Project Number: 2-34569.01

30a Huna Road Papakainga

Three Waters Feasibility Assessment

2 June 2023

CONFIDENTIAL

wsp

150 YEARS IN AOTEAROA

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Contents

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This Report ('**Report**') has been prepared by WSP exclusively for Ngati Awa Social and Health Services (NASH) ('**Client**') in relation to Three Waters requirements for development of 30A Huna Road, Whakatāne ('**Purpose**') and in accordance with the ACENZ Engineering NZ Short form Agreement with the Client dated 01/04/2023. The findings in this Report are based on and are subject to the assumptions specified in the Report. WSP accepts no liability whatsoever for any reliance on or use of this Report, in whole or in part, for any use or purpose other than the Purpose or any use or reliance on the Report by any third party.

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1 Introduction

NASH on behalf of the Kawarehe Trust have plans to develop part of the property at 30A Huna Road, Whakatāne with 58 dwellings. The site is currently under agricultural use.

The property, Allotment 28B6B2 Rangitaiki Parish SA, is owned by;

Emlyn Rua

Frederick Lawson

Patricia Phillips

Stanley Ratahi

Te Noho Lawson

The full parcel area is just over 15 ha, however only the southernmost 3.7 ha, located on a historic dune, is scheduled for development. The low-lying portion of the property will continue to be used for agriculture.

2 Stormwater

The proposed area to be developed is approximately 37,250m^2. Currently the area is in pasture grass. Following development, the area will be medium density standalone houses. The new site coverage with impermeable surfaces, including roofs, and driveways is approximately. 60% - 70% impervious.

There is no existing stormwater infrastructure, with stormwater currently flowing north from the raised area to the lower lying pasture area, eventually discharging to the Orini Canal, and to a low-lying area on the southern boundary.

2.1 Whakatāne Engineering Code of Practise (WDC ECoP) Requirements

4.1.9 Disposal of Stormwater

The volume of residential roof stormwater to be retained /disposed of to soakage shall be calculated as the run-off resulting from a 10% AEP storm, with a duration of ten minutes, using the rainfall intensity obtained as set out in Clause 4.1.11.1 and a run-off coefficient C of 0.9.

4.1.11.1 Rainfall Intensity specified for area is 16mm (without climate change considerations).

WDC advise that they require the RCP 8.5 Climate change scenario to be considered.

2.2 District Plan Requirements

In addition to 4.1.11.1

Rule 13.2.28.2 *A stormwater disposal system shall be provided to any residential, community or business activity or to any lot to be used for one or more of these activities which includes primary and secondary control systems that;*

a. *Shall be capable of disposing of surface water resulting from a rainfall event having 10% probability of occurring annually. This system shall contain or dispose of stormwater on site, or direct it into a designated stormwater reticulation and disposal system;*

b. *Shall provide a secondary flow system capable of conveying surface water resulting from a rainfall event having a 1% probability of occurring annually to ensure that surface water shall not enter buildings (detached garages excluded);*

Rule 13.2.28.4 *All land use and subdivision development in the Whakatāne Urban Area (including the Hub, Coastlands, Piripai and the Gateway industrial area) shall comply with water quantity and quality provisions in the Whakatāne Urban Stormwater Catchment Management Plan and in addition;*

a. *All activities shall ensure that stormwater shall be detained to discharge at levels no greater than pre-development levels;*

b. *Stormwater from properties that are not located in the good ground soakage areas as indicated by the blue shaded areas on the Whakatāne Urban Area – Ground Soakage Plan. Appendix 13.7.4 shall not be discharged into the Council storm water system unless approved by Council.*

The minimum building platform levels will be 3.2m RL (WDC Datum).

2.3 BOPRC Requirements

Below is the BOPRC standard wording for stormwater detention requirements on the Rangitāiki plains:

"Rangitāiki Drainage Scheme

The proposed subdivision / land use activity [choose one] is located within a catchment that flows into the BOPRC managed Rangitāiki Drainage Scheme.

BOPRC is an affected party based on the nature of the infrastructure and environmental purpose for the control scheme. BOPRC opposes the proposed subdivision / land use activity [choose one] unless a condition of consent is imposed requiring on-site detention be provided to prevent an increase in volume of runoff from the site in a 72-hour 100 year including climate change event. This detention should be to a minimum standard of 80% of pre-development peak discharge in accordance with the Stormwater Management Guidelines for the Bay of Plenty region (BOPRC Guideline 2012/01).

If the requirement for this post-development stormwater discharge mitigation condition is not provided for, BOPRC requests the application be declined or publicly notified.

Furthermore, the impacts on flood levels in the flood prone area from earthworks infilling the flood storage must be 100% mitigated if they are more than minor. "

BOPRC require that the RCP 8.5 climate change scenario is considered.

Indicative required volume for compliance is 4,200m^3. There is ample room on the legal parcel, north of the development to provide this storage.

2.4 Hydrological conditions including Climate Change Scenario

The current HIRDS V4.0 10-year 10-minute rainfall is 17.9mm.

The HIRDS V4.0 RCP 8.5 10-year 10-minute rainfall to 2100 is 24mm.

The HIRDS V4.0 RCP 8.5 100 Year 10-minute rainfall to 2100 is 39.6mm.

The HIRDS V4.0 RCP 8.5 100y 72-hour rainfall to 2100 is 360mm.

2.5 Peak Flow and attenuation

Pre-development peak flow for the 10-minute 10% event was determined using the rational method. Peak flow from the area of the legal property to be developed, pre development is estimated to be 447 l/s.

Post development assuming a runoff coefficient for the site of 0.6, the flow rate would be 894 l/s.

450l/s must be attenuated.

2.6 Required Retention for 1 in 10-year event.

From the WDC ECOP retention for the 1 in 10-year, 10-minute event is required. The required volume for the RCP 8.5 to 2100 event is approximately 585m^3 across the whole development (including roofs, roads and footpaths).

This could be provided between the houses in stormwater crate type soakage systems. The soil and elevation at the site means that two layers of the system will be able to be used, meaning 3.3m^2 of soakage for every 100m of hard area. In practise a combination of stormwater attenuation via "milk crate" style soakage cells for houses and possibly driveways would be used, and soakage for roading would be retained in a stormwater treatment system elsewhere. Options for this include a pond or swale, probably to the north and east of the site, in combination with rain gardens incorporated into the road and green spaces.

The soil type and site elevation mean that retention is feasible within the development.

2.7 Stormwater considerations

2.7.1 Site Soil Type

From the BOPRC Soil overlay, the soil type over the site (orange in the image below) is Kopeopeo coarse loamy sand, a Composite yellow-brown pumice soil yellow-brown sand, classed as well drained.

The surrounding soil (purple in the image below) is Rewatu fine sandy loam, a Typic Orthic Gley Soil, considered imperfectly drained.

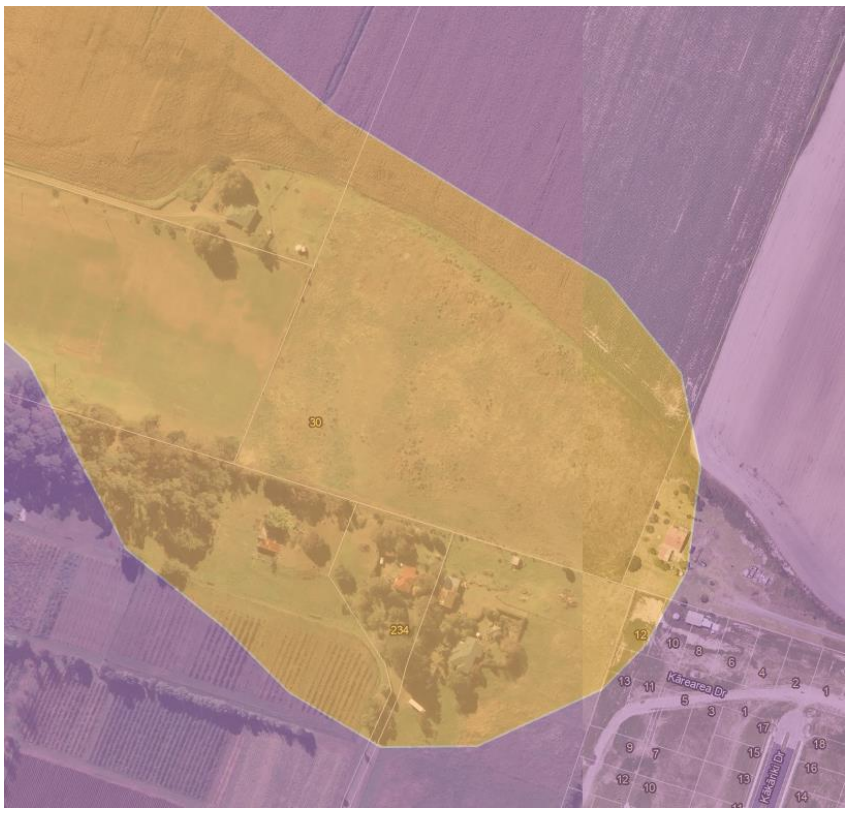

Figure 1 Soil types

2.7.2 Roof Water Treatment

Roof water will need to be retained and soaked on site. Soakage can be to soak holes, or other proprietary soakage devices (stormwater crates - Ecobloc or equivalent) or can be captured in slim line rainwater tanks adjacent to buildings, with the following individual minimum retention requirements for each square metre of roof, driveway, shed or paved area.

Table 1 Indicative stormwater detention volumes and appropriate types

Building	Minimum detention volume per 100m² to meet ECOP requirements (m³)* including climate change	Suggested location – to be determined by the architect
Roof (runoff coefficient (RC) 0.9)	2.16	Slimline tanks to the west of the building, and/or soak holes or other soakage types
Asphalt or concreted area (RC = 0.85)	2.04	Adjacent to paved areas; soak holes or other soakage devices. Roadside drains, mid-road rain gardens
Porous pavers – sealed joints (driveways or patios) (RC = 0.8)	1.92	Adjacent to paved areas; soak holes or other soakage devices.
Porous pavers – open joints (driveways or patios) (RC = 0.6)	1.44	Adjacent to, or underneath paved areas; soak holes or other soakage devices.

*WDC ECOP requirements with RCP6.0 to 2100 from HIRDS

Each soakage or storage option will have a high-level overflow, for flow above the 10-year return design event, which we propose will discharge to an overland dish channel, or roadside kerb and channel to the stormwater system for the development.

2.7.3 Driveway and Paved area Stormwater Water Treatment

Driveways and other paved areas can be sloped to stormwater detention devices. These will be stormwater retention in the form of soakage rings, stormwater crates, 'aqua comb', ecobloc or other proprietary stormwater detention solutions, or a pond providing the required stormwater storage volumes.

These areas are designed to retain stormwater and soak it away if the soil allows. But also, to slowly release the stormwater into stormwater management to the north of the development (Orini Canal).

No additional discharge is possible to the Kope Canal, due to the volume of stormwater which already discharges into this water way from the surrounding catchment. Kope canal is a flood management waterway.

Pathways and carparks can be constructed of porous concrete or porous pavers such as Firth 'Flowpave' or equivalent product to slow stormwater. Pavers are underlain with filter cloth and a permeable basecourse which doubles as stormwater soakage/retention for the catchment. Excess rainwater overflows the permeable surface and is disposed to roadside kerb and channel.

Permeable basecourses should have a minimum of 30% voids. Scoria or pumice are unsuitable, as they crush over time (Auckland Council Permeable Pavement Construction Guide)

Current discharge from the site would be in the order of 358 m^3 for a 10-year return, 10-minute event. Post development the discharge from the site shall be no greater than before development, for the design event.

2.8 Secondary Flow event Conveyance

Secondary flow paths are required for the 1% return event. These can be provided by kerb and channel, dish channels and a stormwater pond to the north with a diffuse overflow to agricultural land to the north.

The 1 in 100 year developed peak flow is 1,474 l/s. Conveyance for this volumetric flow must be provided to a disposal location.

Currently the site elevation varies between 3 and 5m RL, with the cropped area to the north at 1 – 2m RL. Stormwater drainage to the north, ultimately to the Orini canal is feasible via the existing network of drainage channels;

Figure 2 Possible Stormwater disposal route north

2.9 Stormwater Feasibility

Stormwater management at the site is feasible. The recommended option is onsite detention with a pond or swale providing capacity for Q_{100} and overdesign events, discharging to the Orini Canal Catchment.

3 Potable water

3.1 Whakatāne Engineering Code of Practice Requirements

From 6.1.3;

In urban residential areas the following demands should be assumed: ·

- Average daily requirement /person 240 litres per head per day ·
- Average number of people per dwelling 3.1.
- Peak flow factor Four (4) times daily average flow

3.2 Base flow

From the Whakatane ECOP recommendations;

- Average daily water requirement will be 43,152 L/day.
- Required Peak flow will be 120 L/min.

Preliminary assessment of the potable water available at Karearea Drive by the Whakatane District Council (WDC) have indicated that these additional flows will be within the capacity of the existing WDC reticulation at the site, this will require confirmation by Council.

Water supply may also be accessed from the Huna Road main, and WDC have indicated that there is sufficient water supply to provide water to the Kawarehe Trust subdivision. Council require that the Kawarehe Trust subdivision provide a 100mm main from Huna Road along the subdivision driveway. This 50mm main is due to be upgraded to 200mm.

Figure 3 - Location of WDC water supply, relative to Huna Road proposed subdivision.

With the current water reticulation configuration, firefighting requirements are not able to be serviced by the existing council water supply.

The firefighting requirements are FW2 (from NZFS Firefighting water Supplies Code of Practise; Table 1), for which the required water supply is (from Table 2) two hydrants one at least 135m from the development and one within 270m each supplying 750 l/min or 12.5 l/s.

Water will need to be stored on site for firefighting purposes – this could be trickle fed from either Huna Road, or Karearea Drive to a series of large tanks. The required storage volume requires assessment. Alternatively, stormwater could be stored for firefighting purposes.

Future planned upgrades to the Whakatane potable water reticulation – in particular, a ring main encompassing the Kawarehe Trust subdivision – may see firefighting water become available from the council supply in the future.

3.3 Potable Water Feasibility

Potable water supply from Whakatane municipal supply is feasible assuming WDC can confirm supply of the required volume.

In the immediate term, firefighting water will need to be stored onsite, as there is insufficient water available in the town supply.

The Trust need to consider whether they will retain ownership (and maintenance) of the potable water supply, or vest the infrastructure with Council, including easement over all of the supply infrastructure.

4 Wastewater

4.1 Whakatāne Engineering Code of Practice Requirements

5.1.4.1 Domestic Flow

Average sewage flow = 200 litres per head per day waste water production (from AS/NZS 1547:2012)

Peak & dilution flow factor = 5 times daily average sewage flow

Minimum required velocity = 0.75 metres per second

4.2 Base flow and Peak flow

Wastewater volume estimate

Site	Estimated current wastewater flow (l/day)	Peak Wastewater flow (l/min)	Peak Wastewater flow (l/s)
30A Huna Road 58 houses (WDC estimate)[1]	35,960	125	2.08
58 houses [2]	46,000	160	2.66

1. Wastewater volume derived from WDC ECOP requirements (average house occupancy of 3.1 occupants
2. Wastewater volume derived from number of houses and peak occupancy from NZS 1547

After allowing for the 5x peaking factor using the WDC estimation method, the instantaneous peak flow is 2.08 l/s (daily average).

There are two possible options for wastewater for the development;

- Onsite disposal
- Connection to council sewer.

These options are explored further here;

4.3 Onsite Disposal

Using a number of assumptions to determine the required area for wastewater disposal including;

- The WDC average of 3.1 people per dwelling
- Primary treatment only, via septic tank
- Standard trench disposal
- Class 3 loam soil with loading rate of 15 mm/day

The required disposal area for each house would be 141 m^2 (more or less).

This area is equivalent to approx. 27% of the total area earmarked for subdivision, which is not feasible with the proposed site coverage.

A community secondary treated wastewater system is an option. This would include septic tanks for each house, or a system of combined septic tanks, with outlet filters and gravity overflow to

pump station. The pump station would serve as emergency storage, and to feed a secondary treatment system.

Secondary treatment would be recommended as the required area is significantly smaller than for primary treated wastewater. An application rate of up to 30-50mm/day would be appropriate for this site, meaning the required disposal area would be half that required for primary treated wastewater.

This could be located on the same legal parcel but to the north of the houses. It is likely that the disposal area would have to be raised to avoid flooding, with significant additional construction cost.

Secondary treated wastewater would require approx. 4,060m^2 for disposal. This is a significant area, and a system of this size would require active management. This approach is not recommended.

4.4 Connection to Council Sewer

Preliminary assessment by WDC has indicated that connection to council sewer is feasible, as the nearby Shaw Road Subdivision sewer has been designed to connect to additional housing to the west. Further testing is being carried out to determine what improvements will be required to the Shaw Road sewage pump station.

A condition of connection would be that the Kawarehe Trust development could include improvements to the sewerage pump station in the Shaw Road development to ensure the additional wastewater volume is able to be conveyed. There may also be a requirement to contribute to the upgrade of the Whakatane Wastewater Treatment plant, depending on the available capacity in the system.

It is assumed that a development contribution will cover these requirements.

The site currently geographically lends itself to gravity sewer to a low point to the north. If this option were chosen there would also need to be a pump station within the Kawarehe Trust Subdivision and rising main to the Shaw Road subdivision.

During the development phase, cut to fill will be carried out to even out site levels. During this phase it would be possible to landscape such that the properties to the north west were highest, and to create grade to the south east, meaning that the whole system could possibly be gravity fed to the Shaw Road infrastructure, avoiding the need for a pumpstation within the Kawarehe Trust development. This would be the preferred option.

Note that from the proposed layout there would be 5 houses at the north west extent of the development which may require a small pumpstation, or pressure sewer to connect to a gravity sewer, as the natural landform at this point is lower than the remainder of the subdivision.

This would be confirmed at developed/detailed design phase. We recommend that an assessment of the cost of any additional fill, vs the cost of a pump station be carried out.

As per the potable water supply assessment an easement over the property at 234 SH30 will be required to connect to the existing Shaw Road Development waste water system.

The minimum gradient for sewer pipe is 0.55% for 150mm pipe and 0.37% for 200mm pipe. If connection to the existing sewer network at Karearea Drive is feasible from a capacity perspective (pipe dia. at Karearea Drive not known) then gravity sewer from the Huna Road development to this point is also feasible.

Should connection to the sewer manhole at Kotare Drive be required, a pump station may be required. It would be necessary to consult with the property owner of #234 SH30 in order to develop this option further.

4.5 Wastewater Feasibility

WSP is of the opinion that for the number of houses planned, onsite wastewater is not feasible.

Disposal via connection to the council sewer is feasible, assuming Martin Van der Aa of Dawn Parade grants easement across 234 State Highway 30, and capacity is available within the WDC system.

Connection would be at council manhole in the Shaw Road Subdivision, either at the end of Karearea Drive (preferred), or Kotare Drive. It may be possible to connect to council sewer without the need for sewer pump station, depending on the connection point.

A development contribution will likely be required.

The Trust need to consider whether they will retain ownership (and maintenance) of the wastewater infrastructure, or vest the infrastructure with Council, including easement over all of the disposal infrastructure.

5 Service Locations

Current service locations are shown in the following screen shot from the WDC GIS service overlays;

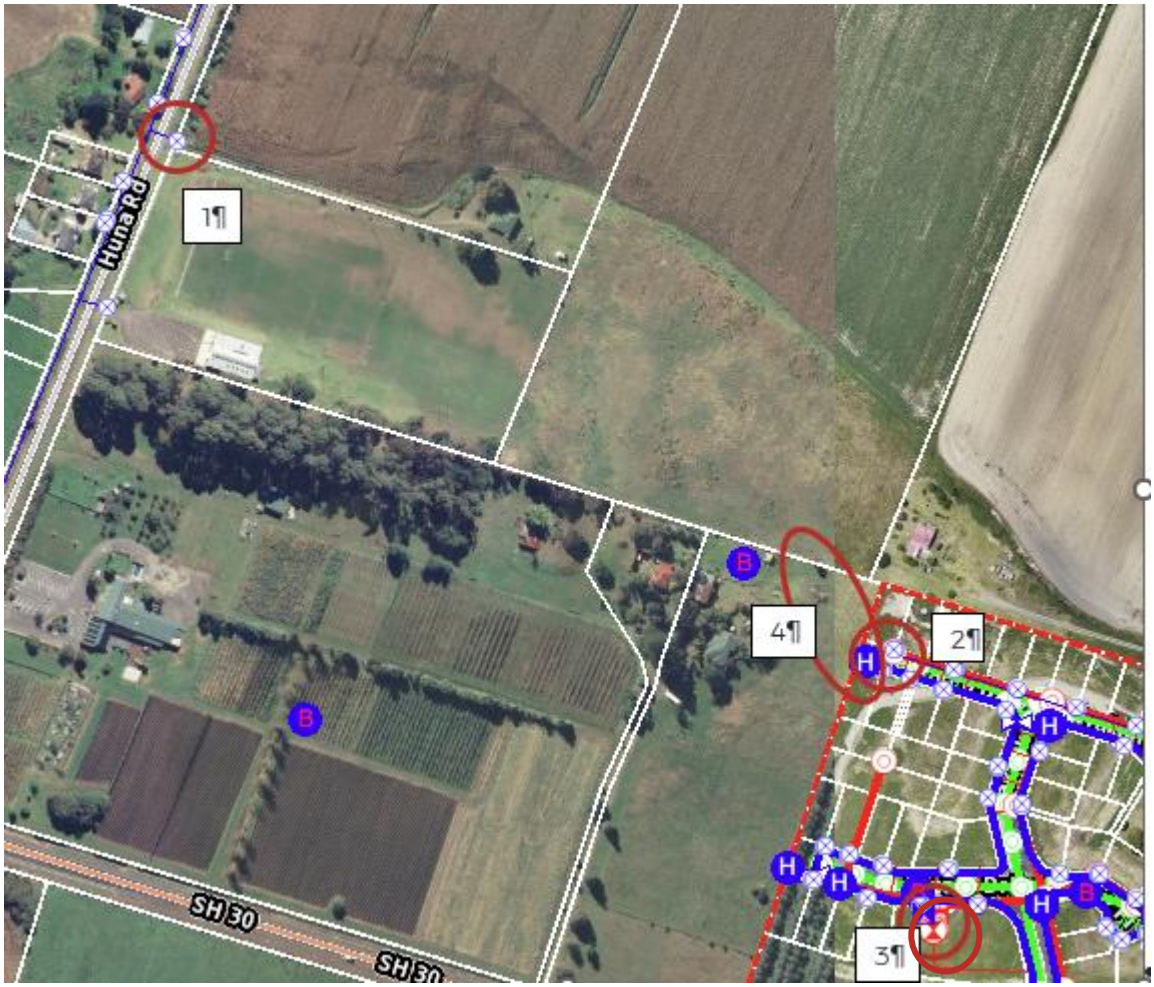

Figure 4 Existing service locations

1. Potable Water Hydrant
2. Existing stormwater line and existing sewage manhole
3. Wastewater Pump station location
4. Easement requirement

Figure 5 Proposed Sewer layout.

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