MEMO

To:	Winton Land Limited
From:	Scott McIntyre
Cc:	James Dufty
Date:	26/04/2024
Re:	**Sunfield Fast Track Application – 3 Waters Review**

McKenzie and Co at the request of Winton Land Limited have undertaken an engineering review of the '3 Waters' proposal prepared by Maven Associates for a fast track application of 244 ha of a master planned community known as **Sunfield**.

The site is located in Ardmore and is generally bounded by Old Wairoa Road to the south, Cosgrove Road to the West and Airfield Road to the north.

Figure 1: Site – Auckland Council GIS

In undertaking the review McKenzie and Co have had the following information made available to review.

- Preliminary 3 Waters Strategy, Rev F Dated 10/9/2021 – Prepared by Maven Associates
- Preliminary 3 Waters Strategy Report, Rev B, dated 11/12/23 – Prepared by Maven Associates

The information contained in the above reports has been subject to an engineering review by Mckenzie and Co to determine if the strategy for managing the 3 Waters follows good engineering practice, meets the expected levels of service, can be developed to comply with Auckland Council's respective standards and requirements and is a practical engineering solution.

The 3 Waters reviewed are as follows and are addressed individually.

- Stormwater
- Wastewater
- Water Supply

Stormwater

The proposed strategy for stormwater is to treat surface water runoff, manage runoff volume from the proposed development area to predevelopment levels and mitigate the impact of increased impervious areas by re-charging the underlying Peat areas.

These practices are typical and commonly used within the local area and are considered the best practical option (BPO).

Stormwater Quality Treatment

The strategy states that stormwater quality treatment is proposed to be undertaken by a treatment train approach largely consistent with GD01 requirements.

Proposed buildings will use inert materials and the runoff can be directly discharged to the re-charge pits. No treatment is proposed or considered necessary.

Roads will have surface water runoff collected via catchpits which will include some form of primary treatment (Tetra Trap or similar) prior to discharging to re-charge pits. Refer Section 3.4, Para 4 of the strategy report. The same paragraph notes that this approach does not meet the requirements of the Network Discharge Consent (NDC) but is considered BPO.

Auckland Council document GD07 Soakage and Ground Re-Charge Guide, Table 16 notes in the 6th bullet point that additional treatment in accordance with GD01 may be required. This should be clarified in the application to make it clear if additional treatment is proposed.

Secondary treatment of surface water runoff will be provided by way of the swale network and or wetlands that are proposed for the site.

Tertiary treatment to complete the treatment train approach will be provided by the TSWCC and the McLennan Wetland for Catchment A only with Catchments B, C and D not discharging to the TSWCC and McLennan Wetland.

Based on the review, the stormwater treatment methods proposed collectively provide an adequate level of stormwater treatment in-line with the best practical option approach and Auckland Council standards and requirements.

Stormwater Conveyance

Conveyance of stormwater around the site is proposed as a combination of reticulated networks and open channels. The reticulated networks will be designed to cater for the 10% AEP event while open channels will be designed for up to the 1% AEP event as they will also function as overland flows paths in many cases. This is BPO for the local area and is compliant with Auckland Council standards and guidelines. The use of open channels in flat terrain is common practice and avoids the need for significant piped infrastructure.

Stormwater Flood Mitigation

The site is low lying and subject to widespread surface flooding as identified in the 3 waters report. It has little or no reticulated drainage currently.

Surface water runoff from the site will discharge from 4 primary catchments post development identified A through D.

Catchment A, post development consists of 150 ha of developed formerly, Future Urban (FU) and Mixed Rural Zone (MRZ) land that is proposed to discharge under Cosgrave Road through a proposed culvert that forms Stage 3 of the TSWCC and has a design capacity of 23 cu.m/s.

Hydraulic modelling has been undertaken of the contributing catchments at Maximum Probable Development levels incorporating the proposed extension of the TSWCC (stage 4) and the network of swales proposed. The hydraulic modelling undertaken using HEC-HMS and HEC- RAS uses appropriate design assumptions and climate change factors to calculate runoff and demonstrates that flows can be managed within the development to meet the Cosgrave Road culvert discharge limitations of 23 cu.m/s.

Given the large contributing catchment and extensive modifications proposed it is recommended that an independent peer review by an experienced flood modeler is undertaken to confirm the preliminary assumptions and flood model outputs. This peer review should be included in the final report.

Catchment B and C consist of 75 ha of MRZ land and 360 ha of upstream undeveloped land that will discharge to the north towards the Papakura Stream. Runoff modelling using HEC-RAS with appropriate design assumptions has determined that the pre-development runoff for the 1% AEP event is in the order of 45 cu.m/s and the post development flows will be managed to not exceed these predevelopment levels by the use of numerous attenuation devices which restrict the flow to pre development values. This is achieved primarily by a new wetland in the northwest and an engineered swale on the eastern and northern boundary of the site to attenuate and manage flows.

The post developed flows calculated using HEC-RAS demonstrate that runoff can be managed to predevelopment levels and as with Catchment A an independent peer review is recommended.

Catchment D consists of 20ha zoned industrial/employment and discharges to the north (as does Catchment B and C) and the Papakura Stream. Again, flows will be managed to predevelopment levels and this has been demonstrated through HEC-HMS calculations with appropriate assumptions and will incorporate a Wetland(s) to manage runoff. This catchment should be included in the recommend peer review of the overall stormwater modelling.

Based on the review of the results outlined in the Maven Associates 3 Waters report, and subject to detailed design and a detailed flood model review, the stormwater flood mitigation approach proposed provides an adequate level of flood mitigation in-line with the best practical option and Auckland Council standards and requirements.

Wastewater

The wastewater strategy proposes to utilise a low pressure system (LPS) reticulation network. The strategy does also note that a gravity-based system with pump stations could also be a viable option.

Given the sites very flat profile and the subsurface conditions (large areas of Peat) the use of a reticulation network that is shallow founded, not susceptible to differential settlement, a LPS is considered the preferred design solution. LPS systems are in use throughout the Auckland region and are an acceptable design solution.

Maven have calculated peak design flows using Watercare guidelines and notably used the Average Dry Weather Flow (ADWF) method as opposed to the Peak Wet Weather Flow (PWWF) method. This approach is appropriate when LPS system is being utilised.as the risk of illegal connections and infiltration is largely eliminated.

To support the proposed density the strategy has used the PWWF method to determine the peak flow for a 1550 lot development based on the existing zoning development potential if served by a gravity-based reticulation network. This has derived a peak flow of 64.91 l/s which is considered the ‘permitted peak base flow’. The peak flow for the proposed development has also been assessed using the ADWF method and this has determined a potential developed peak flow of 57.63 l/s

The values and approach included in the strategy is consistent with Watercare guidelines for calculation of peak flows for both methods. This approach is appropriate to determine peak flows and confirms that if an LPS system is utilised the proposed development peak flows are less than the potential flows from a gravity based system based on the current zoning potential of the site.

The entire project is to be reticulated towards a 525mm diameter Takanini Branch sewer line located near the site in Bruce Pulman Park. Maven have stated both Watercare and Veolia have confirmed that there is adequate capacity for the project flows from the Sunfield development. It is noted that confirmation of this should be included with any final application.

Based on the review of the wastewater approach proposed in the Maven Associates 3 Waters report, and subject to Watercare and Veolia confirming adequate wastewater capacity, the wastewater proposed can provide an adequate level of service in-line with the best practical option approach.

Water Supply

The water supply strategy proposes a reticulated supply network that will provide both potable water and firefighting requirements. This is common practice in the Auckland region to service developments and is considered the most practical approach.

The water strategy also notes that Veolia are responsible for the operation, maintenance and connections to the water supply that will serve the Sunfield development.

The new supply network is proposed to connect to an existing Bulk Supply Point (BSP) on the existing 450mm diameter transmission line located within Airfield Road on the northern boundary of the site. New infrastructure will be required from the BSP to the development site.

Maven have calculated the peak water demand values which are contained in Appendix D of the Strategy document. It is noted that the calculated values use different allocations of dwellings, light industrial land and retail to those used in the Wastewater calculation while the value for schools is the same, refer table below. The wastewater allocations appear consistent with the overall summary of land-uses in the Strategy document. It is recommended that the water demand values are re-assessed on the same land use basis to be consistent.

Table 1 - Water and Wastewater Demand Assumptions

Use	Wastewater	Water Supply
Dwellings	4000 Dwellings	5000 Dwellings
Light Industrial	55.9 ha	40.5 ha
Retail	13.5 ha	8.2 ha
Schools	2000 people	2000 People

The method of calculation for peak water demand is consistent with Watercare guidelines.

Maven have noted in their report that preliminary discussions with Veolia have indicated that the existing BSP points will be able to meet the fire fighting requirements. Confirmation of this should be provided in the final reporting submitted with the fast track application.

Maven have also noted that the BSP may require upgrading or a second BSP installed to meet demand requirements for potable supply. This approach is considered practical and again this assumption should be confirmed during the consenting process.

The waters strategy notes that the local bulk supply network is connected nearby to the main water supply bulk supply network for much of the Auckland region. The strategy assumes that due to this close proximity,

there will be adequate supply available. This assumption, which is reasonable, will need verification from Watercare to confirm supply is available during the consent application.

Based on the review of the water supply approach proposed in the Maven Associates 3 Waters report, and subject to Watercare and Veolia confirming adequate supply, the water supply proposed can provide an adequate level of service in-line with the best practical option approach.

Conclusion

Overall, the 3 Waters strategy proposed by Maven Associates generally follows Auckland Council requirements and guidelines for land development.

The approach for stormwater of managing flows to pre-development levels or in the case of Catchment A to a managed peak flow discharge via a combination of channels, swales, ground recharge and wetlands has been demonstrated in the information provided. The design approach follows the correct design assumptions and practices and subject to final detailed design and an independent flood model peer review, the stormwater strategy ought to perform as predicted with no downstream detrimental impacts.

The use of a low pressure wastewater reticulation system is supported as the most appropriate engineering solution for the development. The method of peak flow determination is in accordance with the appropriate design standards. Subject to confirmation from Watercare and Veolia on capacity, the design strategy is appropriate.

Water reticulation demand assumptions should be updated to be consistent with the overall project demands, although no significant changes to water demand values are expected. Confirmation from Veolia on supply availability to be suitable for the development should be sought during the consent application.

In conclusion, based on the information that has been provided as part of the engineering strategy review, and subject to an independent flood model peer review, and further detailed design, the engineering approach identified in the Maven Associates Preliminary 3 Waters Strategy Report is considered appropriate and in line with best practical options and Auckland Council standards and requirements.