ENVELOPE

INFRASTRUCTURE REPORT

234, Rangiuru Road, Otaki

DOCUMENT CONTROL RECORD

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APPENDICES

1.0 INTRODUCTION

1.1 THE SITE

The development site is located at 234, Rangiuru Road, Otaki. The existing lot is formally described as Lot 2 DP 42874 and is 2.39 hectares in size.

The site is currently a vacant lot with no existing buildings or permanent structures, aside from some temporarily parked farm machinery. The proposed development comprises a 43-lot subdivision, which will be accessed via a new road connecting to Rangiuru Road at a single intersection.

Figure 1: Locality Plan

1.2 TOPOGRAPHY & ORIENTATION

The existing site is relatively flat and existing contours slopping away from Rangiuru Road towards an existing stream north of the site. The levels across the site are uniform with the neighbouring properties.

1.3 EXISTING LAND USE

The site is predominantly grass covered with a small number of livestock kept on site.

1.4 PROPOSED DEVELOPMENT

The proposed development will create:

- 43 residential lots, each with one residential dwelling.
- 1 Road to vest
- 1 Drainage Reserve to vest, contains 2 ponds and a swale.
- 1 JOAL

This report assesses feasibility of the stormwater and wastewater drainage, water supply and other associated infrastructure to cater for the proposed development.

2.0 EARTHWORKS

2.1 GENERAL DESCRIPTION

Earthworks are required to facilitate this development, and these are shown on our 200 series plans. Filling will be undertaken to enable the residential lots to have building platforms above the 1% AEP flood level (including freeboard).

To complete the site subdivision, minor earthworks will be required for the following activities within the site:

- Stripping topsoil and stockpile on site (0.3m cut depth).
- Import 26,050 m^3 of fill to site, with a maximum fill depth of 1.2m from the existing ground level.

Table 1: Earthwork Volumes

	Area (m^2)	Cut (m^3)	Fill (m^3)	Balance (m^3)
Bulk Earthworks	23,997	208	26260	26,050 (Fill)
Topsoil Strip	23,997	7,197	-	7,197 (Cut)
Import Fill	23,997	-	26,050	26,050 (Fill)

The earthwork volumes have been calculated to the finished subgrade level, assumed to be 200 mm below the finished ground level. This provides allowance for the import of road basecourse materials, building foundation preparation, and topsoil re-spread. It is anticipated that approximately 50% of the stripped topsoil will be removed from site.

We have allowed for a small amount of unsuitable and contaminated material to be cut and removed off site. Contaminated land and remedial works can be found in the PSI/DSI and RAP reports by ENGEO.

2.2 EARTHWORKS REPORT

A separate Earthworks Report has been prepared and is included in Appendix 2. It outlines the proposed earthworks construction methodology, and supporting erosion and sediment controls, including the sediment retention pond, diversion channels, stabilised access, and associated monitoring requirements necessary to complete the works efficiently and in accordance with Greater Wellington Regional Council's Erosion and Sediment Control Guide for Land Disturbing Activities in the Wellington Region.

3.0 ROADS AND ACCESS

3.1 GENERAL DESCRIPTION

Our 3000-series plans detail the proposed roading layout, which includes:

- One new public road to vest, connecting to Rangiuru Road via a new intersection.
- One JOAL accessed from Road 01.
- Four lots with new vehicle crossings directly onto Rangiuru Road. These lots will provide on-site turning areas to ensure no reversing onto Rangiuru Road, with detailed designs to be confirmed at the Building Consent Stage

Table 2: Road Dimensions

Road ID	Overall Legal Width (m)	Carriageway (m)	Parking/Berm	Footpath (m)
Road 1	15.0	6.0	2x2.25	2x 1.5
JOAL 1	4.5	3.6	-	-

Road gradients across the development are very flat, with a minimum grade of 0.5%. Several lots will be serviced by shared driveways, each supported by appropriate access easements.

Vehicle tracking for Road 01 has confirmed that a medium rigid truck can safely turn within the cul-de-sac. All lots will provide on-site turning areas to avoid any reversing movements onto public roads.

A total of 13 on-street parking spaces have been provided. Given the high number of driveways, parking locations have been carefully planned to avoid conflicts. We have worked closely with the landscape architect and traffic engineer to ensure all driveways and JOALs meet the required visibility standards.

4.0 WASTEWATER

4.1 EXISTING WASTEWATER

There are existing DN150 public wastewater mains within Rangiuru Road; however, due to the site's topography, a gravity connection to the existing network is not feasible.

4.2 PROPOSED WASTEWATER

As a gravity connection to the existing wastewater main is not feasible, a new wastewater pump station will be constructed as part of the development. This station will pump flows to a new manhole on the existing Rangiuru Road wastewater network. The pump station will be designed and constructed in accordance with Council standards, is intended to be vested to Council, and will be confirmed in detail through the Engineering Approval process. The pump station is proposed to be located within the drainage reserve.

Table 3: Wastewater Flows

ID	Number of Lots	Population per Lot	ADWF (Litres/Second)	PDWF (Litres/Second	PWWF (Litres/Second)
PS 1	43	2.5	0.313	0.781	1.56

Preliminary discussions have also considered the potential to service the eastern lot at 254 Rangiuru Road, currently being developed by KCDC, via a gravity connection to the proposed pump station. This may offer an opportunity for a shared asset; however, insufficient design information is available at this stage to confirm a connection. The high-water table may also make achieving the required depth challenging, though further discussions on this option are welcomed.

4.3 WASTEWATER IMPACT ASSESSMENT

The HAL Development Impact Assessment confirms that the proposed 43-lot subdivision can be serviced by the existing downstream wastewater network, with the development generating a PWWF of 1.56 L/s and sufficient capacity in the DN150 line and Pump Station 13 to accommodate additional flows. While surcharge occurs further downstream at the terminal pump station (OSP00012), this is an existing network constraint unrelated to the development and is expected to be resolved through KCDC's planned upgrades, including the Pump Station 13 diversion to the WWTP and Aotaki Street gravity upgrade, which together reduce overflow risk to acceptable levels.

The full assessment can be found in Appendix 5.

5.0 STORMWATER

5.1 GENERAL

The proposed stormwater management system is summarised as follows:

1. **Lot Runoff (10% AEP):** Stormwater from residential lots will be collected via roof downpipes and directed into individual rainwater reuse tanks. Overflow from these tanks will discharge into the underground piped network through lot-specific laterals.

2. **Road Runoff (10% AEP):** Road stormwater will drain to roadside raingardens, which provide the primary treatment function. Treated water will enter the network via subsoil drains, or overflow through the scupper manhole within each raingarden before being conveyed to the piped system.

3. **Major Flow (1% AEP):** During larger storm events, overland flow will be conveyed along road corridors and directed towards the two proposed attenuation ponds.

4. **Attenuation Ponds**: Two attenuation ponds are proposed to manage post-development peak flows and reduce them to pre-development discharge rates. Splitting attenuation across two ponds enables flows to be more evenly distributed and better reflect the natural catchment pattern.

5. **Discharge Swale:** A planted discharge swale is proposed along the northern boundary, equipped with a concrete level spreader to distribute flows evenly. As the ponds discharge into the swale via a bubble-up manhole, water will overtop the spreader bar uniformly, creating sheet flow which will convey across the 3m buffer zone to the boundary, then existing stream. This approach replicates pre-development sheet flow characteristics rather than concentrating flows at a single discharge point.

5.2 STORMWATER CATCHMENTS

The site comprises three primary pre-development catchments that currently discharge via overland sheet flow toward the stream to the north. The stormwater design methodology has been developed to replicate these pre-development flow patterns as closely as practicable. The existing catchment extents are shown in Figure 2.

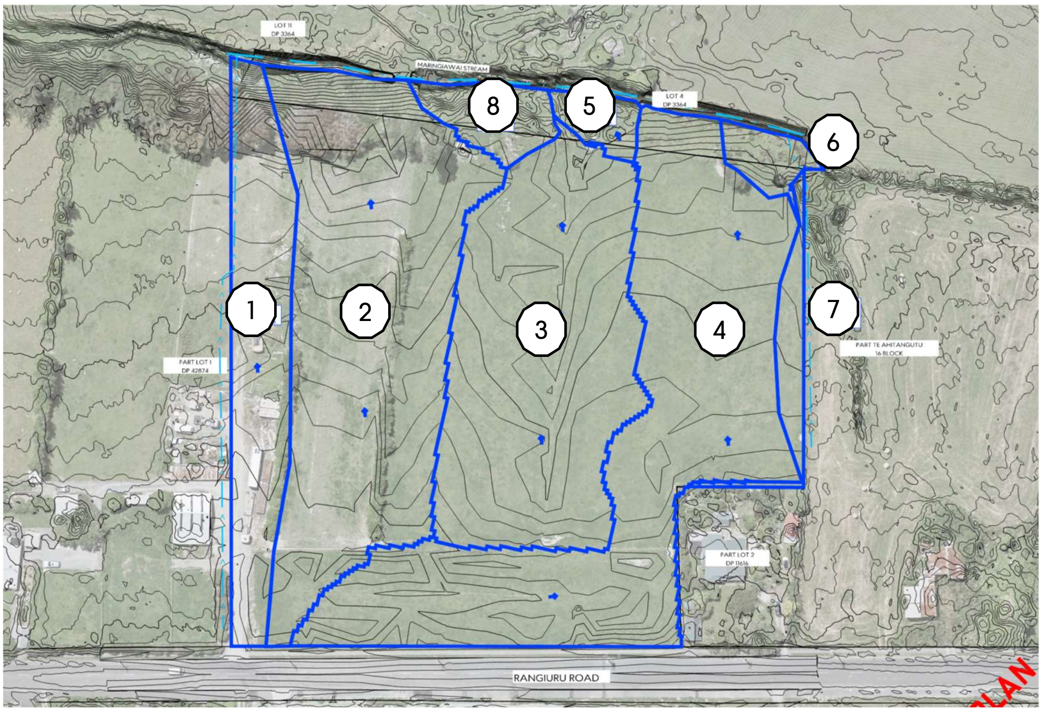

Figure 2: Catchment Plan

The tables below provide a summary of each catchment and its respective discharge characteristics, forming the basis for ensuring post-development flows align with pre-development conditions.

Table 1. Summary of Pre Development Catchment

Catchment ID	Area (ha)	Post Development Discharge Notes
01	0.27	Batters and back yards will discharge to the existing overland flow path on the western boundary
02	0.72	Discharge swale will match the pre-development sheet flow

Catchment ID	Area (ha)	Post Development Discharge Notes
03	0.60	Discharge swale will match the pre-development sheet flow
04	0.79	Discharge swale will match the pre-development sheet flow
05	0.04	Discharge swale will match the pre-development sheet flow
06	0.04	Batters from the earthworks will discharge here. The catchment is small and will generally remain unchanged. Discharge swale will match the pre-development sheet flow
07	0.05	Batters and back yards will discharge to the existing overland flow path on the eastern boundary
08	0.08	This is a highpoint along the northern boundary. The swale will not discharge here, and the post development catchment will generally remain unchanged.

5.3 PRIMARY NETWORK

Stormwater runoff from events up to the 10% AEP (including climate-change allowances) will be conveyed via kerb and channel to roadside raingardens, before discharging to the two attenuation ponds located within the development. Raingardens are positioned at local low points and along road corridors to intercept and treat runoff. Each raingarden is fitted with a scruffy dome to capture flows exceeding the water-quality event and to collect subsoil drainage, which will then be conveyed to the piped network. Each residential lot will also be provided with a lateral connection to the public stormwater system. The proposed network layout is shown on the 4000-series design drawings (Appendix 1).

5.4 SECONDARY NETWORK

The 1% AEP (with climate-change allowance) event will be conveyed as overland flow along the road corridors toward the two attenuation ponds. Minor ponding may occur within the roadway prior to overtopping the kerb and channel, however maximum depths are expected to remain shallow, generally up to 100mm.

5.5 STORMWATER TREATMENT

Stormwater treatment will be provided through three raingardens, which have been centralised where practicable to capture runoff from their contributing catchments. Each raingarden has been sized to treat the impervious road and parking areas that drain to it.

Additional treatment will be provided through low-flow channels within the ponds, as well as the planted swale, which will contribute to retention through evaporation and uptake by vegetation.

Each dwelling will also be required to install a rainwater re-use tank to support stormwater retention.

Table 2. Summary of raingardens

Raingarden ID	Road Area	Raingarden Area (m^2)	% Check
RG-01	410	8.5	2.1 %
RG-02	390	8.8	2.3 %
RG-03	874	17.5	2.0 %

5.6 HYDRAULIC NEUTRALITY & ATTENUATION

The stormwater ponds have been designed in accordance with the Kapiti Coast District Council *Subdivision and Development Principles and Requirements*, using HEC-HMS hydrological modelling. Key model outputs are summarised in the tables and figures below. The pond design parameters and resulting hydrographs have been directly incorporated into the flood model to inform the flood risk assessment, ensuring the system performs as intended during major flood events. No on-lot detention has been assumed in the design.

Each pond has a maximum water depth of 1.0 m, enabling full drainage and ensuring the base remains dry between storm events. The pond inverts are set at RL 4.10, with the discharge level spreader set at RL 4.05. A 300 mm freeboard is provided, and each pond includes capacity for the required 70 m^3 of flood-storage offset, as outlined in the flood assessment.

Tables 5 and 6 present the peak water levels, discharges, and storage volumes for each pond for the 2-, 5-, 10- and 100-year events.

Table 3. Pond 1 Summary

Pond 1	2 Year	5 Year	10 Year	100 Year
Peak Inflow	0.087	0.108	0.151	0.240
Peak Discharge	0.035	0.041	0.051	0.096
Pond Max. Depth (m)	0.234	0.296	0.43	0.71
Pond Volume (m^3)	77	98	144	236

Table 4. Pond 2 Summary

Pond 2	2 Year	5 Year	10 Year	100 Year
Peak Inflow	0.073	0.090	0.127	0.202
Peak Discharge	0.037	0.043	0.63	0.114
Pond Max. Depth (m)	0.249	0.318	0.47	0.70
Pond Volume (m^3)	49	63	93	140

Table 5 and Figures 2 and 3 illustrate the combined pre- and post-development flows for the site as a whole. These flows represent the total discharge from both ponds, conveyed to land via the level spreader.

Table 5. Pre/Post Development Discharge

Pre/Post	2 Year	5 Year	10 Year	100 Year
Pre-development Peak Flow (m^3/s)	0.060	0.079	0.119	0.2108
Post-development Peak Flow (m^3/s)	0.720	0.084	0.115	0.2107

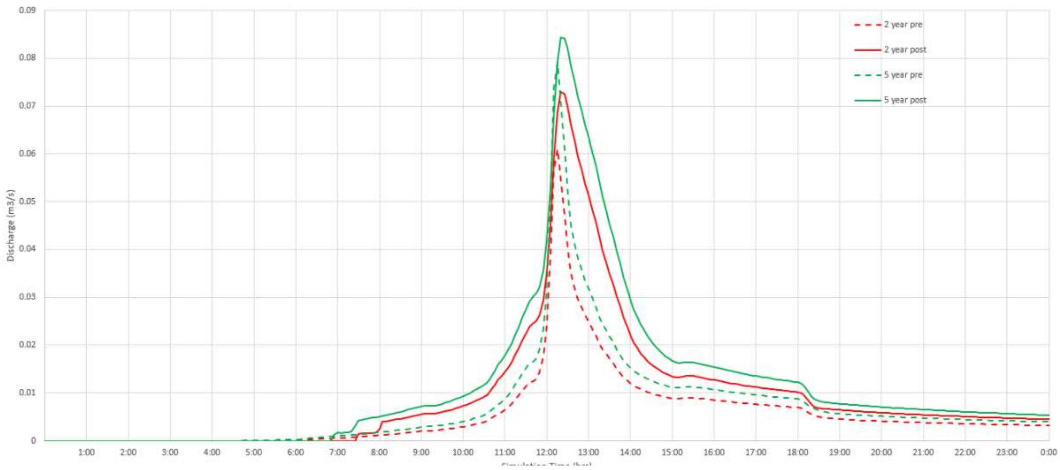

Figure 3: Pre and Post development peak flows. 2- and 5-year design event

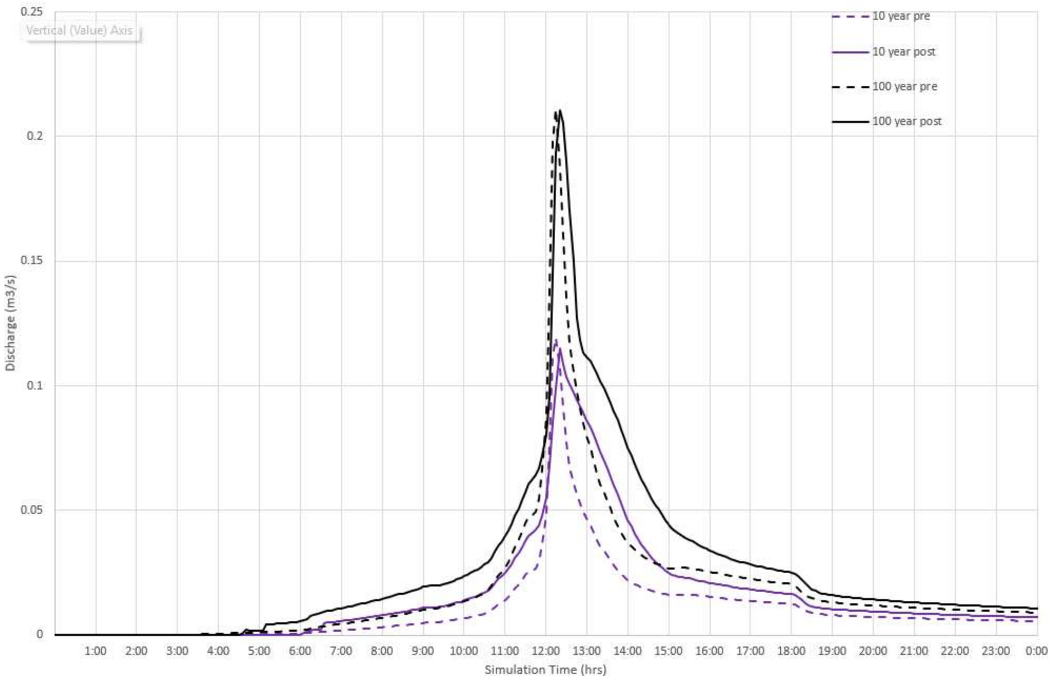

Figure 4: Pre and Post development peak flows. 10- and 100-year design event

These results show that the proposed pond (376m^3 volume) is sufficient to attenuate stormwater from the site for storm events up to the 100-year event.

As stormwater from the development is disposed on site, the development meets the requirements for hydraulic neutrality in terms of peak flow and volume.

5.7 STORMWATER DISCHARGE

Stormwater will discharge via a dispersion swale and level spreader located 3 m south of the northern boundary. This design enables flows to be released as sheet flow, replicating pre-development conditions rather than concentrating runoff at a single outlet point. Three pre-development catchments naturally drain northwards, and the proposed system has been designed to maintain this distribution. Portions of the northern boundary are elevated and would not have received runoff under pre-development conditions; accordingly, the swale and spreader bar do not extend into these areas.

5.8 FLOOD RISK ASSESSMENT

An existing flood risk exists on the site. The flood risk can be alleviated by carrying out earthworks that will enable new dwellings to be constructed at proposed minimum recommended building levels (RBL's) that have been provide by KCDC GIS flood maps. Additionally, some lots have been raised along the east and west boundaries to account for updated flood modelling. $70m^3$ of on-site existing flood storage can be mitigated through the proposed stormwater attenuation pond. A further detailed assessment has been provided by Envelope.

5.9 RAINWATER RE-USE

4,000l rainwater tanks are proposed for rainwater re-use, supplying outdoor tap and toilet water for houses at the site. The Kapiti Coast District Plan requires a potable water reduction of 30% in order to meet the requirements of rule INF-MENU-R35 as a Restricted Discretionary activity.

Historic annual rainfall in Otaki is 1098mm/year with average monthly rainfall greater than 50mm/month and most months greater than 60mm/month. Based on the proposed roof areas and assuming 8% losses, the roof will supply approximately $6m^3$ of water per, with most months supplying significantly more than this.

Outdoor and toilet use has been estimated at approximately 30-40% of daily use. The daily water demand calculated in accordance with the KCDC SPDR is 600l/house, meaning that the outdoor and toilet water use is approximately 190-250l/house/day. The proposed rainwater tanks will supply 15-20 days of water, which would provide adequate supply of water for outdoor and toilet use.

The proposed 4,000l rainwater tanks are suitable to meet the restricted discretionary activity requirements of rule INF-MENU-R35. Dependent on the final development water usage, additional measures to achieve water reduction could be considered including the use of water reduction fixtures within houses.

The tanks will be detailed at the building consent stage.

6.0 WATER RETICULATION

6.1 EXISTING WATER SUPPLY

There are existing public DN150 and DN200 water mains within Rangiuru Road, and an existing fire hydrant is located on the opposite side of the road from the development.

6.2 PROPOSED WATER SUPPLY

The proposed water design is shown on our 5000 series plans. We propose to connect a new 150mm diameter main to the existing main DN200 main within Rangiuru Road. A new ridermain will service lots fronting Rangiuru Road to avoid disturbance of the existing carriageway and footpath.

A new hydrant will be installed within the development.

6.3 WATER MODELLING ASSESSMENT

Modelling undertaken by Stantec (2024) confirms that the development can be fully serviced under both current (2018) and future (2051) network conditions. Minimum operating pressures remain well above the required levels (approximately 51m under current peak-day conditions and 40m under

2051 conditions), and FW2 fire-flow requirements are achieved at all hydrants within the development.

While cumulative growth across the Ōtaki network will require coordinated management, this development on its own has a negligible effect on the wider system. The planned 5,500 m^3 Ōtaki Reservoir, scheduled for completion in late 2024, will provide additional storage to buffer peak demands and ensure long-term resilience and capacity for future growth.

The full assessment can be found in Appendix 4

7.0 UTILITY SERVICES

7.1 POWER

There is an existing overhead power pole along Rangiuru Road. We have liaised with Scanpower, who have confirmed that a connection from this pole can feasibly service the development. It is recommended that a new transformer be installed and appropriately sized to accommodate future development.

7.2 TELECOMMUNICATION

We have liaised with Chorus regarding providing fibre telecommunications to the development. Chorus have confirmed that the development can be adequately serviced from a telecommunications perspective.

8.0 CONCLUSIONS

Based on the above summary of our assessments, we conclude that there are no Infrastructure Servicing related issues which should affect the ability of the development proposal to be implemented.

Civil infrastructure will be designed in accordance with the Kapiti Coast District Council Subdivision and Development Principles and Requirements and NZS4404:2004

9.0 LIMITATIONS

9.1 GENERAL

This report is for the use of Classic Developments and Kapiti Coast District Council only and should not be used or relied upon by any other person or entity or for any other project.

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

APPENDICES

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APPENDIX 2
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WATER MODELLING ASSESSMENT

APPENDIX 5
WASTERWATER IMPACT ASSESSMENT