ENCLOSURE I

Preliminary Engineering Services Report

Development Nous Limited

996 State Highway 2, Whirinaki

Preliminary Engineering Service Report - V1

H20180064_PESR_V1

PREPARED FOR EVANS FAMILY TRUST

AUGUST 2022

DEVELOPMENT NOUS

www.developmentnous.nz

Contents

LIST OF APPENDICES:

1. INTRODUCTION & SCOPE

Development Nous Ltd (DNL) was appointed by **Evans Family Trust** (the Applicants) to compile a Preliminary Engineering Servicing Report (PESR) for the proposed subdivision establishing 81 new residential lots and a commercial space with provision for 2 residential apartments above the commercial floorspace to the east of Pohutukawa Drive, Hastings.

This report provides a high-level civil engineering assessment to demonstration the viability of the proposed development to support the *COVID Fast-Track Consenting* application. Specifically, this report will address the three-water servicing, roading and earthworks elements for the proposed development.

Subsequent Engineering Services Reports delving in further detail of the proposed development will supplement this report, with Detailed Engineering Design applications to follow upon consent being received for each of the associated development stages.

1.1. Information and Standards

Information provided includes the site location and a proposed scheme plan outlining the indicative number of lots and layout of the development presented in **Appendix A.**

Information on existing services was made available through the HDC GIS system and targeted topographic site survey. The investigation referenced the following resources:

- EAM NZ LTD - *Preliminary Site Investigation (PSI) – 996 State Highway 2, Whirinaki* (Reference EAM2238-REP-01, dated February 2022);
- EAM NZ LTD – *Ecological Assessment – Whirinaki Drain,Whirinaki* (Reference EAM2282-REP-01, dated July 2022);
- Freeman Cook & Associates Pty Ltd – *Wastewater Proposal for Pohutukawa Drive Subdivision: Preliminary Data* (dated August 2022);
- Hastings District Council – *Engineering Code of Practice* (dated 2020);
- Hastings District Council - *IntraMap HDC*;
- Hawke's Bay Regional Council - *Hawke's Bay Waterway Guidelines Erosion & Sediment Control* (dated 2009);
- Hawke's Bay Regional Council - *Hawke's Bay Waterway Guidelines Works in Waterways* (dated April 2009);
- Hawke's Bay Regional Council - *Hawke's Bay Waterway Guidelines Stormwater Management* (dated May 2009);
- Hawke's Bay Regional Council – *Hazard Portal GIS Hazards Resource*
- Initia Limited – *Geotechnical Report – 996 State Highway 2, Whirinaki* (Reference: P-001359 Rev 1, dated June 2020);
- Ministry of Business, Innovation & Employment - Acceptable Solutions and Verification Methods for New Zealand Building Code Clause – *E1 Surface Water V9* (dated February 2014);
- NZS 1547:2012- *On-site Domestic Wastewater Management;*
- NZS 4404:2010 - *Land Development and Subdivision Infrastructure*; and
- SNZ PAS 4509:2008 New Zealand Fire Service Firefighting Water Supplies Code of Practice, particularly Table 1: (method for determining required water supply classification) and Table 2: (method for determining Firefighting water supply).

2. SITE LOCATION

Located at 996 State Highway 2, the development site is situated in the north eastern corner of the wider property. The overall property occupies an area of approximately 52 ha, extending from North Shore Road to the mouth of the Eskdale River. State Highway 2 forms the western boundary of the property. The wider property has the following legal description:

- SECS 44 PT 25 BLK XII PUKETAPU SD;
- LOT 8 DP381095;
- LOT 101 DP505383;
- LOT 1 DP3354;
- LOT 2 PT 1 DP 4741; and
- LOT 1 DP9884.

The site is bounded by North Shore Road and combination of residential / pastural land to the north. Existing residential properties to the east, cropped land and the mouth of the Eskdale River to the south and Whirinaki Drain to the west. Further beyond the bounds of the Whirinaki Drain, additional pastural field is situated between the drain and State Highway 2. The portion of land proposed for development as presented in **Figure 1-1** below, occupies an area of approximately 9.04 ha.

Figure 1-1 - Site Location (Source: HDC IntraMap)
Red boundary line indicates extent of development.

2.1. Site Topography, Constraints & Opportunities

2.1.1. Site Topography

Under pre-developed condition, the site is relatively flat and low lying. Ground levels throughout the development range from approximately RL 6.5 in along the northern boundary to RL 5.3 along the Whirinaki Drain. The development falls from the northern and southern boundary to the centre of the site and ultimately to the Whirinaki Drain.

2.1.2. Soil Permeability

An assessment of the site's soil permeability was undertaken using *Manaaki Whenua Landcare Research S-MAP Online*. **Figure 2-1** below depicts the site to be *Imperfectly Drained*.

Figure 2-2 – Soil Permeability (Source: S-Map)

2.1.3. Whirinaki Drain

The Whirinaki Drain currently traverses the proposed western boundary of the site and bisects the south eastern corner of the site. Extending approximately 1,300m north and 1,200m south (measurements origin at the Stage Highway 2 culvert), the drain conveys runoff from Pan Pac Forest Products (east of drain) and surrounding hills (west of drain). Once collected, runoff is conveyed south, traversing the State Highway before flowing along the proposed development. Once past the site, the drain follows a series of tight bends ultimately discharging to the mouth of the Eskdale River. The drain is influenced by the tide extending to the bounds of the site.

As discussed in EAM's *Restoration Options – Whirinaki Drain* (dated July 2022), it is believed the drain is a man made structure with the purpose of intercepting runoff from the pine forestry hills and diverting the flows away from the PanPac Mill. Two informal weir structures have been create generally in line with two bends directly south of the development boundary and a farm bridge crossing the drain at the approximate half way point of the site.

2.1.4. Natural Hazards

Consultation with the Hawke's Bay Hazard Portal has determined the site is impacted by the following natural hazards. Refer to the Natural Hazards report presented in **Appendix B**.

Liquefaction

HBRC's Hazard Portal suggests the site is deemed to have a "medium liquefaction vulnerability" with damage from liquefaction possible. Site investigations undertaken by the geotechnical specialists *Initia* determined the following:

- *"Under SLS levels of shaking, liquefaction is unlikely.*
- *Under ULS levels of shaking, thin localised bands of material within the subsoil profile are potentially liquefiable. The thickness of these liquefiable layers is generally between 0.2m and 0.5m and the layers are not continuous."*

For further details of the liquefaction impacting the site, refer to Initia's *Geotechnical Report – 996 State Highway 2, Whirinaki* (dated June 2022).

Earthquake Amplification

HBRC's Hazard Portal suggests the has medium to high "Relative Earthquake Amplification" with alluvial sand, silt and gravel. Site investigations undertaken by the geotechnical specialists *Initia* determined the following:

- "*Rock is expected to be a significant depth below existing ground level, i.e., the depths of soil are likely to exceed the allowable levels for Class C – Shallow Soil; and*
- *The strengths of material exceed those required for Class E – Very Soft Soil.*

The design peak ground accelerations follow:

- *"Serviceability Limit State (SLS)*
    - *Annual Probability of Exceedance = 1 in 25,*
    - *Effective Magnitude M_{eff} = 6.4,*
    - *Peak Ground Acceleration (g) = 0.12*
- *Ultimate Limit State (SLS)*
    - *Annual Probability of Exceedance = 1 in 500,*
    - *Effective Magnitude M_{eff} = 7.1,*
    - *Peak Ground Acceleration (g) = 0.58"*

For further details of the seismic considerations for the site, refer to Initia's *Geotechnical Report – 996 State Highway 2, Whirinaki* (dated June 2022).

Coastal Environment

The site sits outside of the coastal environment zone however is bound by the zoning along the southern and northern site boundary.

Coastal Inundation Extent

The site is largely free from the Coastal Inundation Extent. Mapping suggests a small seam extending from the southern boundary encroaching approximately 1/3 into the site is impacted by up to the Year 2120 – 1% AEP. On further investigation of this extent, it is clear the inundation is contained within the Whirinaki Drain and does not extend into the bounds of the proposed works.

Tsunami Inundation Extent

The site is fully covered by the *Tsunami Near Source Inundation Extent*. The *Tsunami Distant Source Inundation Extent* extends from the southern boundary and extends north. Once at the centre of the site, this extent splits and extends to the northeast and north western property boundary.

Flood Extent

The development is impacted by flooding, it is expected the flooding results from the confluence of waterways, low waterway grades and the meandering nature of the drain at the outlet. HBRC's Hazard Portal does not specify a level for the flooding across the site

During a recent *renewal of consent to dispose of clean fill at the mouth of the Esk River*, HBRC were engaged to undertake a flood assessment of the proposed works. The completion of the assessment determined the 100-year flood levels in the areas are approximately RL 16m as documented in **Appendix C**.

Note, flood levels detailed in the memorandum are in terms of Napier 1962 local vertical datum, while the levels adopted for the design and assessment for the proposed development at in terms of New Zealand Vertical Datum 2016. To ensure the flood level reflects the adopted datum, a conversion was undertaken based on -10.31 to Hawke's Bay Local authority. Therefore, the adjusted 100-year flood level is RL 5.7.

In lieu of further consultation with HBRC, RL 5.7 has been adopted as the 100-year flood level. Further discussion with HBRC is required during the future stages of the development to agree on the adopted 100-year flood level.

3. STORMWATER ANALYSIS

3.1. Pre-Development Stormwater Quantity

3.1.1. Pre-Development Stormwater Drainage Conditions

The natural site topography falls from Pohutukawa Drive along the eastern edge of the site, to the Whirinaki Drain along the western edge of the site. Runoff generated within the bounds of the site are conveyed to the Whirinaki Drain via overland sheet flow conditions. Generally low lying, the site is subject to flooding. Situated upstream of the confluence of the Esk River, Whirinaki Drain and the Pacific Ocean, it is anticipated flooding in the area is caused by the flood plain for the respective waterways with tidal impacts. The Eskdale River and Whirinaki Drain have extensive upstream catchment approximating to 26,789ha and 471.7ha respectively. The primary catchment of concern is that which is discharging to and conveyed within the Whirinaki Drain.

Extending approximately 6km to the north / north west, the catchment follows the trajectory of the drain to the north where it meets the Pan Pac Processing Mill. Once at the Mill, the drain and catchment extends west collecting runoff from the pine forestry hills. For further details of the greater catchment conditions, refer to **Section 3.3**.

There is limited reticulated network in the vicinity of the site. Drainage was installed along Pohutukawa drive during the previous subdivision works which are conveyed to the Whirinaki Drain via a pipe which bisects the site.

For further details of the sites existing catchment extents and the wider catchment discharging to the Whirinaki Drain, refer to Drawing No. **H20180064-50-A-02** and **H20180064-50-A-04** presented in **Appendix E**.

3.1.2. Pre-Development Stormwater Hydrology

The Rational Method was used to calculate the pre-development runoff flows. The sections to follow provide a summary of the calculations:

3.1.2.1. Pre-Development Catchment Data

Catchment parameters were delineated based on the existing topography and aerial imagery. The site is considered to be a single catchment and conveys runoff from an external catchment to the east through the site to the drain. For the purpose of this investigation, the assessment has considered catchments on the eastern side of the drain only, any catchments discharging to the drain from the west yield a separate discharge location from the catchments to the east.

Refer to drawing **H20180064-50-A-02** in **Appendix E** for the pre-development topographical catchment layout and **Appendix D** for the calculations.

The development site currently consists of pasture land with underlying stiff clays silt with high plasticity. The pre-developed run-off coefficients for the development are derived from Table 1 of clause E1 in the New Zealand Building Code for Surface Water (Rational Method):

- Heavy Clay soil types:
  - Pasture and grass cover = 0.4 (Subtract slope correction, 0 - 5%)
- Land use types:
  - Residential areas in which impervious area is 36% to 50% of gross area = 0.55 (Subtract slope correction, 0 - 5%)

Table 3-1 Pre-Development Catchment Data

PRE-DEVELOPMENT CATCHMENT DATA			
Catchment Area Name	**Catchment Area (ha)**	**Runoff Coefficient (C)**	**Time of Concentration (Tc)**
A	10.062	0.35	51
B	5.779	0.50	23

3.1.3. Pre-Development Stormwater Run-off Summary

The pre-development stormwater run-off flows are summarised and tabulated in **Table 3-2** below.

Table 3-2 Pre-Development Runoff Flows

PRE-DEVELOPMENT RUNOFF FLOWS					
Catchment Name	**1:2-year flood (m^3/s)**	**1:5-year flood (m^3/s)**	**1:10-year flood (m^3/s)**	**1:50-year flood (m^3/s)**	**1:100-year flood (m^3/s)**
A	0.232	0.321	0.392	0.579	0.669
B	0.283	0.395	0.484	0.722	0.836
TOTAL:	**0.514**	**0.716**	**0.876**	**1.301**	**1.505**

*Note: Peak flows presented reflect the flows for the contributing catchments Time of Concentration. No flow routing between catchments have been considered at this point in time.

3.2. Post-Development Stormwater Quantity

3.2.1. Post-Development Stormwater Drainage Conditions

Runoff generated within the post-development site will be conveyed and discharged to the Whirinaki Drain. The primary stormwater catchment conveyed by the Whirinaki drain extends approximately 6 kms upstream of the site. Preliminary assessment of the Whirinaki Drain catchment confirms peak flows within the Drain are expected to reach the development within approximately 18 hours from the commencement of a storm event. The site however is anticipated to have a post-development time of concentration in the order of 10 to 15 minutes. Thus, the considerable difference between the peak conveyance within the drain and the discharge of the site will not coincide. The development of the site is not expected to increase the peak flow conveyed via the drain. For further details of the wider catchment analysis, refer to **Section 3.3**.

The following section details the change in catchment characteristics and peak flows discharging the site following the proposed development. Refer to Drawing No. **H20180064-50-A-03** in **Appendix E** for the post-developed catchments and **Appendix D** for the calculations.

3.2.1.1. Post-Development Stormwater Hydrology

The Rational Method was used to calculate the post-development runoff flows. The following sections provides summaries of the calculations:

3.2.1.2. Post-Development Catchment Data

A preliminary earthworks design has been prepared for the site which has formed the basis for the post-development catchment delineation. The preliminary stormwater drainage layout has been prepared to discharge each catchment to the proposed swale bounding the Drain. Runoff within this swale is to be conveyed to the proposed raingarden to the southern of the development before discharging to the Whirinaki Drain.

Refer to Drawing. **H20180064-50-A-03** in **Appendix E** for the preliminary stormwater layout and catchments, note all catchments are subject to change during detailed design.

The post-developed run-off coefficients (C-Value) for the development are derived from table 1 in the New Zealand Building Code Clause E1-Surface Water (Rational Method):

<u>Land use types:</u>

- Land use types:
  - Residential areas in which impervious area is 36% to 50% of gross area = 0.55
- Industrial, commercial, shopping areas and town house developments
  - C-Value = 0.65
- Developed Surface types:
  - Asphalt and concrete paved surfaces = 0.85
- Developed Surface types:
  - Maintained Lawn = 0.25
- Subtract slope correction, 0 - 0.5%

The summary of the catchment data is tabulated in **Table 3-3** below;

Table 3-3 Post-Development Catchment Data

POST-DEVELOPMENT CATCHMENT DATA			
Catchment Name	**Catchment Area (ha)**	**Runoff Coefficient (C)**	**Time of Concentration (Tc)**
A	0.375	0.60	10
B	2.524	0.56	10
C	2.786	0.57	10
D	4.378	0.55	10
Pre-B	5.779	0.50	23

3.2.1.3. Post-Development Stormwater Run-off Summary

The post-development stormwater run-off flows are summarised and tabulated in **Table 3-4** below.

Table 3-4 Post-Development Runoff Flows

POST-DEVELOPMENT RUNOFF FLOWS					
Catchment Area Name	**1:2-year flood (m^3/s)**	**1:5-year flood (m^3/s)**	**1:10-year flood (m^3/s)**	**1:50-year flood (m^3/s)**	**1:100-year flood (m^3/s)**
A	0.034	0.048	0.059	0.090	0.105
B	0.215	0.303	0.373	0.563	0.657
C	0.239	0.336	0.415	0.625	0.730
D	0.368	0.518	0.639	0.963	1.125
TOTAL:	**0.856**	**1.205**	**1.486**	**2.241**	**2.617**
Pre-B	0.422	0.602	0.748	1.146	1.344

3.2.1.4. Pre to Post Development Runoff Comparison

Table 3-5 Post-Development Runoff Flows

SITE RUNOFF FLOW COMPARISON					
Catchment Area Name	**1:2-year flood (m^3/s)**	**1:5-year flood (m^3/s)**	**1:10-year flood (m^3/s)**	**1:50-year flood (m^3/s)**	**1:100-year flood (m^3/s)**
Pre	0.232	0.321	0.392	0.579	0.669
Post	0.856	1.205	1.486	2.241	2.617
Difference	**+0.624**	**+0.884**	**+1.093**	**+1.662**	**+1.948**

As demonstrated in **Table 3-5** above, the development of the site will result in an increase in runoff generated throughout the site. As discussed in **Section 3.2.1**, although the development will see an increase in runoff, by discharging flows to the Whirinaki Drain in a prompt manner, the coincidence in peak flows (from the upstream catchment) in the Drain is not expected to occur thus mitigating the need for peak flow mitigation.

3.3. Upstream Catchment Quantity Assessment

Due to the proximity of the site to the Whirinaki Drain, it is necessary to consider the existing functionality of the drain and the impacts of the proposed development. Utilising LiDAR surface information with considerations of the HBRC Water Management Catchment Mapping, an assessment was undertaken to determine the size, surface characteristics and time of concentration for the catchment. This assessment was then tested against the post development discharge characteristics to determine if the conveyance between both systems cause a nuisance to the existing system.

Refer to Drawing No. **H20180064-50-A-04** for the greater catchment delineation and **Appendix D** for the calculations.

3.3.1. Upstream Catchment Stormwater Hydrology

The Rational Method was used to calculate the pre-development runoff flows. The sections to follow provide a summary of the calculations:

3.3.1.1. Upstream Catchment Data

Catchment parameters were delineated based on the existing topography and aerial imagery. The run-off coefficients for the catchments were derived from Table 1 of clause E1 in the New Zealand Building Code for Surface Water (Rational Method):

- Medium Soakage soil types:
  - Pasture and grass cover = 0.3
  - Cultivated = 0.2
- Parks, playgrounds and reserves:
  - Predominately bush = 0.25
- Land use types:
  - Residential areas in which impervious area is 36% to 50% of gross area = 0.55
- Industrial, commercial, shopping areas and town house developments
  - C-Value = 0.65
- Subtract slope correction, 0 - 0.5%

Table 3-6 Upstream Catchment Data

PRE-DEVELOPMENT CATCHMENT DATA			
Catchment Area Name	**Catchment Area (ha)**	**Runoff Coefficient (C)**	**Time of Concentration (Tc - mins)**
Upstream	488.67	0.27	1,067

3.3.1.2. Upstream Stormwater Run-off Summary

The pre-development stormwater run-off flows are summarised and tabulated in **Table 3-7** below.

Table 3-7 Upstream Catchment Runoff Flows

PRE-DEVELOPMENT RUNOFF FLOWS					
Catchment Name	**1:2-year flood (m^3/s)**	**1:5-year flood (m^3/s)**	**1:10-year flood (m^3/s)**	**1:50-year flood (m^3/s)**	**1:100-year flood (m^3/s)**
Upstream	1.739	2.344	2.804	3.967	4.493

*Note: Peak flows presented reflect the flows for the contributing catchments Time of Concentration. No flow routing between catchments have been considered at this point in time.

As demonstrated in **Table 3-6** and **Table 3-3** above, the upstream catchment has a time of concentration in the order of 18 hours whereas the development achieves a time of concentration of circa 10 minutes.

On this basis, any runoff discharging from the development will have discharged to, conveyed by, and discharged from the Whirinaki Drain well before the peak of the catchment. Therefore, peak flow mitigation is deemed unnecessary as increase flow from the development will not result in an increase in flows within the Drain.

3.3.2. Mitigation Strategy

Should peak flow mitigation be necessary, the following devices are potential options to achieve the necessary peak flow mitigation. Further investigation into the type, size and location will be undertaken at detailed design if required.

- Incorporate attenuation into the proposed stormwater treatment area to the south of the development.
- Incorporate on lot attenuation of up to 5,000L per lot. This has the potential to provide up to 405m³ of stormwater attenuation.
- Utilise the proposed network from attenuation.
- Onsite soakage should soakage testing confirm the suitability of the soil.

3.4. On-Site Flooding

Due to the flat nature of the Drain, the surrounding low-lying areas are subject to flooding as presented on HBRC's *Hazard Report* presented in **Appendix B**. During design works undertaken in the surrounding area, HBRC was consulted to undertake a flood assessment to determine flood levels in the area. Correspondence from HBRC has been presented in **Appendix C** which discusses the 100-year flood level determined in this assessment was RL 16.

Note, flood levels detailed in the memorandum are in terms of Napier 1962 local vertical datum, while the levels adopted for the design and assessment for the proposed development at in terms of New Zealand Vertical Datum 2016. To ensure the flood level reflects the adopted datum, a conversion was undertaken based on -10.31 to Hawke's Bay Local Authority. Therefore, the adopted 100-year flood level = RL 5.7.

To determine the impact of the development in on the surrounding flooding, a simplified displacement assessment has been undertaken. As demonstrated in Drawing No. **H20180064-50-A-05** in **Appendix E**, a volume has been generated between the existing ground level and the 100-year flood level. Any filling above the 100-year flood event will not further displace the extent of flooding.

Therefore, it is anticipated that approximately 21,600m³ will be displaced when filling the site to the achieve flood immunity.

Further investigation is to be undertaken at the detailed design stage of the development design to determine:

- If the displacement will result adverse impacts to the surrounding area; if so,
- Undertake compensatory cut to offset the volume lost due to filling of the site.
    - An assessment will be undertaken to determine where compensatory cut can occur outside the bounds of the development although within the wider property to mitigate adverse impacts to the surrounds.

Due to the proximity of the site to the ocean and the expected tidal influence on flows within the drain, further analysis is required to determine the influence of the tide on the flooding in the area.

3.5. Stormwater Quality

To mitigate the impact of suburban pollutants on the surrounding environment and receiving waterway, a raingarden is proposed directly to the south of the development. The proposed swale bounding the drain will collect runoff from the development and convey the untreated

water to the proposed raingarden. Proposed to treat only the ground runoff, the raingarden will utilise an engineered filter to clean the runoff before discharging to the drain.

All buildings are to utilise inert roofing material to reduce the production and discharge of chemicals.

Refer to **Figure 3-1** below for a typical raingarden cross section.

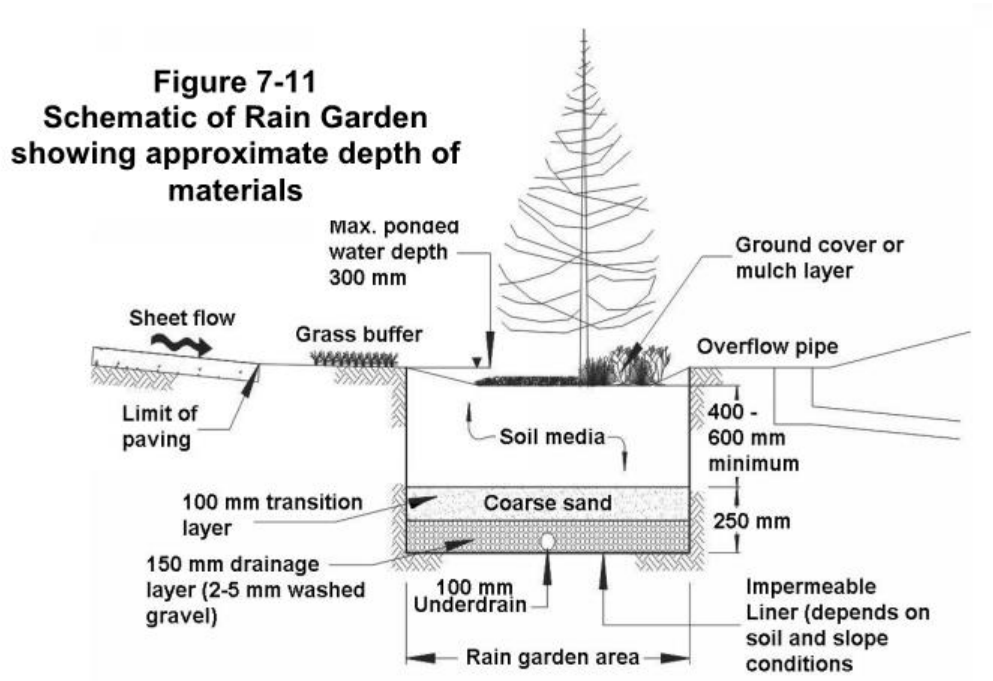


Figure 3-1: Proposed Rain Garden Cross Section (Source: HBWG Stormwater Management)

To reduce the conveyance of suspended solids in the runoff, the proposed internal swale will be planted with vegetation that will have the effect of cleansing pollutants. The internal swale will be planted with vegetation as follows:

- Grassed
- Oioi
- Purei, Pukio
- Giant umbrella sedge
- Wiwi / Common Rush

Final planting of the basin is to be confirmed at detailed design.

4. WASTEWATER

4.1. Existing Wastewater Infrastructure

There is no existing reticulated wastewater network in the vicinity of the site.

4.2. Post-Development Wastewater Servicing

In lieu of a reticulated network, onsite disposal is the most appropriate method of wastewater servicing.

Due to the complex nature of the site, *Freeman Cook & Associates* were contracted to undertake an assessment of the site and its soil composition to determine a suitable wastewater disposal method to service the development. A summary of the findings and recommendations are provided below:

- The average minimum lot size does not provide sufficient area required to an on-lot wastewater disposal system to meet the HBRC Regional Resource Management Plan requirements.
- A communal sewer plant treatment facility is proposed to treat the wastewater discharge anticipated for the development.
- A Membrane Bioreactor (MBR) level of treatment is proposed due to the anticipated loading, level of treatment and treatment plant disposal location.
- 8 x wastewater fields equating to an area of 19,200m² are proposed on the western side of the Whirinaki Drain.
- A pressurised reticulated network is proposed throughout the development to collect and convey the wastewater discharge from each lot to the treatment plan.
- Each lot will require a small, buried pump to discharge macerated sewerage from the lots to proposed wastewater mains throughout the development.

Refer to Drawing No. **H20180064-60-A-01** in **Appendix E** for the proposed infrastructure layout and treatment plan / field locations.

For further details of the wastewater treatment options, refer to Freeman Cook & Associates' *Wastewater Proposal for Pohutukawa Drive Subdivision: Preliminary Data* (dated August 2022) report.

Due to the complexity of the proposed system, consultation will be undertaken with experts in MBR treatment plant design and pressure sewer design at the next phase of the application process to ensure the correct system is design and installed for the requirements of the development.

Preliminary wastewater demand calculations have been provided in the following sections.

4.2.1. Post-Development Residential Demand

The proposed system will result in the construction of a fully isolated system, designed and functioning for a predetermined loading. Devoid of a connection to the HDC reticulated network, the design will utilise treatment and discharge to ground via an advanced effluent field system. The reticulation will be under pressure within a sealed system, obviating the need for incorporation of an infiltration multiplier. Accordingly, the standard 250L/p/d reticulated value of the HDC ECoP and NZS4404, which incorporates a multiplier provision for infiltration, is considered to represent an overestimate of the per person loading within the proposed sealed system.

The Hawke's Bay Regional Council Regional Resource Management Plan and ASNZS 1547-2012 *On-site Domestic Wastewater Management* have also been consulted, as these provide applicable design guidance for the loading of single domestic on-site systems (discharge generation in isolation of infiltration). The discharge to ground and ultimately the loading on the system is guided by the domestic on-site system per person discharge generation values set out in the Hawke's Bay Regional Council's Regional Resource Management Plan and ASNZS 1547:2012 *On-site Domestic Wastewater Management*.

The daily design flows presented in HDC ECoP and NZ4404 and the more relevant design flows documented in *Figure 6* of HBRCs *Regional Resource Management Plan and* ASNZS 1547:2012 *On-site Domestic Wastewater Management* are presented below:

- **HDC** / **NZ4404** = 250L/pp/p day
- **HBRC** = 200L/pp/p day
- **ASNZS1547** = 200L/pp/p day

The occupancy assumption is a critical function which, when paired with the design flow, determines the volume of discharge from the development. Noting that the application is for subdivision to create lots for future residential development, we have taken a relatively conservative view informed by our understanding of the current development industry and based the wastewater design on the construction of four-bedroom homes on the lots and provision of two x two-bedroom apartments above the commercial floorspace.

The HDC ECoP /NZ4404 EP of 3.5 was deemed to be a somewhat low occupation rate in relation to the anticipated future development of the lots given the lot sizes, likely land value and current development trends. Conversely, while the Regional Resource Management Plan provisions require single on-site domestic systems to cater to the peak loading of two persons per bedroom, this is an unrealistically high occupation assumption when averaged across the development. While there may be eight-person (or greater) households within the development, there will also be lower occupation of other homes.

The following summarises the most appropriate Equivalent Population assumptions.

- **HDC** / **NZ4404** = 3.5 per lot
- **HBRC** = 2 person / bedroom
- **ASNZS1547** = 6 persons per 4-bed dwelling.

Demand calculations are conservatively based on 4-bedroom dwellings per lot. On this basis, we deem the most appropriate EP assumption reflect those detailed in *NZ1547*, 6 persons per 4-bedroom dwelling. **Table 4-1** below compares the anticipated demand in accordance with HDC's requirements and the proposed demand.

Table 4-1: Design Assumption Comparison

Guideline	Design Flow (l/p/day)	EP	Average Dry Weather Flow (l/d)*
HDC/NZ4404	250	3.5	875
HBRC/NZS1547	200	6	1,200

*Note, no factors were applied to the ADWF calculations.

Further design guidance is provided by ASNZS 1547-2012 *On-site Domestic Wastewater Management* (noting again that this is targeted towards single domestic systems, not communal systems). Table J1 of the ASNZS recommends design based on 6 – 7-person occupation of a four-bedroom dwelling with a resulting design flow of 1,000 – 1,400 litres per day. The proposed demand assumptions result in a daily volume of 1,200 litres per day which falls within the recommended range for an onsite solution.

As presented in **Table 4-1** above, the proposed assumption methodology of adopting design flows in accordance with HBRC and EP assumptions in accordance with NZ1547, produces a more conservative system demand without the allowance for unrealistic occupancies.

On this basis, the ADWF rate for the proposed development is calculated as follows:

- Proposed Wastewater Demand:
  Residential Lot ADWF: 200 l/p/day x 81 lots x 6 EP = **97.2 kl/day (1.13 l/s)**

  Residential Unit ADWF: 200 l/p/day x 2 lots x 4 EP = **1.6 kl/day (0.02 l/s)**

As discussed in **Section 4.2**, a pressurised system is proposed for the development. As pressurised systems are fully sealed, the impacts of infiltration and wet weather will result in a negligible impact to, the inflow or conveyance capacity of the network. Thus, pipe infiltration has not been considered in this assessment. The final design of the pressurised system will be undertaken by or in accordance with the recommendation of a professional in the topic. Should additionally flows from infiltration be required, this will be done so at the advice of the professional.

4.2.2. Post-Development Commercial Demand

Wastewater generated from the commercial node on this site can be estimated using the design criteria set out in *NZ4404:2010* where the design for light, medium and heavy industrial land use as detailed in **Table 4-2** below.

Table 4-2: Commercial and Industrial Flows

Industry Type (Water Usage)	Design Flow (l/s/ha)
Light	0.4
Medium	0.7
Heavy	1.3

Table Source: Table 5-1 of NZS4404:2010

The wastewater scheme has been classified as having a Light industry type.

The development proposes the construction of up to 1,750m² of commercial space. The ADWF rate for the future development is calculated as follows:

Table 4-4: Commercial and Industrial Flows

Industry Type (Water Usage)	Design Flow (l/s)	Design Flow (l/d)
Average Dry Weather Flow (ADWF)	0.07	6,048

Refer to the detailed calculations presented in **Appendix D** for the full wastewater demand calculations.

4.3. Wastewater Network Detail Design

The detailed design of the proposed sewer network will be compiled to meet the requirements of the HDC ECoP 2020 and will be submitted for engineering approval at each stage of the development.

The design of the treatment field, wastewater fields and associated infrastructure is to be undertaken by the elected specialists.

5. WATER SUPPLY

5.1. Existing & Proposed Water Services Infrastructure

Under pre-developed conditions, a water main surrounds the site.

An existing DN150 UPVC runs within the Stage Highway 2 road reserve which feeds a DN150 MDPE pipe which runs the length of North Shore Road. Once at the North Shore Road meets the beach front, the water line runs south, ultimately reducing to a DN100 MDPE line approximately halfway along the beach frontage. This line continues to Pohutukawa Drive where it terminates approximately 130m from the North Shore Road and Pohutukawa Drive intersection.

It is understood (from previous work in the area) that this water main has limited capacity and is not expected to have sufficient pressure to provide the combination of potable and firefighting supply for any new developments in the area.

5.2. Post-Development Servicing Strategy

To sufficiently supply the development for all water requirements, the proposed servicing strategy includes:

- New water mains feeding off the infrastructure within Pohutukawa Drive is proposed throughout the development.
- Each lot is required to provide onsite water supply through the use of a water tank to mitigate the reduce network capacity. A trickle feed connection is proposed to be established to each new lot to maintain water levels within the tanks while minimising the peak demand of the development on the water network.
- Firefighting supply is proposed to be achieved from the reticulated network by establishing new hydrants throughout the development.

5.2.1. Post-Development Water Demand

The proposed development has the potential to see the construction of 83 residential lots with approximately 1,750m² floorspace for commercial purposes.

The AADD rate for the proposed development is calculated as follows:

- Proposed Residential Lot AADD:
  400 l/p/day x 81 lots x 6 EP = **196.8 kl / day**
- Proposed Residential Unit AADD:
  400 l/p/day x 2 lots x 4 EP = **3.2 kl / day**

As the *HDC ECoP* does not specify the typical demand for a commercial water supply, water assumptions have been adopted in accordance with *Table 6.1.c* of Auckland Council's *Water and Wastewater Code of Practice for Land Development and Subdivision*. To determine conservative demand rates, all commercial spaces were assumed to be *Wet Retail* (representative of cafes, bars, restaurants and supermarkets) to provide a worst-case scenario, specifying a demand of 15 L per day per net m² of floor area.

- Proposed Commercial AADD:
  15 l x 1,750 m² = **26.3 kl / day**

The tabulated design water demand (consumption) with peak factors for the residential and commercial developments are indicated in **Table 5-1**.

Table 5-1 Proposed Water Demand

Water Demands		
Residential Lots		
Parameter	**Value**	**Unit**
Typical demand	400	l/person/day
Application lots	81	lots
Estimated Population (EP)	6	Per/unit
Average daily demand	**194.4**	**kl/day**
Peak Daily Demand Factor	2	
Peak Daily Demand	**388.8**	**kl/day**
Peak Hourly Demand Factor	**5**	
Peak Hourly Demand	**81,000**	**l/hr**
	22.5	**l/s**
Residential Units		
Parameter	**Value**	**Unit**
Typical demand	400	l/person/day
Application lots	2	lots
Estimated Population (EP)	4	Per/unit
Average daily demand	**3.2**	**kl/day**
Peak Daily Demand Factor	2	
Peak Daily Demand	**6.4**	**kl/day**
Peak Hourly Demand Factor	**5**	
Peak Hourly Demand	**1,333**	**l/hr**
	0.37	**l/s**
Commercial		
Area	1750	m²
Design Flow Allowance	15	l/m²/d
Average daily demand	**26.3**	**kl/day**
Peak daily demand factor	2.0	
Peak daily demand	**52.5**	**kl/day**
Peak hourly demand factor	5.0	
Peak hourly demand	**10.9**	**kl/hr**
	3.04	**l/s**

5.3. Firefighting Demand

To support development of this site, a water scheme also needs to provide a water supply that can provide water at a flow rate, pressure, and volume for firefighting purposes specific to the land use proposed by the development.

The provision of a firefighting water supply to a reasonable level for the application area has been limited to the fire building classification FW2 non-sprinkled structures; (Housing: includes single family dwellings, multi-unit dwellings, but excludes multi-storey apartment blocks).

A classification FW2 water scheme is required to provide 750 litres/minute from a maximum of two hydrants with flows and distances being with hydrants located within 135 metres and 270 metres, respectively. The expected water flow rate must be provided with a minimum residual water pressure of no less than 100kPa.

Existing fire hydrants are located within Pohutukawa Drive and North Shore Road, additional fire hydrants will be strategically positioned within the proposed development, to service the proposed scheme plan accordingly. Refer to Drawing No. **H20180064-70-A-02** in **Appendix E** for the Fire Hydrant layout, indicating the proposed fire hydrant locations.

5.4. Water Network Detailed Design

The detailed design of the proposed water infrastructure will be compiled to meet the requirements of the HDC CoP 2020 and will be submitted for engineering approval at each stage of the development.

6. EARTHWORKS

6.1. Earthworks

As discussed in **Section 3.4** the site requires filling to achieve flood immunity and to mitigate on site ponding. As such, bulk filling and shaping of the site is required to form final surface levels, finished floor levels, roading and overland flow paths to ensure the site effectively mitigates any adverse stormwater impacts.

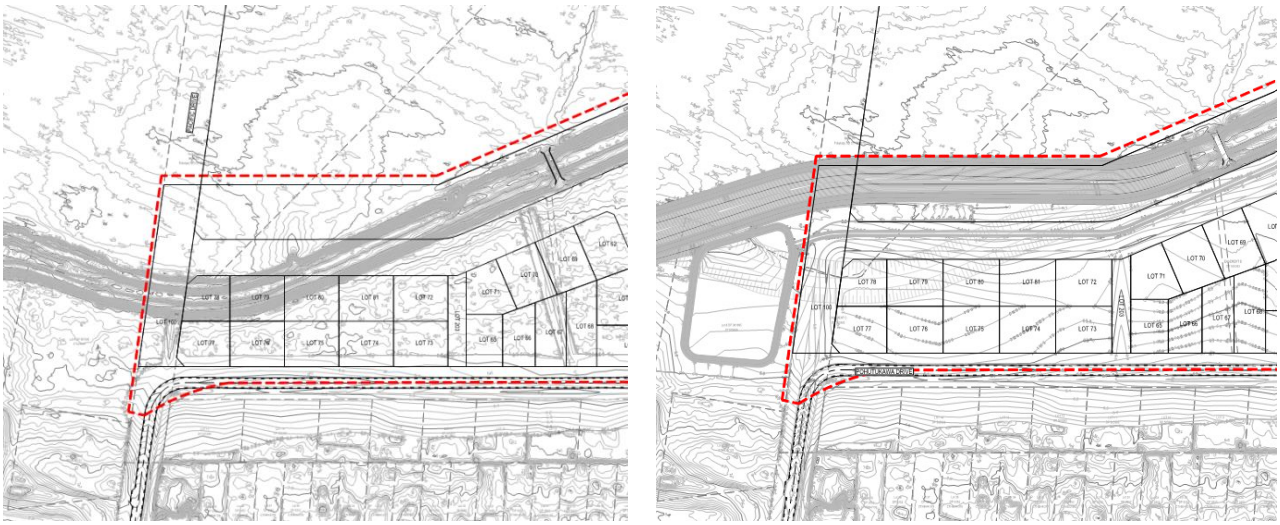
The pre-development alignment of the Whirinaki Drain bisects the southern corner of the site. The proposed earthworks include the realignment of the drain as discussed in **Section 6.1.2**.

6.1.1. Site Earthworks

Preliminary earthworks design was undertaken to determine the cut and fill volumes to achieve a minimum site RL = 5.7 (or to the 100-year flood level). Approximately 21,600m³ of fill is required to achieve the minimum FFL = 5.7. A site wide removal of the 200mm to 300mmstrip of topsoil (equating too approximately 33,500m³ of cut) is also required. As recommended by the geotechnical investigation, all vegetation is to be cleared and topsoil removed prior to filling on site. Refer Drawing No. **H20180064-30-A-02** in **Appendix E** for further details.

6.1.2. Whirinaki Drain Realignment

The south western corner of the proposed development extent is bisected by a portion of the Whirinaki Drain. A minor drain realignment is proposed to improve the alignment of the drain correcting an existing area that is susceptible to bank failure. As demonstrated in **Figure 6-1** below, the proposed realignment will incorporate two easy curves in place of the existing more pronounced bend to ease the alignment through this area.



Pre-Development Alignment

Post-Development Alignment

Figure 6-1 – Drain Realignment

All works undertaken within the drainage reserve will be designed an undertaken in accordance with the Hawke's Bay Waterway Guidelines *Works in Waterways* (dated April 2009). Temporary drain diversions will be implemented should the works require (noting that the drain does not convey flow outside of rain events).

6.2. Soil Contamination

A Preliminary Site Investigation (PSI) was undertaken by EAM NZ Ltd to determine the level of soil contamination throughout the proposed development. The assessment was supported by indicative soil sampling and concluded the following:

- *All OCP or Heavy metal had not been used as part of the farmland pesticide practices*
- *Traces of DDT was noted in one composite sample which was below the NES rural residential (25% produce) requirements*
- *All soil metal results are an uncontaminated Hawke's Bay Background Soil*
- *All metal results are well below the NES rural residential (25% produce) standard*
- *The site is not considered to be HAIL land*
- *The site is compliant with NES soil contaminant standards*

The site is not considered to require any further soil contamination assessment. This site requires no further assessment. The proposed development of the site is considered highly unlikely to present a risk to human health.

Refer to EAM NZ LTD - *Preliminary Site Investigation (PSI) – 996 State Highway 2, Whirinaki* (Reference EAM2238-REP-01, dated February 2022) for the full soil contamination investigation.

6.3. Geotechncial Investigation

Initia Limited were engaged to undertake a geotechnical investigation as documented in the *996 State Highway 2, Whirinaki – Geotechnical Report* (reference: P001359 – Rev 1), dated June 2022. This investigation determined the existing soil composition consists of:

- *"A layer of topsoil up to 0.3m,*
- *Unit 1 comprising loosely packed silty/sandy silt to depths of typically in the order of 1m and 2m;*
- *Unit 2 comprising clayey silt, very stiff, high plastic, to depths of typically in the order of 2m and 6m (black gravel layer at the east portion of the site);*
- *Unit 3 comprising loose to medium dense to very dense gravel layer dipping from east to west."*

For further details, refer to *Section 3.1* of Initia's *Geotechnical Investigation*.

6.3.1. Groundwater

Groundwater within Test Pits ranged between 3.1m and 4.2m below ground level. Ground water within CPTs ranged between 1.8m and 4.2m. The geotechnical analysis adopted a groundwater level of 3m below ground level.

For further details, refer to *Section 3.2* of Initia's *Geotechnical Investigation*.

6.3.2. Liquifaction

Initia undertook a CPT-based liquefaction analysis which determined the following:

- *Under SLS levels of shaking, liquefaction is unlikely to be triggered;*
- *Under ULS levels of shaking, thin, localised bands of material within the subsoil profile are potentially liquefiable. The thickness of these liquefiable layers is generally between 0.2m and 0.5m and the layers are not continuous.*

For further details, refer to *Section 4.2.2* of Initia's *Geotechnical Investigation*.

6.3.3. Seismic Considerations

Based on the requirements of NZS 1170:2004, Initia recommends the site subsoil class of Class D (Deep Soil) be used in the structural design of house foundations. Ground analysis of the site determined the following:

- *50 year design life for the proposed buildings;*
- *Importance level 2 – IL2;*
- *SLS return Period – 1 in 25 years return period event; and*
- *ULS return period – 1 in 500 years return period events.*

For further details, refer to *Section 4.2.1* of Initia's *Geotechnical Investigation*.

6.3.4. Foundation Recommendations

Based on the liquefaction results, a mild to moderate risk, shallow foundation is considered to be appropriate for the proposed structures. For further details, refer to *Section 4.4* of Initia's Geotechnical Investigation.

6.3.5. Pavement and Services Recommendations

Any driveways, roadways or floor slabs situated near the surface sand soils are to be design utilising a minimum CBR of 3%.

Drainage is recommended during the construction of basecourse and subgrade to minimise subgrade degradation or eroding.

For further details, refer to *Section 4.5* of Initia's *Geotechnical Investigation*.

6.4. Erosion and Sediment Control

There is a potential for the earthworks to produce pollution from erosion and sediments onsite. An Erosion and Sediment Control Plan (ESCP) will be developed in accordance with the requirements of the Hawke's Bay Regional Council Guidelines for Erosion and Sediment Controls and will be submitted to Hastings District Council for approval with the detailed design drawings for each stage of the proposed development.

7. ROADS, ACCESS RIGHTS OF WAY & PAVED SURFACES

A traffic assessment will be undertaken to ensure the most appropriate roading layout and hierarchy. The currently layout was prepared with consultation from ECC traffic engineers. Further details and a formal investigation will be prepared and presented at the next stage of the documentation process.

7.1. Roading Layout

The road's geometrical layout and typical road reserve cross-sections will be design in accordance with the HDC ECoP.

Preliminary typical road sections have been prepared and presented in **Appendix E**.

7.2. Pavement Design

All pavement designs will be undertaken in accordance with the recommendations of the Geotechnical Engineer. Further details for the road pavements design will be submitted during consent submission of each stage, taking into account the anticipated traffic volumes and types of vehicles including waste collection units, commercial traffic and buses.

7.3. On-Street Parking

On-street parking will be provided along the new proposed road network.

7.4. Road Infrastructure Assets Private/Public

The majority of the proposed road infrastructure will be vested to Council, with two private accessways anticipated by the proposed form of development.

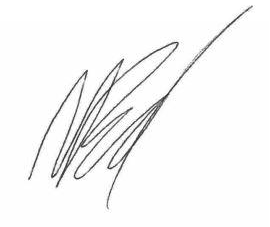
8. UTILITY SERVICES

The utility companies Unison (power) and Chorus (telecommunications) have been consulted regarding servicing the site. It has been indicated that sufficient power and telecommunications are available for reticulation throughout the site.

9. CONCLUSION

This report concludes that all civil engineering considerations required to support the proposal by the **Evans Family Trust** (the Applicants) can be adequately addressed as follows

- Stormwater – A stormwater pipe and overland flow network is proposed to collect and convey runoff generated by the site to the Whirinaki Drain. Site filling is proposed to ensure the site meets minimum flood immunity levels.
  - Stormwater quality treatment is proposed in the form of an end of line rain garden.
  - Peak flow mitigation has been deemed unnecessary due to the non-coincidental peak flow conveyed within the drain. Flood displacement is expected to be required however; further investigation will be undertaken to confirm these assumptions.
- Water – The proposed development will connect to the existing water mains with ring mains to provide trickle feeds to the proposed onsite rain water tank system (primary potable supply for each lot)
- Firefighting – Existing fire hydrants are relocated within Pohutukawa Drive and North Shore Road, additional fire hydrants will be strategically positioned within the proposed development, to service the proposed scheme plan accordingly.
- Wastewater – A MBR wastewater treatment plan is proposed to be constructed to service the proposed wastewater generation. A pressurised main is proposed throughout the development to convey the wastewater to the proposed treatment plant.
- Earthworks – Earthworks will be undertaken to achieve the required flood immunity. All earthworks undertaken on site will be done so in accordance with the recommendations of the geotechnical engineer.
- Roads - Geometrical layout will be in accordance with the HDC E*CoP* 2020.
- Pavement – Pavement design will be undertaken in accordance with the Geotechnical Engineers recommendations.
- Utilities – The relevant utility companies have confirmed the development is serviceable for both power and telecommunications. Planning is currently in progress.

DOCUMENT CONTROL	
PREPARED FOR:	***Evans Family Trust***
PROJECT NAME:	***996 State Highway 2, Whirinaki***
PROJECT NO.:	***H20180064-PESR***
FILE REFERENCE:	***Preliminary Engineering Servicing Report***
DATE:	***12 August 2022***
VERSION:	***1***
AUTHOR / APPROVER:	 ***Mitchell Pal*** *SENIOR CIVIL ENGINEER – CPEng* *12 August 2022* ***DEVELOPMENT NOUS LIMITED*** *502 Karamu Road North, Hastings* *4122 New Zealand* *P.O. Box 385 Hastings 4156* s 9(2)(a)

PRELIMINARY ENGINEERING SERVICES REPORT

APPENDIX A

LAYOUT

DATE PLOTTED: 2 August 2022 1:40 PM BY : MICHAEL VANDERPEET

0 20 40 60 80 100m

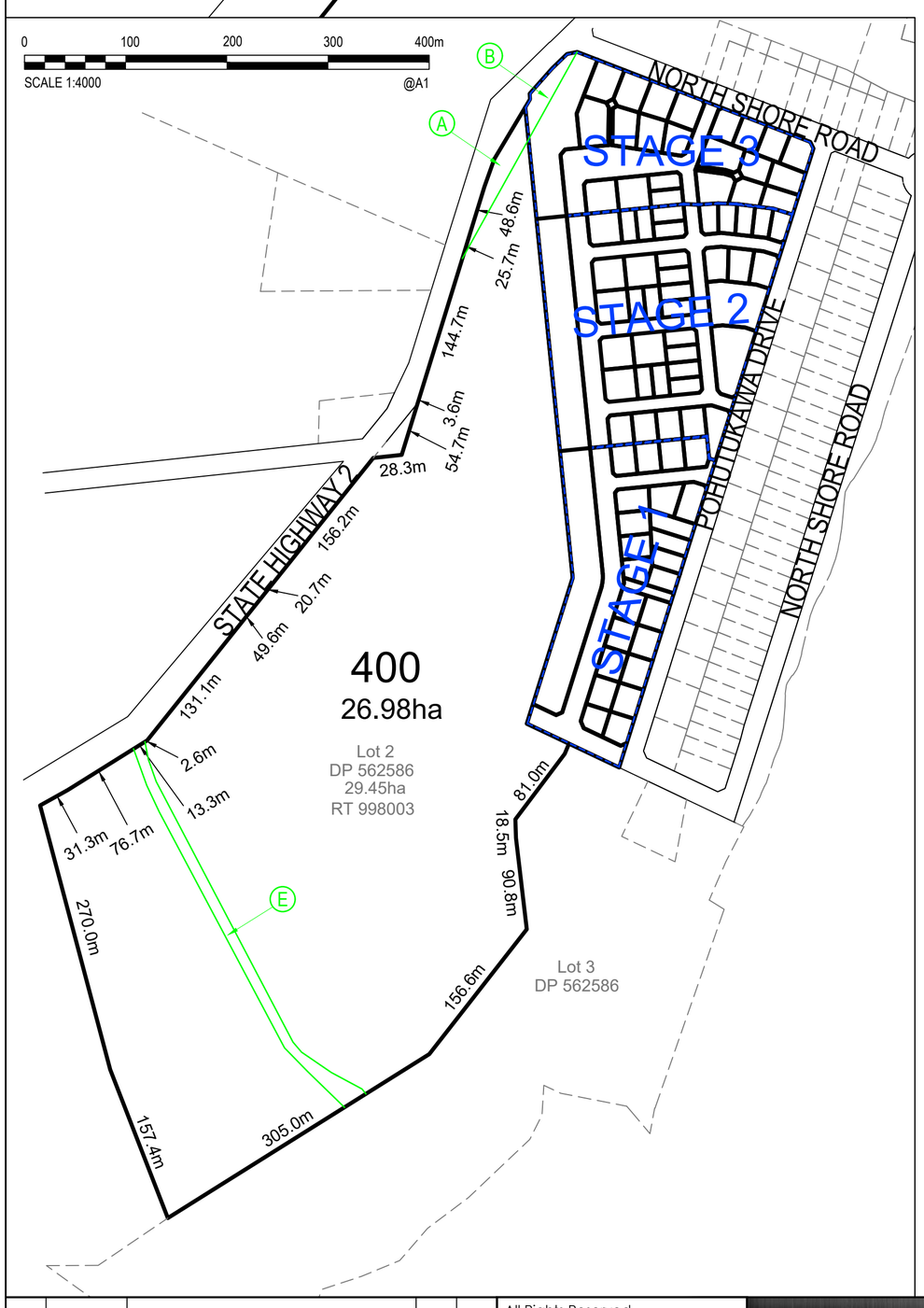
SCALE 1:1000 @A1

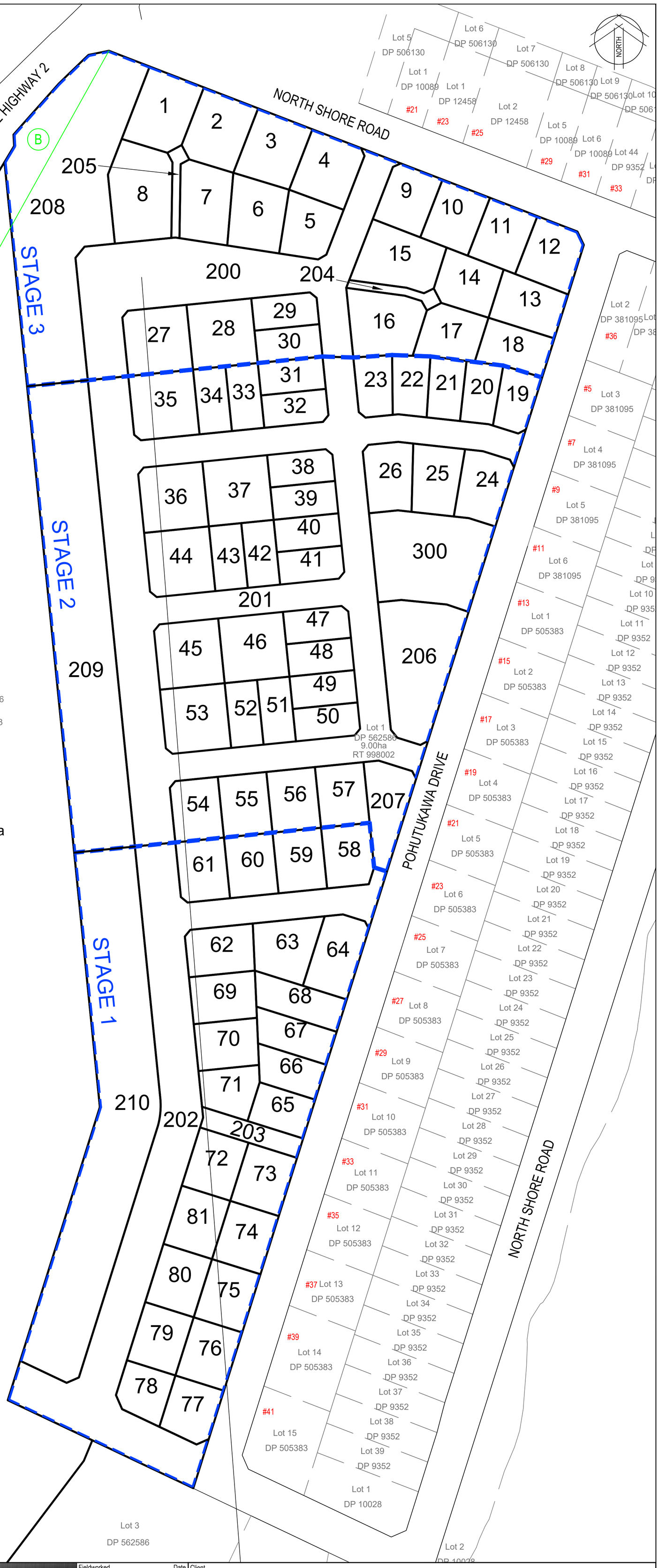
NOTES

1. This plan has been produced for resource consent purposes. All areas are subject to resource consent approval and final land transfer survey.
2. Current Hastings District Council Zoning - Rural.
3. Boundaries have been determined from underlying survey plans through a Traverse Spreadsheet calculation. Neighbouring Boundaries have been obtained from the LINZ geodetic database 31/03/2022
4. Easement Surrender:
   Stage 1:
   Area A DP 562586 (EI. 10871084.9) is to be surrendered in full, with road to vest in this location.
   It is noted easements created by EI. 10871084.9 are subject to Section 243(a) of the RMA 1991.
   Area C DP 562586 (EI. 10871084.10) is to be surrendered in full, with road to vest in this location.
   Areas BA & BB (EI. 10871084.10) are to be surrendered in full.
   It is noted easements created by EI. 10871084.10 are subject to Section 243(a) of the RMA 1991.
5. Amalgamation Conditions:
   Stage 3:
   "That Lot 204 hereon be held in 2 undivided half shares by the owners of Lots 14 & 17 hereon as tenants in common in the said shares and that individual record of title be issued in accordance herewith."
   "That Lot 205 hereon be held in 2 undivided half shares by the owners of Lots 1 & 2 hereon as tenants in common in the said shares and that individual record of title be issued in accordance herewith."
6. Stage 1 - Lots 202 & 203 are to be vested in Hastings District Council as road upon deposit.
   Stage 2 - Lots 201 is to be vested in Hastings District Council as road upon deposit.
   Stage 3 - Lots 200 is to be vested in Hastings District Council as road upon deposit.
7. Stage 1 - Lot 210 is to be vested in Hastings District Council as Local Purpose Reserve (drainage) upon deposit.
   Stage 2 - Lot 209 is to be vested in Hastings District Council as Local Purpose Reserve (drainage) upon deposit.
   Stage 3 - Lot 208 is to be vested in Hastings District Council as Local Purpose Reserve (drainage) upon deposit.
8. Lots 206 & 207 are to be future parking lots.
9. Lot 300 is to be a future commercial lot.
10. Lot 400 is to be an un-serviced balance lot.
11. Area D is subject to a Consent Notice 10871084.8

SCHEDULE OF EASEMENTS			
PURPOSE	SHOWN	SERVIENT TENEMENT (BURDENED LAND)	DOMINANT TENEMENT (BENEFITED LAND)
RIGHT OF WAY, RIGHT TO DRAIN WATER & SEWAGE & RIGHT TO CONVEY ELECTRICITY & TELECOMMUNICATIONS	LOT 204	LOT 204	LOTS 14 & 17
	LOT 205	LOT 205	LOTS 1 & 2

SCHEDULE OF EXISTING EASEMENTS			
PURPOSE	SHOWN	SERVIENT TENEMENT (BURDENED LAND)	DOCUMENT
RIGHT OF WAY	E	LOT 400	TBC (DP 562586)





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Rev.	Date	Description	Appd.	Issued
1	29/07/2022	FOR APPROVAL	KRC	MV

Fieldworked	Date	
Drawn	Date	MV 29/07/2022
Checked	Date	KRC 29/07/2022
Designed	Date	
Approved	Date	

Client: EVANS FAMILY TRUST
Project: POHUTUKAWA DRIVE, NAPIER
SCHEME PLAN - SHEET 1 OF 3
Title: PROPOSED SUBDIVISION OF LOTS 1 & 2 DP 562586 COMPRISED IN RT 998002 & 998003

Status: FOR APPROVAL
NOT TO BE USED FOR CONSTRUCTION PURPOSES

Datum	Council Ref.	Scale	Size
HB2000		1:1000	A1

Drawing Number: H20180064-RC-001
Revision: 1

XREF's:
CAD File: H20180064-RC.dwg

DATE PLOTTED: 2 August 2022 1:40 PM BY: MICHAEL VANDERFEET

NOTES

1. This plan has been produced for resource consent purposes. All areas are subject to resource consent approval and final land transfer survey.
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4. Easement Surrender:
   Stage 1:
   Area A DP 562586 (EI. 10871084.9) is to be surrendered in full, with road to vest in this location.
   It is noted easements created by EI. 10871084.9 are subject to Section 243(a) of the RMA 1991.
   Area C DP 562586 (EI. 10871084.10) is to be surrendered in full, with road to vest in this location.
   Areas BA & BB (EI. 10871084.10) are to be surrendered in full.
   It is noted easements created by EI. 10871084.10 are subject to Section 243(a) of the RMA 1991.
5. Amalgamation Conditions:
   Stage 3:
   "That Lot 204 hereon be held in 2 undivided half shares by the owners of Lots 14 & 17 hereon as tenants in common in the said shares and that individual record of title be issued in accordance herewith."
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11. Area D is subject to a Consent Notice 10871084.8

SCHEDULE OF EASEMENTS

PURPOSE	SHOWN	SERVIENT TENEMENT (BURDENED LAND)	DOMINANT TENEMENT (BENEFITED LAND)
RIGHT OF WAY, RIGHT TO DRAIN WATER & SEWAGE & RIGHT TO CONVEY ELECTRICITY & TELECOMMUNICATIONS	LOT 204	LOT 204	LOTS 14 & 17
	LOT 205	LOT 205	LOTS 1 & 2

SCHEDULE OF EXISTING EASEMENTS

PURPOSE	SHOWN	SERVIENT TENEMENT (BURDENED LAND)	DOCUMENT
RIGHT OF WAY	E	LOT 400	TBC (DP 562586)

Rev.	Date	Description	Appd.	Issued
1	29/07/2022	FOR APPROVAL	KRC	MV

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Fieldworked	Date	
Drawn MV	Date 29/07/2022	
Checked KRC	Date 29/07/2022	
Designed	Date	
Approved	Date	

Client: EVANS FAMILY TRUST
Project: POHUTUKAWA DRIVE, NAPIER
SCHEME PLAN - SHEET 2 OF 3
Status: FOR APPROVAL
NOT TO BE USED FOR CONSTRUCTION PURPOSES
Title: PROPOSED SUBDIVISION OF LOTS 1 & 2 DP 562586 COMPRISED IN RT 998002 & 998003

Datum	Council Ref.	Scale	Size
HB2000		1:750	A1

Drawing Number: H20180064-RC-002
Revision: 1

CAD File: H20180064-RC.dwg

DATE PLOTTED: 2 August 2022 1:40 PM BY : MICHAEL VANDERPEET

NOTES

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	LOT 205	LOT 205	LOTS 1 & 2

SCHEDULE OF EXISTING EASEMENTS			
PURPOSE	SHOWN	SERVIENT TENEMENT (BURDENED LAND)	DOCUMENT
RIGHT OF WAY	E	LOT 400	TBC (DP 562586)

Rev.	Date	Description	Appd.	Issued
1	02/08/2022	FOR APPROVAL	KRC	MV

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SURVEYING • URBAN DESIGN • ENGINEERING • TOWN PLANNING
ENVIRONMENTAL • LANDSCAPE ARCHITECTURE

Fieldworked	Date
Drawn	Date MV 29/07/2022
Checked	Date KRC 29/07/2022
Designed	Date
Approved	Date

Client: EVANS FAMILY TRUST
Project: POHUTUKAWA DRIVE, NAPIER
SCHEME PLAN - SHEET 3 OF 3
Status: FOR APPROVAL
NOT TO BE USED FOR CONSTRUCTION PURPOSES
Title: PROPOSED SUBDIVISION OF LOTS 1 & 2 DP 562586 COMPRISED IN RT 998002 & 998003
Datum: HB2000 | Council Ref. | Scale: 1:500 | Size: A1
Drawing Number: H20180064-RC-003
Revision: 1

XREFs:
CAD File: H20180064-RC.dwg

PRELIMINARY ENGINEERING SERVICES REPORT

APPENDIX B

HBRC HAZARD REPORT

Natural Hazards Report

The information displayed is schematic only and serves as a guide. It has been compiled from Hawke's Bay Regional Council records and is made available in good faith but its accuracy or completeness is not guaranteed. Cadastral Information has been derived from land Information New Zealand's (LINZ) Core Record System (CRS).

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20/01/2022

966 Hway 2 Whirinaki, Hastings District
Secs 44 Part 25 Blk XII Puketapu SD Lot 8 DP 381095 Lot 101 DP 505383 Lot 1 DP 335 4 Lot 2 Part 1 DP 4741 Lot 1 DP 9884
0954019300

This report summarises the known hazards intersecting this property, based on research reports commissioned to assess regional risk – these are summarised below. The hazard assessment methodologies, information compilation and presentation techniques used for these assessments include certain qualifications and limitations on the use, noting:

a. The hazard information provided is based on the best information available at the time of the studies and was supplied under specific contract arrangements including financial and time constraints.
b. The hazard information may be liable to change or review if new information is made available.
c. Councils and other organisations may hold more detailed hazard information than provided here. This Natural Hazard Property Report is not a substitute for a Land Information Memorandum (LIM).
d. The precision and accuracy of the data varies, therefore it is important that you obtain expert advice to help to interpret the information.

The hazard maps in this report are based on the following referenced research reports. Online HBRC Natural Hazards Report Database contains a register of the hazard research reports and publications from either the Council or external organisations and this database may contain other pertinent information related to this area. Go to www.hbrc.govt.nz and search #hazards:
The referenced reports are:

1. Earthquake Fault lines
   - Earthquake hazards in Hawke's Bay Initial assessment
   - Earthquake hazard analysis - Stage 1. Recurrence of large earthquakes determined from geological and seismological studies in the Hawke's Bay area
   - Active Fault Mapping and Fault Avoidance Zones for Central Hawkes Bay District: 2013 Update Active Fault Mapping and Fault Avoidance Zones for Hastings District and environs
   - Fault Avoidance Zone Mapping for Wairoa District, Napier City and surrounds
2. Earthquake Liquefaction
   - Assessment of liquefaction risk in the Hawke`s Bay: Volume 1: The liquefaction hazard model
   - Assessment of liquefaction risk in the Hawke`s Bay: Appendices for Volume 1
3. Earthquake Amplification
   - Hawke's Bay Regional Council earthquake hazard analysis program, Stage III : evaluation of ground shaking amplification potential Volume 1
   - Hawke's Bay Regional Council earthquake hazard analysis program, Stage III : evaluation of ground shakingamplification potential Volume 2: Appendices
4. Tsunami Inundation Extents
   - Hawkes BayTsunami Inundation by Attenuation Rule
   - Review of Tsunami Hazard in New Zealand
5. Flooding Extents
   - Wairoa River Flood Hazard Study
   - TeNgaru Catchment Flood Hazard Study
   - Waipatiki Catchment Flood Hazard Analysis
   - Kopuawhara Opoutama Flood Hazard Analysis
6. Coastal Hazard
   - Regional Coastal Environmental Plan
   - Clifton to Tangoio Coastal Hazards Strategy 2120 - Coastal Hazard Assessment
   - Clifton to Tangoio Coastal Hazards Strategy 2120 - Coastal Risk Assessment
   - Other Coastal Hazard Reports
   - Cliff Hazard Zone Delineation

7. Landslide Risk
    - Roll out of Erosion Models for Regional Councils: Landcare Research Limited
    - Earthquake-Induced Landslide Forecast and Hazard Assessment, Hawke's Bay Region.
    - Earthquake-Induced Landslide Forecast and Hazard Assessment, Bluff Hill, Napier.
8. Quaternary Geology
    - Hawke's Bay Regional Council earthquake hazard analysis program, Stage III : evaluation of ground shaking amplification potential Volume 2: Appendices
9. Wairoa River Bank Stability Zones
    - Wairoa River Bank Stability Assessment

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3. The hazard information provided does not imply any actual level of damage to any particular structure, utility service or other infrastructure.
4. These maps should not be relied upon as the sole basis for making any decision in relation to potential risk.
5. The hazard information provided is regional in scope and cannot be substituted for a site-specific investigation. A suitably qualified and experienced practitioner should be engaged if a site specific investigation is required.
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LIQUEFACTION

Low (cream) means there might be 'none to minor' liquefaction for 500 year earthquake shaking (typically larger than magnitude 6), medium (orange) means there might be 'minor' to moderate damage, and 'high' (brown) might be moderate to severe damage.

In Wairoa District, Central Hawke's Bay District and the wider Hastings District (outside the Heretaunga Plains) due to the limited data available to assess vulnerabilities, buffer zones have been added to liquefaction hazard areas. The width of this buffer zone is 500 m (+/- 250 m) and allows for the differences between the accuracy of lines on a geological map at a scale of 1:250 000 (+/- 250m) and the greater accuracy of property boundaries on cadastral maps to be reconciled. If a property is located wholly or partially within the buffer zone this indicates that there is uncertainty about the level of liquefaction hazard. Site specific assessments (ranging from visual inspection through to ground investigations) will be needed to determine the level of liquefaction hazard. If a buffer zone boundary line falls across a property it should initially be treated as being part of the higher hazard class when interpreting the map.

Liquefaction occurs when waterlogged sediments are agitated by an earthquake. As a result, the soil behaves like a liquid, has an inability to support weight and can flow down very gentle slopes. This condition is usually temporary, but buildings can sink and underground pipes may rise to the surface. When the shaking stops, groundwater is squeezed out of the ground causing flooding, leaving areas covered in mud.

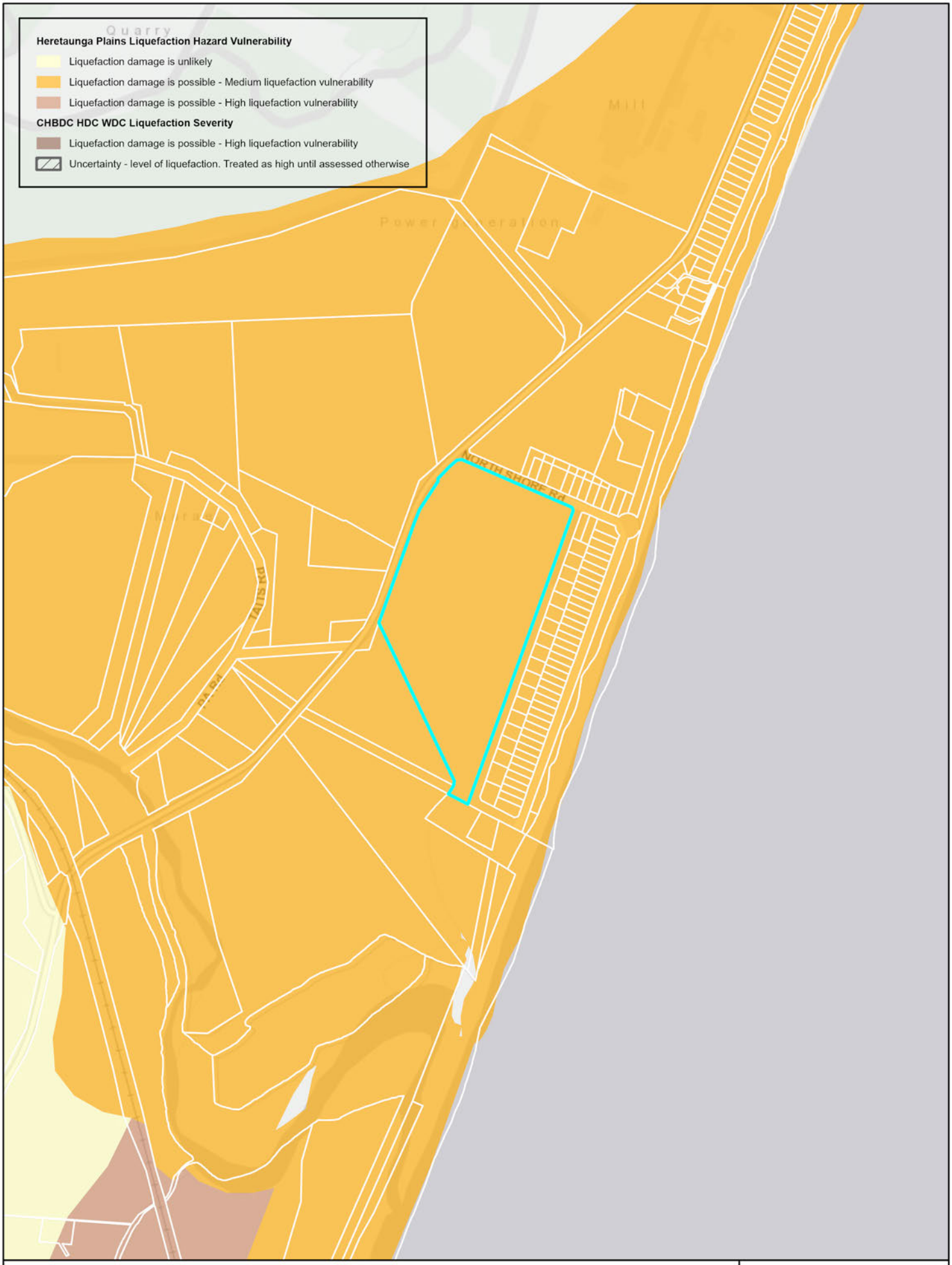
Liquefaction effects have been reported in the Hawke's Bay region during four historical earthquakes since 1840 at Modified Mercalli (MM) shaking intensities between MM7 and MM10, including in 1931. Low-lying areas in the region, especially these near the coast, and reclaimed land are particularly susceptible.

What can you do?

If building, it is recommended you reference the Ministry of Business, Innovation & Employment (MBIE) and the Ministry for the Environment document "Planning and engineering guidance for potentially liquefaction-prone land" and if necessary obtain expert advice from a qualified and experienced geotechnical engineer.

Important to note that having land included in a particular zone does not unequivocally mean that the land is "good", "medium" or "bad." The maps indicate what is a strong possibility across those areas. The best areas (cream) have a very low probability of having a liquefaction problem, but there may still be some localised places where the hazard exists. The only sure way of showing whether a specific site has low or high vulnerability is a site specific geotechnical investigation.

On a property already developed, there are options to mitigate the risk of liquefaction, but the easiest way to mitigate liquefaction risk is to ensure your insurance sum-insured is sufficient to rebuild with heavier duty foundations in the event of total loss (noting this could be fire or flood - not just earthquake).



Liquefaction Hazard

HAWKE'S BAY EMERGENCY MANAGEMENT GROUP

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AMPLIFICATION

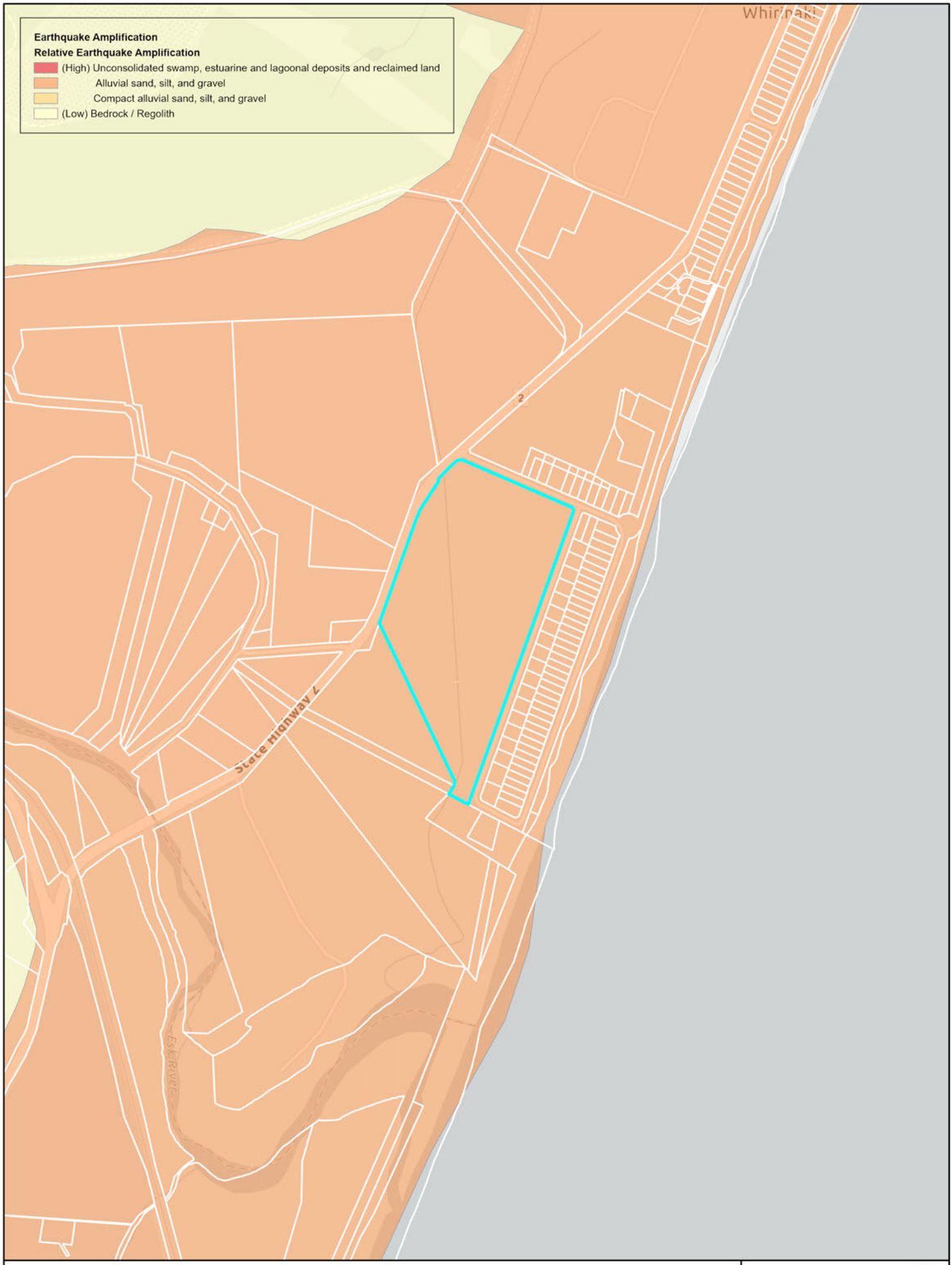
This amplification map shows areas susceptible to ground shaking in an earthquake. Most of the damage during an earthquake is caused by ground shaking. Seismic waves, travelling through the earth at different speeds and amplitudes because of a fault rupture, cause the ground to vibrate and shake in an earthquake. The intensity of ground shaking at any location is affected by the magnitude of the earthquake, proximity to the source of the earthquake, and the geological material underneath that location. Larger earthquakes generally produce greater shaking and shaking is usually more intense nearer the source of the earthquake.

Different frequencies of shaking also affect buildings differently - in general, low frequency motions affect taller buildings more, while high frequencies affect shorter buildings. The type of material underlying the site can have a great effect on the nature and intensity of the shaking. Sites underlain by hard, stiff material such as bedrock or old compacted sediments usually experience much less shaking than sites located on young, loosely consolidated sediment, which tends to amplify shaking.

What can you do?

Most people in Hawke's Bay will survive a large earthquake with some loss, but some people will be severely affected. If you are developing land in a susceptible area, it is recommended owners/developers obtain expert advice from a qualified and experienced geotechnical engineer before progressing plans.

On a property already developed, the easiest way to mitigate earthquake risk is to ensure your insurance sum-insured is sufficient to rebuild with heavier duty foundations in the event of total loss (noting this could be fire or flood - not just earthquake).



Earthquake Amplification

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FLOODING

The map shows general details about flooding patterns and areas at risk. There are 3 coloured zones; Blue (flood risk areas), cream (low risk areas) and cross-hatch blue (areas not included in the flood study and which may or may not be susceptible to flooding).

The maps have been produced using computer models using verification with actual events where possible. Flood extents shown in the maps are not meant to show specific flooding details on each property.

Flood modelling is based on 100-year return period events (1% annual exceedance probability) for river flood risk areas, and 50 year return period events (2% annual exceedance probability) for floodplain flood risk areas.

The effects of climate change have not been included in this flood modelling.

These maps should not be relied upon as the sole basis for making any decision in relation to potential flood risk. Contact the Hawke's Bay Regional Council Engineering Department if further information is required with regards to a specific property.

Urban pipe networks and flooding on the street network in the urban areas have not been considered in the flood modelling. Urban areas show flood risk areas that are the result of the capacity of open drains being exceeded.

In some flood risk areas, houses and other structures may be elevated above the ground, and would be considered not floodable. These cases are not identified in this flood modelling.

Flooding vs. Ponding

Major flooding happens when the capacity of a stream or drain is exceeded. Small scale, localised ponding may occur in areas where water cannot get to the stream through the normal paths of overland flow when the streams are not in flood. The flood hazard study does not consider this type of localised ponding in detail.

Learn more about our flood risks https://www.hbemergency.govt.nz/hazards/storms-and-floods/

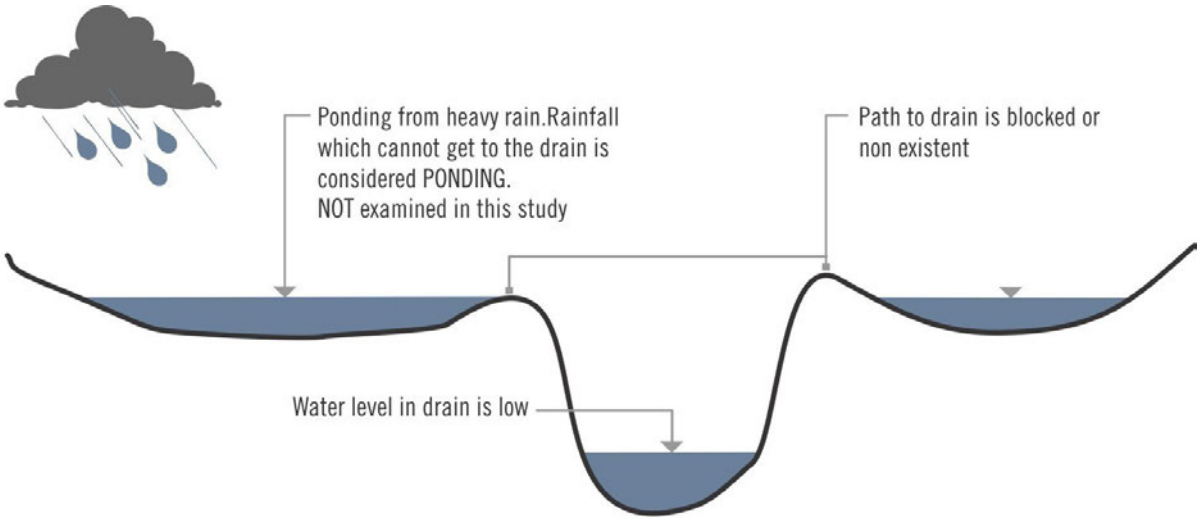
What can you do?

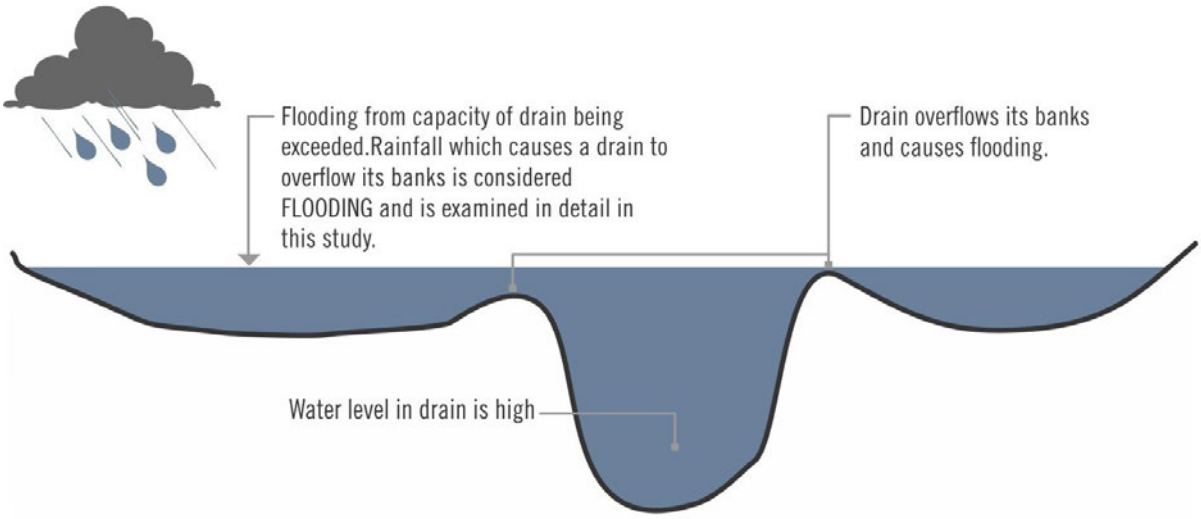
If you are thinking about buying a property which is subject to flooding:

1. Get a Land Information Memorandum (LIM) report from the city or district council.
2. Find out about the history of the area. Ask local people who have lived in the area for a long time about events in the past.
3. Check out your potential purchase during a storm.
4. Be aware a resource consent may be required for any new building or additions or extensions to existing buildings on the property.

If you already own a property at risk from flooding, then:

1. Organise a household emergency plan and be prepared to evacuate quickly if necessary.
2. Check the weather forecast regularly as severe weather watches and warning are issued by the MetService and are available via email alerts.
3. If a flood is imminent, lift valuable household items and chemicals as high above the floor as possible. Consider using sandbags to protect your home.


Ponding from heavy rain.Rainfall which cannot get to the drain is considered PONDING.
NOT examined in this study
Path to drain is blocked or non existent
Water level in drain is low


Flooding from capacity of drain being exceeded.Rainfall which causes a drain to overflow its banks is considered FLOODING and is examined in detail in this study.
Drain overflows its banks and causes flooding.
Water level in drain is high

Flooding

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COASTAL ENVIRONMENT

The Coastal Environment means an environment in which the coast is a significant element or part, and includes:

(a) The coastal marine area;
(b) Any areas identified as being affected by, or potentially affected by, coastal flooding or coastal erosion;
(c) Any of the following:

1. Tidal waters and the land above mean high water springs;
2. Dunes;
3. Beaches;
4. Areas of coastal vegetation and coastal associated fauna;
5. Coastal cliffs
6. Salt marshes;
7. Coastal wetlands, including estuaries; and
8. Areas where activities occur or may occur which have a direct physical connection with, or impact on, the coast.

For the purposes of the Regional Coastal Environment Plan, the coastal environment comprises all of the coastal marine area of Hawke's Bay and the coastal margin.

Coastal Environment

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COASTAL HAZARDS

Hawke's Bay Region has over 350km of open coast and estuary shoreline. This ranges from rocky shores and cliffs to dunes, sandy beaches and gravel beaches. Our shoreline does not stay in one place. It changes position in response to storms, large waves and high tides. Landward movement of the shoreline - coastal erosion - is usually in response to these natural processes. Such changes in shorelines are typically only a problem when property, infrastructure or other human assets have been built too close to the shore and become threatened.

Coastal hazards include tsunami, storm erosion and storm flooding. The present-day extent and likelihood of various coastal hazard risks are expected to increase as a result of climate change projections of increased storm intensities and a rise in sea level of around one metre in the next 100 years.
The Regional Coastal Environment Plan identifies Coastal Hazard Zones ('CHZs') to assist HBRC and communities make informed decisions about managing risks associated with coastal erosion and coastal flooding. The Regional Coastal Environment Plan contains three key objectives regarding coastal hazards:

- Risks posed by coastal hazards to people and property are avoided or mitigated.
- To avoid new and further inappropriate development in areas identified as being currently at risk of coastal erosion or inundation (i.e.: those areas within Coastal Hazard Zone 1).
- To avoid new and further inappropriate development in areas identified as being at risk of coastal erosion or inundation during the next 100 years (i.e.: those areas within Coastal Hazard Zone 2 or Coastal Hazard Zone 3), taking into account the risk associated with global sea level rise and the level of protection afforded by natural coastal features and lawfully established coastal protection structures.

Coastal hazard zones identified in the Regional Coastal Environment Plan are:

- Coastal Hazard Zone 1 (CHZ1) which represents land assessed as being subject to storm erosion, short-term fluctuations and dune instability and includes river mouth and stream mouth areas susceptible to both erosion and inundation due to additional hydraulic forcing of river or estuary systems. For the purposes of this Plan, it extends a distance of 200m seaward from its inland boundary.
- Coastal Hazard Zone 2 (CHZ2) which represents land assessed as being potentially at risk up to 2100 due to long term rates of coastal erosion and at some locations, may also include areas assessed as being potentially at risk of sea water inundation in a 1 in 50 year combined tide and storm surge event. It includes allowance for sea level rise, but does not include land within Coastal Hazard Zone 1 or Coastal Hazard Zone 3.
- Coastal Hazard Zone 3 (CHZ3) represents an area of land assessed as being potentially at risk of sea water inundation in a 1 in 50 year combined tide and storm surge event, and includes allowance for sea level rise, but does not include land within Coastal Hazard Zone 1 or Coastal Hazard Zone 2.
- Transition Hazard Zone represents an area of land assessed as being within CHZ1 or CHZ2 and also potentially at risk of cliff shore erosion processes.

Sea water inundation referred to in CHZs 1-3 do not relate to tsunami events. That is a separate risk assessment.

REPORTS TO INFORM CHZs

The Regional Coastal Environmental Plan's CHZs have been based on a number of earlier technical assessments of coastal erosion and inundation. Many of those reports can be viewed on the HBRC's website: www.hbrc.govt.nz (keyword #hbcoast) Coastal Hazards

What can you do?

If you are thinking about buying a house near the coast you can reduce the risk of purchasing a property that may be affected by coastal erosion or flooding by:

1. Getting a Land Information Memorandum (LIM) report from the city or district council.
2. Finding out about the history of the area. Ask local people who have lived in the area for a long time about how the shoreline has changed and how much erosion has happened in the past.
3. Checking out your potential purchase during a storm or when the tide is running high.
4. Thinking about how the location of the shoreline may change over the next few decades, based on past changes and possible future accelerated change due to sea level rise.
5. Assessing whether there is room to relocate the buildings on your property further landward on your section if erosion threatens it, and check the council's consent requirements for relocating.

6. Being aware that building seawalls to protect your property is rarely an effective long-term solution. It may be difficult to gain resource consent to build a new seawall because seawalls can worsen the erosion effects on your neighbours.
7. Being aware a resource consent may be required from the Regional Council for any new building or additions or extensions to existing buildings on the property.
8. Being aware that the coastal hazard zone is an assessment of areas at risk of erosion or flooding in the future based on data and knowledge currently available about sea level rise and climate change.
9. Being aware that the Clifton to Tangoio Coastal Hazards Strategy is currently reviewing coastal hazards risks along that stretch of coastline to ensure the most accurate and up to date data and science are being used and this Strategy may result in changes to the coastline and coastal planning responses.
10. Being aware that if the councils do implement actions such as beach re-nourishment or building a seawall, then owners of nearby properties are very likely to be charged for their fair share of the costs of those works and the ongoing maintenance.

If you already own a coastal property, then get some advice.

Check the information reports on coastal hazard studies and management options. However, there are no magic solutions, and ultimately retreating back from the coast may be the only cost-effective option if erosion continues. The traditional 'solution' to such coastal erosion problems is to build a seawall to 'hold' or 'advance the line'. Such actions unfortunately are rarely the most effective option in the long-term, often being only effective for a few years, and can lead to a false sense of security and further development behind the seawall. Seawalls can also exacerbate erosion along adjacent sections of coast.

Plan a retreat. Determine whether there is scope to relocate the buildings on your property, either further landward on your section, or to another location. This should be a particular consideration when planning to re-develop, upgrade or extend the property. Despite the up-front costs, on severely eroding coasts, relocation can often be the most cost-effective and appropriate solution in the longer-term. Relocating your dwelling may require a permit from the city or district council.

Get some advice. Check with the regional council about possible resource consent requirements if you are thinking of doing building work or earthworks on your property within a coastal hazard zone. Also check with the city or district council about building permit requirements and possible limitations of subdividing properties.

Engage. Talk to the regional council or district / city council about the Clifton to Tangoio Coastal Hazards Strategy and engage in strategy development, particularly the design, timing and costs of preferred options for local action.

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CLIFTON TO TANGOIO COASTAL HAZARDS STRATEGY 2120

A review of the existing hazards information for the most populated stretch of the Hawke's Bay coastline is currently underway through the Clifton to Tangoio Coastal Hazards Strategy 2120. As an initial outcome, this Strategy has produced updated hazards information using the latest sea level rise predictions and refined methodology.

The following hazards have been mapped:

- Coastal Erosion

  - Now shown as a series of probabilistic lines indicating the likelihood of coastal erosion occurring in present day, 2065 and 2120

- Coastal Inundation

  - Now shown as areas of permanent inundation (caused by sea level rise and tides) and extreme inundation (caused by extreme storm events, sea level rise and tides) in present day, 2065 and 2120

- Tsunami

  - A revision of the previous tsunami mapping carried out by Hawke's Bay Regional Council showing a 100 year, 200 year and 2000 year return period. This review has confirmed the existing mapping.

The technical report underpinning this mapping can be accessed via the source report link below

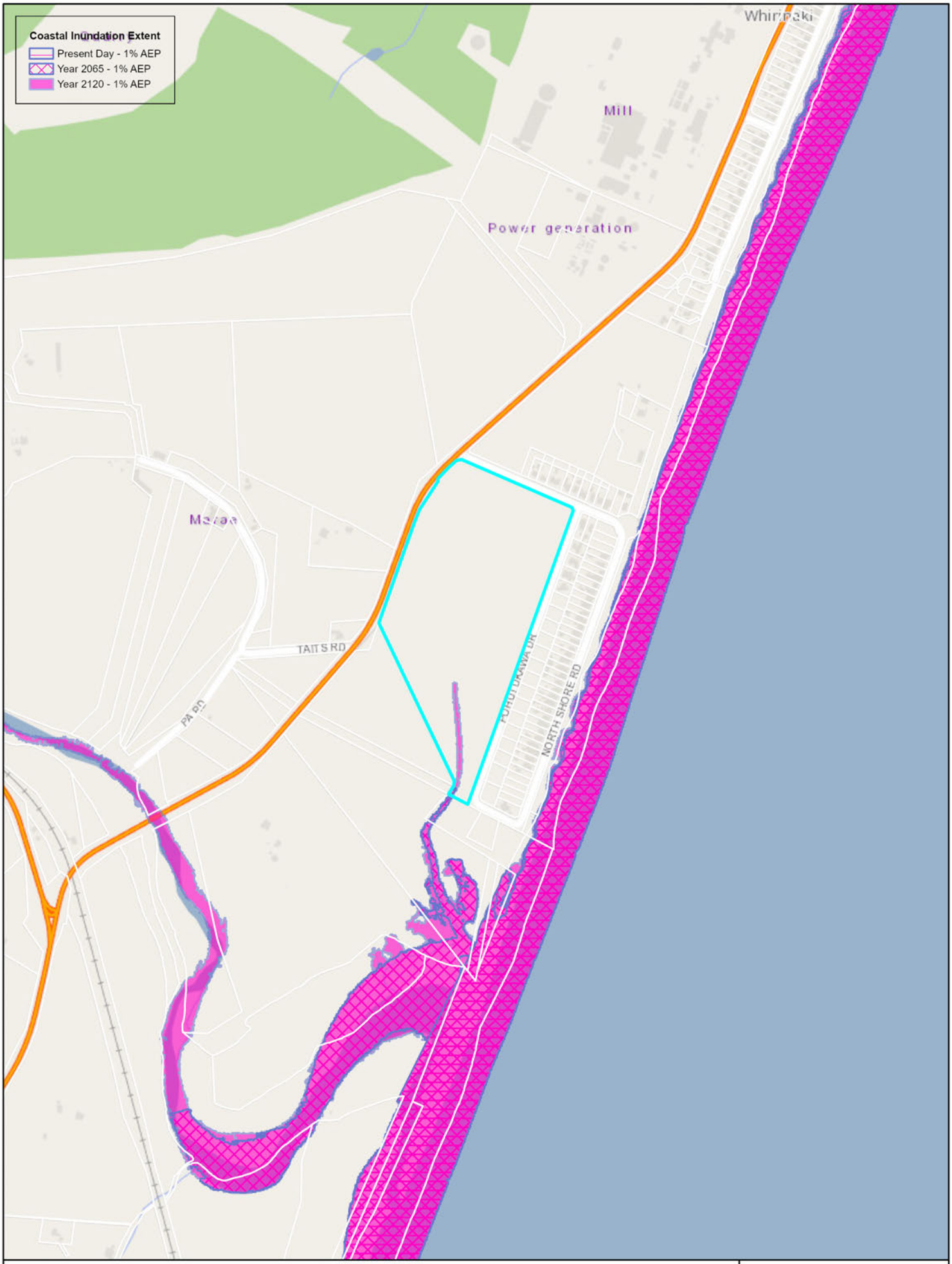
Clifton to Tangoio Coastal Hazards Strategy 2120 - Coastal Hazard Assessment

In considering this new information on coastal hazards, an assessment has been prepared to consider the overall risk that each hazard presents. This risk assessment has been calculated in terms of losses and likelihood. Risk has been calculated based on human, economic, social/ cultural and environmental losses for each hazard. The risk assessment report can be accessed via the Source report link below

Clifton to Tangoio Coastal Hazards Strategy 2120 - Coastal Risk Assessment

This new information on hazards and risks will be utilised in subsequent stages of the Strategy to develop responses to coastal hazards between Clifton and Tangoio. This may involve physical responses to mitigate risks and a review of the current Regional Coastal Environment Plan and Napier District Plan Coastal Hazard Zones and the rules that apply to them. While no new rules or regulations are proposed at this stage, be aware that this hazards information must be reflected on Land Information Memorandums, as is the case with all hazards information held by Council.

For further information about the Clifton to Tangoio Coastal Hazards Strategy 2120, visit www.hbcoast.co.nz



Coastal Inundation Extent

(CLIFTON TO TANGOIO COASTAL HAZARDS STRATEGY 2120)

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TSUNAMI INUNDATION

The East Coast of New Zealand has been identified with a significant tsunami risk because the Hikurangi subduction zone - New Zealand's largest fault, but we are also at risk of tsunami from distant and regional sources around the Pacific Ocean.

Map shows study areas divided into 2 coloured zones for tsunami inundation in a combination of worst case scenarios, up to a 2,500 year return period for Hawke's Bay, as follows:

1. Tsunami near source inundation extents (blue) - a tsunami coming from a near source, like very strong local earthquake
2. Tsunami distant source inundation extents (light blue hatch) - a tsunami coming from distant source across the Pacific Ocean, e.g. Peru

A more detailed map (Layer Name: Near Source Max Depth) between Tangoio & Clifton shows how deep the water may be after multiple tsunami waves in a 2000 year return period.

Risks in these areas include destruction of homes, businesses and infrastructure in inundation zones, along with injuries and loss of life, with environmental devastation and the slow process of recovery.

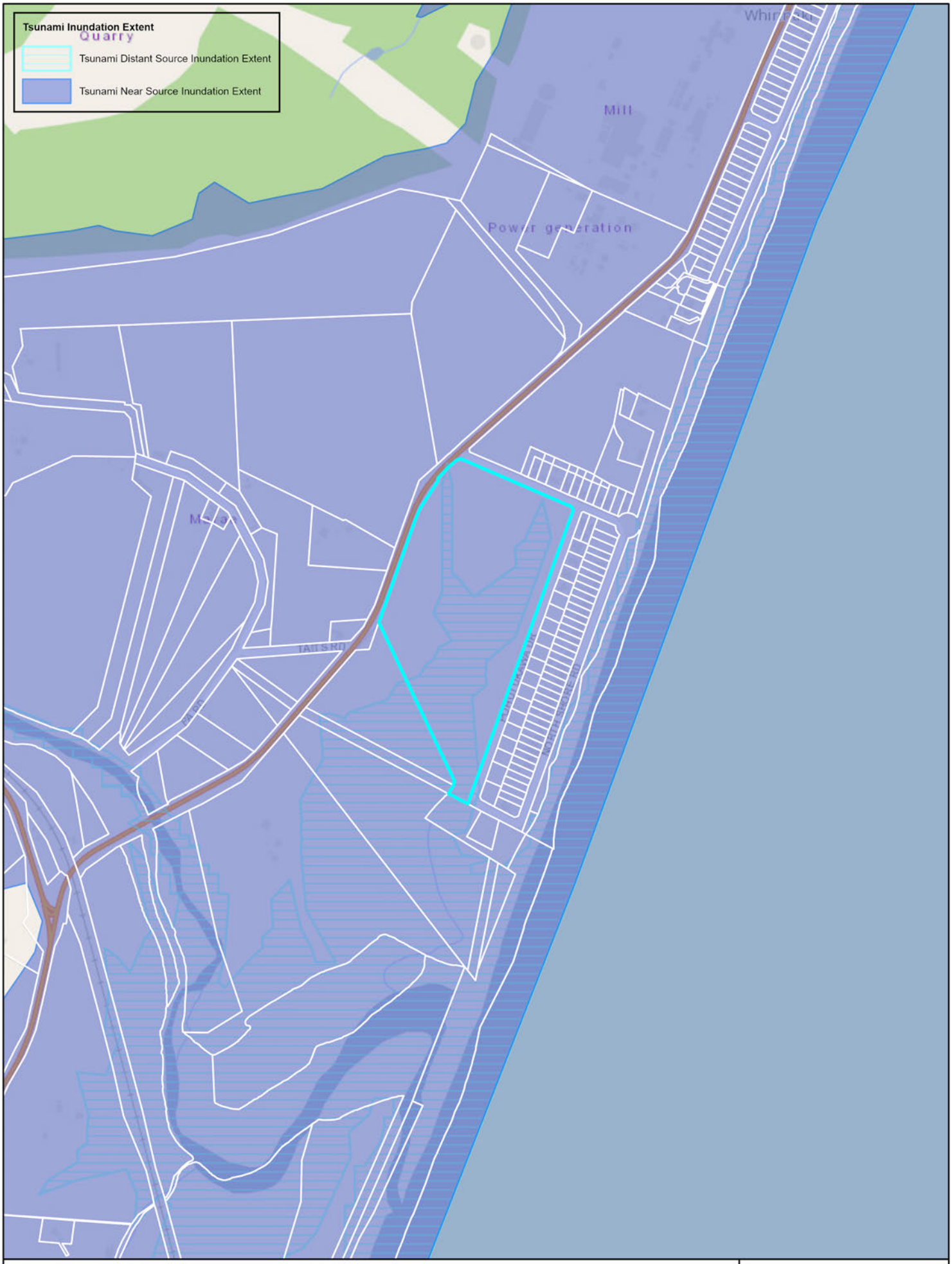
These inundation studies and road network maps are used to create the tsunami evacuation zones for the region which can be found here https://www.hbemergency.govt.nz/hazards/tsunami/

What can you do?

Most people in Hawke's Bay can survive a large tsunami if they self - evacuate in time. If you are developing land in a susceptible area, it is recommended you check tsunami evacuation zones, and develop your own tsunami evacuation route to work out if there is time to evacuate.

If you are already living in a tsunami evacuation zone, the easiest way to mitigate your tsunami risk is to ensure your insurance sum-insured is sufficient in the event of total loss. Then develop a tsunami evacuation route and if you feel a long or strong earthquake, drop, cover and hold for the earthquake, then self - evacuate. The first wave may arrive within 15 minutes so quickly get to a safe location - by foot or by bike. Leave immediately, every step counts. Go as fast as you can.

Remember, in the event of a tsunami the first wave is may not be the biggest. Wait for official 'All Clear' before returning.



Tsunami Inundation Extents

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ENGINEERING SERVICES REPORT

APPENDIX C

HBRC FLOOD LEVEL ADVICE

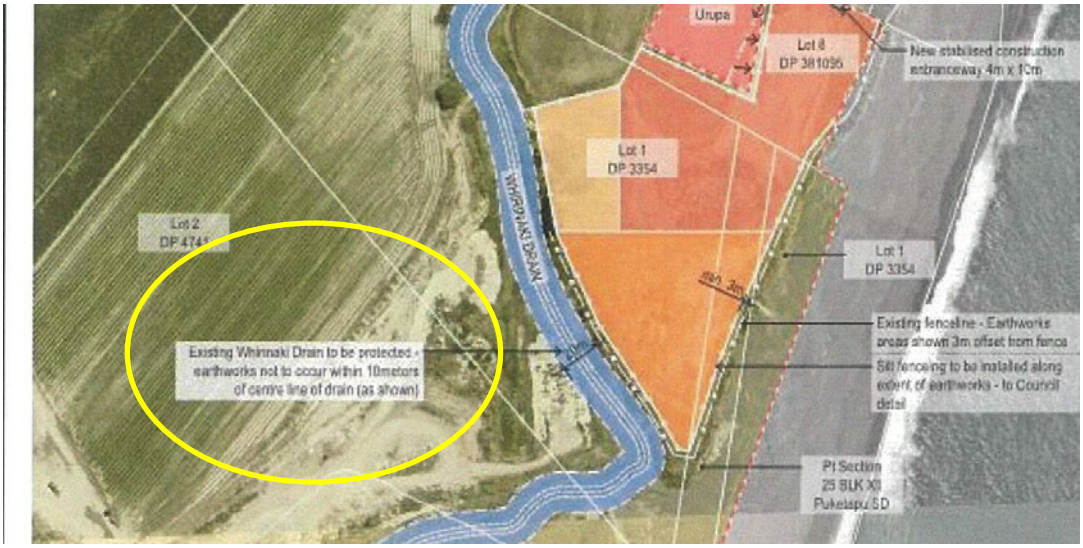
MEMORANDUM

To:	Tania Diack
From:	Craig Goodier
Date:	05 Aug 2019
Ref:	APP-124149
Subject:	Pacific Cleanfills Ltd., Whirinaki

The application is for a renewal of a consent to dispose of clean fill at the mouth of the Esk River. The previous consent DP040026L was issued in March 2004.

An issue raised in the Section 92 information request was to examine the effects of a further 2 m depth of fill may have on flood levels in the surrounding area. Examination of the existing ground level has shown the present ground level is approximately RL 17, and 100 year flood levels in the area are around RL 16 m or less. Based on this we consider the increase in ground levels from RL 17 m to around RL 19 m will have no effect on flood levels in the area.

We note that condition 3 of the expired consent required that the consent holder shall not deposit cleanfill within 20 m of the Whirinaki Stream until after the stream bank protection works are completed. A drawing included with the application has a note saying earthworks not to occur within 10 m of centre line of drain.



The drawing note is inconsistent with the consent condition. We understand the correct interpretation is that earthworks are not to occur within 20 m of the top of the bank of Whirinaki Stream.

Based on the information provided in the application we consider that the potential effects of the activity in terms of flooding, stream dynamics, scour, and erosion are considered to be less than minor. The proximity of fill to the drain is of concern, and the location of the fill should be shown.

ENGINEERING SERVICES REPORT

APPENDIX D

SERVICING CALCULATIONS

Rational Method Calculation - Summary

File: H:_2018\H20180064 - Pohutukawa Dr, North Shore\Engineers\Calculations\SW Calcs\[0.DNL-Stormwater Runoff_R1 (2022 06 17).xlsx]Runoff Summary For Report

Date: 5/08/2022

Job: H20200078

PRE-DEVELOPMENT CATCHMENT DATA				PRE-DEVELOPMENT RUNOFF FLOWS				
Catchment Area Name	Catchment Area (ha)	Runoff Coefficient (C)	Time of Concentration (Tc)	1:2 year flood (m^3/s)	1:5 year flood (m^3/s)	1:10 year flood (m^3/s)	1:50 year flood (m^3/s)	1:100 year flood (m^3/s)
Pre-A	10.062	0.35	51 min	0.232	0.321	0.392	0.579	0.669
Pre-B	5.779	0.50	23 min	0.283	0.395	0.484	0.722	0.836

POST-DEVELOPMENT CATCHMENT DATA				POST-DEVELOPMENT RUNOFF FLOWS				
Catchment Area Name	Catchment Area (ha)	Runoff Coefficient (C)	Time of Concentration (Tc)	1:2 year flood (m^3/s)	1:5 year flood (m^3/s)	1:10 year flood (m^3/s)	1:50 year flood (m^3/s)	1:100 year flood (m^3/s)
Post-A	0.375	0.60	10 min	0.034	0.048	0.059	0.090	0.105
Post-B	2.524	0.56	10 min	0.215	0.303	0.373	0.563	0.657
Post-C	2.786	0.57	10 min	0.239	0.336	0.415	0.625	0.730
Post-D	4.378	0.55	10 min	0.368	0.518	0.639	0.963	1.125

PRE & POST-DEVELOPMENT PEAK FLOW COMPARISON					
Catchment Area Name	1:2 year flood (m^3/s)	1:5 year flood (m^3/s)	1:10 year flood (m^3/s)	1:50 year flood (m^3/s)	1:100 year flood (m^3/s)
Pre-Developed	0.232	0.321	0.392	0.579	0.669
Post-Developed	0.856	1.205	1.486	2.241	2.617
Difference	**0.624**	**0.884**	**1.093**	**1.662**	**1.948**

Rational Method Peak Flow Estimation - **Catchment Pre-A**

File: H:_2018\H20180064 - Pohutukawa Dr, North Shore\Engineers\Calculations\SW Calcs\[0.DNL-Stormwater Runoff_R1 (2022 06 17).xlsx]Pre-A
Date: 5/08/2022
Job: H20180064
Catchment Area Pre-A

Time of Concentration Calculations								
Reference	**Equation Type / Method**	**Area (m²)**	**Length (m)**	**Av, Slope (%)**	**Height diff, of catchment**	**Velocity (m/s)**	**Mannings Roughness**	**tc (mins)**
E1_2,3,2(b)(i)	Time of Overland flow		118	0.4			0.06	**34.89**
4,6,8 QUDM (2013) or E1_2,3,2 table 2	Road/Channel		274	0.2				**16.04**
							tc (min)	**51 min**

Coefficent of Runoff "C" (E1_Table 1)		
Surface Description	**Landuse "Ci"**	**Landuse Area "Ai"**
Heavy clay - Grass and pasture cover	0.4	100,621 m²
Sub-Total:		0.40
Slope Correction for Runoff Coefficients (E1_Table 2)		
0-5%	subtracting	0.05
Coefficent of Runoff "C"		**0.35**

Rainfall intensities (mm/hr) :: RCP6.0 for the period 2081-2100

ARI	AEP	C	A (ha)	I (mm/hr)	Q (m^3/s)	Q (l/s)
2	0.50	0.35	10.062	23.693	0.232	231.778
5	0.20	0.35	10.062	32.843	0.321	321.286
10	0.10	0.35	10.062	40.120	0.392	392.478
20	0.05	0.35	10.062	47.919	0.469	468.768
50	0.02	0.35	10.062	59.171	0.579	578.845
100	0.01	0.35	10.062	68.381	0.669	668.945

Rational Method Peak Flow Estimation - **Catchment Pre-B**

File: H:_2018\H20180064 - Pohutukawa Dr, North Shore\Engineers\Calculations\SW Calcs\[0.DNL-Stormwater Runoff_R1 (2022 06 17).xlsx]Pre-A
Date: 5/08/2022
Job: H20180064
Catchment Area Pre-B

Time of Concentration Calculations								
Reference	**Equation Type / Method**	**Area (m²)**	**Length (m)**	**Av, Slope (%)**	**Height diff, of catchment**	**Velocity (m/s)**	**Mannings Roughness**	**tc (mins)**
E1_2,3,2(b)(i)	Time of Overland flow		81	3.4			0.045	**15.25**
E1_2,3,3	Time of Network flow (pipe flow)		215			1.5		**2.39**
							tc (min)	**23 min**

Coefficent of Runoff "C" (E1_Table 1)		
Surface Description	**Landuse "Ci"**	**Landuse Area "Ai"**
Res areas with Fi = 36% - 50%	0.55	57,789 m²
	Sub-Total:	0.55
Slope Correction for Runoff Coefficients (E1_Table 2)		
0-5%	subtracting	0.05
	Coefficent of Runoff "C"	**0.50**

Rainfall intensities (mm/hr) :: RCP6.0 for the period 2081-2100

ARI	AEP	C	A (ha)	I (mm/hr)	Q (m^3/s)	Q (l/s)
2	0.50	0.50	5.779	35.200	0.283	282.527
5	0.20	0.50	5.779	49.209	0.395	394.963
10	0.10	0.50	5.779	60.276	0.484	483.788
20	0.05	0.50	5.779	72.363	0.581	580.807
50	0.02	0.50	5.779	89.982	0.722	722.215
100	0.01	0.50	5.779	104.117	0.836	835.666

Rational Method Peak Flow Estimation - **Catchment Post-A**

File: H:_2018\H20180064 - Pohutukawa Dr, North Shore\Engineers\Calculations\SW Calcs\[0.DNL-Stormwater Runoff_R1 (2022 06 17).xlsx]Pre-A
Date: 5/08/2022
Job: H20180064
Catchment Area Post-A

Time of Concentration Calculations								
Reference	**Equation Type / Method**	**Area (m²)**	**Length (m)**	**Av. Slope (%)**	**Height diff. of catchment**	**Velocity (m/s)**	**Mannings Roughness**	**tc (mins)**
E1_2.3.2 (a)	Time of entry	3746						**10.00**
							tc (min)	**10 min**

Coefficent of Runoff "C" (E1_Table 1)		
Surface Description	**Landuse "Ci"**	**Landuse Area "Ai"**
Asphalt and concrete paved surfaces	0.85	1,284 m²
Res areas with Fi = 36% - 50%	0.55	2,462 m²
	Sub-Total:	0.65
Slope Correction for Runoff Coefficients (E1_Table 2)		
0-5%	subtracting	0.05
	Coefficent of Runoff "C"	**0.60**

Rainfall intensities (mm/hr) :: RCP6.0 for the period 2081-2100

ARI	AEP	C	A (ha)	I (mm/hr)	Q (m^3/s)	Q (l/s)
2	0.50	0.60	0.375	54.600	0.034	34.249
5	0.20	0.60	0.375	76.900	0.048	48.238
10	0.10	0.60	0.375	94.800	0.059	59.466
20	0.05	0.60	0.375	114.000	0.072	71.510
50	0.02	0.60	0.375	143.000	0.090	89.701
100	0.01	0.60	0.375	167.000	0.105	104.755

Rational Method Peak Flow Estimation - **Catchment Post-B**

File: H:_2018\H20180064 - Pohutukawa Dr, North Shore\Engineers\Calculations\SW Calcs\[0.DNL-Stormwater Runoff_R1 (2022 06 17).xlsx]Pre-A
Date: 5/08/2022
Job: H20180064
Catchment Area Post-B

Time of Concentration Calculations								
Reference	**Equation Type / Method**	**Area (m²)**	**Length (m)**	**Av. Slope (%)**	**Height diff. of catchment**	**Velocity (m/s)**	**Mannings Roughness**	**tc (mins)**
E1_2.3.2 (a)	Time of entry	25239						**10.00**
							tc (min)	**10 min**

Coefficent of Runoff "C" (E1_Table 1)		
Surface Description	**Landuse "Ci"**	**Landuse Area "Ai"**
Asphalt and concrete paved surfaces	0.85	5,163 m²
Res areas with Fi = 36% - 50%	0.55	20,076 m²
	Sub-Total:	0.61
Slope Correction for Runoff Coefficients (E1_Table 2)		
0-5%	subtracting	0.05
	Coefficent of Runoff "C"	**0.56**

Rainfall intensities (mm/hr) :: RCP6.0 for the period 2081-2100

ARI	AEP	C	A (ha)	I (mm/hr)	Q (m^3/s)	Q (l/s)
2	0.50	0.56	2.524	54.600	0.215	214.887
5	0.20	0.56	2.524	76.900	0.303	302.653
10	0.10	0.56	2.524	94.800	0.373	373.101
20	0.05	0.56	2.524	114.000	0.449	448.666
50	0.02	0.56	2.524	143.000	0.563	562.800
100	0.01	0.56	2.524	167.000	0.657	657.256

Rational Method Peak Flow Estimation - **Catchment Post-C**

File: H:_2018\H20180064 - Pohutukawa Dr, North Shore\Engineers\Calculations\SW Calcs\[0.DNL-Stormwater Runoff_R1 (2022 06 17).xlsx]Pre-A
Date: 5/08/2022
Job: H20180064
Catchment Area Post-C

Time of Concentration Calculations								
Reference	**Equation Type / Method**	**Area (m²)**	**Length (m)**	**Av. Slope (%)**	**Height diff. of catchment**	**Velocity (m/s)**	**Mannings Roughness**	**tc (mins)**
E1_2.3.2 (a)	Time of entry	27861						**10.00**
							tc (min)	**10 min**

Coefficent of Runoff "C" (E1_Table 1)		
Surface Description	**Landuse "Ci"**	**Landuse Area "Ai"**
Asphalt and concrete paved surfaces	0.85	7,404 m²
Res areas with Fi = 36% - 50%	0.55	15,946 m²
Industrial, commercial and townhouses	0.65	2,369 m²
Maintained gardens / lawns	0.25	2,142 m²
	Sub-Total:	0.62
Slope Correction for Runoff Coefficients (E1_Table 2)		
0-5%	subtracting	0.05
	Coefficent of Runoff "C"	**0.57**

Rainfall intensities (mm/hr) :: RCP6.0 for the period 2081-2100

ARI	AEP	C	A (ha)	I (mm/hr)	Q (m^3/s)	Q (l/s)
2	0.50	0.57	2.786	54.600	0.239	238.814
5	0.20	0.57	2.786	76.900	0.336	336.352
10	0.10	0.57	2.786	94.800	0.415	414.645
20	0.05	0.57	2.786	114.000	0.499	498.623
50	0.02	0.57	2.786	143.000	0.625	625.466
100	0.01	0.57	2.786	167.000	0.730	730.439

Rational Method Peak Flow Estimation - **Catchment Post-D**

File: H:_2018\H20180064 - Pohutukawa Dr, North Shore\Engineers\Calculations\SW Calcs\[0.DNL-Stormwater Runoff_R1 (2022 06 17).xlsx]Pre-A
Date: 5/08/2022
Job: H20180064
Catchment Area Post-D

Time of Concentration Calculations								
Reference	**Equation Type / Method**	**Area (m²)**	**Length (m)**	**Av. Slope (%)**	**Height diff. of catchment**	**Velocity (m/s)**	**Mannings Roughness**	**tc (mins)**
E1_2.3.2 (a)	Time of entry	43775						**5.00**
E1_2.3.3	Time of Network flow (pipe flow)		250			1.5		**2.78**
							tc (min)	**10 min**

Coefficent of Runoff "C" (E1_Table 1)		
Surface Description	**Landuse "Ci"**	**Landuse Area "Ai"**
Asphalt and concrete paved surfaces	0.85	7,876 m²
Res areas with Fi = 36% - 50%	0.55	35,899 m²
	Sub-Total:	0.60
Slope Correction for Runoff Coefficients (E1_Table 2)		
0-5%	subtracting	0.05
	Coefficent of Runoff "C"	**0.55**

Rainfall intensities (mm/hr) :: RCP6.0 for the period 2081-2100

ARI	AEP	C	A (ha)	I (mm/hr)	Q (m^3/s)	Q (l/s)
2	0.50	0.55	4.378	54.600	0.368	367.796
5	0.20	0.55	4.378	76.900	0.518	518.013
10	0.10	0.55	4.378	94.800	0.639	638.591
20	0.05	0.55	4.378	114.000	0.768	767.926
50	0.02	0.55	4.378	143.000	0.963	963.276
100	0.01	0.55	4.378	167.000	1.125	1124.944

Rational Method Peak Flow Estimation - **Catchment** **Upstream Catchment**

File: H:_2018\H20180064 - Pohutukawa Dr, North Shore\Engineers\Calculations\SW Calcs\[0.DNL-Stormwater Runoff_R1 (2022 06 17).xlsx]Upstream Catchment
Date: 5/08/2022
Job: H20200078
Catchment Area Upstream Catchment

Time of Concentration Calculations

Reference	Equation Type / Method	Area (m²)	Length (m)	Av, Slope (%)	Height diff, of catchment	Velocity (m/s)	Mannings Roughness	tc (mins)
E1_2,3,2 (a)	Time of entry	4886697						**0.00**
E1_2,3,2(b)(i)	Time of Overland flow		0	0.5			0.0225	**0.00**
4,6,8 QUDM (2013) or E1_2,3,2 table 2	Road/Channel		3207	0.006				**1041.63**
E1_2,3,3	Time of Network flow (pipe flow)		0			1.5		**0.00**
E1_2,3,3	Time of Network flow (channel flow)		0			1.5		**0.00**
E1_2,3,6	Alternative method		2865		200			**24.95**
							tc (min)	**1,067 min**

Coefficent of Runoff "C" (E1_Table 1)

Surface Description	Landuse "Ci"	Landuse Area "Ai"
Bush	0.25	3,547,876 m²
Industrial, commercial and townhouses	0.65	246,953 m²
Medium Soakage - Cultivated	0.2	666,503 m²
Medium Soakage - Pusture and scrub cover	0.3	188,384 m²
Res areas with Fi = 36% - 50%	0.55	112,264 m²
Medium Soakage - Pusture and scrub cover	0.3	124,664 m²
No Data	0	m²
No Data	0	m²
	Sub-Total:	0.27
Slope Correction for Runoff Coefficients (E1_Table 2)		
5-10%	no adjustment	-
	Coefficent of Runoff "C"	**0.27**

Rainfall intensities (mm/hr) :: RCP6.0 for the period 2081-2100

ARI	AEP	C	A (ha)	I (mm/hr)	Q (m^3/s)	Q (l/s)
2	0.50	0.27	488.670	4.685	1.739	1739.395
5	0.20	0.27	488.670	6.314	2.344	2343.854
10	0.10	0.27	488.670	7.554	2.804	2804.211
20	0.05	0.27	488.670	8.824	3.276	3275.705
50	0.02	0.27	488.670	10.686	3.967	3966.932
100	0.01	0.27	488.670	12.102	4.493	4492.601

Wastewater Demand Calculation

File: H:_2018\H20180064 - Pohutukawa Dr, North Shore\Engineers\Calculations\SW Calcs\[0.DNL-Stormwater Runoff_R1 (2022 06 17).xlsx]Sheet1

Date: 12/08/2022

Job: H20180064

Type	Number of Lots	Demand (l/p/day)	Estimated Population (EP)	Average Dry Weather Flow (ADWF) (kl/day)	Average Dry Weather Flow (ADWF) (l/s)	Dry Weather Diurnal Peak Factor	Peak Dry Weather Flow (PDWF) (kl/day)	Peak Dry Weather Flow (PDWF) (l/s)	Infiltration Factor	Peak Wet Weather Flow (PWWF) (kl/da)	Peak Wet Weather Flow (PWWF) (l/s)
Residential Lots	81	200	6	97.20	1.13	2.5	243.00	2.81	2.0	486.00	5.63
Residential Units	2	200	4	1.60	0.02	2.5	4.00	0.05	2.0	8.00	0.09

ENGINEERING SERVICES REPORT

APPENDIX E

CIVIL ENGINEERING PLANS

DATE PLOTTED: 10 August 2022 1:37 pm BY: HUGO NELL

NOTES

1. ALL PROPOSED WORKS HAVE BEEN DESIGNED IN ACCORDANCE WITH HASTINGS DISTRICT COUNCIL ENGINEERING CODE OF PRACTICE (2020) AND ASSOCIATED DRAWINGS OR WHERE DEFERRED BY THAT CODE NZS4404:2010 (NEW ZEALAND STANDARD FOR LAND DEVELOPMENT AND SUBDIVISION INFRASTRUCTURE).
2. COORDINATES ARE IN TERMS OF NZGD2000 (HAWKES BAY CIRCUIT).
3. LEVELS ARE IN TERMS OF NEW ZEALAND VERTICAL DATUM 2016, THE CONVERSION VALUE FROM HB LOCAL AUTHORITY 1972 TO NZVD 2016 IS -10.31m.
4. ALL PROPERTY BOUNDARIES AND DIMENSIONS ARE SUBJECT TO RESOURCE CONSENT APPROVAL & LAND TRANSFER SURVEY.
5. EXISTING SERVICES INFORMATION HAVE BEEN SOURCED FROM HDC GIS DATABASE & TOPOGRAPHIC SURVEY OF VISIBLE SERVICES.
6. CONTRACTORS TO LOCATE ALL EXISTING UNDERGROUND SERVICES PRIOR TO COMMENCING CONSTRUCTION WORK.
7. ALL PROPOSED WORKS HAVE BEEN DESIGNED IN ACCORDANCE WITH HAWKES BAY WATERWAY GUIDELINES FOR EROSION AND SEDIMENT CONTROL (HBWG 2009).

LEGEND

- CADASTRAL INFORMATION
- EXTENTS OF DEVELOPMENT
- EX. ROADS
- EX. WALKWAYS
- 0.25 EG. CONTOUR LINES @0.25m INTERVALS

NEW ZEALAND STATE HIGHWAY 2

PACIFIC DRIVE

NORTH SHORE ROAD

POHUTUKAWA DRIVE

NORTH SHORE ROAD

CAD File: H20180064-30-A_Earthworks Layouts.dwg

Rev.	Date	Description	Appd.	Issued
1	22/07/2022	FOR RESOURCE CONSENT	MP	JJP

NORTH

0 20 40 60 80 100m

SCALE 1:1000 @A1

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DEVELOPMENT NOUS
SURVEYING • URBAN DESIGN • ENGINEERING • TOWN PLANNING
ENVIRONMENTAL • LANDSCAPE ARCHITECTURE

Fieldworked	Date -
Drawn	Date LB 22/07/2022
Checked	Date JJP 22/07/2022
Designed	Date RR 22/07/2022
Approved	Date MP 22/07/2022

Client: EVANS FAMILY TRUST

Project: POHUTUKAWA RESIDENTIAL SUBDIVISION DEVELOPMENT
WHIRINAKI

Title: EARTHWORKS
EXISITNG CONTOURS

Status: FOR RESOURCE CONSENT
NOT TO BE USED FOR CONSTRUCTION PURPOSES

Datum	Council Ref.	Scale	Size
HB2000	TBC	1:1000	A1

Drawing Number: H20180064-30-A-01

Revision: 1

DATE PLOTTED: 10 August 2022 1:38 pm BY: HUGO NELL

NOTES

1. ALL PROPOSED WORKS HAVE BEEN DESIGNED IN ACCORDANCE WITH HASTINGS DISTRICT COUNCIL ENGINEERING CODE OF PRACTICE (2020) AND ASSOCIATED DRAWINGS OR WHERE DEFERRED BY THAT CODE NZS4404:2010 (NEW ZEALAND STANDARD FOR LAND DEVELOPMENT AND SUBDIVISION INFRASTRUCTURE).
2. COORDINATES ARE IN TERMS OF NZGD2000 (HAWKES BAY CIRCUIT).
3. LEVELS ARE IN TERMS OF NEW ZEALAND VERTICAL DATUM 2016, THE CONVERSION VALUE FROM HB LOCAL AUTHORITY 1972 TO NZVD 2016 IS -10.31m.
4. ALL PROPERTY BOUNDARIES AND DIMENSIONS ARE SUBJECT TO RESOURCE CONSENT APPROVAL & LAND TRANSFER SURVEY.
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6. CONTRACTORS TO LOCATE ALL EXISTING UNDERGROUND SERVICES PRIOR TO COMMENCING CONSTRUCTION WORK.
7. ALL PROPOSED WORKS HAVE BEEN DESIGNED IN ACCORDANCE WITH HAWKES BAY WATERWAY GUIDELINES FOR EROSION AND SEDIMENT CONTROL (HBWG 2009).

LEGEND

- CADASTRAL INFORMATION
- EXTENTS OF DEVELOPMENT
- PROP. LOT BOUNDARY
- EX. ROADS
- EX. WALKWAYS
- 0.25 DESIGN CONTOUR LINES @0.25m INTERVALS
- 0.25 EG. CONTOUR LINES @0.25m INTERVALS

Sbdn B Lot 11 DP 3351
CTHBK1/237

NEW ZEALAND STATE HIGHWAY 2

POHUTUKAWA DRIVE

NORTH SHORE ROAD

LOT 100 LOT 200 LOT 201 LOT 202 LOT 203 LOT 204 LOT 300

LOT 1 LOT 2 LOT 3 LOT 4 LOT 5 LOT 6 LOT 7 LOT 8 LOT 102

LOT 9 LOT 10 LOT 11 LOT 12 LOT 13 LOT 14 LOT 15 LOT 16 LOT 17 LOT 18 LOT 19 LOT 20 LOT 21 LOT 22 LOT 23 LOT 24 LOT 25 LOT 26 LOT 27 LOT 28 LOT 29 LOT 30 LOT 31 LOT 32 LOT 33 LOT 34 LOT 35 LOT 36 LOT 37 LOT 38 LOT 39 LOT 40 LOT 41 LOT 42 LOT 43 LOT 44 LOT 45 LOT 46 LOT 47 LOT 48 LOT 49 LOT 50 LOT 51 LOT 52 LOT 53 LOT 54 LOT 55 LOT 56 LOT 57 LOT 58 LOT 59 LOT 60 LOT 61 LOT 62 LOT 63 LOT 64 LOT 65 LOT 66 LOT 67 LOT 68 LOT 69 LOT 70 LOT 71 LOT 72 LOT 73 LOT 74 LOT 75 LOT 76 LOT 77 LOT 78 LOT 79 LOT 80 LOT 81

Rev.	Date	Description	Appd.	Issued
1	22/07/2022	FOR RESOURCE CONSENT	MP	JJP

NORTH

0 20 40 60 80 100m
SCALE 1:1000 @A1

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DEVELOPMENT NOUS
SURVEYING • URBAN DESIGN • ENGINEERING • TOWN PLANNING
ENVIRONMENTAL • LANDSCAPE ARCHITECTURE

Fieldworked	Date -
Drawn LB	Date 22/07/2022
Checked KC	Date 22/07/2022
Designed RR	Date 22/07/2022
Approved MP	Date 22/07/2022

Client: EVANS FAMILY TRUST
Project: POHUTUKAWA RESIDENTIAL SUBDIVISION DEVELOPMENT
WHIRINAKI
Title: EARTHWORKS
DESIGN CONTOURS

Status: FOR RESOURCE CONSENT
NOT TO BE USED FOR CONSTRUCTION PURPOSES

Datum	Council Ref.	Scale	Size
HB2000	TBC	1:1000	A1

Drawing Number: H20180064-30-A-02
Revision: 1

CAD File: H20180064-30-A_Earthworks Layouts.dwg

DATE PLOTTED: 10 August 2022 3:21 pm BY: HUGO NELL

NOTES

1. ALL PROPOSED WORKS HAVE BEEN DESIGNED IN ACCORDANCE WITH HASTINGS DISTRICT COUNCIL ENGINEERING CODE OF PRACTICE (2020) AND ASSOCIATED DRAWINGS OR WHERE DEFERRED BY THAT CODE NZS4404:2010 (NEW ZEALAND STANDARD FOR LAND DEVELOPMENT AND SUBDIVISION INFRASTRUCTURE).
2. COORDINATES ARE IN TERMS OF NZGD2000 (HAWKES BAY CIRCUIT).
3. LEVELS ARE IN TERMS OF NEW ZEALAND VERTICAL DATUM 2016, THE CONVERSION VALUE FROM HB LOCAL AUTHORITY 1972 TO NZVD 2016 IS -10.31m.
4. ALL PROPERTY BOUNDARIES AND DIMENSIONS ARE SUBJECT TO RESOURCE CONSENT APPROVAL & LAND TRANSFER SURVEY.
5. EXISTING SERVICES INFORMATION HAVE BEEN SOURCED FROM HDC GIS DATABASE & TOPOGRAPHIC SURVEY OF VISIBLE SERVICES.
6. CONTRACTORS TO LOCATE ALL EXISTING UNDERGROUND SERVICES PRIOR TO COMMENCING CONSTRUCTION WORK.
7. ALL PROPOSED WORKS HAVE BEEN DESIGNED IN ACCORDANCE WITH HAWKES BAY WATERWAY GUIDELINES FOR EROSION AND SEDIMENT CONTROL (HBWG 2009).

LEGEND

- CADASTRAL INFORMATION
- PROP. LOT BOUNDARIES
- EXTENTS OF DEVELOPMENT
- -0.2 CUT CONTOURS @ 0.2m INTERVALS
- 0.2 FILL CONTOURS @ 0.2m INTERVALS
- 0.0 0 CUT & FILL CONTOURS

CUT & FILL VOLUMES

CUT & FILL AREA	CUT	FILL	BALANCE
SITE	-5 250m³	83 150m³	77 900m³
DRAIN WORKS	-12 800m³	2 100m³	-10 700m³
STRIP & STOCKPILE TOPSOIL	-33 500m³	-	-
FILL LOT AREA FROM STOCKPILE		7 500m³	

NEW ZEALAND STATE HIGHWAY 2

POHUTUKAWA DRIVE

NORTH SHORE ROAD

NORTH SHORE ROAD

LOT 1 LOT 2 LOT 3 LOT 4 LOT 5 LOT 6 LOT 7 LOT 8 LOT 9 LOT 10 LOT 11 LOT 12 LOT 13 LOT 14 LOT 15 LOT 16 LOT 17 LOT 18 LOT 19 LOT 20 LOT 21 LOT 22 LOT 23 LOT 24 LOT 25 LOT 26 LOT 27 LOT 28 LOT 29 LOT 30 LOT 31 LOT 32 LOT 33 LOT 34 LOT 35 LOT 36 LOT 37 LOT 38 LOT 39 LOT 40 LOT 41 LOT 42 LOT 43 LOT 44 LOT 45 LOT 46 LOT 47 LOT 48 LOT 49 LOT 50 LOT 51 LOT 52 LOT 53 LOT 54 LOT 55 LOT 56 LOT 57 LOT 58 LOT 59 LOT 60 LOT 61 LOT 62 LOT 63 LOT 64 LOT 65 LOT 66 LOT 67 LOT 68 LOT 69 LOT 70 LOT 71 LOT 72 LOT 73 LOT 74 LOT 75 LOT 76 LOT 77 LOT 78 LOT 79 LOT 80 LOT 81 LOT 100 LOT 102 LOT 200 LOT 201 LOT 202 LOT 203 LOT 204 LOT 300 LOT

Rev.	Date	Description	Appd.	Issued
1	22/07/2022	FOR RESOURCE CONSENT	MP	JJP

NORTH

0 20 40 60 80 100m

SCALE 1:1000 @A1

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DEVELOPMENT NOUS
SURVEYING • URBAN DESIGN • ENGINEERING • TOWN PLANNING
ENVIRONMENTAL • LANDSCAPE ARCHITECTURE

Fieldworked	Date -
Drawn	HN Date 22/07/2022
Checked	JJP Date 22/07/2022
Designed	JJP Date 22/07/2022
Approved	MP Date 22/07/2022

Client: EVANS FAMILY TRUST

Project: POHUTUKAWA RESIDENTIAL SUBDIVISION DEVELOPMENT
WHIRINAKI

Title: EARTHWORKS
DEPTH CONTOURS

Status: FOR RESOURCE CONSENT
NOT TO BE USED FOR CONSTRUCTION PURPOSES

Datum	Council Ref.	Scale	Size
HB2000	TBC	1:1000	A1

Drawing Number: H20180064-30-A-03
Revision: 1

CAD File: H20180064-30-A_Earthworks Layouts.dwg

DATE PLOTTED: 10 August 2022 1:41 pm BY: HUGO NELL

NOTES

1. ALL PROPOSED WORKS HAVE BEEN DESIGNED IN ACCORDANCE WITH HASTINGS DISTRICT COUNCIL ENGINEERING CODE OF PRACTICE (2020) AND ASSOCIATED DRAWINGS OR WHERE DEFERRED BY THAT CODE NZS4404:2010 (NEW ZEALAND STANDARD FOR LAND DEVELOPMENT AND SUBDIVISION INFRASTRUCTURE).
2. COORDINATES ARE IN TERMS OF NZGD2000 (HAWKES BAY CIRCUIT).
3. LEVELS ARE IN TERMS OF NEW ZEALAND VERTICAL DATUM 2016, THE CONVERSION VALUE FROM HB LOCAL AUTHORITY 1972 TO NZVD 2016 IS -10.31m.
4. ALL PROPERTY BOUNDARIES AND DIMENSIONS ARE SUBJECT TO RESOURCE CONSENT APPROVAL & LAND TRANSFER SURVEY.
5. EXISTING SERVICES INFORMATION HAVE BEEN SOURCED FROM HDC GIS DATABASE & TOPOGRAPHIC SURVEY OF VISIBLE SERVICES.
6. CONTRACTORS TO LOCATE ALL EXISTING UNDERGROUND SERVICES PRIOR TO COMMENCING CONSTRUCTION WORK.
7. ALL PROPOSED WORKS HAVE BEEN DESIGNED IN ACCORDANCE WITH HAWKES BAY WATERWAY GUIDELINES FOR EROSION AND SEDIMENT CONTROL (HBWG 2009).

LEGEND

- CADASTRAL INFORMATION
- EXTENTS OF DEVELOPMENT
- PROP. LOT BOUNDARY
- EX. ROADS
- EX. WALKWAYS
- 0.25 DESIGN CONTOUR LINES @0.25m INTERVALS
- 0.25 EG. CONTOUR LINES @0.25m INTERVALS

EXTENT OF WORKS

LOT 78 LOT 79 LOT 80 LOT 81 LOT 72 LOT 71 LOT 70 LOT 69 LOT 62 LOT 63 LOT 64 LOT 65 LOT 66 LOT 67 LOT 68 LOT 100 LOT 77 LOT 76 LOT 75 LOT 74 LOT 73 LOT 203 LOT 61 LOT 54 LOT 55 LOT 60 LOT 56 LOT 59 LOT 57 LOT 58 LOT 202 LOT 53 LOT 45 LOT 52 LOT 46 LOT 51 LOT 47 LOT 50 LOT 49 LOT 48 LOT 44 LOT 36 LOT 43 LOT 37 LOT 42 LOT 38 LOT 41 LOT 40 LOT 39 LOT 35 LOT 27 LOT 34 LOT 28 LOT 33 LOT 30 LOT 32 LOT 31 LOT 201 LOT 300 LOT 26 LOT 23 LOT 22 LOT 25 LOT 21 LOT 20 LOT 24 LOT 19

POHUTUKAWA DRIVE

PRE-DEVELOPMENT ALIGNMENT
SCALE 1:1000

POST-DEVELOPMENT ALIGNMENT
SCALE 1:1000

Rev.	Date	Description	Appd.	Issued
1	22/07/2022	FOR RESOURCE CONSENT	MP	JJP

NORTH

0 20 40 60 80 100m
SCALE 1:1000 @A1

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DEVELOPMENT NOUS
SURVEYING • URBAN DESIGN • ENGINEERING • TOWN PLANNING
ENVIRONMENTAL • LANDSCAPE ARCHITECTURE

Fieldworked	Date -
Drawn	LB 22/07/2022
Checked	KC 22/07/2022
Designed	RR 22/07/2022
Approved	MP 22/07/2022

Client: EVANS FAMILY TRUST
Project: POHUTUKAWA RESIDENTIAL SUBDIVISION DEVELOPMENT
WHIRINAKI
Title: EARTHWORKS
PRE & POST-DEVELOPMENT DRAIN ALIGNMENT

Status: FOR RESOURCE CONSENT
NOT TO BE USED FOR CONSTRUCTION PURPOSES

Datum	Council Ref.	Scale	Size
HB2000	TBC	1:1000	A1

Drawing Number: H20180064-30-A-04
Revision: 1

CAD File: H20180064-30-A_Earthworks Layouts.dwg

NOTES

1. ALL PROPOSED WORKS HAVE BEEN DESIGNED IN ACCORDANCE WITH HASTINGS DISTRICT COUNCIL ENGINEERING CODE OF PRACTICE (2020) AND ASSOCIATED DRAWINGS OR WHERE DEFERRED BY THAT CODE NZS4404:2010 (NEW ZEALAND STANDARD FOR LAND DEVELOPMENT AND SUBDIVISION INFRASTRUCTURE).
2. COORDINATES ARE IN TERMS OF NZGD2000 (HAWKES BAY CIRCUIT).
3. LEVELS ARE IN TERMS OF NEW ZEALAND VERTICAL DATUM 2016, THE CONVERSION VALUE FROM HB LOCAL AUTHORITY 1972 TO NZVD 2016 IS -10.31m.
4. ALL PROPERTY BOUNDARIES AND DIMENSIONS ARE SUBJECT TO RESOURCE CONSENT APPROVAL & LAND TRANSFER SURVEY.
5. EXISTING SERVICES INFORMATION HAVE BEEN SOURCED FROM HDC GIS DATABASE & TOPOGRAPHIC SURVEY OF VISIBLE SERVICES.
6. CONTRACTORS TO LOCATE ALL EXISTING UNDERGROUND SERVICES PRIOR TO COMMENCING CONSTRUCTION WORK.
7. ALL PROPOSED WORKS HAVE BEEN DESIGNED IN ACCORDANCE WITH HAWKES BAY WATERWAY GUIDELINES FOR EROSION AND SEDIMENT CONTROL (HBWG 2009).

LEGEND

- CADASTRAL INFORMATION
- EXTENT OF DEVELOPMENT
- LOT BOUNDARY
- 0.25 EG. CONTOUR LINES @0.25m INTERVALS
- 0.25 DESIGN CONTOUR LINES @0.25m INTERVALS
- EX. ROADS
- EX. WALKWAYS
- PROP. SWALE
- BACK BERM / FOOTPATH / FRONT BERM / PROPOSED VEHICLE CROSSING / ROADWAY / FRONT BERM / FOOTPATH / BACK BERM

DATE PLOTTED: 10 August 2022 1:48 pm BY : HUGO NELL

CAD File: H20180064-40-A_Layouts.dwg

Rev.	Date	Description	Appd.	Issued
1	22/07/2022	FOR RESOURCE CONSENT	MP	RR

NORTH

0 25 50 75 100 125m

SCALE 1:1250 @A1

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DEVELOPMENT NOUS

SURVEYING • URBAN DESIGN • ENGINEERING • TOWN PLANNING
ENVIRONMENTAL • LANDSCAPE ARCHITECTURE

Fieldworked: -	Date
Drawn: LB	Date: 22/07/2022
Checked: JJP	Date: 22/07/2022
Designed: RR	Date: 22/07/2022
Approved: MP	Date: 22/07/2022

Client: EVANS FAMILY TRUST

Project: POHUTUKAWA RESIDENTIAL SUBDIVISION DEVELOPMENT WHIRINAKI

Title: ROADING LAYOUT

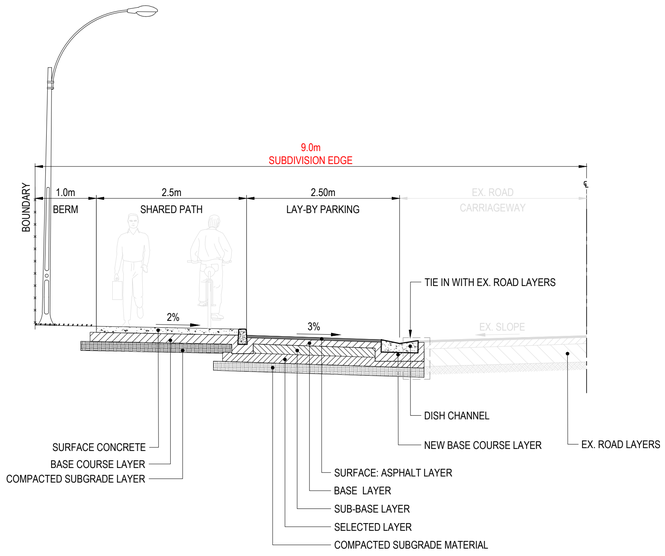
Status: **FOR RESOURCE CONSENT**
NOT TO BE USED FOR CONSTRUCTION PURPOSES

Datum	Council Ref.	Scale	Size
HB2000	TBC	1:1000	A1

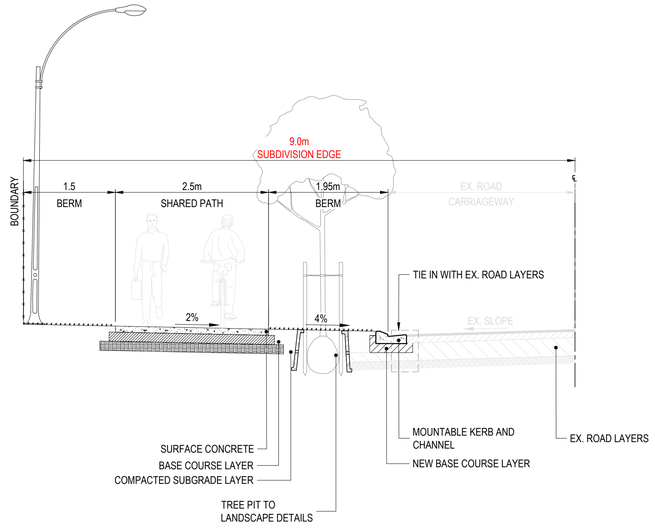
Drawing Number: H20180064-40-A-01

Revision: 1

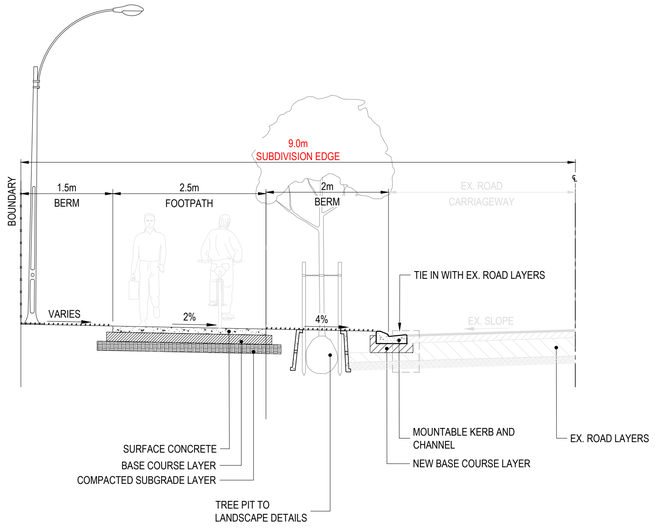
DATE PLOTTED: 2 August 2022 4:09 pm BY: HUGO NELL



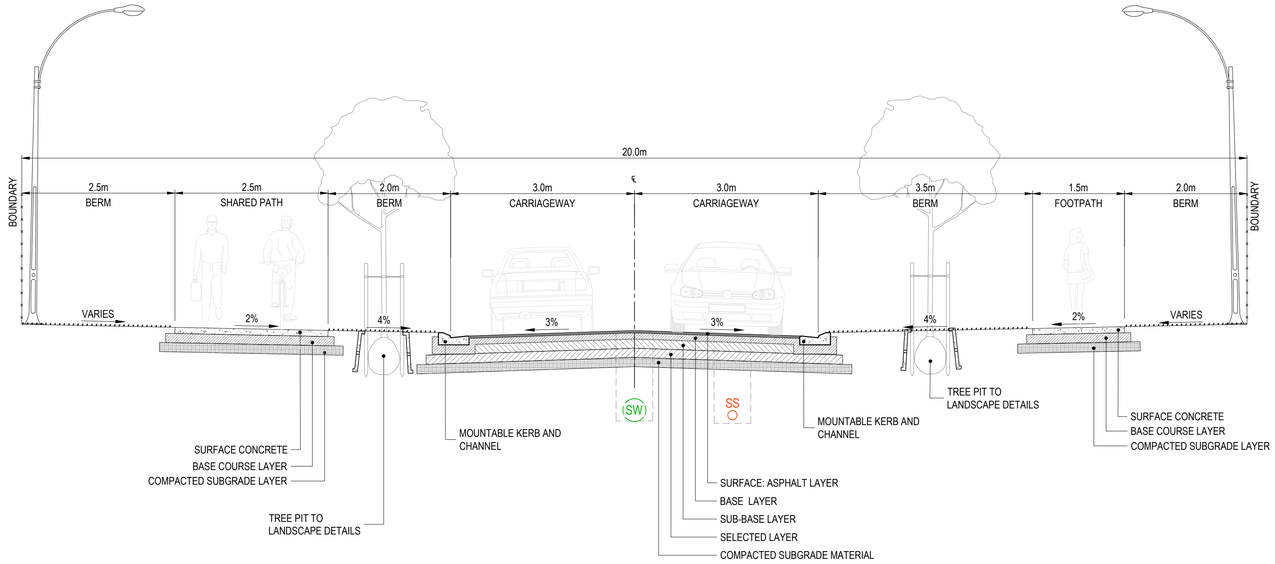
EX. CORRIDOR - POHUTUKAWA DRIVE (A)
TYPICAL CROSS-SECTION
SCALE 1:50
40-A-01



EX. CORRIDOR - POHUTUKAWA DRIVE (B)
TYPICAL CROSS-SECTION
SCALE 1:50
40-A-01



EX. CORRIDOR - NORTH SHORE ROAD (C)
TYPICAL CROSS-SECTION
SCALE 1:50
40-A-01



20m CORRIDOR - ROAD 01 (D)
TYPICAL CROSS-SECTION
SCALE 1:50
40-A-01

CAD File: H20180064-40-A_Layouts.dwg

Rev.	Date	Description	Appd.	Issued
1	22/07/2022	FOR RESOURCE CONSENT	MP	RR

0 1 2 3 4 5m
SCALE 1:50 @A1

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DEVELOPMENT NOUS
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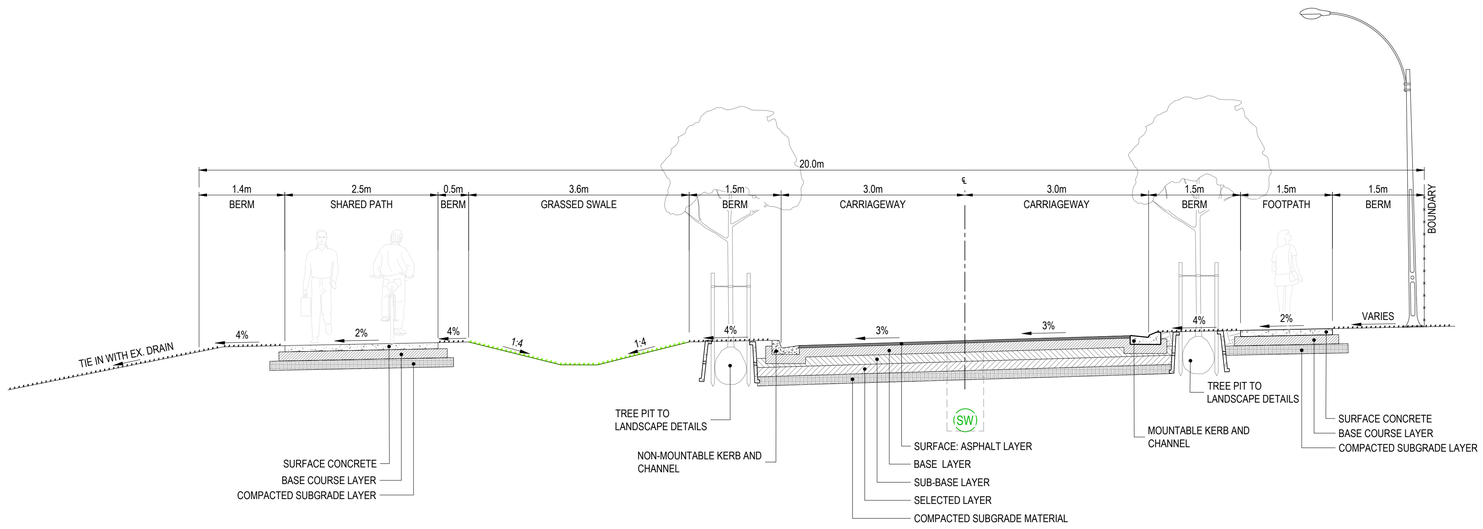
Fieldworked	-	Date -
Drawn	LB	Date 22/07/2022
Checked	JJP	Date 22/07/2022
Designed	RR	Date 22/07/2022
Approved	MP	Date 22/07/2022

Client: EVANS FAMILY TRUST
Project: POHUTUKAWA RESIDENTIAL SUBDIVISION DEVELOPMENT
WHIRINAKI
Status: FOR RESOURCE CONSENT
NOT TO BE USED FOR CONSTRUCTION PURPOSES
Title: ROADING
TYPICAL CROSS-SECTIONS A; B; C & D

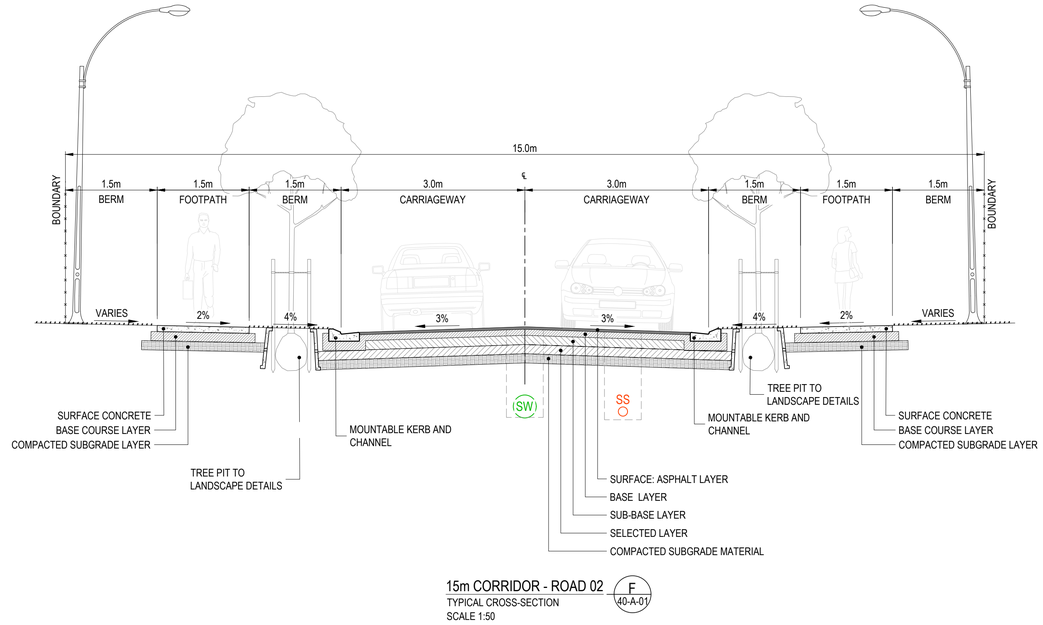
Datum	Council Ref.	Scale	Size
HB2000	TBC	1:50	A1

Drawing Number: H20180064-40-A-02
Revision: 1

DATE PLOTTED: 2 August 2022 4:10 pm BY: HUGO NELL



20m CORRIDOR - ROAD 01 (E, 40-A-01)
TYPICAL CROSS-SECTION
SCALE 1:50



15m CORRIDOR - ROAD 02 (F, 40-A-01)
TYPICAL CROSS-SECTION
SCALE 1:50

Rev.	Date	Description	Appd.	Issued
1	22/07/2022	FOR RESOURCE CONSENT	MP	RR

0 1 2 3 4 5m
SCALE 1:50 @A1

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DEVELOPMENT NOUS
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Fieldworked	Date -
Drawn LB	Date 22/07/2022
Checked JJP	Date 22/07/2022
Designed RR	Date 22/07/2022
Approved MP	Date 22/07/2022

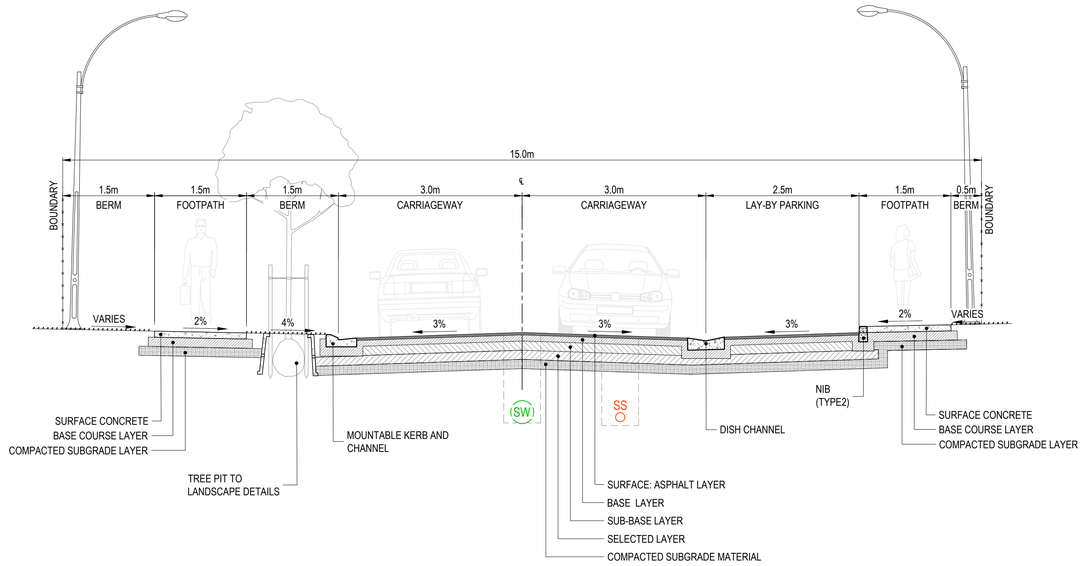
Client: EVANS FAMILY TRUST
Project: POHUTUKAWA RESIDENTIAL SUBDIVISION DEVELOPMENT WHIRINAKI
Status: FOR RESOURCE CONSENT — NOT TO BE USED FOR CONSTRUCTION PURPOSES
Title: ROADING TYPICAL CROSS-SECTIONS E & F

Datum	Council Ref.	Scale	Size
HB2000	TBC	1:50	A1

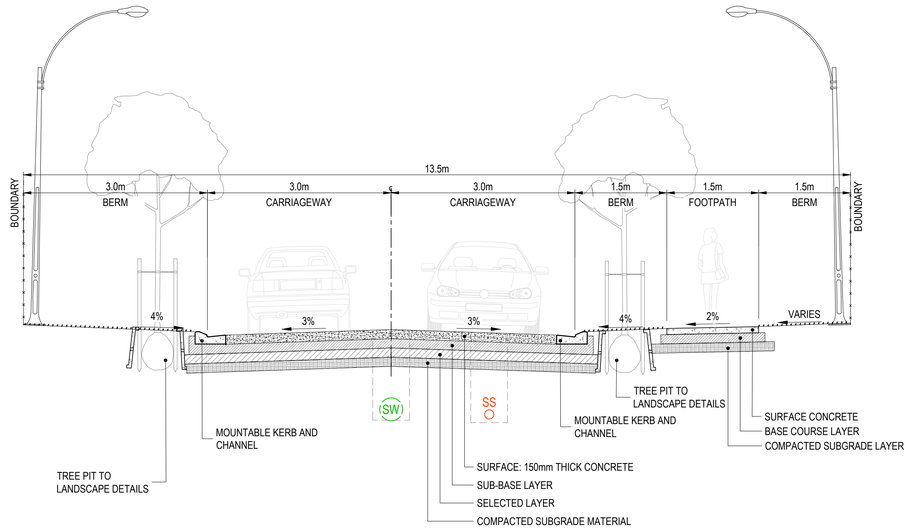
Drawing Number: H20180064-40-A-03
Revision: 1

CAD File: H20180064-40-A_Layouts.dwg

DATE PLOTTED: 2 August 2022 4:10 pm BY: HUGO NELL



15m CORRIDOR WITH LAY-BY PARKING - ROAD 02 (G, 40-A-01)
TYPICAL CROSS-SECTION
SCALE 1:50



13.5m CORRIDOR - ROAD 05-ROAD 09 (H, 40-A-01)
TYPICAL CROSS-SECTION
SCALE 1:50

Rev.	Date	Description	Appd.	Issued
1	22/07/2022	FOR RESOURCE CONSENT	MP	RR

CAD File: H20180064-40-A_Layouts.dwg

0 1 2 3 4 5m
SCALE 1:50 @A1

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DEVELOPMENT NOUS
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ENVIRONMENTAL • LANDSCAPE ARCHITECTURE

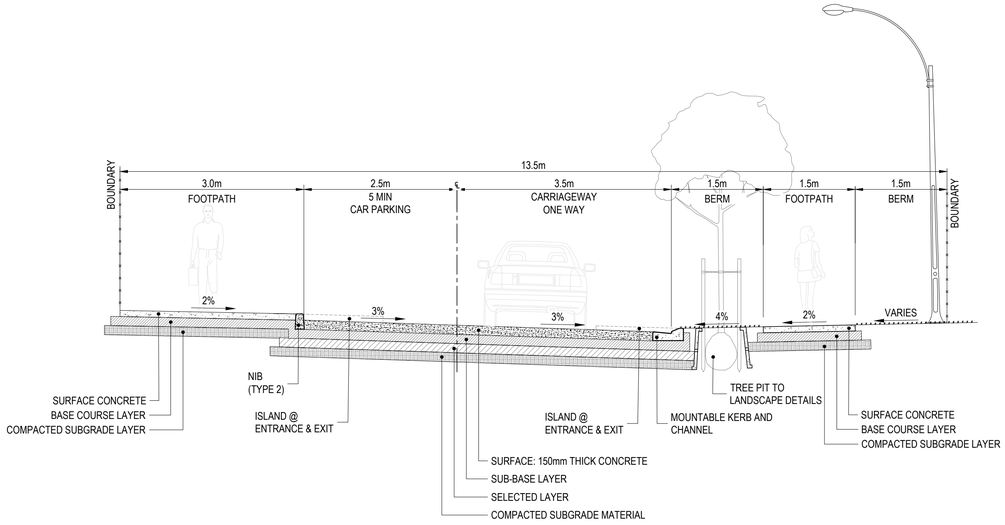
Fieldworked	-	Date -
Drawn	LB	Date 22/07/2022
Checked	JJP	Date 22/07/2022
Designed	RR	Date 22/07/2022
Approved	MP	Date 22/07/2022

Client: EVANS FAMILY TRUST
Project: POHUTUKAWA RESIDENTIAL SUBDIVISION DEVELOPMENT
WHIRINAKI
Status: FOR RESOURCE CONSENT
NOT TO BE USED FOR CONSTRUCTION PURPOSES
Title: ROADING
TYPICAL CROSS-SECTIONS G & H

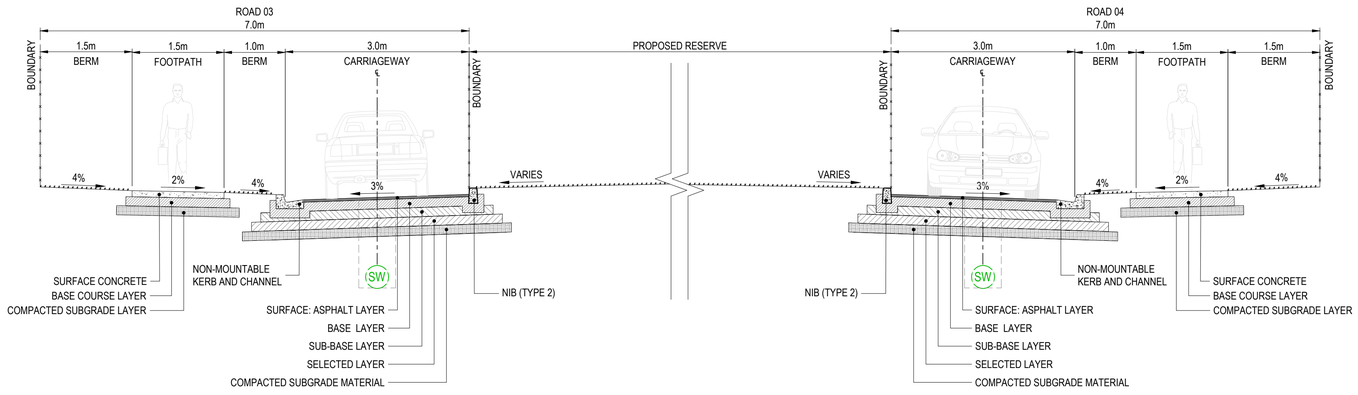
Datum	Council Ref.	Scale	Size
HB2000	TBC	1:50	A1

Drawing Number: H20180064-40-A-04
Revision: 1

DATE PLOTTED: 2 August 2022 4:11 pm BY: HUGO NELL



13.5m CORRIDOR - ROAD 10 (I / 40-A-01)
TYPICAL CROSS-SECTION
SCALE 1:50



8m CORRIDOR - ROAD 03 & 04 (J / 40-A-01)
TYPICAL CROSS-SECTION
SCALE 1:50

Rev.	Date	Description	Appd.	Issued
1	22/07/2022	FOR RESOURCE CONSENT	MP	RR

CAD File: H20180064-40-A_Layouts.dwg

0 1 2 3 4 5m
SCALE 1:50 @A1

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DEVELOPMENT NOUS
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ENVIRONMENTAL • LANDSCAPE ARCHITECTURE

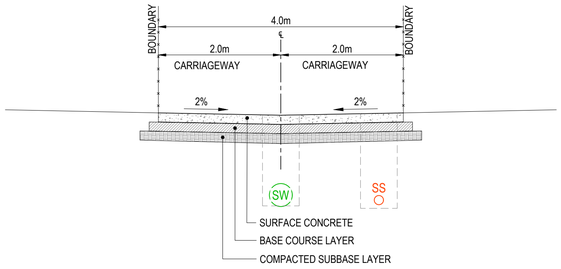
Fieldworked	-	Date -
Drawn	LB	Date 22/07/2022
Checked	JJP	Date 22/07/2022
Designed	RR	Date 22/07/2022
Approved	MP	Date 22/07/2022

Client: EVANS FAMILY TRUST
Project: POHUTUKAWA RESIDENTIAL SUBDIVISION DEVELOPMENT
WHIRINAKI
Status: FOR RESOURCE CONSENT
NOT TO BE USED FOR CONSTRUCTION PURPOSES
Title: ROADING
TYPICAL CROSS-SECTIONS I & J

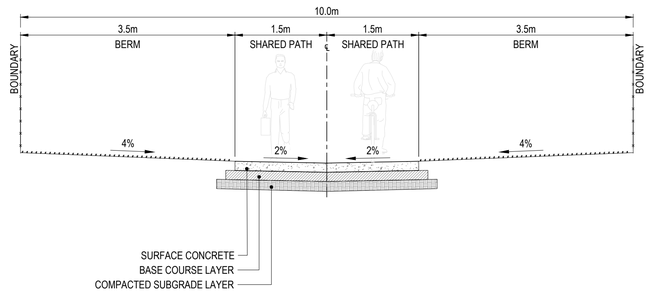
Datum	Council Ref.	Scale	Size
HB2000	TBC	1:50	A1

Drawing Number: H20180064-40-A-05
Revision: 1

DATE PLOTTED: 2 August 2022 4:11 pm BY: HUGO NELL



4m CORRIDOR - JOAL 01 & 02 (K, 40-A-01)
TYPICAL CROSS-SECTION
SCALE 1:50



10m CORRIDOR - SHARED PATH (L, 40-A-01)
TYPICAL CROSS-SECTION
SCALE 1:50

Rev.	Date	Description	Appd.	Issued
1	22/07/2022	FOR RESOURCE CONSENT	MP	RR

0 1 2 3 4 5m
SCALE 1:50 @A1

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DEVELOPMENT NOUS
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ENVIRONMENTAL • LANDSCAPE ARCHITECTURE

Fieldworked	-	Date -
Drawn	LB	Date 22/07/2022
Checked	JJP	Date 22/07/2022
Designed	RR	Date 22/07/2022
Approved	MP	Date 22/07/2022

Client: EVANS FAMILY TRUST
Project: POHUTUKAWA RESIDENTIAL SUBDIVISION DEVELOPMENT
WHIRINAKI
Status: FOR RESOURCE CONSENT
NOT TO BE USED FOR CONSTRUCTION PURPOSES
Title: ROADING
TYPICAL CROSS-SECTIONS K & L

Datum	Council Ref.	Scale	Size
HB2000	TBC	1:50	A1

Drawing Number: H20180064-40-A-06
Revision: 1

CAD File: H20180064-40-A_Layouts.dwg

DATE PLOTTED: 10 August 2022 1:57 pm BY: HUGO NELL

NOTES

1. ALL PROPOSED WORKS HAVE BEEN DESIGNED IN ACCORDANCE WITH HASTINGS DISTRICT COUNCIL ENGINEERING CODE OF PRACTICE (2020) AND ASSOCIATED DRAWINGS OR WHERE DEFERRED BY THAT CODE NZS4404:2010 (NEW ZEALAND STANDARD FOR LAND DEVELOPMENT AND SUBDIVISION INFRASTRUCTURE).
2. COORDINATES ARE IN TERMS OF NZGD2000 (HAWKES BAY CIRCUIT).
3. LEVELS ARE IN TERMS OF NEW ZEALAND VERTICAL DATUM 2016.
4. ALL PROPERTY BOUNDARIES AND DIMENSIONS ARE SUBJECT TO RESOURCE CONSENT APPROVAL & LAND TRANSFER SURVEY.
5. EXISTING SERVICES INFORMATION HAVE BEEN SOURCED FROM HDC GIS DATABASE & TOPOGRAPHIC SURVEY OF VISIBLE SERVICES.
6. CONTRACTORS TO LOCATE ALL EXISTING UNDERGROUND SERVICES PRIOR TO COMMENCING CONSTRUCTION WORK.
7. ALL PROPOSED WORKS HAVE BEEN DESIGNED IN ACCORDANCE WITH HAWKES BAY WATERWAY GUIDELINES FOR EROSION AND SEDIMENT CONTROL (HBWG 2009).
8. PIPE SIZES TO BE CONFIRMED AT DETAILED DESIGN STAGE.

LEGEND

- CADASTRAL INFORMATION
- EXTENT OF DEVELOPMENT
- 0.25 EG. CONTOUR LINES @0.25m INTERVALS
- 0.25 DESIGN CONTOUR LINES @0.25m INTERVALS
- LOT BODY
- EX. ROADS
- EX. WALKWAYS
- PROP. ROADS
- EX. DRAIN
- PROP. DRAIN RE-ALIGNMENT
- PROP. SWALE
- SW EX. STORMWATER INFRASTRUCTURE
- SWD EX. STORMWATER SUB-SOIL DRAIN
- SWP EX. STORMWATER SOAKAGE DRAIN
- PROP. STORMWATER MAIN LINES (PUBLIC)
- PROP. STORMWATER MAIN LINES (PRIVATE)
- PROP. STORMWATER MANHOLES (PUBLIC)
- PROP. STORMWATER MANHOLES (PRIVATE)

NEW ZEALAND STATE HIGHWAY 2

PROP. CULVERT WITH HEADWALLS

EX. SW TO BE DECOMMISSIONED

STORMWATER TREATMENT POND

POHUTUKAWA DRIVE

NORTH SHORE ROAD

ROAD 01 ROAD 02 ROAD 03 ROAD 04 ROAD 05 ROAD 06 ROAD 07 ROAD 08 ROAD 09 ROAD 10

JOAL 01 JOAL 02

LOT 100 LOT 200 LOT 201 LOT 202 LOT 203 LOT 204 LOT 300

LOT 1 LOT 2 LOT 3 LOT 4 LOT 5 LOT 6 LOT 7 LOT 8 LOT 9 LOT 10 LOT 11 LOT 12 LOT 13 LOT 14 LOT 15 LOT 16 LOT 17 LOT 18 LOT 19 LOT 20 LOT 21 LOT 22 LOT 23 LOT 24 LOT 25 LOT 26 LOT 27 LOT 28 LOT 29 LOT 30 LOT 31 LOT 32 LOT 33 LOT 34 LOT 35 LOT 36 LOT 37 LOT 38 LOT 39 LOT 40 LOT 41 LOT 42 LOT 43 LOT 44 LOT 45 LOT 46 LOT 47 LOT 48 LOT 49 LOT 50 LOT 51 LOT 52 LOT 53 LOT 54 LOT 55 LOT 56 LOT 57 LOT 58 LOT 59 LOT 60 LOT 61 LOT 62 LOT 63 LOT 64 LOT 65 LOT 66 LOT 67 LOT 68 LOT 69 LOT 70 LOT 71 LOT 72 LOT 73 LOT 74 LOT 75 LOT 76 LOT 77 LOT 78 LOT 79 LOT 80 LOT 81

Rev.	Date	Description	Appd.	Issued
1	22/07/2022	FOR RESOURCE CONSENT	MP	RR

CAD File: H20180064-50-A_Layouts.dwg

NORTH

0 20 40 60 80 100m

SCALE 1:1000 @A1

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DEVELOPMENT NOUS
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ENVIRONMENTAL • LANDSCAPE ARCHITECTURE

Fieldworked	Date -
Drawn LB	Date 22/07/2022
Checked JJP	Date 22/07/2022
Designed RR	Date 22/07/2022
Approved MP	Date 22/07/2022

Client: EVANS FAMILY TRUST

Project: POHUTUKAWA RESIDENTIAL SUBDIVISION DEVELOPMENT
WHIRINAKI

Title: STORMWATER LAYOUT

Status: FOR RESOURCE CONSENT
NOT TO BE USED FOR CONSTRUCTION PURPOSES

Datum	Council Ref.	Scale	Size
HB2000	TBC	1:1000	A1

Drawing Number: H20180064-50-A-01

Revision: 1

DATE PLOTTED: 10 August 2022 2:00 pm BY: HUGO NELL

NOTES

1. ALL PROPOSED WORKS HAVE BEEN DESIGNED IN ACCORDANCE WITH HASTINGS DISTRICT COUNCIL ENGINEERING CODE OF PRACTICE (2020) AND ASSOCIATED DRAWINGS OR WHERE DEFERRED BY THAT CODE NZS4404:2010 (NEW ZEALAND STANDARD FOR LAND DEVELOPMENT AND SUBDIVISION INFRASTRUCTURE).
2. COORDINATES ARE IN TERMS OF NZGD2000 (HAWKES BAY CIRCUIT).
3. LEVELS ARE IN TERMS OF NEW ZEALAND VERTICAL DATUM 2016, THE CONVERSION VALUE FROM HB LOCAL AUTHORITY 1972 TO NZVD 2016 IS -10.31m.
4. ALL PROPERTY BOUNDARIES AND DIMENSIONS ARE SUBJECT TO RESOURCE CONSENT APPROVAL & LAND TRANSFER SURVEY.
5. EXISTING SERVICES INFORMATION HAVE BEEN SOURCED FROM HDC GIS DATABASE & TOPOGRAPHIC SURVEY OF VISIBLE SERVICES.
6. CONTRACTORS TO LOCATE ALL EXISTING UNDERGROUND SERVICES PRIOR TO COMMENCING CONSTRUCTION WORK.
7. ALL PROPOSED WORKS HAVE BEEN DESIGNED IN ACCORDANCE WITH HAWKES BAY WATERWAY GUIDELINES FOR EROSION AND SEDIMENT CONTROL (HBWG 2009).

LEGEND

- CADASTRAL INFORMATION
- EXTENT OF DEVELOPMENT
- 0.25 EG. CONTOUR LINES @0.25m INTERVALS
- EX. ROADS
- EX. WALKWAYS
- SW EX. STORMWATER INFRASTRUCTURE
- SWD EX. STORMWATER SUB-SOIL DRAIN
- SWP EX. STORMWATER SOAKAGE DRAIN
- PRE-DEVELOPMENT STORMWATER CATCHMENT

PRE-DEVELOPMENT CATCHMENT DATA				PRE-DEVELOPMENT RUNOFF FLOWS				
Catchment Area Name	Catchment Area (ha)	Runoff Coefficient (C)	Time of Concentration (Tc)	1:2 year flood (m^3/s)	1:5 year flood (m^3/s)	1:10 year flood (m^3/s)	1:50 year flood (m^3/s)	1:100 year flood (m^3/s)
Pre-A	10,082	0,35	51 min	0,232	0,321	0,392	0,579	0,669
Pre-B	5,779	0,50	23 min	0,283	0,395	0,484	0,722	0,836

NEW ZEALAND STATE HIGHWAY 2

NORTH SHORE ROAD

POHUTUKAWA DRIVE

CATCHMENT A

CATCHMENT B

PRE-DEVELOPMENT

Rev.	Date	Description	Appd.	Issued
1	22/07/2022	FOR RESOURCE CONSENT	MP	RR

NORTH

0 20 40 60 80 100m

SCALE 1:1000 @A1

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DEVELOPMENT NOUS
SURVEYING • URBAN DESIGN • ENGINEERING • TOWN PLANNING
ENVIRONMENTAL • LANDSCAPE ARCHITECTURE

Fieldworked	-	Date -
Drawn	LB	Date 22/07/2022
Checked	JJP	Date 22/07/2022
Designed	RR	Date 22/07/2022
Approved	MP	Date 22/07/2022

Client: EVANS FAMILY TRUST

Project: POHUTUKAWA RESIDENTIAL SUBDIVISION DEVELOPMENT
WHIRINAKI

Title: STORMWATER
PRE-DEVELOPMENT CATCHMENT LAYOUT

Status: FOR RESOURCE CONSENT
NOT TO BE USED FOR CONSTRUCTION PURPOSES

Datum	Council Ref.	Scale	Size
HB2000	TBC	1:1000	A1

Drawing Number: H20180064-50-A-02

Revision: 1

CAD File: H20180064-50-A Layouts.dwg

DATE PLOTTED: 10 August 2022 3:28 pm BY: HUGO NELL

NOTES

1. ALL PROPOSED WORKS HAVE BEEN DESIGNED IN ACCORDANCE WITH HASTINGS DISTRICT COUNCIL ENGINEERING CODE OF PRACTICE (2020) AND ASSOCIATED DRAWINGS OR WHERE DEFERRED BY THAT CODE NZS4404:2010 (NEW ZEALAND STANDARD FOR LAND DEVELOPMENT AND SUBDIVISION INFRASTRUCTURE).
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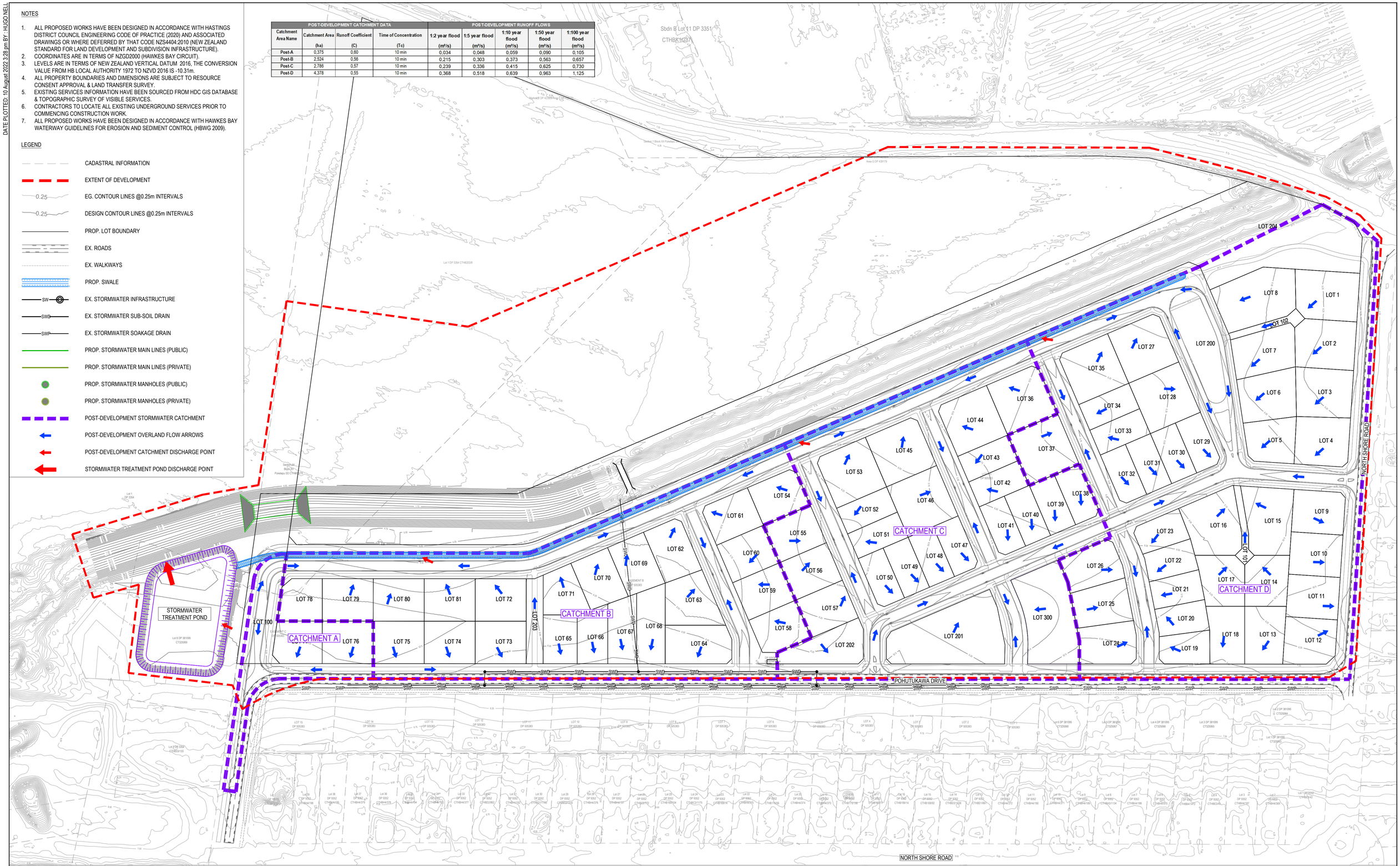
LEGEND

- CADASTRAL INFORMATION
- EXTENT OF DEVELOPMENT
- 0.25 EG. CONTOUR LINES @0.25m INTERVALS
- 0.25 DESIGN CONTOUR LINES @0.25m INTERVALS
- PROP. LOT BOUNDARY
- EX. ROADS
- EX. WALKWAYS
- PROP. SWALE
- SW EX. STORMWATER INFRASTRUCTURE
- SWD EX. STORMWATER SUB-SOIL DRAIN
- SWP EX. STORMWATER SOAKAGE DRAIN
- PROP. STORMWATER MAIN LINES (PUBLIC)
- PROP. STORMWATER MAIN LINES (PRIVATE)
- PROP. STORMWATER MANHOLES (PUBLIC)
- PROP. STORMWATER MANHOLES (PRIVATE)
- POST-DEVELOPMENT STORMWATER CATCHMENT
- POST-DEVELOPMENT OVERLAND FLOW ARROWS
- POST-DEVELOPMENT CATCHMENT DISCHARGE POINT
- STORMWATER TREATMENT POND DISCHARGE POINT

POST-DEVELOPMENT CATCHMENT DATA				POST-DEVELOPMENT RUNOFF FLOWS				
Catchment Area Name	Catchment Area (ha)	Runoff Coefficient (C)	Time of Concentration (Tc)	1:2 year flood (m^3/s)	1:5 year flood (m^3/s)	1:10 year flood (m^3/s)	1:50 year flood (m^3/s)	1:100 year flood (m^3/s)
Post-A	0,375	0,60	10 min	0,034	0,048	0,059	0,090	0,105
Post-B	2,524	0,56	10 min	0,215	0,303	0,373	0,563	0,657
Post-C	2,786	0,57	10 min	0,239	0,336	0,415	0,625	0,730
Post-D	4,378	0,55	10 min	0,368	0,518	0,639	0,963	1,125



POST-DEVELOPMENT

Rev.	Date	Description	Appd.	Issued
1	22/07/2022	FOR RESOURCE CONSENT	MP	RR

NORTH

0 20 40 60 80 100m

SCALE 1:1000 @A1

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DEVELOPMENT NOUS
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Fieldworked	Date -
Drawn LB	Date 22/07/2022
Checked JJP	Date 22/07/2022
Designed RR	Date 22/07/2022
Approved MP	Date 22/07/2022

Client: EVANS FAMILY TRUST

Project: POHUTUKAWA RESIDENTIAL SUBDIVISION DEVELOPMENT
WHIRINAKI

Status: FOR RESOURCE CONSENT
NOT TO BE USED FOR CONSTRUCTION PURPOSES

Title: STORMWATER
POST-DEVELOPMENT CATCHMENTS & FLOW DIRECTION ARROWS

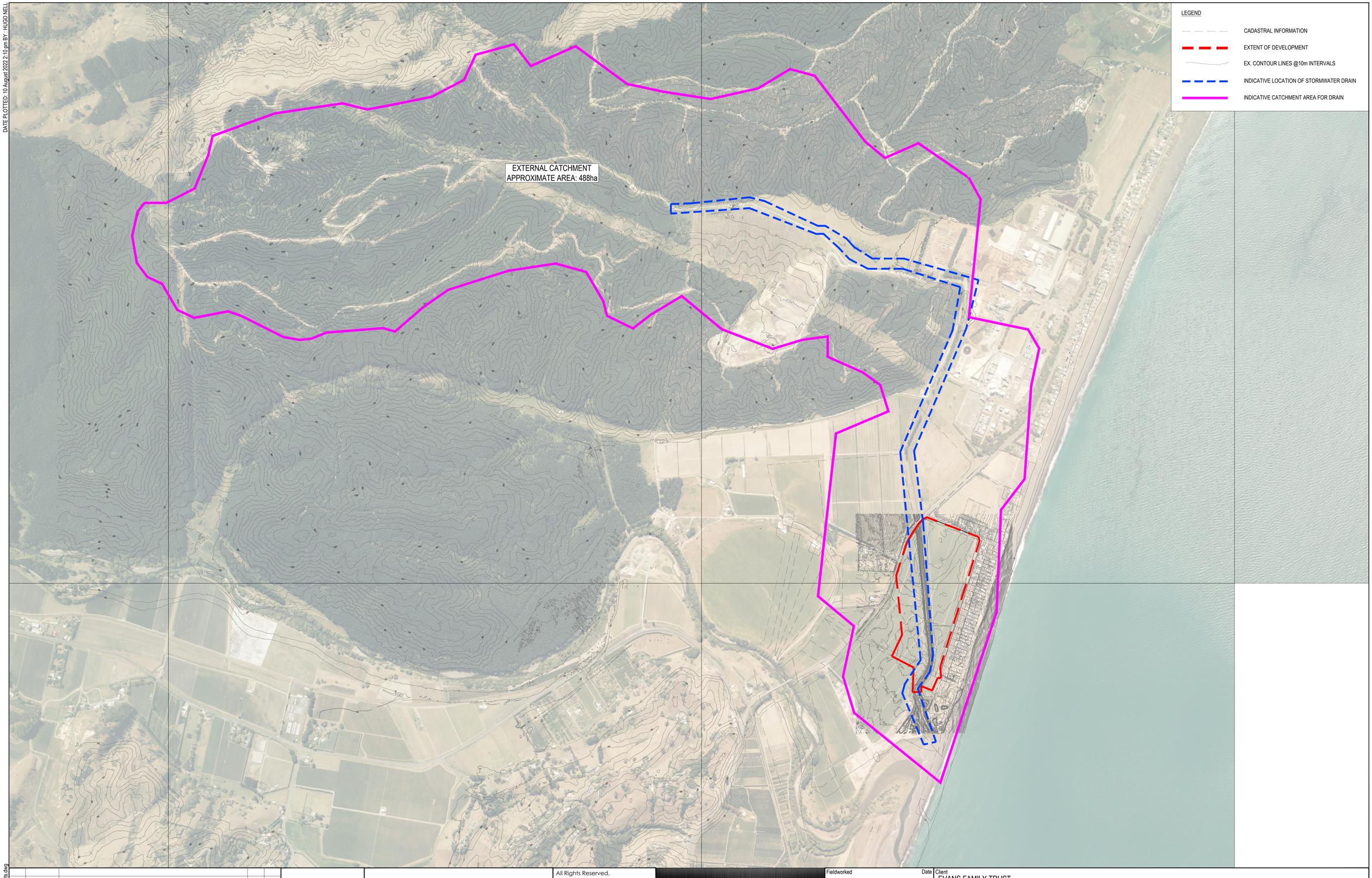
Datum	Council Ref.	Scale	Size
HB2000	TBC	1:1000	A1

Drawing Number: H20180064-50-A-03

Revision: 1

CAD File: H20180064-50-A_Layouts.dwg

DATE PLOTTED: 10 August 2022 2:10 pm BY: HUGO NELL



CAD File: H20180064-50-A_Layouts.dwg

Rev.	Date	Description	Appd.	Issued
1	22/07/2022	FOR RESOURCE CONSENT	MP	RR

NORTH

0 150 300 450 600 750m

SCALE 1:7500 @A1

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DEVELOPMENT NOUS
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Fieldworked	Date -
Drawn	Date LB 22/07/2022
Checked	Date JJP 22/07/2022
Designed	Date RR 22/07/2022
Approved	Date MP 22/07/2022

Client: EVANS FAMILY TRUST

Project: POHUTUKAWA RESIDENTIAL SUBDIVISION DEVELOPMENT
WHIRINAKI

Status: FOR RESOURCE CONSENT
NOT TO BE USED FOR CONSTRUCTION PURPOSES

Title: STORMWATER
INDICATIVE CATCHMENT AREA FOR DRAIN

Datum	Council Ref.	Scale	Size
HB2000	TBC	1:7500	A1

Drawing Number: H20180064-50-A-04

Revision: 1

DATE PLOTTED: 10 August 2022 2:11 pm BY: HUGO NELL

NOTES

1. ALL PROPOSED WORKS HAVE BEEN DESIGNED IN ACCORDANCE WITH HASTINGS DISTRICT COUNCIL ENGINEERING CODE OF PRACTICE (2020) AND ASSOCIATED DRAWINGS OR WHERE DEFERRED BY THAT CODE NZS4404:2010 (NEW ZEALAND STANDARD FOR LAND DEVELOPMENT AND SUBDIVISION INFRASTRUCTURE).
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LEGEND

- CADASTRAL INFORMATION
- EXTENT OF DEVELOPMENT
- 0.25 EG. CONTOUR LINES @0.25m INTERVALS
- PROP. LOT BOUNDARY
- EX. ROADS
- EX. WALKWAYS
- EXTENT OF PONDING

FLOOD EXTENT
FLOOD LEVEL RL = 5.7m
FILL BELOW 5.7m = 21 592m³

POHUTUKAWA DRIVE

NORTH SHORE ROAD

PRE-DEVELOPMENT

Rev.	Date	Description	Appd.	Issued
1	22/07/2022	FOR RESOURCE CONSENT	MP	RR

NORTH

0 20 40 60 80 100m

SCALE 1:1000 @A1

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Fieldworked	Date -
Drawn	Date 22/07/2022
LB	
Checked	Date 22/07/2022
JJP	
Designed	Date 22/07/2022
RR	
Approved	Date 22/07/2022
MP	

Client: EVANS FAMILY TRUST

Project: POHUTUKAWA RESIDENTIAL SUBDIVISION DEVELOPMENT
WHIRINAKI

Title: STORMWATER
PRE-DEVELOPMENT PONDING

Status: FOR RESOURCE CONSENT
NOT TO BE USED FOR CONSTRUCTION PURPOSES

Datum	Council Ref.	Scale	Size
HB2000	TBC	1:1000	A1

Drawing Number: H20180064-50-A-05

Revision: 1

CAD File: H20180064-50-A_Layouts.dwg

DATE PLOTTED: 10 August 2022 2:17 pm BY: HUGO NELL

NOTES

1. ALL PROPOSED WORKS HAVE BEEN DESIGNED IN ACCORDANCE WITH HASTINGS DISTRICT COUNCIL ENGINEERING CODE OF PRACTICE (2020) AND ASSOCIATED DRAWINGS OR WHERE DEFERRED BY THAT CODE NZS4404:2010 (NEW ZEALAND STANDARD FOR LAND DEVELOPMENT AND SUBDIVISION INFRASTRUCTURE).
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8. EFFLUENT FIELD AND TREATMENT PLAN DESIGNED BY OTHERS.

LEGEND

- CADASTRAL INFORMATION
- EXTENT OF DEVELOPMENT
- PROP.LOT BOUNDARY
- 20m CONTAMINATION BUFFER
- EX. WALKWAYS
- PROP. ROADS
- EX. SEWER (SS)
- PROP. PUB / PVT DN32 uPVC SEWER PRESSURE CONNECTION
- PROP. PUB / PVT DN100 uPVC SEWER PRESSURE MAIN
- PROP. PUB / PVT HOUSE CONNECTION - REFER TO DETAIL
- PROP. PUB / PVT NON-RETURN VALVE
- PROP. WASTE WATER FIELDS
- PROP. EARTH BUND

STATE HIGHWAY 2

BUFFER ZONE

20m

20.0m

9.8m

TOTAL AREA = 19 200m²

2400m² (x8)

250m

SEWER PLANT 1000m²

NORTH SHORE ROAD

POHUTUKAWA DRIVE

LOT 100

LOT 200

LOT 201

LOT 202

LOT 203

LOT 204

LOT 300

ROAD 01

ROAD 02

ROAD 03

ROAD 04

ROAD 05

ROAD 06

ROAD 07

ROAD 08

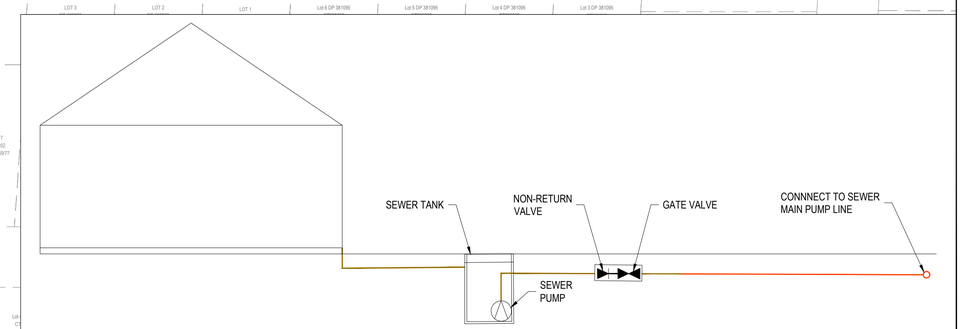
ROAD 09

ROAD 10

JOAL 01

JOAL 02

LOT 1 LOT 2 LOT 3 LOT 4 LOT 5 LOT 6 LOT 7 LOT 8 LOT 9 LOT 10 LOT 11 LOT 12 LOT 13 LOT 14 LOT 15 LOT 16 LOT 17 LOT 18 LOT 19 LOT 20 LOT 21 LOT 22 LOT 23 LOT 24 LOT 25 LOT 26 LOT 27 LOT 28 LOT 29 LOT 30 LOT 31 LOT 32 LOT 33 LOT 34 LOT 35 LOT 36 LOT 37 LOT 38 LOT 39 LOT 40 LOT 41 LOT 42 LOT 43 LOT 44 LOT 45 LOT 46 LOT 47 LOT 48 LOT 49 LOT 50 LOT 51 LOT 52 LOT 53 LOT 54 LOT 55 LOT 56 LOT 57 LOT 58 LOT 59 LOT 60 LOT 61 LOT 62 LOT 63 LOT 64 LOT 65 LOT 66 LOT 67 LOT 68 LOT 69 LOT 70 LOT 71 LOT 72 LOT 73 LOT 74 LOT 75 LOT 76 LOT 77 LOT 78 LOT 79 LOT 80 LOT 81



PROPOSED INTERNAL LOT SEWER PUMP ASSEMBLY
SCALE N.T.S

Rev.	Date	Description	Appd.	Issued
1	22/07/2022	FOR RESOURCE CONSENT	MP	RR

NORTH

0 20 40 60 80 100m
SCALE 1:1000 @A1

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DEVELOPMENT NOUS
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ENVIRONMENTAL • LANDSCAPE ARCHITECTURE

Fieldworked	Date -
Drawn	LB 22/07/2022
Checked	JJP 22/07/2022
Designed	RR 22/07/2022
Approved	MP 22/07/2022

Client: EVANS FAMILY TRUST
Project: POHUTUKAWA RESIDENTIAL SUBDIVISION DEVELOPMENT
WHIRINAKI
Title: SEWER LAYOUT

Status: FOR RESOURCE CONSENT
NOT TO BE USED FOR CONSTRUCTION PURPOSES

Datum	Council Ref.	Scale	Size
HB2000	TBC	1:1000	A1

Drawing Number: H20180064-60-A-01
Revision: 1

CAD File: H20180064-60-A_Layouts.dwg

DATE PLOTTED: 10 August 2022 2:23 pm BY: HUGO NELL

NOTES

1. ALL PROPOSED WORKS HAVE BEEN DESIGNED IN ACCORDANCE WITH HASTINGS DISTRICT COUNCIL ENGINEERING CODE OF PRACTICE (2020) AND ASSOCIATED DRAWINGS OR WHERE DEFERRED BY THAT CODE NZS4404:2010 (NEW ZEALAND STANDARD FOR LAND DEVELOPMENT AND SUBDIVISION INFRASTRUCTURE).
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7. ALL PROPOSED WORKS HAVE BEEN DESIGNED IN ACCORDANCE WITH HAWKES BAY WATERWAY GUIDELINES FOR EROSION AND SEDIMENT CONTROL (HBWG 2009).
8. PIPE SIZES TO BE CONFIRMED AT DETAILED DESIGN STAGE.

LEGEND

- CADASTRAL INFORMATION
- EXTENT OF DEVELOPMENT
- LOT BODY
- EX. ROADS
- EX. WALKWAYS
- PROP. ROADS
- W — EX. Ø100 WATER NETWORK
- W1 — EX. Ø150 WATER NETWORK
- W2 — EX. Ø160 WATER NETWORK
- PROP. DN40 WATER LINES (PUBLIC)
- PROP. DN63 WATER MAIN LINES (PUBLIC)
- PROP. DN100 WATER MAIN LINES (PUBLIC)
- PROP. DN32 WATER LINES (PRIVATE)
- W / ⧗ — EX. WATER TOBY / VALVE
- H / H — EX. FIRE HYDRANT / PROP. FIRE HYDRANT
- W / W — PROP. WATER TOBY (PUBLIC) / (PRIVATE)
- ⧗ / V — PROP. WATER VALVE (PUBLIC) / (PRIVATE)

Sbdn B Lot 11 DP 3351
CTHBK1/237

EX. Ø150 uPVC
EX. Ø160 MDPE

LOT 204
CONNECT TO EXISTING Ø150 WATER MAIN

EX. Ø160
EX. Ø150

LOT 8 LOT 1 LOT 7 LOT 2 LOT 6 LOT 3 LOT 5 LOT 4

LOT 200
JOAL 02
LOT 102
2 x DN32
DN100 HDPE
DN40
DN63 HDPE
ROAD 03
ROAD 04
NORTH SHORE ROAD

LOT 27 LOT 35 LOT 34 LOT 28 LOT 33 LOT 29 LOT 30 LOT 31 LOT 32

LOT 36 LOT 44 LOT 43 LOT 37 LOT 42 LOT 39 LOT 38 LOT 40 LOT 41

LOT 45 LOT 53 LOT 54 LOT 52 LOT 46 LOT 51 LOT 47 LOT 48 LOT 50 LOT 49

LOT 61 LOT 55 LOT 60 LOT 56 LOT 59 LOT 57 LOT 58 LOT 202

LOT 62 LOT 69 LOT 63 LOT 70 LOT 71 LOT 64 LOT 68 LOT 67 LOT 66 LOT 65

LOT 78 LOT 79 LOT 80 LOT 81 LOT 72 LOT 77 LOT 76 LOT 75 LOT 74 LOT 73

LOT 100
LOT 203
EASEMENT B DP 505383
EASEMENT C DP 505383
DP 505383 EASEMENT A

LOT 201 LOT 300 LOT 26 LOT 25 LOT 24

LOT 23 LOT 16 LOT 15 LOT 9 LOT 22 LOT 17 LOT 14 LOT 10 LOT 21 LOT 18 LOT 13 LOT 11 LOT 20 LOT 19 LOT 12

LOT 100
LOT 101
2 x DN32

ROAD 01
ROAD 05
ROAD 06
ROAD 07
ROAD 08
ROAD 02
POHUTUKAWA DRIVE

END CAP FOR FUTURE CONNECTION

CONNECT TO EXISTING Ø150 WATER MAIN

CONNECT TO EXISTING Ø150 WATER MAIN

CONNECT TO EXISTING Ø100 WATER MAIN

CONNECT TO EXISTING Ø100 WATER MAIN

CONNECT TO EXISTING Ø100 WATER MAIN

EX. Ø100

NORTH SHORE ROAD

Section 44 Block XII Puketapu SD CTHB1/279
Lot 1 DP 3354
Lot 1 DP 3354 CTHB2/38
Section 1 Block XII Puketapu SD
Marked F DP 425909 Area F DP 425909
Area G DP 439179
Marked H DP 455054
Lot 8 DP 381095 CT525099
Lot 2 DP 3354 CTHB33/133
Lot 1 DP 10028 CTHB49/1049
Lot 1 DP 10089 CTHBA1/835
Lot 1 DP 12408 CTHB23/1083
Lot 2 DP 12408 CTHB23/1090
Lot 5 DP 10089 CTHBD1/894
Lot 6 DP 10089 CTHBA2/1306
Lot 44 DP 9302 CTHB108/200
Lot 45 DP 9302 CTHB20/742
Lot 46 DP 9302 CTHB47/287
Lot 1 DP 9895 CTHB7/765
Lot 2 DP 9895 CTHB7/640
Lot 3 DP 9895 CTHBA1/126
Lot 2 DP 381095 CT525004
Lot 1 DP 381095 CT525003

Rev.	Date	Description	Appd.	Issued
1	22/07/2022	FOR RESOURCE CONSENT	MP	RR

CAD File: H20180064-70-A_Layouts.dwg

NORTH

0 25 50 75 100 125m
SCALE 1:1250 @A1

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DEVELOPMENT NOUS
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ENVIRONMENTAL • LANDSCAPE ARCHITECTURE

Fieldworked	Date -
Drawn	Date LB 22/07/2022
Checked	Date JJP 22/07/2022
Designed	Date RR 22/07/2022
Approved	Date MP 22/07/2022

Client: EVANS FAMILY TRUST
Project: POHUTUKAWA RESIDENTIAL SUBDIVISION DEVELOPMENT
WHIRINAKI
Title: WATER LAYOUT

Status: FOR RESOURCE CONSENT
NOT TO BE USED FOR CONSTRUCTION PURPOSES

Datum	Council Ref.	Scale	Size
HB2000	TBC	1:1000	A1

Drawing Number: H20180064-70-A-01
Revision: 1

DATE PLOTTED: 10 August 2022 4:14 pm BY: HUGO NELL

NOTES

1. ALL PROPOSED WORKS HAVE BEEN DESIGNED IN ACCORDANCE WITH HASTINGS DISTRICT COUNCIL ENGINEERING CODE OF PRACTICE (2020) AND ASSOCIATED DRAWINGS OR WHERE DEFERRED BY THAT CODE NZS4404:2010 (NEW ZEALAND STANDARD FOR LAND DEVELOPMENT AND SUBDIVISION INFRASTRUCTURE).
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LEGEND

- CADASTRAL INFORMATION
- EXTENT OF DEVELOPMENT
- LOT BODY
- EX. ROADS
- EX. WALKWAYS
- PROP. ROADS
- W — EX. Ø100 WATER NETWORK
- W1 — EX. Ø150 WATER NETWORK
- W2 — EX. Ø160 WATER NETWORK
- PROP. DN40 WATER LINES (PUBLIC)
- PROP. DN63 WATER MAIN LINES (PUBLIC)
- PROP. DN100 WATER MAIN LINES (PUBLIC)
- PROP. DN32 WATER LINES (PRIVATE)
- H — EX. FIRE HYDRANT SERVICE AREA (135m RADIUS)
- H — FIRE HYDRANT SERVICE AREA (135m RADIUS)
- W / H — EX. FIRE HYDRANT / PROP. FIRE HYDRANT
- W / ⧖ — EX. WATER TOBY / VALVE

Marked E DP 423909 Area E DP 439179

Sbdn B Lot 11 DP 3351 CTHBK1/237

EX. Ø150 uPVC

EX. Ø160 MDPE

EX. Ø150

EX. Ø160

EX. Ø150

EX. Ø150

EX. Ø100

EX. Ø100

EX. Ø100

EX. Ø100

NORTH SHORE ROAD

POHUTUKAWA DRIVE

ROAD 01

ROAD 02

ROAD 03

ROAD 04

ROAD 05

ROAD 06

ROAD 07

ROAD 08

LOT 100

LOT 200

LOT 201

LOT 202

LOT 203

LOT 204

LOT 300

DN100 HDPE

DN63 HDPE

DN40

2 x DN32

JOAL 02

LOT 102

JOAL 01

LOT 101

Rev.	Date	Description	Appd.	Issued
1	22/07/2022	FOR RESOURCE CONSENT	MP	RR

CAD File: H20180064-70-A_Layouts.dwg

NORTH

0 20 40 60 80 100m

SCALE 1:1000 @A1

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DEVELOPMENT NOUS
SURVEYING • URBAN DESIGN • ENGINEERING • TOWN PLANNING
ENVIRONMENTAL • LANDSCAPE ARCHITECTURE

Fieldworked	Date -
Drawn LB	Date 22/07/2022
Checked JJP	Date 22/07/2022
Designed RR	Date 22/07/2022
Approved MP	Date 22/07/2022

Client: EVANS FAMILY TRUST

Project: POHUTUKAWA RESIDENTIAL SUBDIVISION DEVELOPMENT
WHIRINAKI

Title: FIRE HYDRANT LAYOUT

Status: FOR RESOURCE CONSENT
NOT TO BE USED FOR CONSTRUCTION PURPOSES

Datum	Council Ref.	Scale	Size
HB2000	TBC	1:1000	A1

Drawing Number: H20180064-70-A-02

Revision: 1