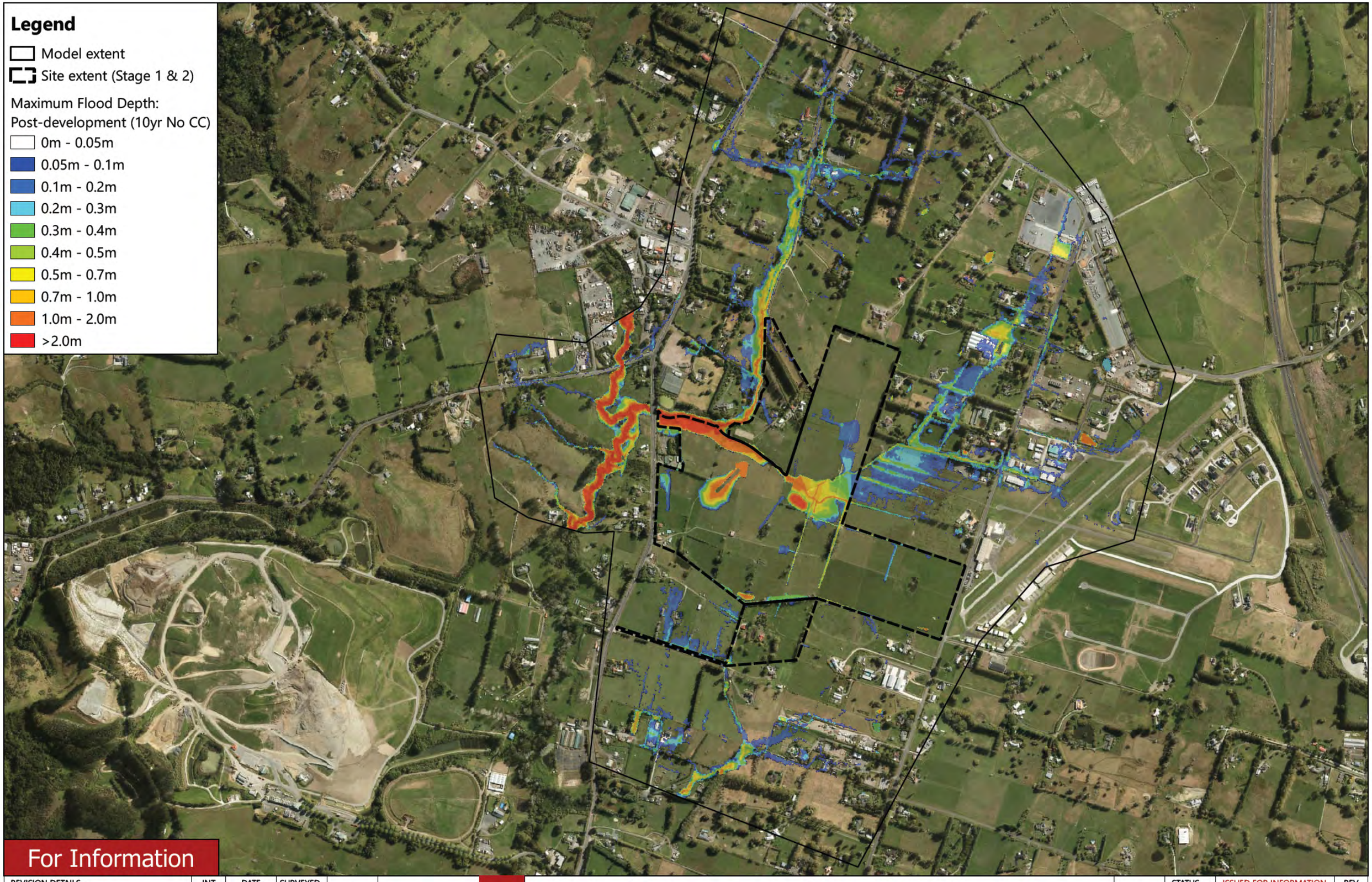
STATUS	ISSUED FOR INFORMATION	REV
SCALE	NTS	1.0
COUNCIL	AUCKLAND COUNCIL	
SHEET	SHEET 9 OF 22	

Legend

- Model extent
- Site extent (Stage 1 & 2)

Maximum Flood Depth:
Post-development (10yr No CC)

- 0m - 0.05m
- 0.05m - 0.1m
- 0.1m - 0.2m
- 0.2m - 0.3m
- 0.3m - 0.4m
- 0.4m - 0.5m
- 0.5m - 0.7m
- 0.7m - 1.0m
- 1.0m - 2.0m
- >2.0m



For Information

REVISION DETAILS		INT	DATE	SURVEYED	-
1.0	For Information	-	30/01/2026	DESIGNED	-
-	-	-	-	DRAWN	RK
-	-	-	-	CHECKED	RN
				APPROVED	PW

8 NUGENT STREET
GRAFTON
AUCKLAND

WOODS
EST.1970
WOODS.CO.NZ

P25-662 - SURF PARK - FLOOD ASSESSMENT
MAXIMUM FLOOD DEPTH - POST DEVELOPMENT 10 YEAR ARI (No CC)

STATUS	ISSUED FOR INFORMATION	REV
SCALE	NTS	1.0
COUNCIL	AUCKLAND COUNCIL	
SHEET	SHEET 10 OF 22	

Legend

- Model extent
- Site extent (Stage 1 & 2)

Maximum Flood Depth:
Post-development (100yr No CC)

- 0m - 0.05m
- 0.05m - 0.1m
- 0.1m - 0.2m
- 0.2m - 0.3m
- 0.3m - 0.4m
- 0.4m - 0.5m
- 0.5m - 0.7m
- 0.7m - 1.0m
- 1.0m - 2.0m
- >2.0m

For Information

REVISION DETAILS		INT	DATE	SURVEYED	-
1.0	For Information	-	30/01/2026	DESIGNED	-
-	-	-	-	DRAWN	RK
-	-	-	-	CHECKED	RN
				APPROVED	PW

8 NUGENT STREET
GRAFTON
AUCKLAND

WOODS
Est.1970

WOODS.CO.NZ

P25-662 - SURF PARK - FLOOD ASSESSMENT
MAXIMUM FLOOD DEPTH - POST DEVELOPMENT 100 YEAR ARI (No CC)

STATUS	ISSUED FOR INFORMATION	REV
SCALE	NTS	1.0
COUNCIL	AUCKLAND COUNCIL	
SHEET	SHEET 11 OF 22	

For Information

REVISION DETAILS		INT	DATE	SURVEYED	-
1.0	For Information	-	30/01/2026	DESIGNED	-
-	-	-	-	DRAWN	RK
-	-	-	-	CHECKED	RN
				APPROVED	PW

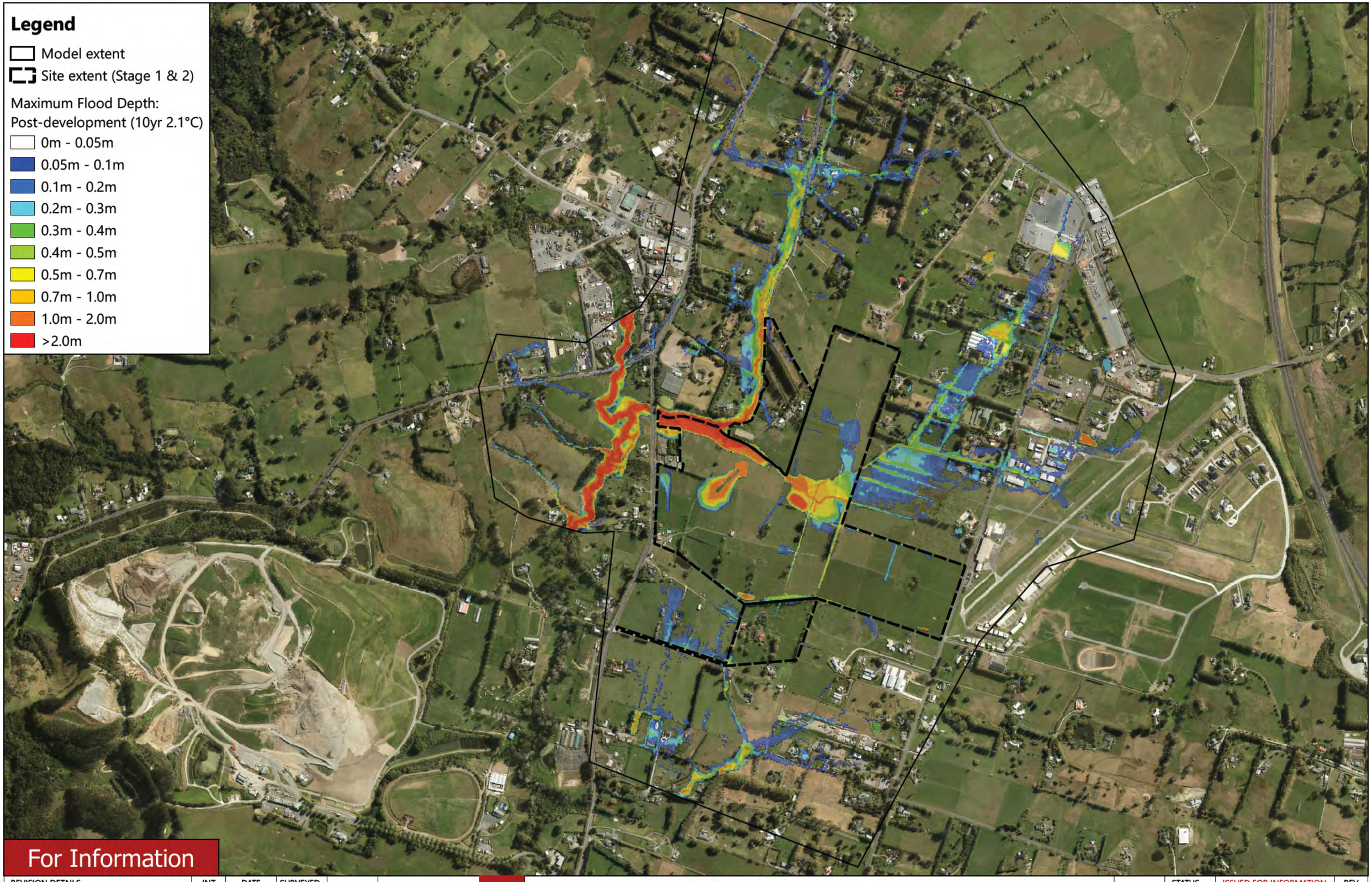
8 NUGENT STREET
GRAFTON
AUCKLAND

WOODS
EST.1970

WOODS.CO.NZ

P25-662 - SURF PARK - FLOOD ASSESSMENT
MAXIMUM FLOOD DEPTH - POST DEVELOPMENT 2 YEAR ARI (2.1°C)

STATUS	ISSUED FOR INFORMATION	REV
SCALE	NTS	1.0
COUNCIL	AUCKLAND COUNCIL	
SHEET	SHEET 12 OF 22	



For Information

REVISION DETAILS		INT	DATE	SURVEYED	-
1.0	For Information	-	30/01/2026	DESIGNED	-
-	-	-	-	DRAWN	RK
-	-	-	-	CHECKED	RN
				APPROVED	PW

8 NUGENT STREET
GRAFTON
AUCKLAND

WOODS.CO.NZ

WOODS Est.1970

P25-662 - SURF PARK - FLOOD ASSESSMENT
MAXIMUM FLOOD DEPTH - POST DEVELOPMENT 10 YEAR ARI (2.1°C)

STATUS	ISSUED FOR INFORMATION	REV
SCALE	NTS	1.0
COUNCIL	AUCKLAND COUNCIL	
SHEET	SHEET 13 OF 22	

Legend

- Model extent
- Site extent (Stage 1 & 2)

Maximum Flood Depth:
Post-development (2yr 3.8°C)

- 0m - 0.05m
- 0.05m - 0.1m
- 0.1m - 0.2m
- 0.2m - 0.3m
- 0.3m - 0.4m
- 0.4m - 0.5m
- 0.5m - 0.7m
- 0.7m - 1.0m
- 1.0m - 2.0m
- >2.0m

For Information

REVISION DETAILS		INT	DATE	SURVEYED	-
1.0	For Information	-	30/01/2026	DESIGNED	-
-	-	-	-	DRAWN	RK
-	-	-	-	CHECKED	RN
				APPROVED	PW

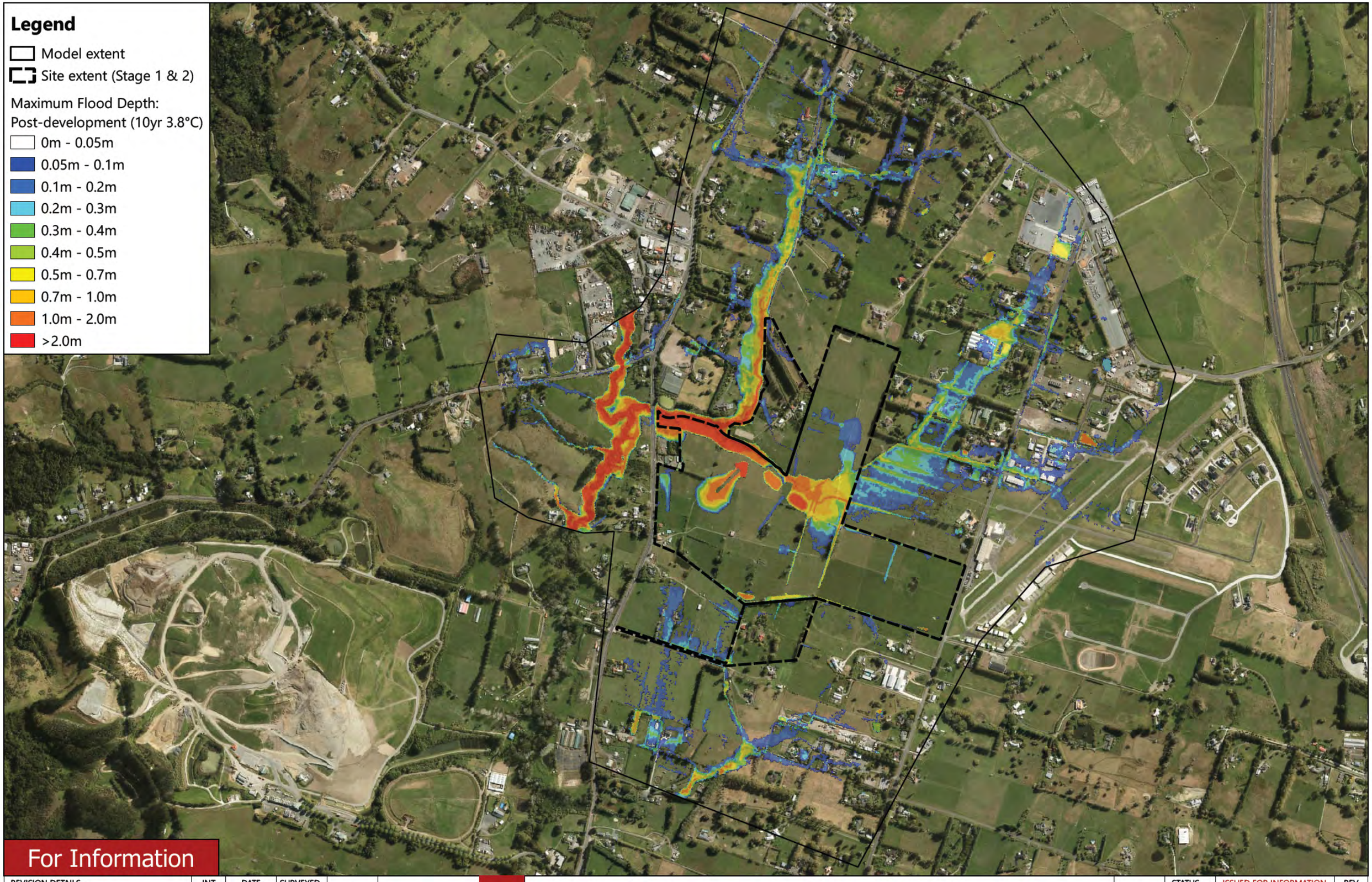
8 NUGENT STREET
GRAFTON
AUCKLAND

WOODS
Est.1970

WOODS.CO.NZ

P25-662 - SURF PARK - FLOOD ASSESSMENT
MAXIMUM FLOOD DEPTH - POST DEVELOPMENT 2 YEAR ARI (3.8°C)

STATUS	ISSUED FOR INFORMATION	REV
SCALE	NTS	1.0
COUNCIL	AUCKLAND COUNCIL	
SHEET	SHEET 14 OF 22	



For Information

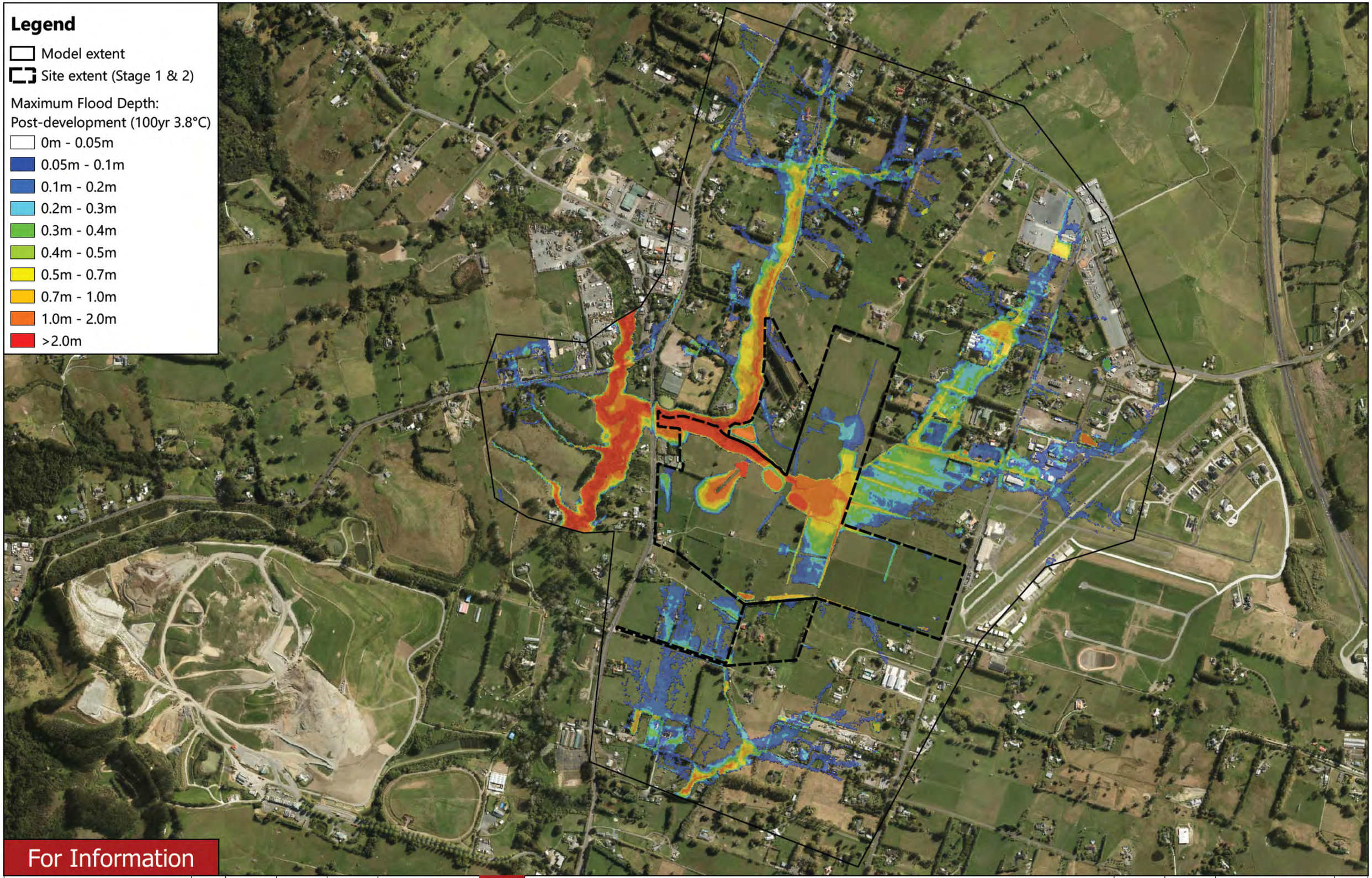
REVISION DETAILS		INT	DATE	SURVEYED	-
1.0	For Information	-	30/01/2026	DESIGNED	-
-	-	-	-	DRAWN	RK
-	-	-	-	CHECKED	RN
				APPROVED	PW

8 NUGENT STREET
GRAFTON
AUCKLAND

WOODS
EST.1970
WOODS.CO.NZ

P25-662 - SURF PARK - FLOOD ASSESSMENT
MAXIMUM FLOOD DEPTH - POST DEVELOPMENT 10 YEAR ARI (3.8°C)

STATUS	ISSUED FOR INFORMATION	REV
SCALE	NTS	1.0
COUNCIL	AUCKLAND COUNCIL	
SHEET	SHEET 15 OF 22	



For Information

REVISION DETAILS		INT	DATE	SURVEYED	-
1.0	For Information	-	30/01/2026	DESIGNED	-
-	-	-	-	DRAWN	RK
-	-	-	-	CHECKED	RN
				APPROVED	PW

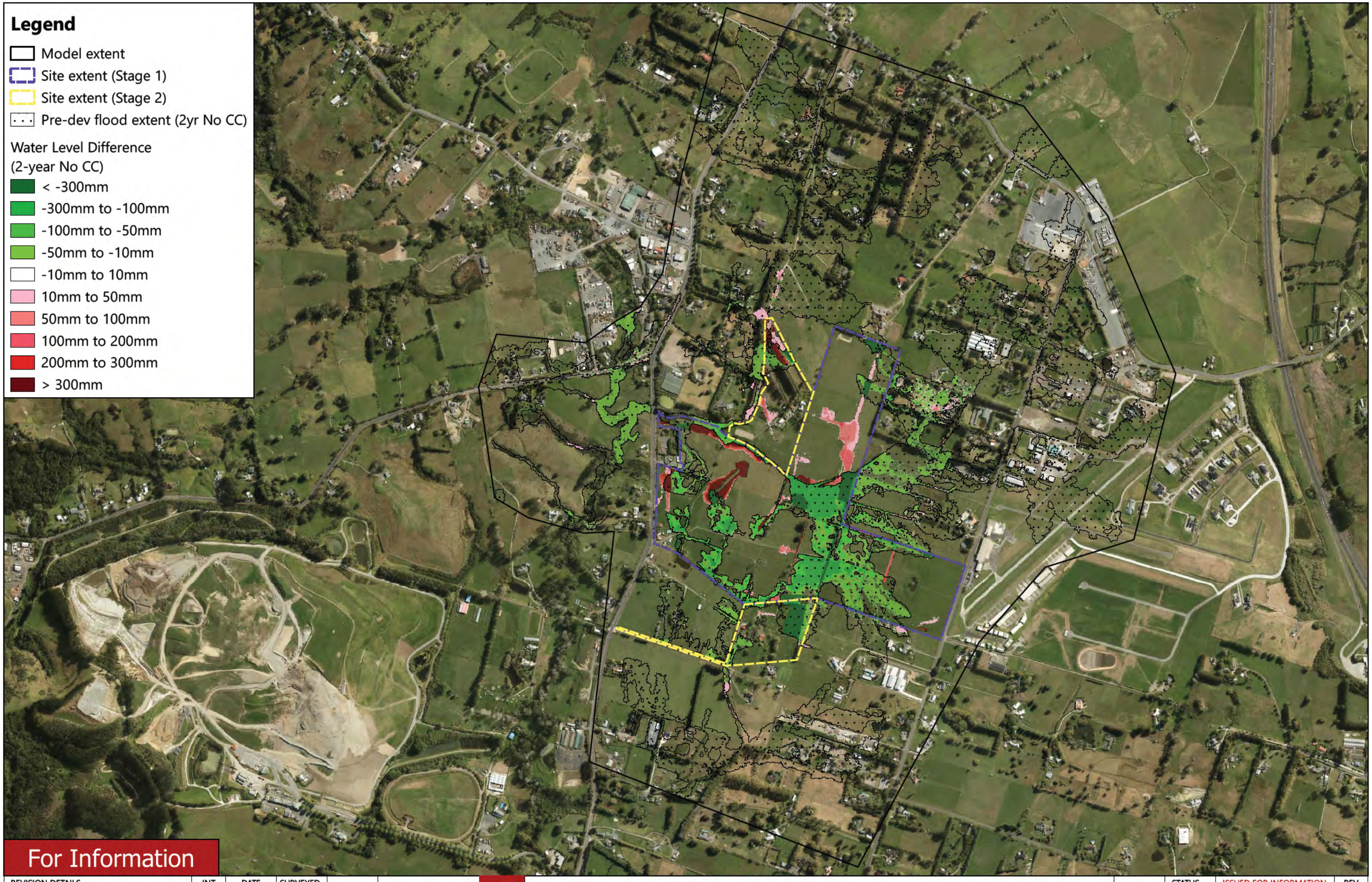
8 NUGENT STREET
GRAFTON
AUCKLAND

WOODS
Est.1970

WOODS.CO.NZ

P25-662 - SURF PARK - FLOOD ASSESSMENT
MAXIMUM FLOOD DEPTH - POST DEVELOPMENT 100 YEAR ARI (3.8°C)

STATUS	ISSUED FOR INFORMATION	REV
SCALE	NTS	1.0
COUNCIL	AUCKLAND COUNCIL	
SHEET	SHEET 16 OF 22	



For Information

REVISION DETAILS		INT	DATE	SURVEYED	-
1.0	For Information	-	30/01/2026	DESIGNED	-
-	-	-	-	DRAWN	RK
-	-	-	-	CHECKED	RN
				APPROVED	PW

8 NUGENT STREET
GRAFTON
AUCKLAND

WOODS
EST.1970

WOODS.CO.NZ

P25-662 - SURF PARK - FLOOD ASSESSMENT
WATER LEVEL DIFFERENCE - 2 YEAR ARI (No CC)

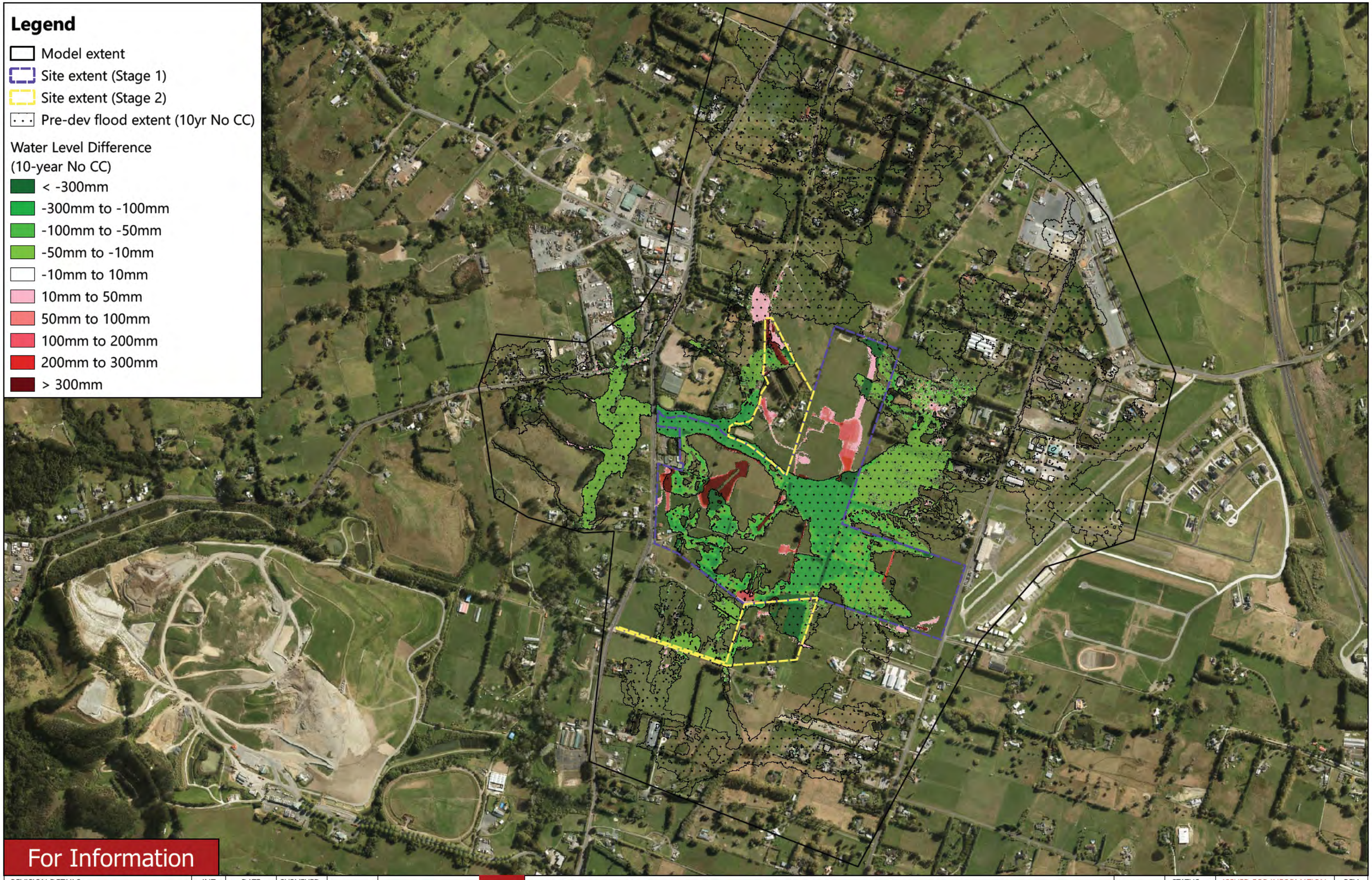
STATUS	ISSUED FOR INFORMATION	REV
SCALE	NTS	1.0
COUNCIL	AUCKLAND COUNCIL	
SHEET	SHEET 17 OF 22	

Legend

- Model extent
- Site extent (Stage 1)
- Site extent (Stage 2)
- Pre-dev flood extent (10yr No CC)

Water Level Difference
(10-year No CC)

- < -300mm
- -300mm to -100mm
- -100mm to -50mm
- -50mm to -10mm
- -10mm to 10mm
- 10mm to 50mm
- 50mm to 100mm
- 100mm to 200mm
- 200mm to 300mm
- > 300mm



For Information

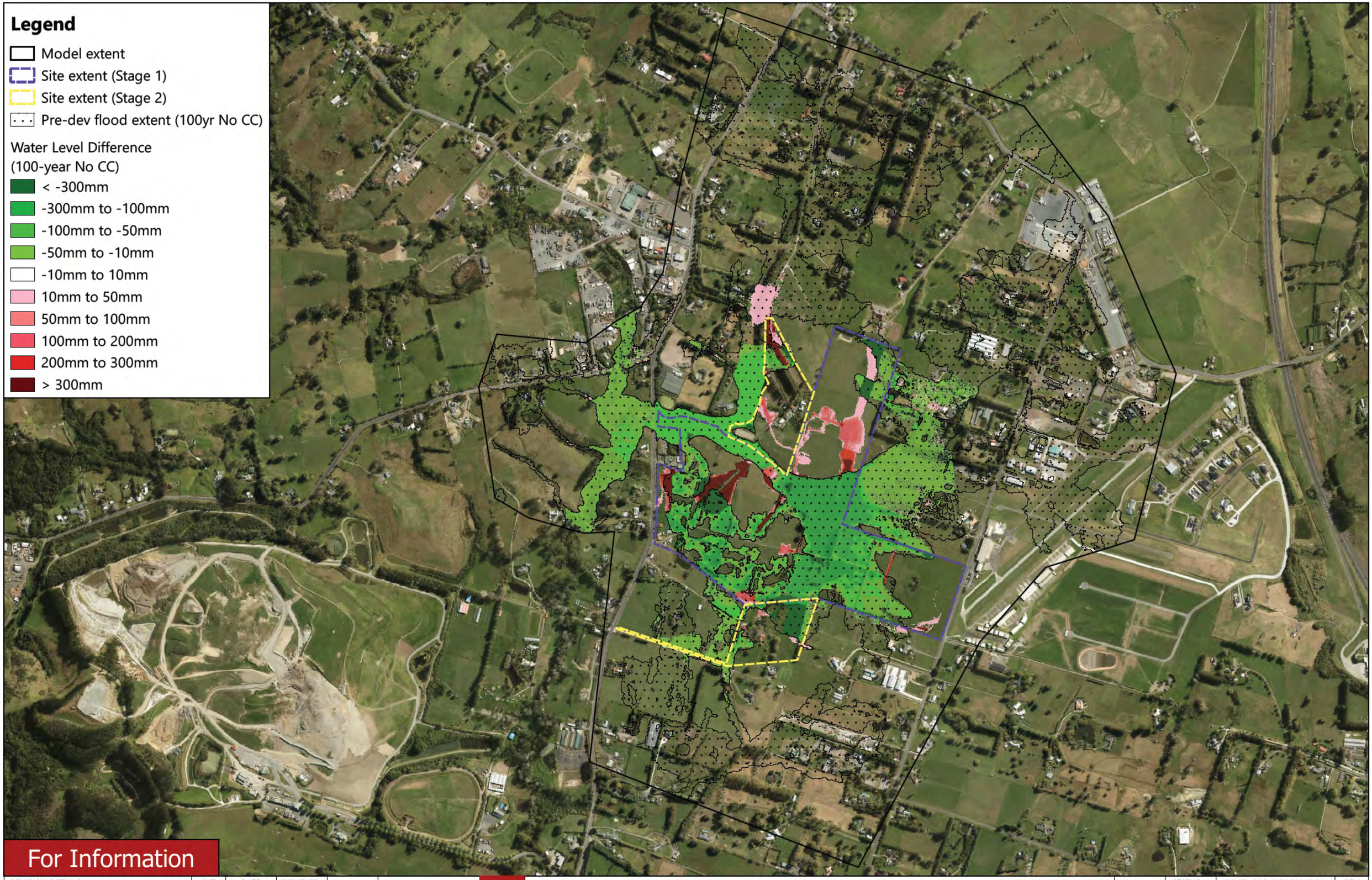
REVISION DETAILS		INT	DATE	SURVEYED	-
1.0	For Information	-	30/01/2026	DESIGNED	-
-	-	-	-	DRAWN	RK
-	-	-	-	CHECKED	RN
				APPROVED	PW

8 NUGENT STREET
GRAFTON
AUCKLAND

WOODS
EST.1970
WOODS.CO.NZ

P25-662 - SURF PARK - FLOOD ASSESSMENT
WATER LEVEL DIFFERENCE - 10 YEAR ARI (No CC)

STATUS	ISSUED FOR INFORMATION	REV
SCALE	NTS	1.0
COUNCIL	AUCKLAND COUNCIL	
SHEET	SHEET 18 OF 22	



For Information

REVISION DETAILS		INT	DATE	SURVEYED	-
1.0	For Information	-	30/01/2026	DESIGNED	-
-	-	-	-	DRAWN	RK
-	-	-	-	CHECKED	RN
				APPROVED	PW

8 NUGENT STREET
GRAFTON
AUCKLAND

WOODS
Est.1970

WOODS.CO.NZ

P25-662 - SURF PARK - FLOOD ASSESSMENT
WATER LEVEL DIFFERENCE - 100 YEAR ARI (No CC)

STATUS	ISSUED FOR INFORMATION	REV
SCALE	NTS	1.0
COUNCIL	AUCKLAND COUNCIL	
SHEET	SHEET 19 OF 22	

Legend

- Model extent
- Site extent (Stage 1)
- Site extent (Stage 2)
- Pre-dev flood extent (2yr 3.8°C)

Water Level Difference
(2-year 3.8°C)

- < -300mm
- -300mm to -100mm
- -100mm to -50mm
- -50mm to -10mm
- -10mm to 10mm
- 10mm to 50mm
- 50mm to 100mm
- 100mm to 200mm
- 200mm to 300mm
- > 300mm

For Information

REVISION DETAILS		INT	DATE	SURVEYED	-
1.0	For Information	-	30/01/2026	DESIGNED	-
-	-	-	-	DRAWN	RK
-	-	-	-	CHECKED	RN
				APPROVED	PW

8 NUGENT STREET
GRAFTON
AUCKLAND

WOODS
Est.1970

WOODS.CO.NZ

P25-662 - SURF PARK - FLOOD ASSESSMENT
WATER LEVEL DIFFERENCE - 2 YEAR ARI (3.8°C)

STATUS	ISSUED FOR INFORMATION	REV
SCALE	NTS	1.0
COUNCIL	AUCKLAND COUNCIL	
SHEET	SHEET 20 OF 22	

For Information

REVISION DETAILS		INT	DATE	SURVEYED	-
1.0	For Information	-	30/01/2026	DESIGNED	-
-	-	-	-	DRAWN	RK
-	-	-	-	CHECKED	RN
				APPROVED	PW

8 NUGENT STREET
GRAFTON
AUCKLAND

WOODS.CO.NZ

WOODS Est.1970

P25-662 - SURF PARK - FLOOD ASSESSMENT
WATER LEVEL DIFFERENCE - 10 YEAR ARI (3.8°C)

STATUS	ISSUED FOR INFORMATION	REV
SCALE	NTS	1.0
COUNCIL	AUCKLAND COUNCIL	
SHEET	SHEET 21 OF 22	

For Information

REVISION DETAILS		INT	DATE	SURVEYED	-
1.0	For Information	-	30/01/2026	DESIGNED	-
-	-	-	-	DRAWN	RK
-	-	-	-	CHECKED	RN
				APPROVED	PW

8 NUGENT STREET
GRAFTON
AUCKLAND

WOODS
EST.1970

WOODS.CO.NZ

P25-662 - SURF PARK - FLOOD ASSESSMENT
WATER LEVEL DIFFERENCE - 100 YEAR ARI (3.8°C)

STATUS	ISSUED FOR INFORMATION	REV
SCALE	NTS	1.0
COUNCIL	AUCKLAND COUNCIL	
SHEET	SHEET 22 OF 22	