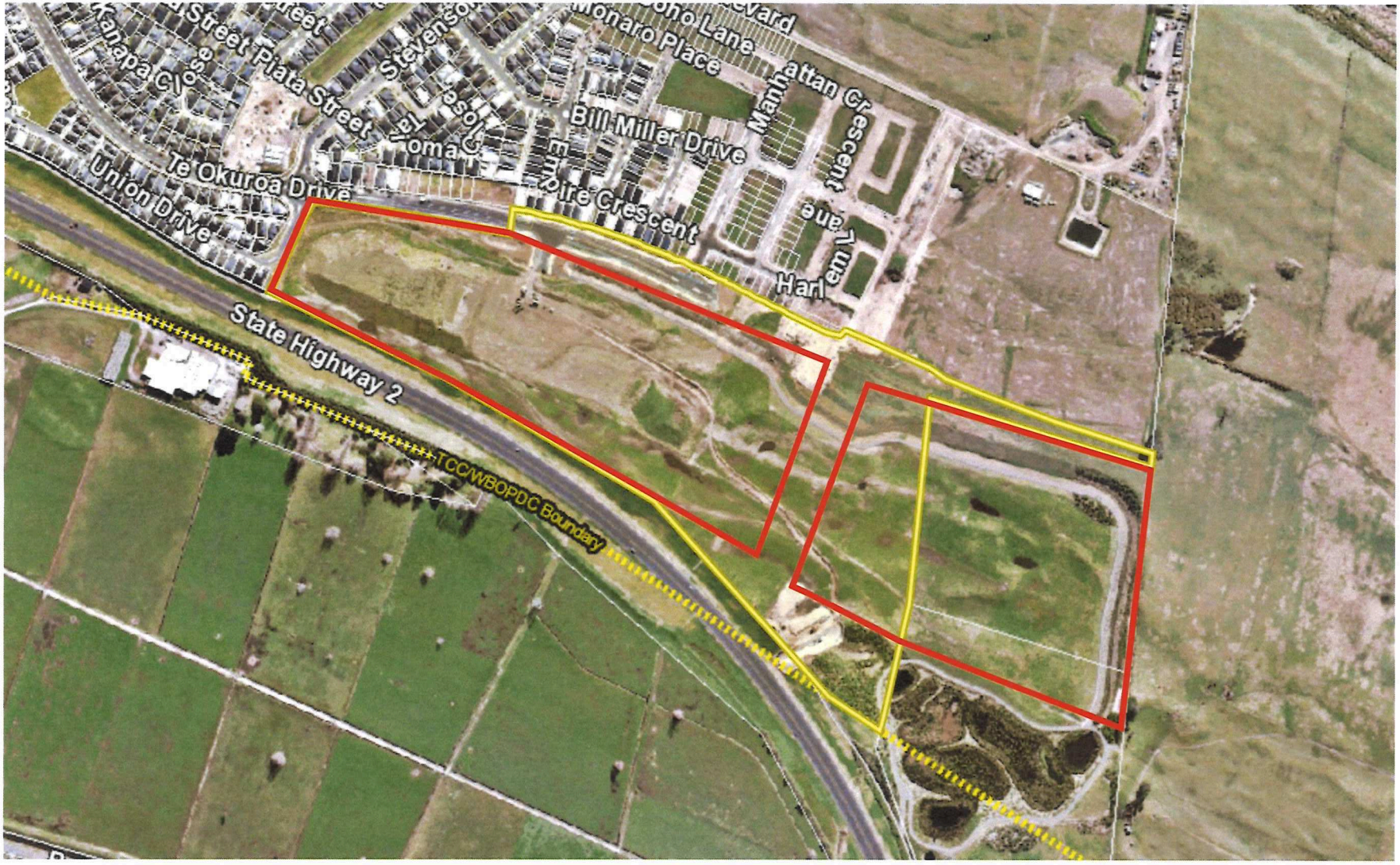
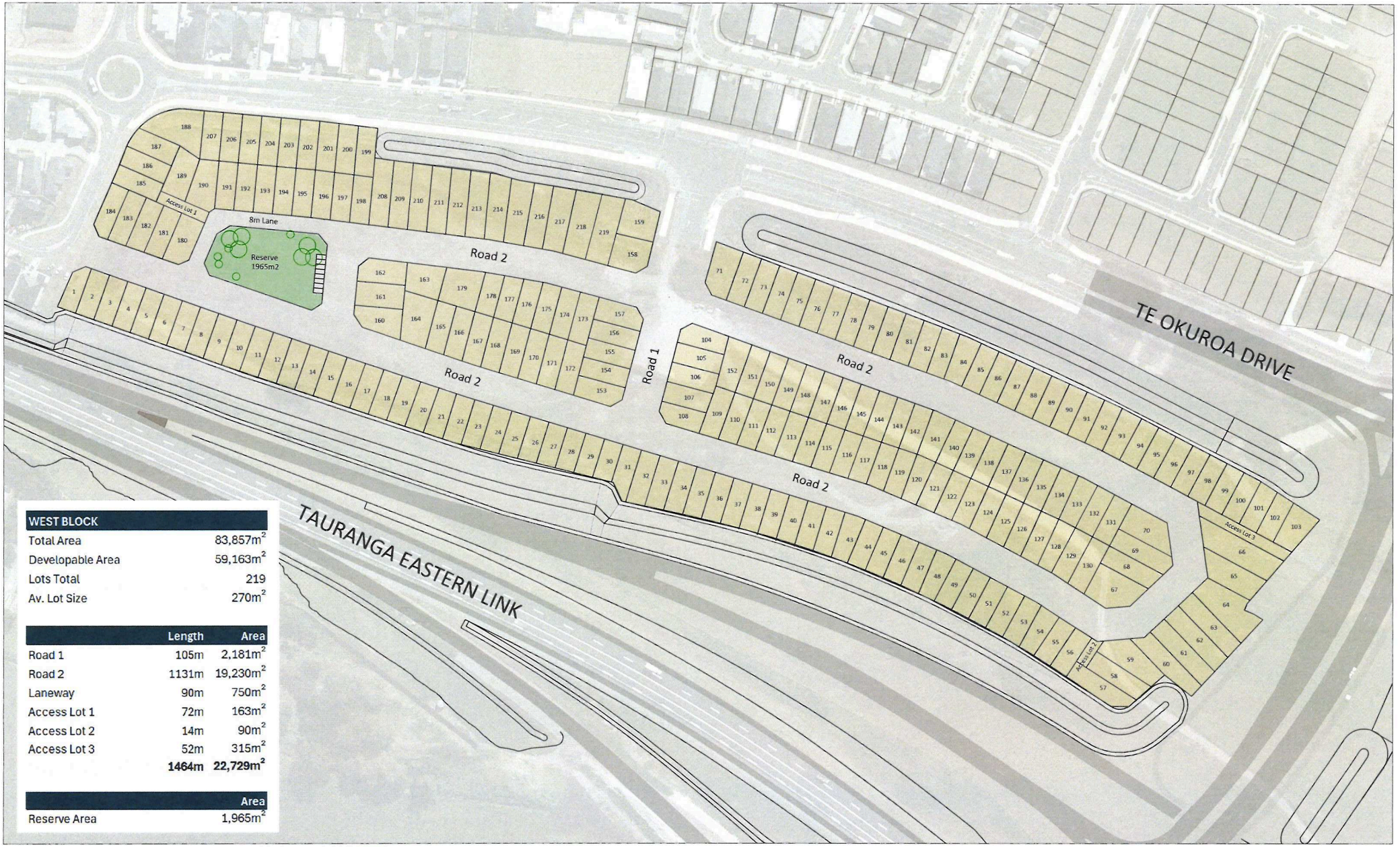

Te Okuroa Drive
Union Drive
State Highway 2
TCC/WBOPDC Boundary
Bill Miller Drive
Empire Crescent
Harlem Lane
Manhattan Crescent
Monaro Place
Piata Street



WEST BLOCK	
Total Area	83,857m^2
Developable Area	59,163m^2
Lots Total	219
Av. Lot Size	270m^2

	Length	Area
Road 1	105m	2,181m^2
Road 2	1131m	19,230m^2
Laneway	90m	750m^2
Access Lot 1	72m	163m^2
Access Lot 2	14m	90m^2
Access Lot 3	52m	315m^2
	1464m	**22,729m^2**

	Area
Reserve Area	1,965m^2

Veros

Tauranga City

Papamoa East Interchange

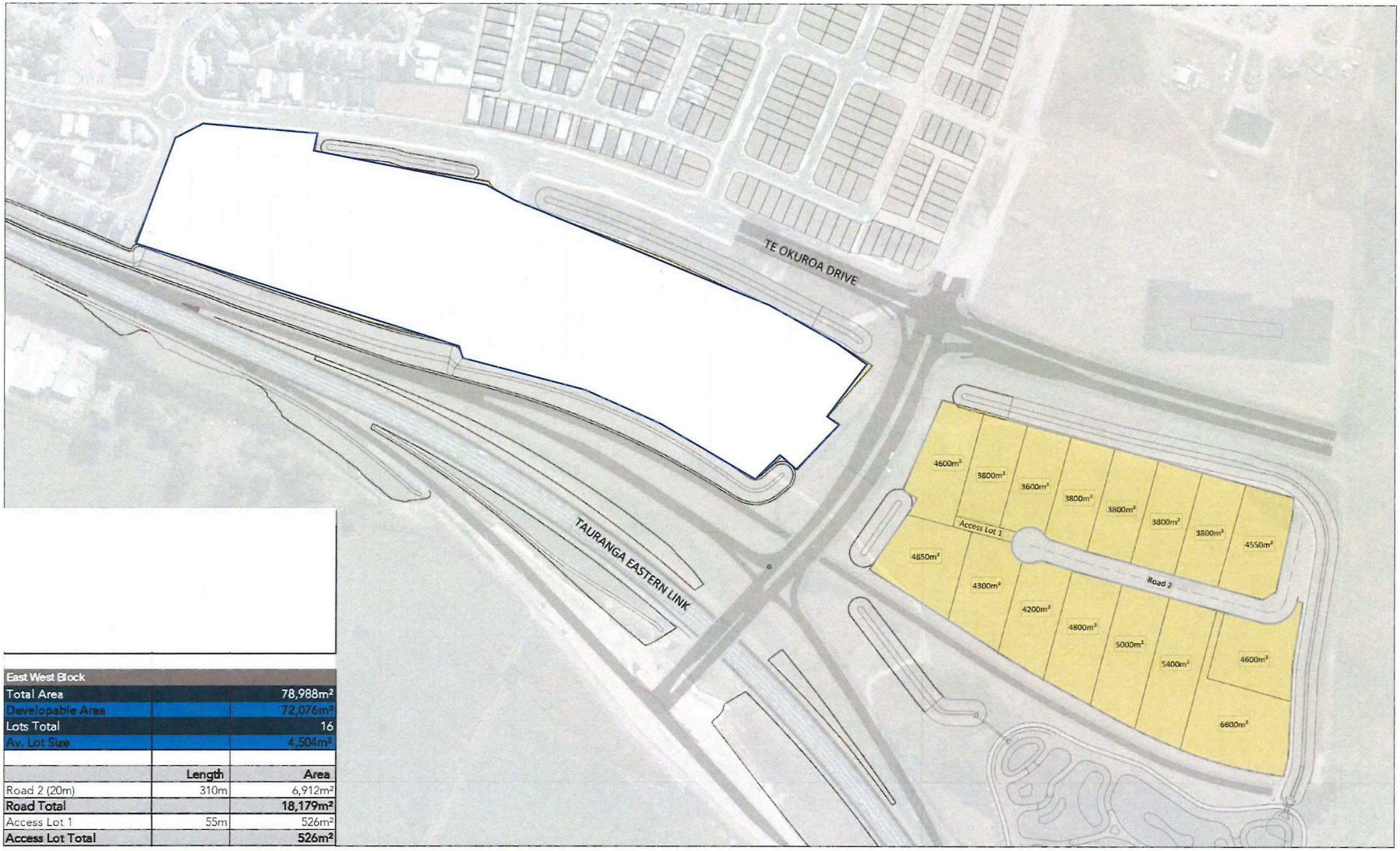
Project

West Block - Residential Scheme

Drawing

1:1750 @A3

N



East West Block		
Total Area		78,988m²
Developable Area		72,076m²
Lots Total		16
Av. Lot Size		4,504m²
	Length	Area
Road 2 (20m)	310m	6,912m²
Road Total		**18,179m²**
Access Lot 1	55m	526m²
Access Lot Total		**526m²**

Veros

Papamoa East

Tauranga City Council

Site Plan

1:2000 @ A3

A Rev

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Memo

To	Michael Kemeys
From	Jarred Stent
Date	2 May 2024
Job No.	148560
Job name	Pāpāmoa East Land
Subject	**Pāpāmoa East Land (PEI) Development Infrastructure**

1. Introduction

Tauranga City Council (TCC) is investigating their options for the development of a pocket of Council land in Pāpāmoa. The land is known as the Pāpāmoa East Land and is located north of the proposed Pāpāmoa Eastern Interchange (PEI), and generally south of Te Okuroa Drive. The boundaries of the site are currently not well defined, however, once PEI is completed and Sands Avenue is extended the site will be split into two sides – the eastern and western. The eastern and western sides are both approximately 7ha in size.

The development objective for the eastern side is to maximise the delivery of industrial lots, whereas the objective of the western side is to develop it into either residential and business land.

As part of TTC's due diligence and business case work, BBO has been asked to provide engineering technical support to Veros around the site's opportunities and constraints in relation to landform design and three waters. BBO has also been asked to provide some high-level thoughts costings for developing the land.

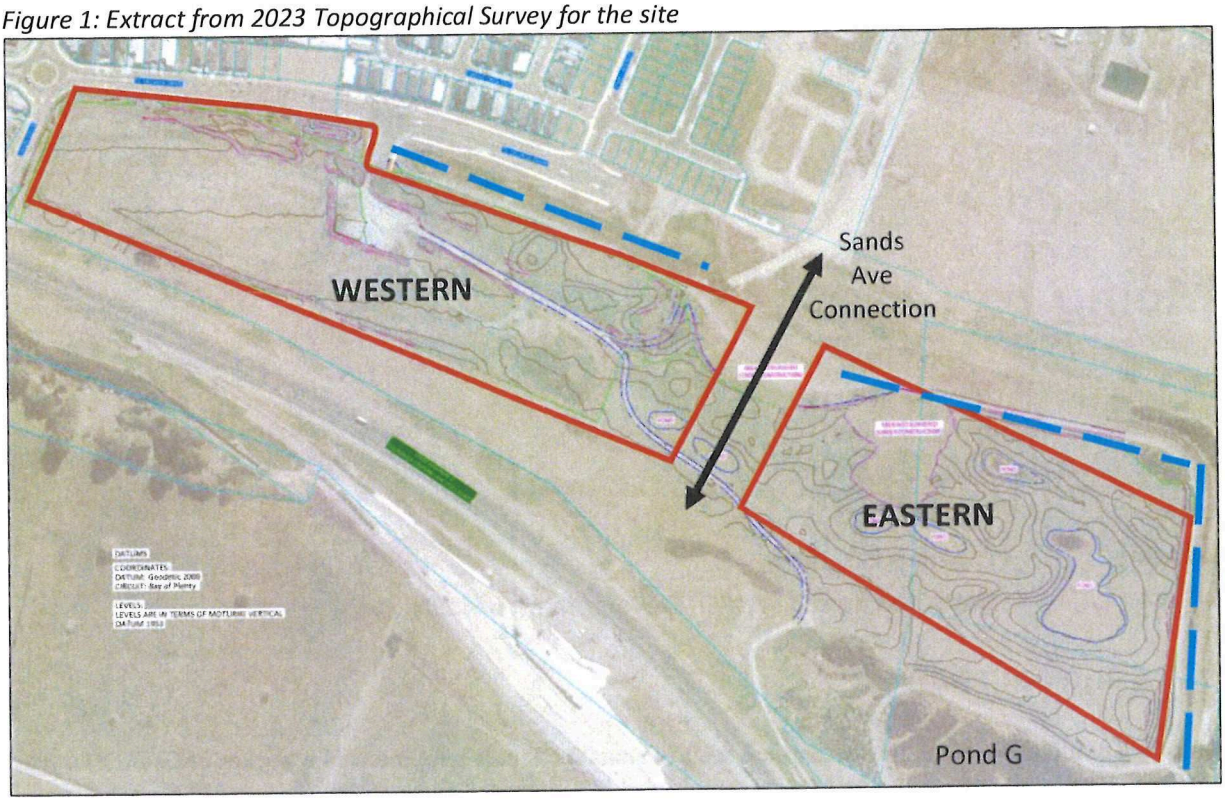
This memo pulls the design and investigations undertaken to date.

2. Landform Design

As noted above, the development area consists of two sections that are to be split by the Sand Avenue extension (as designed). To the south and to the north of the western area are swales that have been constructed to direct stormwater runoff to a wetland (Pond G) located at the far southeastern corner of the Council land. These features provide fixed points to which the landform design of the site needs to respond to. The landform design has also been constrained by wastewater falls to tie into the existing pump station.

BBO completed a topographical survey of the site in late 2023. That survey has identified that the historical stockpile previously located on the western side, has been spread generally evenly across the site, with a difference of approximately 2.2m across the site (or 1% gradient). The eastern side has not been earthworked and has high points and depressions across it. This survey information has been used to inform the landform design. A snip from the topographical plan is provided as Figure 1 below, to show the existing landform profile and the location of each development site and some of the features described above.

Figure 1: Extract from 2023 Topographical Survey for the site



2.1 Western Side Design

Based on those fixed features describe above, the earthworks on the western side have been graded with a crest that enables stormwater runoff to flow both northwest towards the Wairakei Catchment and southeast towards the existing swales and Pond G.

To facilitate wastewater flows (as discussed below) the earthwork profile for the site has been graded at a 1% slope in all directions. Elevation levels have been established to direct wastewater to the pump station in the northeast and the existing wastewater reticulation in the northwest.

Based on this profile, anticipated earthworks volumes for the western side are 33,800m³ and 5,000m³ of fill (including compaction factors). See the attached Conceptual Cut Fill Area Plan for further information on the location of cut and fills. It is anticipated that the surplus cut will be utilised on the eastern side.

2.2 Eastern Side Design

The earthworks on the eastern side of the development have been graded with a single slope to allow stormwater to flow towards the northern swales (and then back to pond G). Please note that the preliminary design does not take into account the future Te Tumu link, which lies between the development and pond G.

To provide for the required wastewater flows, the earthworks have been graded at a 1% slope, and elevation levels were established to direct wastewater towards the northwest pump station while maintaining a designed floor level above the 1% AEP flood.

Based on this profile, anticipated earthworks volumes for the eastern side are 48,800m³ of cut and 59,000m³ of fill (including compaction factors). See the attached Conceptual Cut Fill Area Plan for further information on the location of cut and fills.

2.3 Industrial versus Residential

The attached Conceptual Cut Fill Area Plan is based on the proposed industrial configuration. While the residential option has a slightly modified roading layout, the key driver in the landform (for either option) is the wastewater falls. For this reason, we do not anticipate that there will be a lot of difference in the final landform for either option. The only material change, for the residential option, will be a slight increase in the top surface to lift the lots to meet the higher freeboard requirements. On this basis, it is our opinion that the earthworks volumes are to be treated equally between either option.

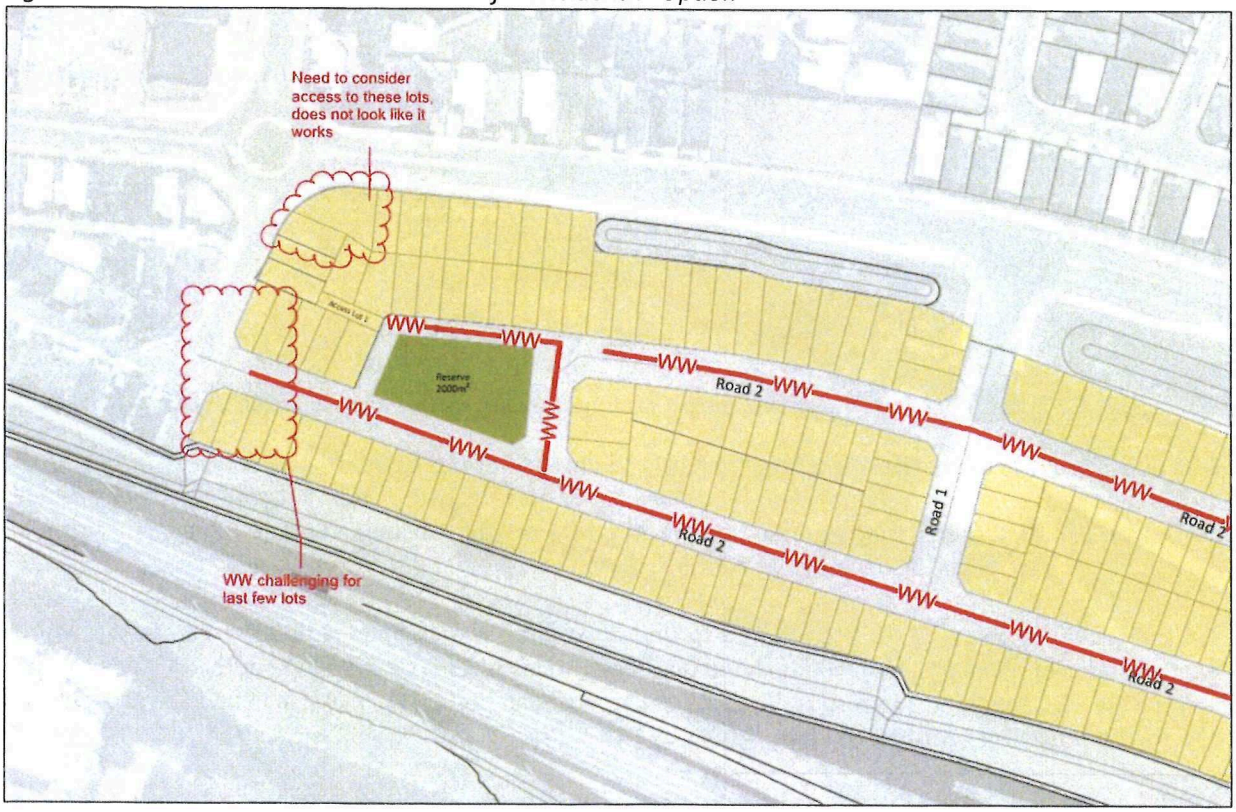
3. Water and Wastewater

BBO has reviewed the water and wastewater infrastructure requirements to service the development options.

Based on this analysis, we can confirm that there does not appear to be any fatal flaws in providing water reticulation for either the industrial/business or residential options.

For wastewater we have identified that there may be some level constraints at the western end of the catchment for the residential option. These constraints may require further lifting of lots locally or reconfiguring to resolve. The location of this issue, along with the wastewater reticulation arrangement, is marked in **Figure 2** below. We are of the opinion that this is not a fatal flaw, for the residential outcome but may require the redesign of the configuration and number of lots in this area. The same issue does not arise with the industrial/business development option because of the likely size of the eventual lots.

Figure 2: Potential Wastewater Constraints for Residential Option



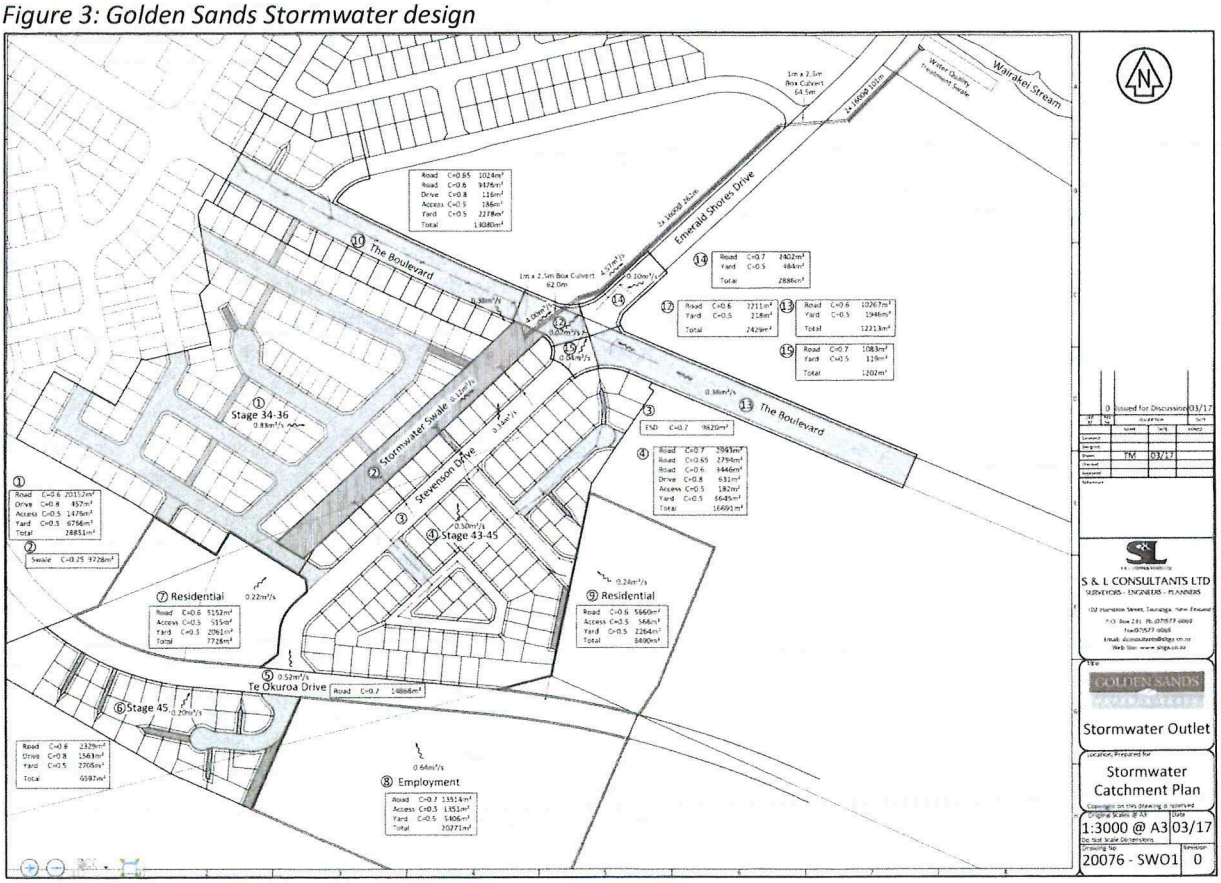
4. Stormwater

4.1 Background and Challenges

In 2017 BBO were engaged by TCC to carry out the design for Te Okuroa Drive - Stage E. During the design phase of that project BBO raised stormwater infrastructure issues regarding the capacity and sizing of the downstream receiving network, as designed by the Golden Sands Developments.

The layout of that development is provided in **Figure 3** below and shows runoff from the Pāpāmoa East Land discharging into stormwater swale through Te Okuroa Drive and stormwater infrastructure.

Figure 3: Golden Sands Stormwater design

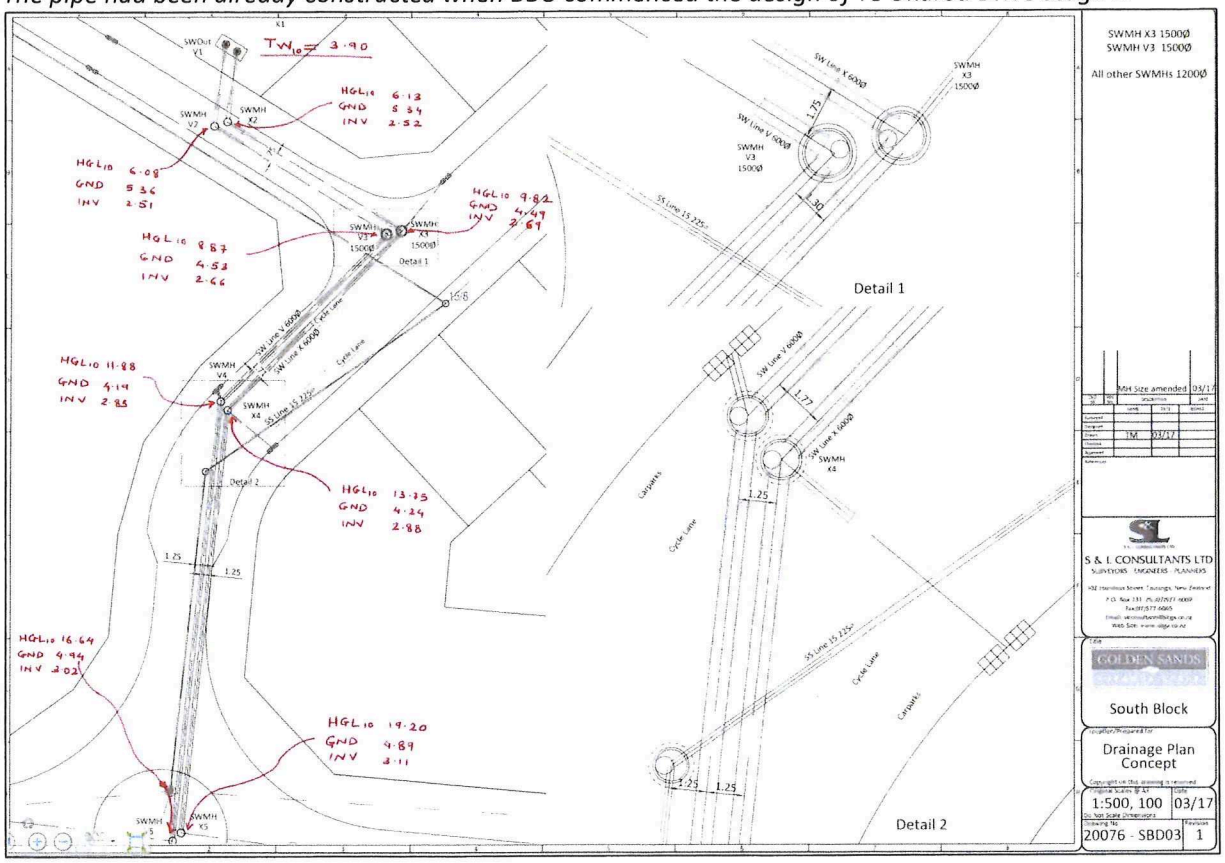


BBO calculated that the network sizes required, to convey runoff from Te Okuroa Drive and the front 3.0 m of adjacent lots, were approximately two times that of the network design and that which had constructed for Golden Sands. BBO were however advised that the network constructed in within Golden Sands should have enough capacity for the development and Te Okuroa Drive.

TCC subsequently engaged Aurecon Group to undertake stormwater flood modelling across the whole Wairakei development area. Aurecon updated this flood model to reflect the design approach Golden Sands used for the development. The results of this modelling was that there is an increase in flood levels, that the development had not been designed for.

Despite the above, and since the Golden Sands designed infrastructure had already been built (including two 600mm pipes discharging into the Swale SW3 as per **Figure 4** below), the final design included an extension of the 600mm pipes all the way to the upstream end of Te Okuroa Drive stretch (Stage E), to maximise capacity even though the diameter was not sufficient.

Figure 4: Golden Sands SW design showing double 600mm pipe discharging into the stormwater Swale SW3. The pipe had been already constructed when BBO commenced the design of Te Okuroa Drive Stage E.



4.2 Potential Solution

Because of this history, stormwater infrastructure within the receiving environment (and which has already been constructed) has limited capacity. As such our solution for the western side of the Pāpāmoa East Land is the best practical option rather than an option that meets all relevant guidelines and specifications.

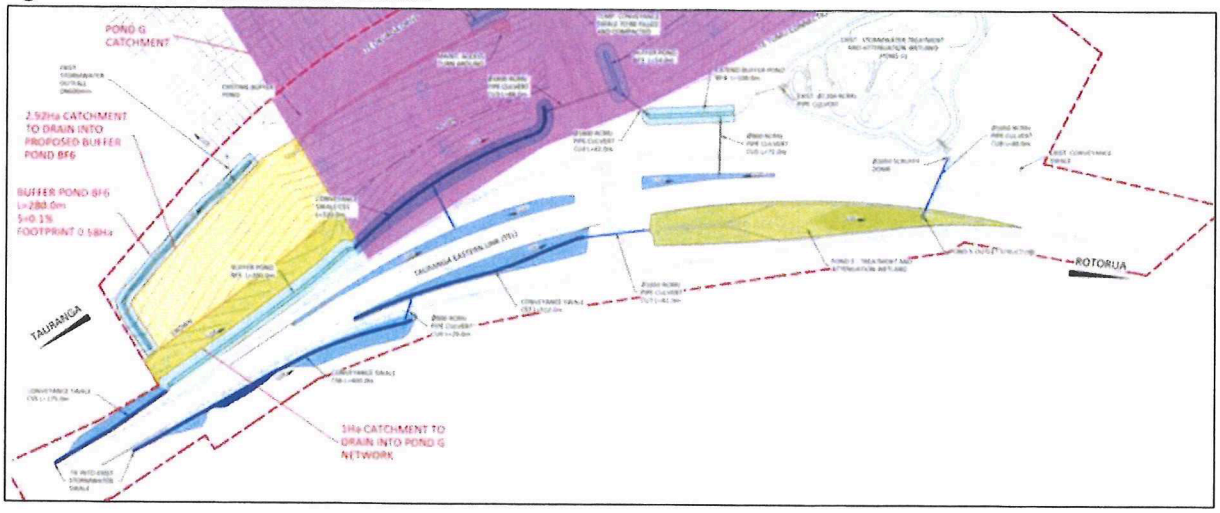
This solution would consist of the extension of the already constructed Buffer Pond BF6 along the north-west and western boundary of in conjunction with grading part of the site to drain toward Buffer Pond BF5 drain discharges into Pond G. This adjustment has already been accounted for in the overall Pond G stormwater model, and therefore does not pose any increased effects to the system's performance. An indicative sketch of this option is provided in **Figure 5** below.

The low grading of the proposed buffer pond/swale provides significant additional storage volume to the system to allow water to back up and slowly discharge through the reticulation across Te Okuroa Drive and into SW3. Additional modelling of the overall reticulation line would help assess the effects of the proposed solution on the function of the line. The buffer pond would also contribute to the overall stormwater treatment of the runoff as well as promote groundwater recharge.

Additional on-lot measures could also be implemented to further reduce volume and peak flow discharges into the existing infrastructure. Rain tanks and underground storage within the lots could be considered. This would require input from geotechnical engineers will be needed to verify groundwater levels and feasibility of underground storage.

This option will also have to be assessed within the context of the overall Wairakei catchment, to identify if there are any adverse flooding effects to the downstream development during the 100-year storm.

Figure 5: Possible Stormwater Solution



5. Cost Estimates

Based on the landform design set out in section 2 above, a cost estimate for the earthworks components was prepared. This estimate is as follows.

s 9(2)(b)(ii)

Within the cost estimates provided we have made the following assumptions:

- Nominal topsoil stripping depth of 150mm assumed.
- A compaction factor of 1.2 has been applied.
- No provision made for imported fill based on the assumption that the onsite material is 100% reusable.
- No provision for export of unsuitable material or contaminated material.
- Rates applied are based on recent tender rates for similar work in the region.
- No allowance for contingency.

In terms of costs for construction of the roading network and associated infrastructure we would recommend using the rates:

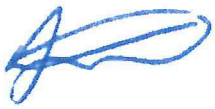
- Based on a 12m wide formation, the per linear metre rate of road, Landscaping, Stormwater (retic, not treatment), Basic utility provision, Lighting and P&G is approx. s 9(2)(b)(ii)
- For additional utilities, an allowance (per m of road cl) of
  - s 9(2)(b)(ii)
  - s 9(2)(b)(ii)

For the professional service fees, we suggest that a value of 8% be adopted for design and tender and 4% for MSQA.

For consenting the land use outcome we would anticipate that a Plan change or Fast Track consenting process would have similar costs of around s 9(2)(b)(ii) for Council costs etc – this includes all technical inputs.

For a subdivision consent for an industrial development outcome we would anticipate that costs would be in the order of s 9(2)(b)(ii) including Council costs.

Yours sincerely
Bloxam Burnett & Olliver



Jarred Stent
Director
s 9(2)(a)

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1	15.04.2024	ISSUE FOR REVIEW	DE	JS	JS
	DATE	ISSUE/REVISION DETAIL	BY	CHK	APPR

DESIGNED: DE | CHECKED: JS
DRAWN: DE | APPROVED:

bbo

CLIENT: Tauranga City

PROJECT: PAPAMOA EAST LAND (PEI) DEVELOPMENT

DRAWING: CONCEPTUAL CUT AND FILL AREAS

STATUS: FOR REVIEW

DATE: 15.04.24

SCALE (ORIGINAL SIZE A3): 1:4000

DRAWING NUMBER: 145280-06-0100

REVISION: -

Version 4.0 - March 2020