Attachment B - Wairakei South Addendum to Infrastructure Report

Wairakei South – Addendum to Infrastructure Report

Date: 17/06/2026

Subject: Stormwater conveyance and treatment solutions considered through master planning and substantive design phase

Purpose

This addendum has been prepared to supplement the Infrastructure Report (Appendix F of the AEE) to provide additional information regarding the stormwater conveyance and treatment options considered during the master planning and substantive design phase for Wairakei South. It should be read in conjunction with the Infrastructure Report, Stormwater Management Plan (Appendix G of the AEE) and the Flood Modelling Report (Appendix H of the AEE), which describe the existing catchment characteristics, groundwater conditions, drainage constraints, receiving environment and proposed stormwater management methodology.

Gravity Catchment Conveyance

A gravity-only drainage approach was considered during the initial master planning stage. This option offers reduced operational requirements and minimises reliance on mechanical infrastructure. However, a gravity-only solution was not considered a viable option for the entire development area and Bell Road Catchment due to:

- the low-lying nature of the site;
- the presence of the existing Kaituna River and Kopuaroa Canal stopbanks;
- capacity constraints within the existing drainage infrastructure beneath State Highway 2;
- the influence of downstream receiving water levels;
- the projected effects of climate change and sea-level rise; and
- the development site has no frontage to the Kaituna River.

It is also important to note that the catchment is currently managed predominantly by a pumped system.

Soakage Based Stormwater Disposal

Stormwater disposal via soakage within the development was also considered.

However, the site is characterised by a shallow groundwater environment and forms part of a low-lying managed drainage catchment. In addition, the proposed development platform is to be established through the placement of engineered fill across the development area. As a result, soakage systems

would be expected to have limited infiltration performance and would provide limited reliability as a primary stormwater management solution.

Infiltration based disposal also has the potential to adversely influence local groundwater levels, which is inconsistent with the broader drainage objectives for the site and surrounding catchment.

Therefore, soakage was not considered a practical or reliable stormwater disposal solution for the proposed development.

Adopted Conveyance Approach

The adopted stormwater conveyance strategy combines gravity drainage with targeted pumping infrastructure to manage potential flood effects, in line with the existing management strategy for the Bell Road Catchment.

Within the North Block, groundwater and stormwater collected within the proposed swale and stormwater management network are conveyed via gravity through the existing drainage system to the Bell Road Drain and ultimately the Kaituna River catchment.

Within the South Block, gravity drainage remains the primary conveyance mechanism under current operating conditions. The proposed Kopuaroa Pump Station has been incorporated to maintain long-term drainage functionality under future climate change and sea-level rise scenarios where rising receiving water levels progressively reduce the effectiveness of the existing gravity drainage pathways.

This hybrid approach makes use of all available gravity drainage solutions while providing resilience to future changes in downstream tailwater conditions and was assessed as the most practical and integrated conveyance solution for the development.

Stormwater Treatment Options Considered

A range of stormwater treatment approaches were considered during the master planning process.

Distributed Rain Gardens and Bioretention Devices

Treatment through distributed rain gardens, bioretention devices and similar at source measures located throughout the development area was considered.

Such systems can provide effective treatment close to the source of runoff and can be successfully incorporated into urban environments. However, for a development of this scale, a distributed treatment approach would require numerous treatment assets throughout the development, resulting in increased operational and maintenance requirements and a greater risk of variable long-term performance. The approach would also reduce opportunities to consolidate stormwater management functions within the wider open space network and would not provide the broader conveyance, attenuation and ecological benefits available through larger integrated stormwater management areas.

Accordingly, a distributed rain garden and bioretention approach was not considered the preferred treatment solution.

Gross Pollutant Traps and Proprietary Treatment Devices

The use of gross pollutant traps (GPTs) and proprietary stormwater treatment devices was also considered during the master planning process.

Such devices can be effective at capturing gross pollutants, litter and, in some cases, sediment and other contaminants from stormwater runoff. However, they generally function as standalone treatment assets and are typically most effective where site constraints limit the availability of larger integrated treatment systems.

For Wairakei South, the proposed stormwater management framework incorporates vegetated swales, stormwater management areas and wetlands that collectively provide a treatment train approach. This approach enables sediment removal, contaminant attenuation, flow management and ecological enhancement functions to be achieved within a single integrated system.

The use of GPTs and proprietary treatment devices would introduce additional treatment assets and associated maintenance requirements while providing limited additional benefit beyond that already achieved through the proposed integrated treatment train.

Accordingly, GPTs and proprietary treatment devices were not adopted as the primary stormwater treatment solution for the development.

Stormwater Management Wetlands

The use of two to three stormwater management wetlands located within the proposed open spaces was considered during the master planning process.

Such systems can provide consolidated treatment for a development of this scale and are capable of delivering sediment removal, contaminant attenuation, flow management and ecological enhancement functions within a single integrated asset. Stormwater management wetlands are generally most effective where sufficient hydraulic head is available to convey inflows into, through and out of the system under gravity, and where permanent water levels can be reliably maintained.

However, the low-lying nature of the development, paired with the requirement to keep inflow channel inverts low in order to maximise available flood storage, meant that the necessary hydraulic gradient could not be achieved. Under these conditions, consolidated wetlands would not function correctly via gravity drainage, and reliable inflow, circulation and discharge could not be assured without introducing additional infrastructure such as pumping.

Accordingly, consolidated stormwater management wetlands were not considered the preferred treatment solution for the site.

Wetland Swales and Stormwater Management Wetlands (Adopted)

The adopted treatment strategy utilises vegetated wetland swales integrated within the proposed drainage network as the primary source of stormwater treatment. These swales provide treatment capable of addressing stormwater quality objectives while also delivering conveyance, attenuation, landscape and ecological benefits within a single integrated system. Treatment performance is able to be quantified and demonstrated against the relevant water quality criteria, and there are maintenance

efficiencies compared with a distributed treatment approach. Additionally, the larger attenuation areas are anticipated to develop unconsolidated wetland characteristics over time. Owing to the high groundwater table across the development and the absence of formal outlet control in these areas, sections of the attenuation storage are expected to remain permanently or seasonally wet, forming vegetated marshy environments. While these areas are expected to provide incidental water quality treatment and ecological benefit, their performance cannot be reliably quantified, and they are therefore not relied upon within the treatment calculations. Any treatment they provide is considered a secondary benefit additional to that achieved by the wetland swales. The integrated treatment wetland swales and bonus stormwater management "wetland" areas was therefore assessed as the most practical, resilient and effective stormwater treatment solution for the proposed development.

Conclusion

A range of stormwater conveyance and treatment options were considered throughout the master planning and design development process.

Having regard to the site's low-lying topography, existing drainage regime, groundwater conditions, future climate change and sea-level rise projections, and the requirement to provide stormwater quantity and quality management for the proposed development, the adopted approach comprising gravity drainage, targeted pumping infrastructure, vegetated swales and stormwater management "wetlands" was assessed as the most practical, resilient and integrated solution available.