

## Memorandum

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<b>Date:</b>	17/05/2023
<b>To:</b>	Katherine Hu, Sunil Prasad, Rachel Griffiths, James Pattullo
<b>From:</b>	Andrew Rossaak
<b>CC:</b>	Fletcher Wilson
<b>Project Number:</b>	P04109
<b>Reviewed and released by:</b>	Stu Farrant

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### Subject: Teitei Drive wetlands and stormwater

Kaianga Ora engaged Morphum to provide additional assessment on the presence and status of any wetlands on site and potential stormwater options to address potential freshwater impacts at their development site located on Teitei Drive in Ohakune.

Morphum visited site on the 10<sup>th</sup> May 2023. The nearest rain gauge ( Waiharuru, 6 km to the south east) recorded 15mm over the previous 10 days, however, on the day of the site visit, heavy falls were recorded with over 23 mm falling during the day.

#### Current land use and site history

The site does not appear to have been used for stock grazing, but rather used to cut hay/silage. The site has well established pasture grasses with silage pit areas on the central fence-line running north-south. Areas of the site remain uncut either due to proximity to waterways or for an apparent presence of a plant unpalatable to stock.

#### Wetlands

Preliminary ecological assessments had identified 4 potential wetland areas on or close to the site<sup>1</sup>. Three of these are along a watercourse/gulley system forming the northern boundary of the site and the fourth is in the south of the site (Figure 1). All potential wetlands were assessed using the NES:F wetland delineation protocols<sup>2</sup>.

The potential wetland in the south of the site (labelled wetland 4 in Figure 1) is a roughly triangular shape and is bordered on the southeast and southern extent by a modified stream. The western extent follows a fence-line, and the northern extent follows a farm track. The vegetation comprised of rank

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<sup>1</sup> Memo from Rachel Griffiths of Kahu Environmental. Freshwater Ecology Aspects for Proposed Development – Teitei Drive Ohakune. Dated 4 April 2023.

<sup>2</sup> Ministry for the Environment. 2022. Wetland delineation protocols. Wellington: Ministry for the Environment.

pasture grass (tall fescue) with patches of *Ranunculus acris*, an exotic species that is easily spread by stock and machinery and is commonly known as meadow buttercup or giant buttercup. This species often grows in moist areas, but is not a determination of wetland, being noted as a facultative species on the wetland plant indicator status rating 2021<sup>3</sup>. It is also considered to be poisonous to livestock and avoided by dairy cattle<sup>4</sup>, which could explain why this area is not included in the hay/silage harvesting conducted on the site. With the *Ranunculus* species being facultative (tall fescue is not on the list), vegetation is inconclusive in determining a wetland at this location and as such further assessment of the vegetation would not add to the wetland determination. The site was assessed using the hydrology and hydric soil tools. The site was slightly downslope, and a stream bordered one side, however there were no indicators of inundation. Soil augers were undertaken in three locations well into the area labelled 4 (Figure 1). The soils were damp near the surface, but dry and friable at a depths of 150 to 300 mm with a colour indicating there was no glaying (Munsel 10YR 5/4) (Figure 2). No matrix or mottles were present. This indicates that this is not a wetland as it lacks wetland hydrology and hydric soils. It is likely that this area is vegetatively different from the rest of the paddock as it has not been mown and allowed to grow rank with resulting increased moisture in the vegetated matter.



**Figure 1: Potential wetlands identified by ecology assessment.**

<sup>3</sup> Wetland indicator status of plants found in New Zealand wetlands as published in Appendix 1 of Clarkson BR, Fitzgerald NB, Champion PD, Forester L, Rance BD 2021.

<sup>4</sup> <https://www.dairynz.co.nz/media/5790938/giant-buttercup-fact-sheet.pdf>



**Figure 2: Soils in potential wetland area 4 illustrating dry lower horizon and red colours.**

Potential wetland 1 is likely a wetland. This is upstream of the site and more than 10 m for expected earthworks. As such it is not considered likely to impact the works and the works are unlikely to affect this wetland. Further assessment was not undertaken to confirm its wetland status or determine whether it is constructed or a natural wetland.

Potential wetland 2 was noted as a flooded gully area. There was a mix of exotic species here including willows and blackberry. The pasture grasses on the edge of this area were flooded at the time of our site visit. There were areas that indicated sustained inundation and pooling of water, indicating a wetland using the hydrology tool. There is an access track separating wetland areas 2 and 3 which did not appear to have any pipes or culverts installed, but composed of mixed gravel aggregate (road base) placed in the gully. The wetland may well be induced by this accessway. This does not, however, alter the status of wetland 2 as a natural wetland under the NES:F or under the RMA.

Potential wetland 3 is immediately downstream of wetland 2. It was also flooded into the pasture grass edge at the time of the site visit (Figure 3). Vegetation is similar to wetland 2 and based on the evidence of regular flooding and very wet soils, this too is considered a natural wetland under the NES:F.



**Figure 3: Potential wetland area 3.**

Wetland 3 was followed downstream where the surface water disappeared. Following the watercourse is limited by the dense vegetation and as such there is uncertainty as to the fate of this water flow. Further assessment may be required. It was noted that there were dry soils in the gully at the western extent of potential wetland 3. The surface was irregular and it is suggested that this area may be an old waste fill area. Historical imagery from Retrolens shows a railway line existed near this location and that there is likely to have been earthworks at this location.

The assessed wetland extent on the site is presented below in Figure 4 along with the field assessment points.



**Figure 4: Assessed wetland area on site and location of assessment points**

## Stormwater

Based on the site visit and the need to demonstrate the protection of existing and downstream freshwater ecosystems there is a need to manage stormwater appropriately. In particular requirements to demonstrate the intent of Te Mana o Te Wai as per the NPS-FM will be important. Based on discussions with the wider design team it appears that to date the design has been developed with a focus only flood attenuation and limited consideration of management of site generated stormwater to mitigate adverse water quality and post developed hydrology.

Based on our understanding of the site and development aspirations we would recommend that in support of the development proposal and consent application a suite of freshwater objectives be documented to define the overall approach. These could include measures including the following;

- Protect and Enhance freshwater systems on the site and downstream;
- Manage site runoff for a range of urban contaminants including heavy metals, hydrocarbons, sediments, temperature and modified hydrology;
- Manage stormwater volumes and peak flowrates to protect downstream ecosystems and reduce risks of downstream flooding;
- Align development outcomes with both NPS-FW and NPS-UD through managing stormwater to meet Te Mana o Te Wai and creating a well-functioning Urban Environment.

These objectives could be achieved through;

- Providing a standalone stormwater management plan for the development which documents the existing condition, regulatory context, objectives and proposed approach to manage freshwater.
- Providing on lot retention and detention through rainwater tanks with plumbed connection to internal non potable demands including toilet and cold water laundry usage. This will likely require a notice on title to ensure subsequent uptake.
- Convey Road and Private Driveway runoff to a designed constructed wetland in the south west corner integrated with flood detention. The design of this will be critical to ensure the outcomes are achieved in a resilient and efficient manner requiring the following;
  - Design in collaboration with landscape architects;
  - Design to enable staging of development;
  - Design to be offline to peak flows with hydraulics to control detention engagement for large infrequent flood events.
- Develop plan for restoration of existing stream through site including appropriate riparian setbacks, integration of viable habitat and connections with community through pedestrian paths etc.
- Consider relocating proposed wastewater pump station to be within ultimate road corridor rather than stream reserve to provide separation from freshwater and enable ready access and maintenance.

Potential opportunities for a scalable (stage 1 and 2) stormwater treatment wetlands is proposed in the south west of the site (the lighter shaded section would be to address stage 2. There is also potential for a water quality wetland in the north of the site. These are illustrated for concept only and are not to scale.



**Figure 5: Potential opportunities for the location of a scalable stormwater treatment wetland in the southwest of the site and a smaller stormwater wetland in the north.**

We trust the above assists with the sustainable development of the site. Please feel free to contact me if you have any questions.

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