

MEMORANDUM

Job 10684

To: Chris Shanks (Tonkin + Taylor)

From: Sam Morris (Lowe Environmental Impact)

Date: 25th of June 2021

Subject: P:B.14c – 474 Beach Road, Porangahau – Hydrogeological Assessment

This memo supplements a hydrogeological assessment to be prepared by Tonkin + Taylor, evaluating the lithology, stratigraphy, and groundwater characteristics of the proposed application site of Porangahau and Te Paerahi’s wastewater at 474 Beach Road, Porangahau referred to as the ‘Stoddart Farm’.

BACKGROUND

Tonkin + Taylor (T&T) have undertaken hydrogeological assessments in the vicinity of the Te Paerahi and Porangahau Water Treatment Plant (WTP), located at 425A Beach Road, Porangahau (Figure 1). Constructed in 2020, the plant receives water from an underlying alluvially derived, fine gravel aquifer to which extensive investigations have been undertaken assessing the characteristics and environmental effects associated with tapping into this resource for domestic water supply.

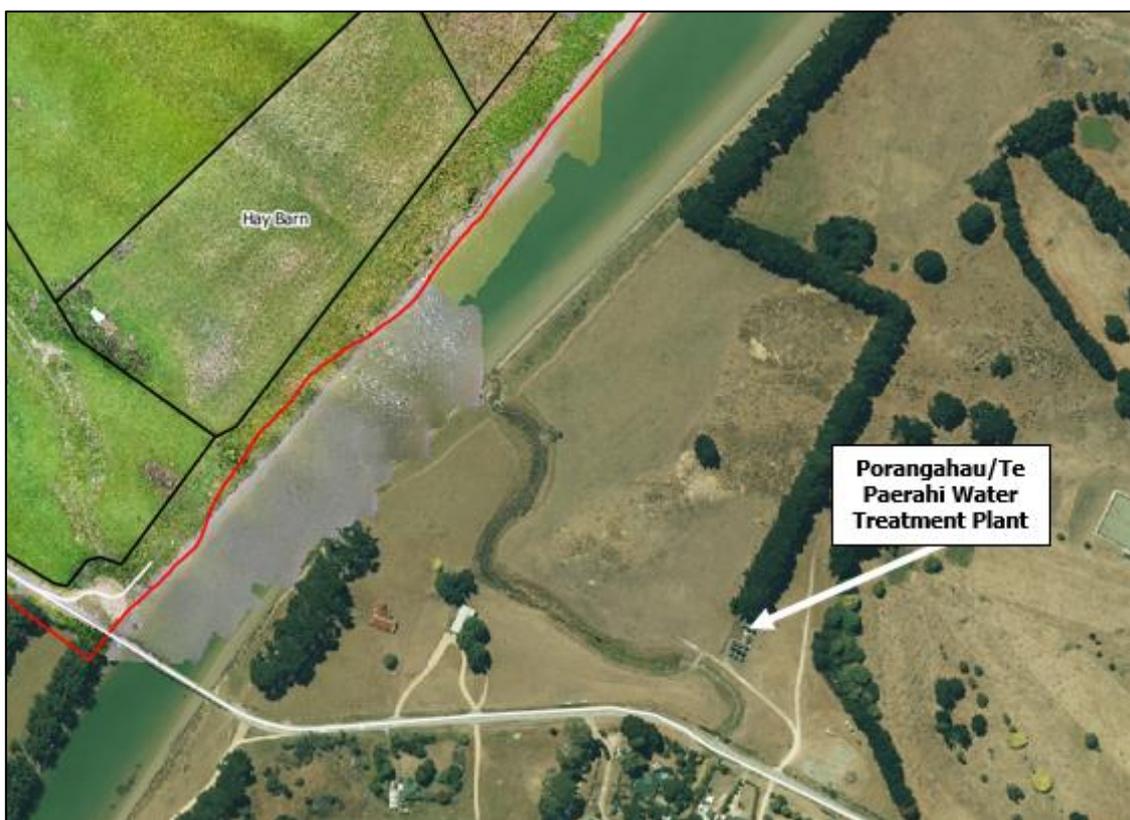


Figure 1: Porangahau/Te Paerahi Water Treatment Plant Location



The proposed wastewater discharge site is located 400 m westward at the nearest point from the WTP, separated by the Porangahau River (Figure 1). Part of the resource consenting process for a wastewater land discharge to the Stoddart Farm, a hydrogeological assessment is required. With T&T having done a hydrogeological assessment on the eastern side of the Porangahau River, an understanding of whether the same water bearing material is present on the western side is needed. Additionally, an assessment into the potential risk of groundwater contamination because of wastewater irrigation to the Stoddart Farm and impacts this may have to the drinking water supply bore is needed.

The bore log for the WTP (HBRC No. 4993) indicates a sandy topsoil to a depth of approximately 3 m, with the presence of fine gravels noticed from 3 m to 7 m. To date no gravels have been located on the Stoddart Farm, primarily due to soil mapping not being to this depth.

FIELD INVESTIGATIONS – 23RD OF JUNE 2021

Field investigations were undertaken by Lowe Environmental Impact (LEI) on June 23, 2021, with the aim to better understand the underlying stratigraphy of the Stoddart Farm and ideally locate the fine grained gravelly layer noted in bore logs surrounding the WTP by T&T. Previous investigations by LEI identified soil types of the property to 1 m depth to which a fine grained gravel layer would underlie (Figure 2).

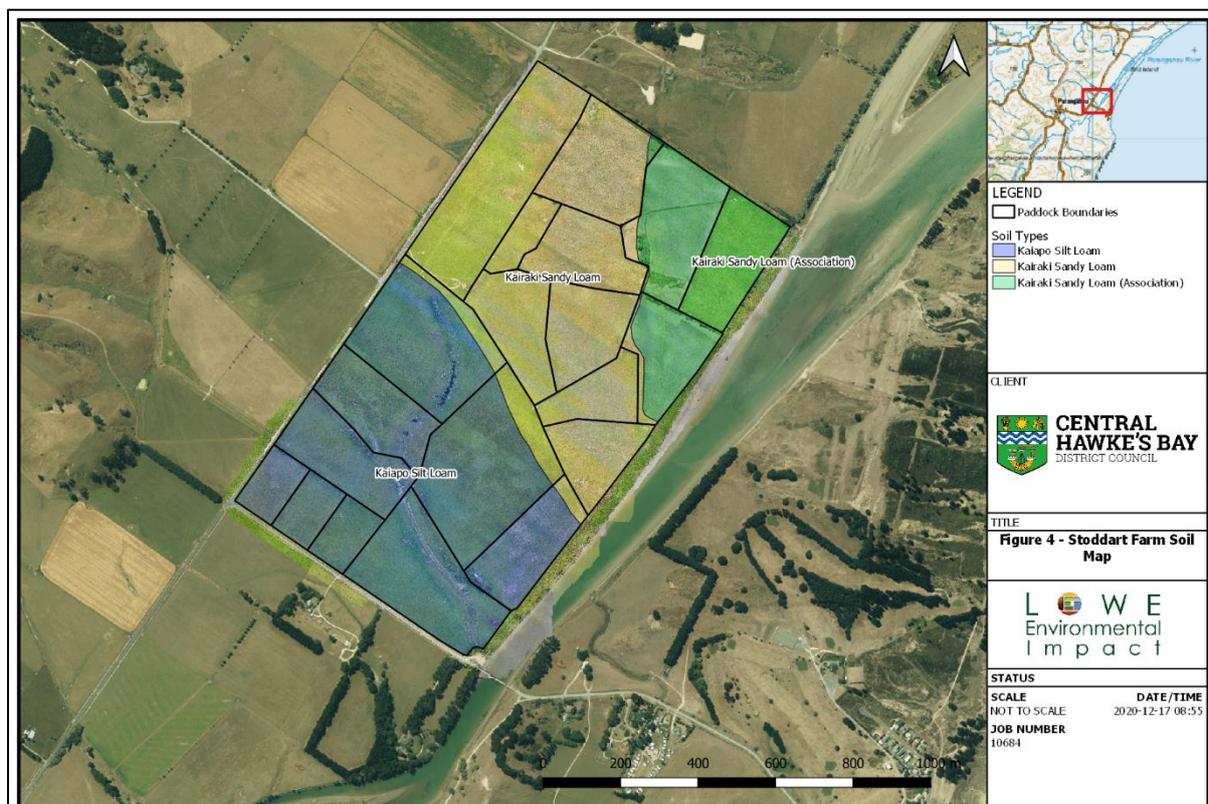


Figure 2: Stoddart Farm – Site Soil Map

The Stoddart Farm features two key streams and a series of small drains running through the property. Stream depths from the bed to ground level vary between 1-2 m, exposing the



underlying material where layering can be identified. Figure 3 shows the waterways running through the property to which investigations were undertaken at. The two solid blue lines represent the main flowing drains, with dashed lines representing ephemeral drains. The drain flowing through the Crossing paddock will be referred to as the Crossing Drain, with the drain flowing through the Pump paddock referred to as the Pump Drain. Downstream where these merge will be referred to as the Wharf Drain. Coloured circles show the location of field investigations to be discussed below. In the days prior to field investigations, the property had received approximately 80 mm of rainfall meaning these drains were flowing high and had flushed out any previously accumulated finer sediments.

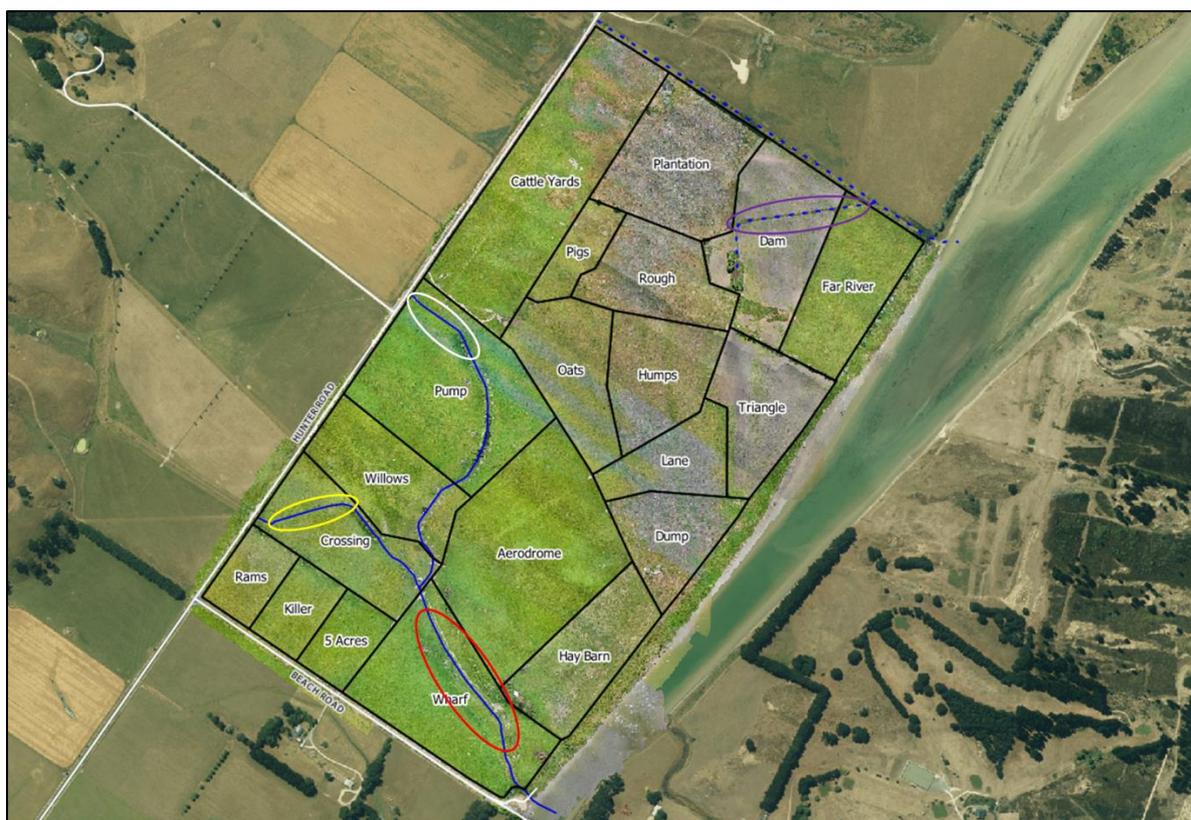


Figure 3: Stoddart Farm – Site Waterways and Investigation Locations

WHARF DRAIN CHANNEL (RED CIRCLE)

Field investigations were undertaken along the lower reach of the drain flowing through the Wharf paddock (red circle). The entirety of this channel flowing through the Wharf, Willows and Pump paddocks (minus the upper 200 m of the channel in the Pump paddock), has recently been excavated to deepen and widen the channel. Where excavated in the Wharf paddock, as well as the confluence with the Crossing Drain, the drain depth here from the bed to ground level is approximately 1.5 m. Fine gravels were located at approximately 1.4 m in depth with these largely all being <2 cm, with a few between 2-5 cm. Fine gravels were rounded, although maintained a degree of angularity.

Excavated material from the drain had been upturned and dumped on the adjacent bank. Here, fine gravels dominated the final scoop of upturned excavated material, indicating the excavation to deeper the channel had skimmed the surface of this gravelly layer underlying



the surrounding clay soil. Along the Wharf Drain, these finer gravels could be noticed along the bed of drain where these having been scoured from the channel walls and channel bed, with finer sediments being flushed out.

Additionally, at the confluence of the two drains upstream of the red circle, the gravel layer is exposed again. Here, gravels appear to be more prevalent and of a larger nature (higher % of 2-5 cm gravels, as compared to downstream).

Figures 4 and 5 represents the fine gravels noticed along the stream channel in the Wharf paddock, with Figure 6 and 7 showing the gravels noticed at the confluence of the two main streams upstream of the Wharf paddock site.



Figure 4: Fine gravel layer exposed near channel bed



Figure 5: Fine gravels within upturned digger bucket



Figure 6: Exposed fine gravel layer at the confluence of the two main streams



Figure 7: Fine gravels at the confluence of the two main streams

CROSSING DRAIN CHANNEL (YELLOW CIRCLE)

Investigations were also undertaken along the Crossing Drain, upstream of the Wharf paddock site. This stream appeared to flow significantly higher and faster than the Pump Drain. As with the previous site, gravels were exposed within the drain channel, however these differed to downstream in both size and depth. Exposed beneath the flowing water level, gravels reflected typical river gravels and were larger (typically 5-10 cm in size) than those downstream, however maintained an equal degree of angularity. This gravelly layer was noticed at 1.2 m in depth, approximately 20 cm higher than that noticed downstream. This difference in depth of gravels cannot be the result of elevation variation between the sites with the Wharf paddock site being at a lower elevation than the upstream Crossing paddock site.



Figures 8 and 9 represent the gravelly layer within the stream channel and gravels pulled from the exposed surface.



Figure 8: Exposed gravel layer within Crossing Drain



Figure 9: Exposed gravels on Crossing Drain wall (gravels 5-10 cm in size)

PUMP STREAM CHANNEL & DAM DRAIN (WHITE & PURPLE CIRCLES)

To conclude the investigation, identification of the same gravelly layering at the previous locations was sought within the northern end of the property. Test holes were dug along drains, and these walked searching for any evidence of gravels, however this was to no avail. Although no gravels were identified at the equivalent depth to what was noticed downstream, it would appear these gravels may be at a greater depth to what was dug.



LANDOWNER COMMENTS

The Stoddarts have a water supply well located within the shed at the southern end of the Hay Barn paddock that is currently not identified on by Hawke's Bay Regional Council. This well is 2.5 m deep and into fine gravels that sit on a silty pan layer. Over its years of operation, Gordon Stoddart mentioned that this well has never run out of water.

CONCLUSIONS

Location of an underlying gravel layer was identified in the drain channels on the southern area of the Stoddart Farm. In the Wharf paddock drain, fine sub-angular gravels were located at approximately 1.4 m in depth, underlying a heavy clay subsoil. Previous excavation works to widen and deepen this drain has exposed this gravelly layer with gravels noticed on the lower drain walls and bed, alongside within the final upturned digger bucket on the adjacent drain bank that has scoured the surface of this gravel layer.

Upstream, these gravels are noticed within the Crossing paddock drain, however at a shallower depth and greater size. Gravels here are larger at 5-10 cm, at a depth of 1.2 m and appear to differ to those noticed downstream. Although the degree of angularity of these gravels between the sites appears to be similar, these differ significantly in that no large 5-10 cm gravels are noticed downstream, and equally minimal fine gravels <2 cm are noticed upstream.

Aside from within the Crossing Drain and the drain flowing through the Wharf paddock, no gravels were noticed in other drain/stream cuttings over Stoddart Farm, implying further work may be required to identify the distribution, depth, and characteristics of these gravels (if they exist).

If you have any questions, please do not hesitate to get in contact.

Yours sincerely,

Low Environmental Impact

Sam Morris
sam@lei.co.nz