Summary of Visual Effects

5.4.17 The Site has a relatively contained visual catchment to within 500 – 600 m from the Site boundary, with potential for some longer distance glimpsed views within 1km. Views towards the Site are well contained within the wider landscape by the higher landforms or Beulah Ridge to the southwest, Suncrest Drive to the south and the higher ridge of land which runs to the east of Pomona Road/ Marriages Road. The greatest visual effects from public locations will be experienced by users of Marriages and Mamaku Roads, and users of the Great Taste Trail who would experience **moderate** adverse effects during the earthworks period of construction. Effects reduce as roads are developed and buildings constructed, and once construction is completed, these visual effects decrease to **low** adverse, as planting proposed within the masterplan establishes the proposed development will integrate into its surroundings.

5.4.18 Dwellings in Beulah Ridge experience elevated views out over the Site to the east. During construction, earthworks to create roads and building platforms would be visible. Once completed, proposed building locations would be visible, interspersed with planting and viewed in the context of the neighbouring Rural 3 developments on the opposite side of Marriages Road. Views would be similar to that of the consented development, but with a greater number of potential dwellings visible. Similar effects would be experienced from some dwellings on Mamaku Road, with some views from this location being partially screened by surrounding vegetation. Once construction is complete, visual effects for these locations reduce to **low-moderate** adverse, reducing further to **low** adverse once masterplan planting has been established.

5.4.19 Views are available from dwellings on the Site boundary at the northern end of Suncrest Drive towards the Site. A 10m offset between the developed lot boundary and the adjoining boundary within dwellings on Suncrest Drive has been allowed for within the masterplan to establish planting between the two developments. During construction, there would be temporary effects as a result of earthworks to establish the roads and building platforms, visible close to the boundaries of these properties. Effects would reduce once construction has been completed and reduce further to **low-moderate** adverse once screen planting has been established.

5.4.20 Visual effects from other dwellings are either more distant, or limited by intervening vegetation or landform and are considered to be **low** to **very low** adverse in the long term.

5.5 Potential Cumulative Effects

5.5.1 There is potential for cumulative landscape effects to occur as a result of the proposal. As the overall density of the proposed development is greater than many Rural 3 subdivisions, existing neighbours along Mamaku Road, Marriages Rd and Suncrest Drive will be aware of the change in landscape character that is the result of increased density. This is proposed to be minimised by:

- The introduction of design controls as outlined in Section 6. This will ensure buildings are recessive in colour and complimentary to the landscape character of the area.
- Offsets of built development from Marriages and Mamaku Roads to allow the balance of rural land in the foreground of views.
- An offset of lot boundaries with the neighbouring properties on Suncrest Drive to allow to mitigation planting between the Site and these neighbouring properties.
- Controls preventing street lighting and the provision of individual landscape plans at the time of building consent to further integrate and mitigate the appearance of dwellings in the surrounding landscape.

Based on the above and the consented subdivision of the Site, the proposal is considered to absorb the increased residential density proposed while also maintaining a sense of rural character through generous setbacks, extensive native revegetation throughout the Site and clustering the built development together. Overall, it is considered that the cumulative effects of the additional density when compared to the consented development will have a **low** adverse cumulative effect on the landscape character of the area.

5.6 Effects in relation to Statutory Provisions

5.6.1 Under RMA s6(a), it is necessary to preserve the natural character of the coastal environment (including the coastal marine area), wetlands, lakes and rivers and their margins, and to protect them from inappropriate subdivision, use, and development. Given the current condition of the streams on Site, it is considered that the proposed masterplan improvements would have a neutral to beneficial effect on the natural character values of the stream and wetlands within the Site.

5.6.2 Visual amenity aspects are a part of amenity values and form part of the suite of Other Matters to consider under s7(c) of the RMA. Visual amenity values stem from the observer's appreciation of the pleasantness, aesthetic coherence and cultural and recreational attributes of an area. The proposed development is considered to fit in with the anticipated outcomes of the Rural Zone within the TRMP as discussed below and result in no greater than **low** adverse visual effects from public locations, and **low-moderate** adverse visual effects from a limited number of private locations.

5.6.3 The masterplan has developed a layout which is in keeping with the requirements of the Tasman RPS to maintain rural character, through including extensive areas of planting and maintaining a large rural balance lot which is similar to that of the consented scheme. The site is not located within or close to any Outstanding Natural Landscapes. The Site is located within the Rural Zone of the TRMP. Chapter 7 of the TRMP sets out the provisions for the Rural Zone, which deals with the availability of rural land for a range of purposes, including the protection of rural character. The proposed development introduces rural residential development, which by its nature has a different character to the open rural landscapes of the area. However the proposed development maintains within it a slightly larger area of rural open space than the consented development, and within this area it is proposed to provide landscape enhancement of the area, with restoration of the existing gullies and ponds and planting throughout the rural balance lot areas to include species from the Moutere Downlands Hill Country Ecosystem native plant restoration lists. This fits with Objective 9.2.2 of the TRMP and its associated policies to consider rural landscape values, retain rural characteristics of the landscape, encourage landscape enhancement and mitigation of landscape changes through design and to avoid, remedy or mitigate cumulative adverse effects of subdivision within rural areas.

5.6.4 The TMRP includes Appendix 3 the Coastal Tasman Area Subdivision and Design Guide (CTDG), in which the Site is located in Landscape Unit 6 – Inland Tasman. A full assessment of the proposal against the provisions of the CTDG is provided in **Appendix 2**. In summary, the proposal has been comprehensively planned, with a focus on stream, pond and wetland rehabilitation. The design places the development on the upper slopes, leaving the lower slopes and valley flats for rural production. Measures have been incorporated into the layout to reduce the visual prominence of development from public roads, by locating development on the spurs and plateaus. Building platforms have been positioned below the ridgeline as far as practicable, leaving room for landscape mitigation in the foreground of building platforms when viewed from Marriages and Mamaku Roads, and the Great Taste Trail.

5.6.5 The masterplan includes the provision of planting of trees and riparian areas throughout the development. Extensive planting is proposed along the road access, along the stream and pond areas and on the slopes around dwellings to filter views of the proposed development and provide greening of the ridgeline along the open spurs of the Site.

6.0 Recommendations

6.1.1 The following recommendations have been made for the proposed development, which are based upon those controls defined for the consented development:

1. That a planting plan be submitted for approval based on the masterplan set. This could be a single plan or a series of staged plans. This will show details of plant species, species, spacings and a specification for implementation and maintenance. The planting plan shall be implemented prior to the issuing of the completion certificate for any given stage. All plants shall be maintained in perpetuity and any dead or diseased plants will be replaced in kind or with similar species.

2. That each private lot owner of a residential lot shall provide a landscape plan that relates to the proposed building on Site. This shall show how landscaping shall provide privacy and amenity between the newly designed house and garage and the neighbouring properties. This shall be designed by a suitably qualified landscape architect or designer and shall be approved by the Council.

3. That a Land Management Report be conditioned to include the management of the following areas as identified on Sheet 4 of the Masterplan Set within the Site:
    - Productive areas
    - Stream
    - Ponds
    - Wetlands
    - Gullies
    - Amenity areas in the balance land
    - Mitigation on the balance land.

a. This report will describe how each of these areas are to be maintained and the timing of the planting. This management plan will outline ownership and legal arrangements, maintenance and how this is funded. The land management report will set out the method of management of all areas of the Site, ownership, management and maintenance structures as set out in 3.13 of Appendix 3 of Part II Appendix 3 of the TRMP.

4. Adverse visual effects associated with the prominent placement of water tanks will be prevented, either by incorporating tanks into the structure of the buildings or burying/screening from public roads and ROWs. A consent notice will require lot owners to install sprinkler systems to reduce on site storage requirements.

5. Boundary lines shall be marked by boundary pegs only, to prevent arbitrary lines in the landscape. Post and wire fencing or post and rail fencing is appropriate. Closed board fencing shall be avoided.

6. Any cuts required in the formation of building platforms shall be married back into the natural contours of the Site and reseeded with local grass seed mix.

Likewise fill batters should be tied in to match the natural undulating contours of the existing landform.

7. Planting of riparian areas shall be consistent with that shown on the masterplan.

8. Access ways shall be formed in a manner that ensures the effects of new entrances are minimised, and that earthworks associated with this is done in a way which is sensitive to the underlying topography – i.e., cuts battered back to tie in with the natural contours and exposed cuts are revegetated with local grass seed mix.

9. Entrances on to Sites should be rural in appearance and consist of rural materials such as local stone, post and rail or post and wire.

10. Height controls and building colour controls should be included as part of the consent. The Lots shall be restricted in height to 6 metres above finished ground level. Buildings shall be single storied and stepped to follow the underlying contours.

11. Colours of houses shall be complimentary to the colours of the local landscape, in a natural range of browns, greens and greys. Colour steel cladding with all wall surfaces to have a reflectance value below 40%. Roofs to be finished to have a reflectance value of 15% or lower.

12. No streetlights shall be used for the access ways. All exterior lighting including streetlights in roads shall be capped and downward facing to prevent unnecessary light spill on neighbouring properties.

7.0 Conclusions

7.1.1 The proposed masterplan development involves the construction and occupation of 58 new rural residential dwellings, with balance lots in rural use, creating a rural residential character to the Site. The masterplan proposes the planting of trees and riparian areas throughout the development. Extensive planting is proposed along the road access, along the stream and pond areas and on the slopes around dwellings to filter views of the proposed development and provide greening of the ridgeline along the open spurs of the Site.

7.1.2 The greatest visual effects would be during the construction period, when earthworks to create road access and building platforms will be visible within the immediate Site context, including for some nearby neighbours. For the nearest neighbours, effects at completion would reduce to **low-moderate adverse**, with effects for other residents reducing to **low to very low adverse**. Effects from public locations range from moderate adverse during the earthworks period, reducing to **Low moderate adverse** at completion and **low to very low adverse** following establishment of vegetation.

7.1.3 Once completed, the proposed development is considered to have a **neutral to beneficial** effect on the natural character values of the area due to the already modified nature of the landscape within the Site and resulting improvements to stream areas carried out as a result of the masterplan development.

7.1.4 Landform effects would also result from earthworks, but these effects are minimised at completion by tying earth worked areas back into the natural contours and reseeding or planting slopes. Overall, while there will be a change to the landscape character of the area as a result of the proposed development, the Site's location within the well-settled Tasman landscape and the proposed masterplan landscape structure, means that once construction is complete, the Site has the capacity to absorb such changes, resulting in **low-moderate** adverse landscape character effects.

8.0 References

Bridget Gilbert Landscape Architecture Ltd. (2022). *Tasman District landscape study 2022: Outstanding natural features and landscapes*. Prepared by Bridget Gilbert Landscape Architecture Ltd for Tasman District Council.

Tasman District Council. (2001). *Tasman regional policy statement*. Tasman District Council.

Tasman District Council. (2014). *Tasman Resource Management Plan*. Tasman District Council. https://www.tasman.govt.nz/my-council/key-documents/tasman-resource-management-plan/

Tasman District Council. (2022). *Aorere ki uta Aorere ki tai—Tasman Environment Plan: Issues and options report: Urban environment—District wide*. Tasman District Council.

Appendix 1: Method Statement

Method Statement

22 November 2023

This assessment method statement is consistent with the methodology (high-level system of concepts, principles, and approaches) of 'Te Tangi a te Manu: Aotearoa New Zealand Landscape Assessment Guidelines', Tuia Pito Ora New Zealand Institute of Landscape Architects, July 2022. The assessment provides separate chapters to discuss landscape, visual and natural character effects where relevant, but is referred to throughout as a Landscape Effects Assessment in accordance with these Guidelines. Specifically, the assessment of effects has examined the following:

- *The existing landscape;*
- *The nature of effect;*
- *The level of effect; and*
- *The significance of effect.*

The Existing Landscape

The first step of assessment entails examining the existing landscape in which potential effects may occur. This aspect of the assessment describes and interprets the specific landscape character and values which may be impacted by the proposal alongside its natural character where relevant as set out further below. The existing landscape is assessed at a scale(s) commensurate with the potential nature of effects. It includes an understanding of the visual catchment and viewing audience relating to the proposal including key representative public views. This aspect of the assessment entails both desk-top review (including drawing upon area-based landscape assessments where available) and field work/Site surveys to examine and describe the specific factors and interplay of relevant attributes or dimensions, as follows:

Physical –relevant natural and human features and processes;

Perceptual –direct human sensory experience and its broader interpretation; and

Associative – intangible meanings and associations that influence how places are perceived.

Engagement with tāngata whenua

As part of the analysis of the existing landscape, the assessment should seek to identify relevant mana whenua (where possible) and describe the nature and extent of engagement, together with any relevant sources informing an understanding of the existing landscape from a Te Ao Māori perspective.

Statutory and Non-Statutory Provisions

The relevant provisions facilitating change also influence the consequent nature and level of effects. Relevant provisions encompass objectives and policies drawn from a broader analysis of the statutory context and which may anticipate change and certain outcomes for identified landscape values.

The Nature of Effect

The nature of effect assesses the outcome of the proposal within the landscape. The nature of effect is considered in terms of whether effects are positive (beneficial) or negative (adverse) in the context within which they occur. Neutral effects may also occur where landscape or visual change is benign.

It should be emphasised that a change in a landscape (or view of a landscape) does not, of itself, necessarily constitute an adverse landscape effect. Landscapes are dynamic and are constantly changing in both subtle and more dramatic transformational ways; these changes are both natural and human induced. What is important when assessing and managing landscape change is that adverse effects are avoided or sufficiently mitigated to ameliorate adverse effects. The aim is to maintain or enhance the environment through appropriate design outcomes, recognising that both the nature and level of effects may change over time.

The Level of Effect

Where the nature of effect is assessed as **'adverse'**, the assessment quantifies the level (degree or magnitude) of adverse effect. The level of effect has not been quantified where the nature of effect is neutral or beneficial. Assessing the level of effect entails professional judgement based on expertise and experience provided with explanations and reasons. The identified level of adverse natural character, landscape and visual effects adopts a universal seven-point scale from **very low** to **very high** consistent with Te Tangi a te Manu Guidelines and reproduced below.

Landscape Effects

A landscape effect relates to the change on a landscape's character and its inherent values and in the context of what change can be anticipated in that landscape in relation to relevant zoning and policy. The level of effect is influenced by the size or spatial scale, geographical extent, duration and reversibility of landscape change on the characteristics and values within the specific context in which they occur.

Visual Effects

Visual effects are a subset of landscape effects. They are consequence of changes to landscape values as experienced in views. To assess where visual effects of the proposal may occur requires an identification of the area from where the proposal may be visible from, and the specific viewing audience(s) affected. Visual effects are assessed with respect to landscape character and values. This can be influenced by several factors such as distance, orientation of the view, duration, extent of view occupied, screening and backdrop, as well as the potential change that could be anticipated in the view as a result of zone / policy provisions of relevant statutory plans.

Natural Character Effects

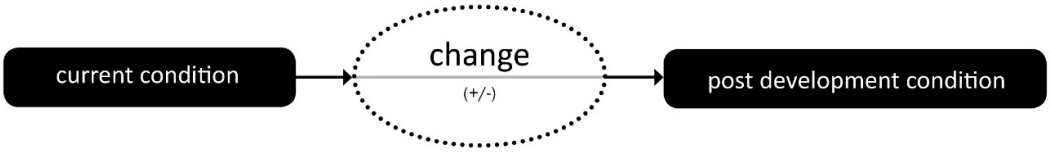
Natural Character, under the RMA, specifically relates to *'the preservation of the natural character of the coastal environment (including the coastal marine area), wetlands, and lakes and rivers and their margins, and the protection of them from inappropriate subdivision, use, and development'*. Therefore, the assessment of natural character effects only involves examining the proposed changes to natural elements, patterns and process which may occur in relevant landscape / seascape contexts.

As with assessing landscape effects, the first step when assessing natural character effects involves identifying the relevant physical and experiential characteristics and qualities which occur and may be affected by a proposal at a commensurate scale. This can be supported

through the input of technical disciplines such as geomorphology, hydrology, marine, freshwater, and terrestrial ecology as well as input from tāngata whenua. An understanding of natural character considers the level of naturalness and essentially reflects the current condition of the environment assessed in relation to the seven-point scale. A higher level of natural character means the waterbody and/or margin is less modified and vice versa.

A natural character effect is a change to the current condition of parts of the environment where natural character occurs. Change can be negative or positive. The resultant natural character effect is influenced by the existing level of naturalness within which change is proposed; a greater level of effect will generally occur when the proposal reduces the naturalness of a less modified environment. In short, the process of assessing natural character effects can be summarised as follows:

- Identify the characteristics and qualities which contribute to natural character within a relevant context and defined spatial scale(s), including the existing level of naturalness;
- Describe the changes to identified characteristics and qualities and the consequent level of natural character anticipated (post proposal); and
- Determine the overall level of effect based on the consequence of change.



The Significance of Effects

Decision makers assessing resource consent applications must evaluate if the effect on individuals or the environment is less than minor[8] or if an adverse effect on the environment is no more than minor[9]. For non-complying activities, consent can only be granted if the s104D 'gateway test' is satisfied, ensuring adverse effects are minor or align with planning objectives. In these situations, the assessment may be required to translate the level of effect in terms of RMA terminology.

This assessment has adopted the following scale applied to relevant RMA circumstances[10] (refer to diagram below), acknowledging low and very low adverse effects generally equate to 'less than minor' and high / very high effects generally equate to significant[11].

[8] RMA, Section 95E

[9] RMA, Section 95E

[10] Seven-point level of effect scale. Source: Te tangi a te Manu, Pg. 15

[11] The term 'significant adverse effects' applies to specific RMA situations, including the consideration of alternatives for Notices of Requirement and AEEs, as well as assessing natural character effects under the NZ Coastal Policy Statement.

Appendix 2: Assessment against Coastal Tasman Design Guide

Table 2: Inland Tasman (Landscape Unit 6)	
Landscape Qualities	**Comment**
(a) Comprehensively planned proposals as a means of optimising development opportunities.	The proposal is comprehensively planned, with a focus on stream/pond/wetland rehabilitation.
(b) Maintaining as far as possible the particular character of each sub-unit.	The proposal has been designed to fit with the qualities of the Beulah Ridge sub unit as outlined in Table 3 below.
(c) Ensuring that substantial plantings of trees, including back drop plantings on the higher slopes are initiated and maintained in order to provide a distinctive landscape setting for development.	The masterplan includes the provision of planting of trees and riparian areas throughout the development. Extensive planting is proposed along the road access, along the stream and pond areas and on the slopes around dwellings to filter views of the proposed development and provide greening of the ridgeline along the open spurs of the Site.
(d) Ensuring that development of this landscape unit does not compromise development opportunities in Landscape Unit 6.	The development is located in landscape unit 6, with neighbouring subdivision Beulah Ridge already developed.
(e) Utilising existing streams, ponds and wetland areas as landscape features.	There are a series of ponds and streams within the existing Site which have been utilised as part of the masterplan framework to provide landscape features, along with additional proposed ponds for stormwater attenuation. Gully and riparian planting is proposed adjacent to these water features throughout the development. The existing outflow from Tuckers dam will be made a feature with planting and a proposed walkway/cycleway alongside.
(f) Seeking to ensure that areas used for rural production activities are maintained and protected wherever possible as an integral part of the 'developed' landscape pattern	The design places development on the upper slopes, leaving the lower slopes and valley flats for rural production.
(g) Keeping all development off significant landforms and ridges that are characteristic and/or define the landscape sub-units.	Measures have been incorporated into the design to reduce the sky-lining effects of development. Emphasis has been placed on reducing the visual prominence of built

	development from public roads and other public places. This in part led to the location of development on the spurs and plateaus of the development area, leaving the lower land adjoining the district roads in rural production with enhanced wetland, pond and stream areas. This has been achieved by positioning the building platforms below the ridgeline as far as practicable, leaving room for landscape mitigation in the foreground of building platforms when viewed from Marriages and Mamaku Roads.
(h) Avoiding development on steep slopes, visually prominent landforms, and where extensive earthworks are required.	Landscape unit 6 is characterised by low rolling spurs and ridges. This gently undulating character enables the creation of building platforms that do not require significant earthworks or retaining structures.
(i) Having no development fronting or directly accessing Old Coach Road.	No development fronts or gains access form Old Coach Road.
(j) Consideration of farm parks concepts as an alternative to cluster developments.	The Site is situated in sub unit 6B, which is identified in the Guidance as suitable for clustered development.
(k) Consideration of rural village concepts as a feature and focus within the landscape unit.	The proposed development has been designed to have a rural village feel, with the more clustered areas of development allowing greater areas of undeveloped farmland. Space between the clusters in the gullies and along the spurs allows for shrub and tree planting to integrate the development into the surrounding rural environment.
(l) Being sensitive to views from the Coastal Highway.	The development is not visible from the Coastal Highway.

Table 3: Beulah Ridge (Landscape Unit 6B)	
Landscape Qualities	**Comment**
(a) Avoiding visually prominent development on the main ridges and internal spurs.	The higher landform of Beulah Ridge to the west of the Site has already been developed, along with the higher ridgeline to the south of the Site. The Site forms two localised spurs. Development along the spurs has been located so that roadways run along the spur, with building platforms set at a lower level below, reducing the effects of the

	appearance of development along the visually sensitive spur.
(b) Utilising local internal terraces and plateaus for cluster-like developments.	The masterplan design forms clustered development along the open spurs of the Site, minimising the need for earthworks and leaving the lower flatter land free for rural production.
(c) Being mindful and sensitive to the development impacts and relationships between adjacent sub-units and, in particular, sub-unit 6B and to a lesser extent sub-units 5A and 6A.	The Site is not visible from sub unit 6A as it is screened from view by Beulah Ridge. The development will be visible from sub unit 5A
(d) Focusing development opportunities west of the ridge above Awa Awa Road.	The development is west of the ridge above Awa Awa Road.
(e) Generally keeping development below spurs and ridgelines within the sub-unit.	Development has been clustered along the open spurs within the Site. The spur aligned with Marriage Road is locally prominent from this viewpoint, but lower the main ridgeline of Beulah ridge to the west and Suncrest Drive to the south. The spur is not visible from Aporo Road to the east, as it is screened by vegetation from this viewpoint. House Sites have been located to largely avoid the top of the spur, with the roading aligned along the spur, and house Sites offset from this at a lower level below the road.

About Boffa Miskell

Boffa Miskell is a leading New Zealand professional services consultancy with offices in Whangarei, Auckland, Hamilton, Tauranga, Wellington, Nelson, Christchurch, Dunedin, and Queenstown. We work with a wide range of local and international private and public sector clients in the areas of planning, urban design, landscape architecture, landscape planning, ecology, biosecurity, cultural heritage, graphics and mapping. Over the past four decades we have built a reputation for professionalism, innovation and excellence. During this time we have been associated with a significant number of projects that have shaped New Zealand's environment.

File Ref: Tasman_Village_Graphic Supplement_20240301.indd

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TASMAN VILLAGE LEA
GRAPHIC SUPPLEMENT

APRIL 2024

Contents

Contents

LEGEND

- EXISTING SITE BOUNDARY & CONTOURS
- PROPOSED LOT BOUNDARY
- INDICATIVE HOUSE (REFER ARTHOUSE ARCHITECTS DOCUMENTATION)
- BLA (BUILDING LOCATION AREA) (REFER ARTHOUSE ARCHITECTS DOCUMENTATION)
- PROPOSED ROAD & STREET PLANTING
- PROPOSED REHABILITATED WATERWAY
- PROPOSED WOODLAND PLANTING
- EXISTING OLIVE GROVE
- PEDESTRIAN/CYCLE WAY
- HORTICULTURE
- WATER BODY
- ENTRANCE FEATURE (REFER DESIGN GUIDE)
- STORMWATER DETENTION AREA (REFER TONKIN & TAYLOR DOCUMENTATION)

JOB TITLE

HARAKEKE 2015 LIMITED

DRAWING TITLE

MAMAKU EAST & WEST CLUSTER

DATE	SCALE
DECEMBER 2016	1:3000 @ A3
SHEET	JOB #
14 of 21	1610

NORTH

N

canopy
LANDSCAPE ARCHITECTS

TASMAN ESTATE

Consented Masterplan

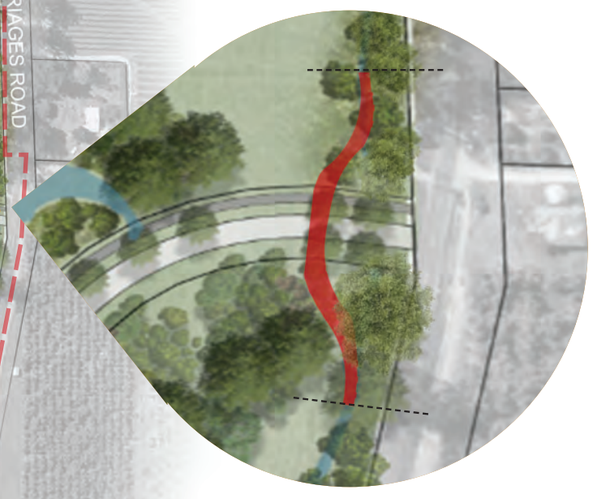
Figure 1

5.0 CONCEPT MASTERPLAN

The proposal will see 58 residential lots created, ranging from smaller lot sizes of around 1100m², up to larger more generous lot sizes of up to 7461m², These will be clustered on the main spurs making the most of views and easy access, whilst settling into the landscape with gully and riparian planting. The balance of the land of which will be restored, retained in pasture and wastewater application areas.

The development will include a trail and pathway network to enable a strong connection between houses and nature as well as with the outer community through the Great Taste Trail.

1. Main Entrance / Access Road
2. Collector Road
3. Feeder Roads
4. Native Planting Areas: Refer to Section 7 - Indicative Drainage/Gully Sections
5. Detention Ponds
6. Constructed Marsh Area (using proposed borrow pit)
7. Existing Outflow from Tuckers Dam
8. Wastewater filtration plant
9. Wastewater Dispersal Field
10. Walkway/Cycleway
11. Great Taste Trail



ESTIMATED EXTENT OF EXISTING WATERCOURSE RE-ALIGNMENT ADJACENT TO MARRIAGES ROAD

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TASMAN VILLAGE

Proposed Masterplan

Date: 23 April 2024 Revision: 1

Plan prepared for Tasman Bay Estates by Boffa Miskell Limited

Project Manager: s 9(2)(a) Drawn: LRo | Checked: LPo

Figure 2

INDICATIVE ROAD SECTION

TASMAN VILLAGE

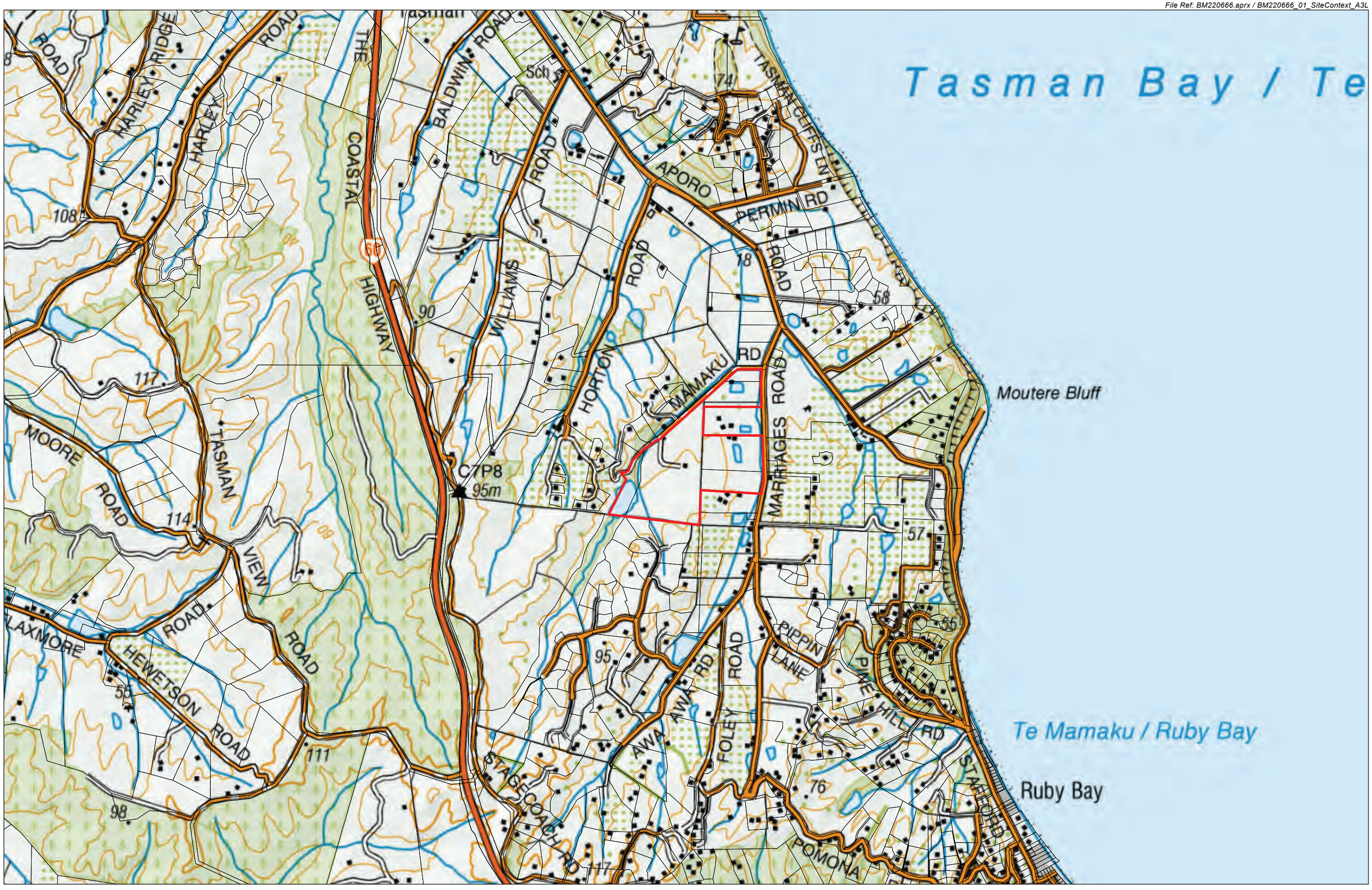
Indicative Roading and Long Sections

Date: 23 April 2024 Revision: 1

Plan prepared for Tasman Bay Estates by Boffa Miskell Limited

Project Manager s 9(2)(a) Drawn: LRo | Checked: LPo

Figure 3



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Data Sources: Eagle Technology, Land Information New Zealand

Projection: NZGD 2000 New Zealand Transverse Mercator

LEGEND

Site boundary

NZ Primary Parcels

TASMAN ESTATE

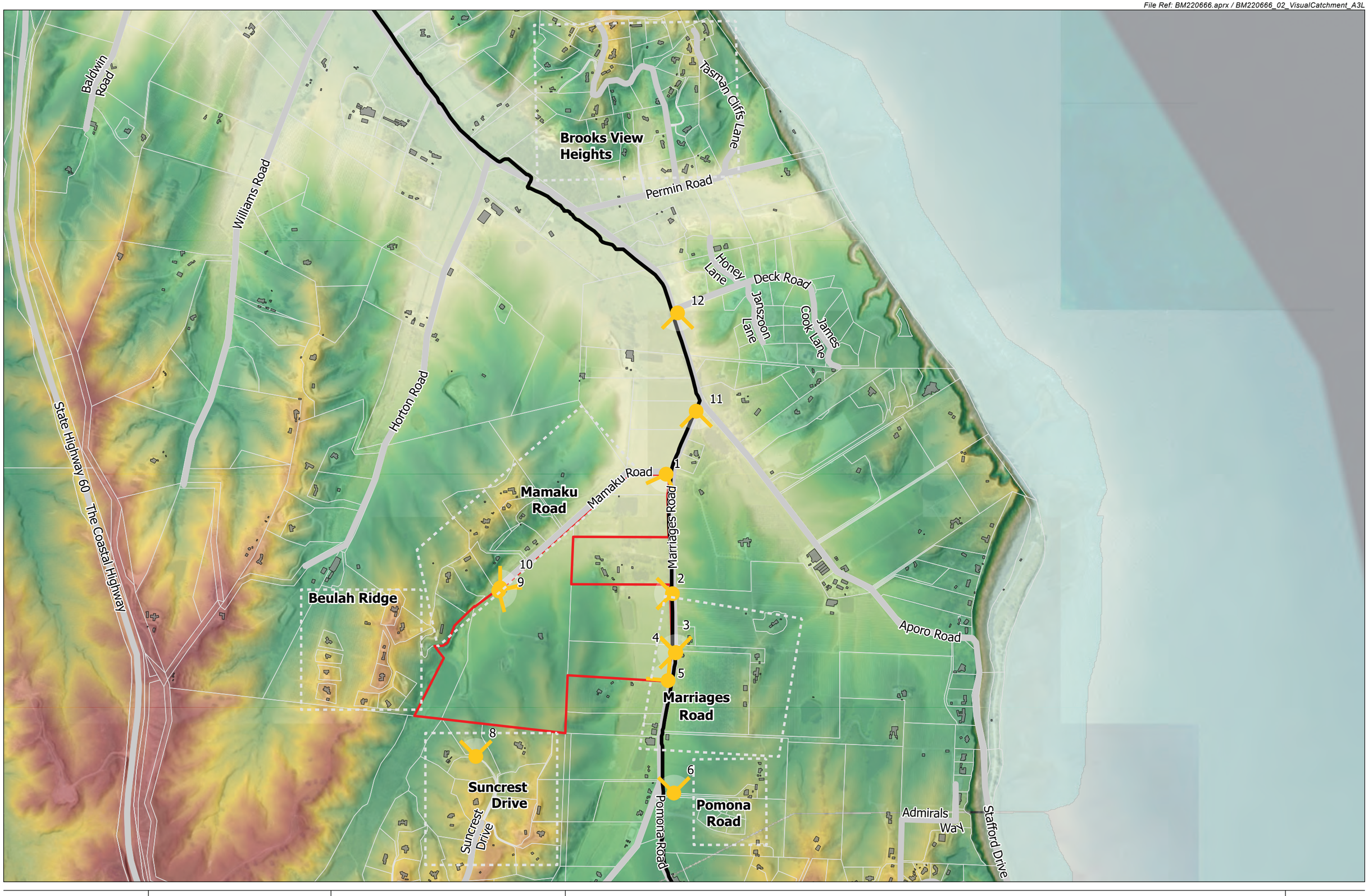
Site context

Date: 13 March 2024 | Revision: 0

Plan prepared for Tasman Bay Estates LImited by Boffa Miskell Limited

Project Manager s 9(2)(a) | Drawn: KMa | Checked: EMc

Map 1



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0 240 m

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Data Sources: Eagle Technology, Land Information New Zealand

Projection: NZGD 2000 New Zealand Transverse Mercator

LEGEND

- Site boundary
- Building Outlines
- Viewpoints
- Dwelling clusters
- Great Taste Trail
- Elevation (m): 215, 0

TASMAN ESTATE

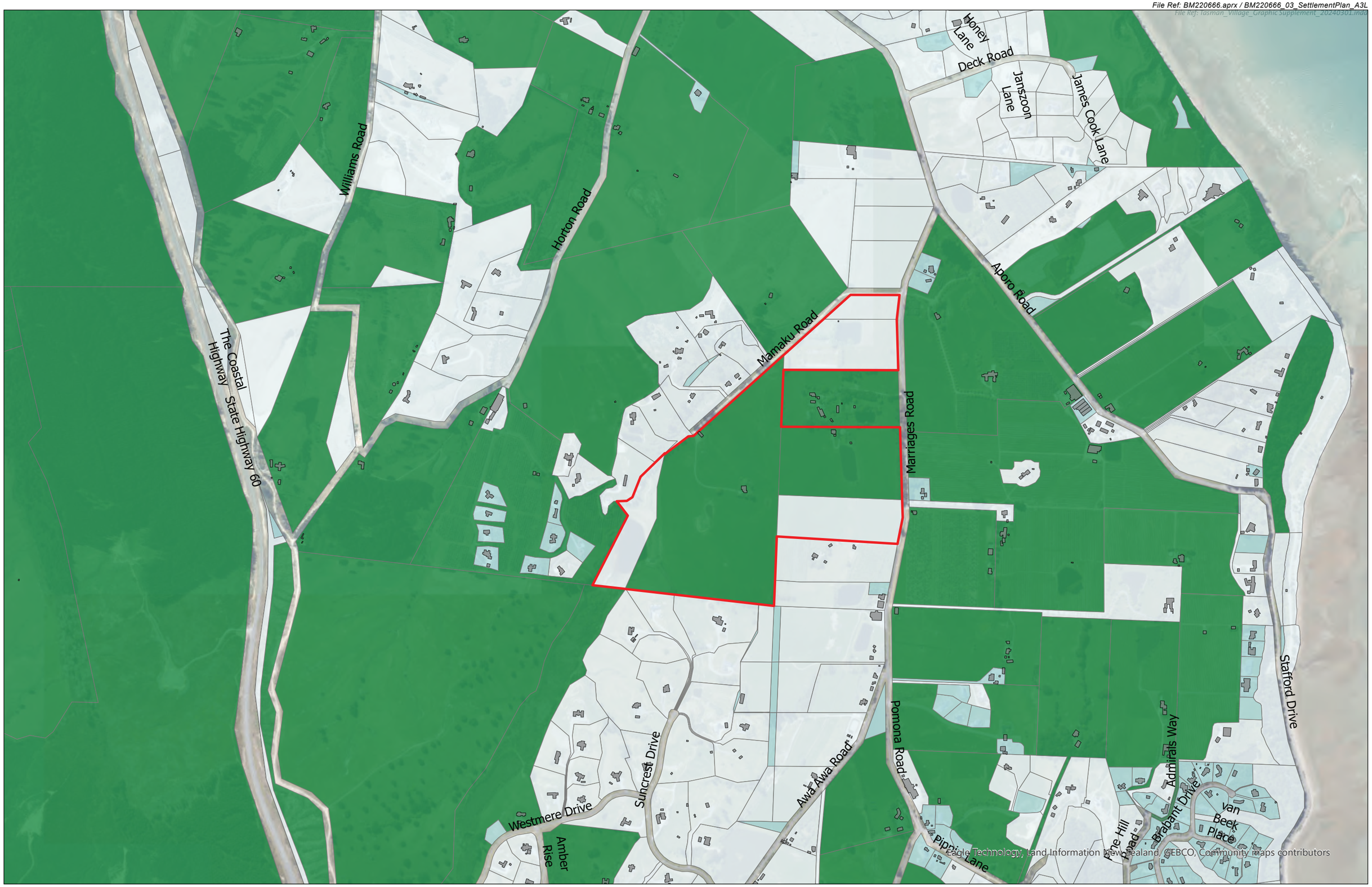
Visual catchment

Date: 21 March 2024 | Revision: 0

Plan prepared for Tasman Bay Estates LImited by Boffa Miskell Limited

Project Manager: s 9(2)(a) | Drawn: KMa | Checked: EMc

Map 2



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0 240 m

1:10,000 @ A3

Data Sources: Eagle Technology, Land Information New Zealand

Projection: NZGD 2000 New Zealand Transverse Mercator

LEGEND

- Building Outlines
- Site boundary Area
- Less than 5000m²
- 5000m² - 5ha
- 5ha or above
- NZ Roads (Addressing)

TASMAN ESTATE

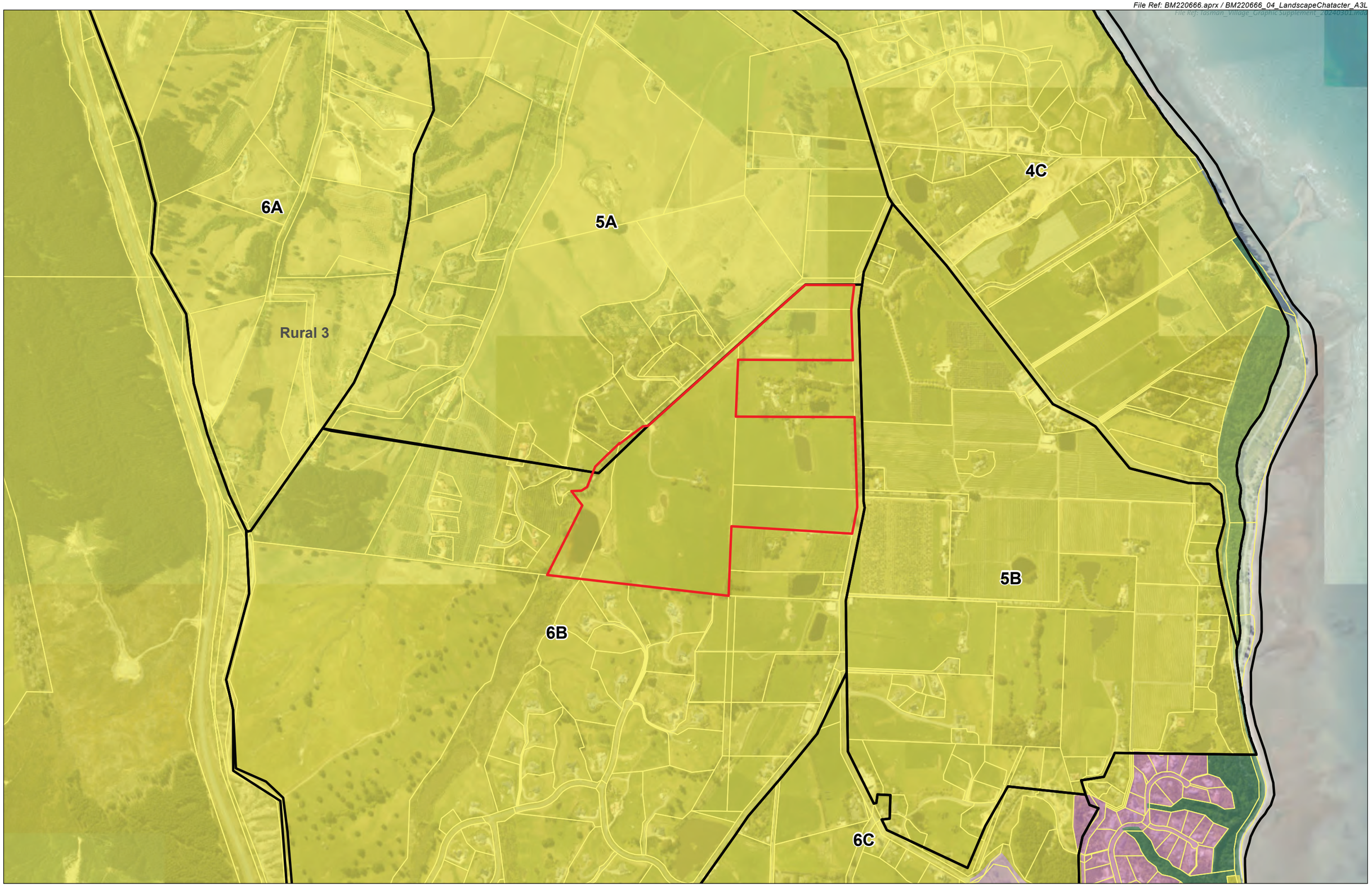
Settlement plan

Date: 13 March 2024 | Revision: 0

Plan prepared for Tasman Bay Estates LImited by Boffa Miskell Limited

Project Manager: s 9(2)(a) | Drawn: KMa | Checked: EMc

Map 3



Boffa Miskell

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0 240 m

1:10,000 @ A3

Data Sources: Eagle Technology, Land Information New Zealand, GEBCO, Community maps contributors, Top of the South Regional Council, Tasman District Council

Projection: NZGD 2000 New Zealand Transverse Mercator

LEGEND

- TDC - Rural 3
- TDC - Rural 1 Closed
- TDC - Rural Residential Serviced
- TDC - Rural Residential
- TDC - Recreation
- TDC - Conservation
- TDC - Open Space
- Site boundary
- Primary Parcels
- Landscape Character Units

TASMAN ESTATE

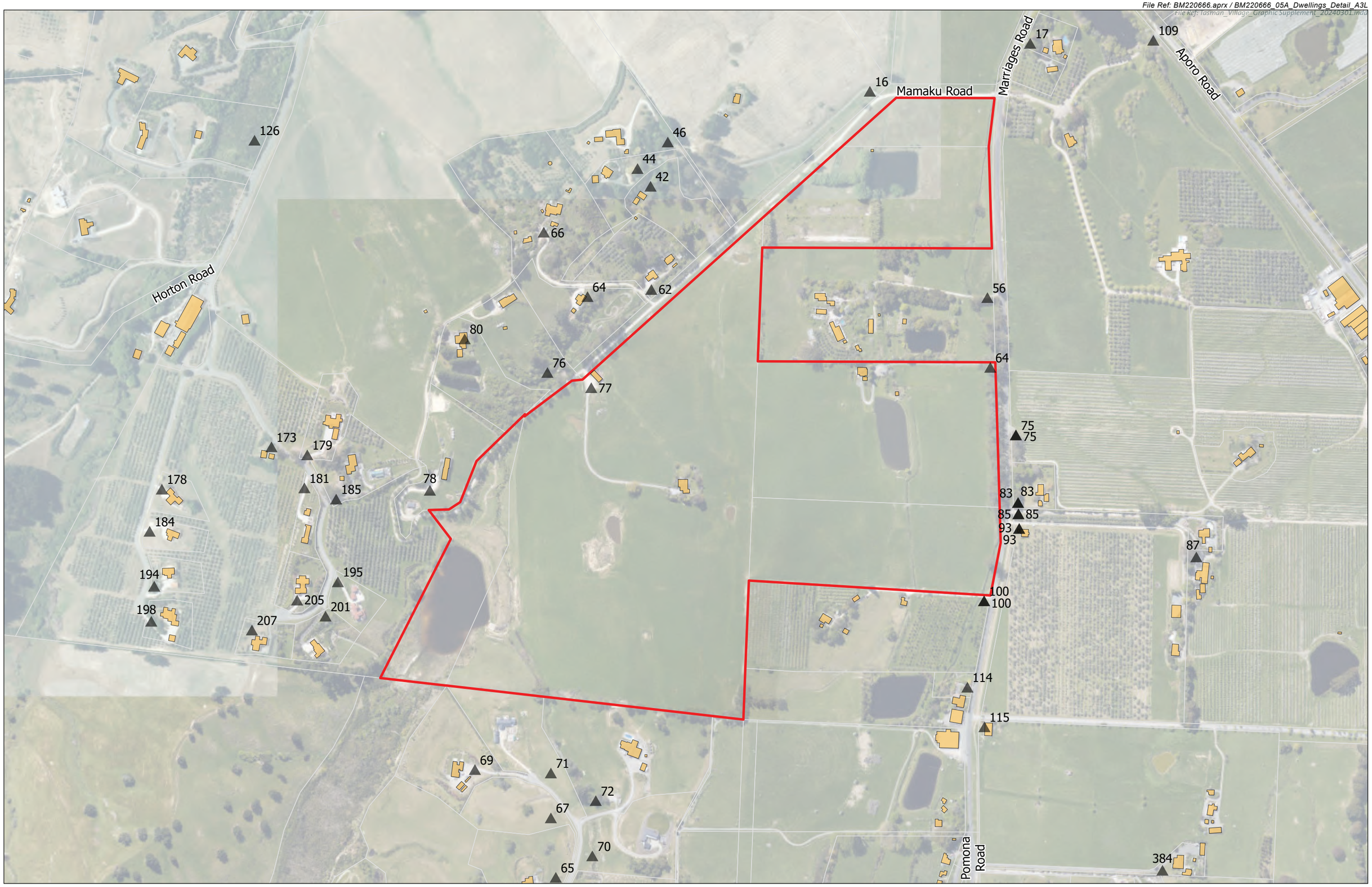
Landscape character areas

Date: 13 March 2024 | Revision: 0

Plan prepared for Tasman Bay Estates LImited by Boffa Miskell Limited

Project Manager s 9(2)(a) | Drawn: KMa | Checked: EMc

Map 4



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0 100 m

1:5,000 @ A3

Data Sources: Eagle Technology, Land Information New Zealand

Projection: NZGD 2000 New Zealand Transverse Mercator

LEGEND

- Site boundary
- Building Outlines
- Addresses (Refer Table 1 in LEA)

TASMAN ESTATE

Nearby dwellings

Date: 13 March 2024 | Revision: 0

Plan prepared for Tasman Bay Estates Limited by Boffa Miskell Limited

Project Manager: s 9(2)(a) | Drawn: EMc | Checked: KMa

Map 5

Viewpoint Photograph 1: View southeast from the corner of Mamaku/Marriages Road

Viewpoint Photograph 2: View west from Marriages Road at exisitng site access

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Viewpoint Details

NZTM Easting	: 1 683 554 mE	Horizontal Field of View	: 90°
NZTM Northing	: 6 012 263 mN	Vertical Field of View	: 30°
Elevation/Eye Height	: 2m / 1.7m	Projection	: Rectilinear
Date of Photography	: 3:00pm 13 June 2018 NZST	Image Reading Distance @ A3 is	20 cm

Data Sources:

TASMAN ESTATE

Viewpoint Photographs

Date: 19 December 2023 Revision: 0

Plan prepared for Tasman Bay Estates by Boffa Miskell Limited

Project Manager s 9(2)(a) Drawn: EMc | Checked: AAn

Viewpoint Photograph 3: View northwest towards site from Great Taste Trail

Viewpoint Photograph 4: View west from Marriages Road

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Viewpoint Details

Horizontal Field of View	: 90°
Vertical Field of View	: 30°
Projection	: Rectilinear
Image Reading Distance @ A3 is 20 cm	

Data Sources:

TASMAN ESTATE

Viewpoint Photographs

Date: 19 December 2023 Revision: 0

Plan prepared for Tasman Bay Estates by Boffa Miskell Limited

Project Manager s 9(2)(a) Drawn: EMc | Checked: AAn

Viewpoint Photograph 5: View north from southern site boundary on Marriages Road

Viewpoint Photograph 6: View north from driveway of Pomona Road subdivision, Pomona Road

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Viewpoint Details

Horizontal Field of View	: 90°
Vertical Field of View	: 30°
Projection	: Rectilinear
Image Reading Distance @ A3 is 20 cm	

Data Sources:

TASMAN ESTATE

Viewpoint Photographs

Date: 19 December 2023 Revision: 0

Plan prepared for Tasman Bay Estates by Boffa Miskell Limited

Project Manager s 9(2)(a) Drawn: EMc | Checked: AAn

Viewpoint Photograph 7: View north from corner of Suncrest Drive and Westmere Ave

Viewpoint Photograph 8: View north from end of Suncrest Drive towards site boundary

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Viewpoint Details

Horizontal Field of View	: 90°
Vertical Field of View	: 30°
Projection	: Rectilinear
Image Reading Distance @ A3 is 20 cm	

Data Sources:

TASMAN ESTATE

Viewpoint Photographs

Date: 19 December 2023 Revision: 0

Plan prepared for Tasman Bay Estates by Boffa Miskell Limited

Project Manager s 9(2)(a) Drawn: EMc | Checked: AAn

Viewpoint Photograph 9: View southeast from end of Mamaku Road

Viewpoint Photograph 10: View northeast from Mamaku Road

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Viewpoint Details

Horizontal Field of View	: 90°
Vertical Field of View	: 30°
Projection	: Rectilinear
Image Reading Distance @ A3 is	20 cm

Data Sources:

TASMAN ESTATE

Viewpoint Photographs

Date: 19 December 2023 Revision: 0

Plan prepared for Tasman Bay Estates by Boffa Miskell Limited

Project Manager: s 9(2)(a) Drawn: EMc | Checked: AAn

Site Photo 1:Existing view north from centre of site on south boundary

Site Photo 2: Existing view south from centre of site on south boundary

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Viewpoint Details

Horizontal Field of View	: 90°
Vertical Field of View	: 30°
Projection	: Rectilinear
Image Reading Distance @ A3 is 20 cm	

Data Sources:

TASMAN ESTATE

Viewpoint Photographs

Date: 19 December 2023 Revision: 0

Plan prepared for Tasman Bay Estates by Boffa Miskell Limited

Project Manager: s 9(2)(a) Drawn: EMc | Checked: AAn

Site Photo 3: Existing View north from southern site boundary

Site Photo 4: Existing View northwest from southwest corner of site

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Viewpoint Details

Horizontal Field of View	: 90°
Vertical Field of View	: 30°
Projection	: Rectilinear
Image Reading Distance @ A3 is	20 cm

Data Sources:

TASMAN ESTATE

Viewpoint Photographs

Date: 19 December 2023 Revision: 0

Plan prepared for Tasman Bay Estates by Boffa Miskell Limited

Project Manager s 9(2)(a) Drawn: EMc | Checked: AAn

VS1A: Existing View west from Great Taste Trail

VS1B: Proposed View west from Great Taste Trail

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Viewpoint Details

Horizontal Field of View	: 90°
Vertical Field of View	: 30°
Projection	: Rectilinear
Image Reading Distance @ A3 is	20 cm

Data Sources:

TASMAN ESTATE

Indicative Visual Simulation

Date: 19 December 2023 Revision: 0

Plan prepared for Tasman Bay Estates by Boffa Miskell Limited

Project Manager: s 9(2)(a) Drawn: EMc | Checked: AAn

s 9(2)(a)

22 April 2024 Ref: 0973

Hayden Talyor
Resource Management Consultant
s 9(2)(a)

Dear Hayden

Proposed Subdivision – Marriages Road, Tasman, Tasman District
Traffic Impact Assessment

Following on from your instructions, my reviews of the subdivision, design advice, site inspections and analysis, I have completed my assessment of the traffic matters associated with the proposed subdivision on Marriages Road, Tasman in Tasman District.

1. Introduction

This Transportation Impact Assessment ("TIA") will form part of the Resource Consent application for the development outlined above. The TIA sets out and describes:

- Site location and description
- The general traffic environment
- Crash history.
- The development proposal, and
- Assessment of the development against the provisions of the Tasman Resource Management Plan (TRMP).

An assessment of the layout, new roads and planning requirements of the proposed subdivision below provides an analysis of the matters as set out above. Traffic Concepts

has not been involved in the road design of the development which was carried out by Eliot Sinclair.

2. Site Location and Description

The site is located at 64 Marriages Road, the title to the south and includes 77 Mamaku Road.

The development site is located Tasman, with the Tasman Village to the north and the Mapua Settlement to the south.

Figure 1 shows the site location and the surrounding road network.

Figure 1: Site Location and Road Network (Source: Top of the South Maps)

As shown the site is located on the western side of Marriages Road and has Mamaku Road along part of its northern boundary. Marriages Road is conveniently linked to Aporo Road to the north which provides connections to the wider road network including SH60. The land is zoned Rural 3.

Figure 2 shows the road environment along Marriages Road.

Figure 2: Marriages Road looking south.

As shown Marriages Road is a sealed two-lane road marked with a centreline. There is no kerb and channel. The Tasman Great Taste Trail is on the right of the photograph. The road geometry is relatively flat and generally straight. The development site is on the right-hand side of the photograph.

The posted speed limit along Marriages Road is 80 km/h.

Marriages Road carries around 350 vehicles per day.

3. Crash History

A detailed search of the NZ Transport Agency crash database was carried out for the five-year period from 2019 to 2023 and for the part year of 2024. The crash search area included all crashes on Marriages Road and Mamaku Road.

There have been no reported crashes within the search area. Marriages Road and generally the roads in the Tasman area provide a relatively safe road environment which is managed by its alignment and signage.

4. Proposed Development

The proposed subdivision seeks to provide 58 lots within a cluster on the spur of the main lot.

Larger scale plans are available in the consent application.

Figure 3 shows the layout of the proposed subdivision.

Figure 3: Proposed Development. (Source: Boffa Miskell)

As shown the development site will have a new intersection onto Marriages Road with no vehicle access to Mamaku Road being proposed. The internal roading rises from Marriages Road with two new roads to vest and four right of ways proposed.

Larger scale plans are available within the consent application.

5. Planning Framework

The development is located mostly within the Rural 3 zone as listed within the Tasman Resource Management Plan (TRMP Map 87). As such, the development parking, loading and access is considered against Chapter 16, Section 16.2 Transport. Consideration of Section 16.3 (Subdivision) and Section 18.8 (Road Area) has also been provided.

Section 16.2 provides the rules and standards for the access, parking and traffic requirements for developments. The TRMP also references the Nelson Tasman Land Development Manual 2019 for engineering standards applicable under the TRMP.

Section 16.3 provides rules and standards around subdivisions with an assessment provided below.

Section 18.8 provides rules and standards for new roads to be vested with Council.

There is no specific Rule requiring a Road Safety Audit in the TRMP, however Table 4-2 of the NTLDM sets out audit stages for developments. Based on Table 4-2 a Road Safety Audit is required to be provided with a Resource Consent application. A Road

Safety Audit of the proposed development will be provided separately as part of the resource consent process.

It should be noted that the writer of this assessment has not been involved in the design of the subdivision roads.

Table 1 below provides a statement of compliance against the relevant requirements set out in Section 16.2.

RULE	REQUIREMENT	DISCUSSION	COMPLIANCE
16.2.2.1	**Permitted Activities (Land Use – Vehicle Access Considerations)** Any land use is a permitted activity that may be undertaken without a resource consent, if it complies with the following conditions:		
16.2.2.1 - Access and Vehicle Crossings			
(a)	*The site of the activity is provided with an access and crossing, laid out and constructed in accordance with the matters listed in Figure 16.2A.* *Note that Figure 16.2A now refers to the NTLDM 2019.*	Figure 16A refers to the NTLDM 2019 and the following: General 4.10.2.1 (a) – (e), 4.10.2.3 and 4.10.2.4 – 4.10.2.8 Higher speed environments 4.10.2.2 Grade and gradient design 4.10.3.2 – 4.10.3.4 Spacing 4.10.2.3 and 4.10.7 Tracking and turning 4.10.6 Sight distances 4.10.4	**Refer to the NTLDM Table (Table 2)**
(b)	*Visibility from the access and crossing complies with 4.10.4.1 and 4.10.4.2 of the Nelson Tasman Land Development Manual 2019.*		**Refer to the NTLDM Table (Table 2)**
(c)	*The design of the access and crossing complies with Figure 4-10 of the Nelson Tasman Land Development Manual 2019 for a Rural 3 zone.*	Figure 4-10 refers to treatments associated with footpaths. The road design will meet the requirements of the Figure 4-10 of the NTLDM.	**Complies**
16.2.2.2 – Frontage to Unformed Legal Roads			
(b)	*Vehicular access to the site of any activity is by formed legal road, or by an existing right-of-way or other legally enduring instrument over another property.*	All access will be from a formed legal road or Right of Way.	**Complies**

16.2.2.3 - Provision for Parking and Loading			
Size of Parking Spaces			
(b)	*The activity does not use parking spaces on another site, except where the title of the site of the activity and the title of the site on which the parking for that activity is provided, are amalgamated or otherwise encumbered so that one site cannot be disposed of independently of the other.*	Parking is provided on the individual allotments and will not be on other titles.	**Complies**
(f)	*Any residential car park is 5 metres x 3 metres, but where two car parks are side-by-side, the combined area may be 5 metres x 5 metres.*	All parking spaces can easily comply with the design vehicle and manoeuvring requirements of the TRMP.	**Can comply**
(j)	*Cycle parking laid out in accordance with Schedule 16.2B is provided*	This rule appears to relate to non-residential activities. The individual lots have sufficient on-site land area to meet this requirement.	**Complies**
(k)	*A carparking area must be included for people with disabilities. The dimensions of spaces for disabled people are detailed in Figure 16.2D.* *Note: In accordance with provision D1.3.6 of the Building Act Code, vehicle spaces for use by people with disabilities shall be provided in sufficient numbers.*	This rule appears to relate to non-residential activities. The individual lots have sufficient on-site land area to meet this requirement.	**Complies**

Table 1: Tasman Resource Management Plan Standards Compliance Table

As shown, there are no areas of non-compliance, noting that there is a cross reference and assessment against the NTLDM provided below.

Table 2 below provides a statement of compliance against the relevant requirements referenced in the TRMP Section 16.2 that are set out in the NTLDM. The TRMP specifically references the following sections of the NTLDM.

- Sections 4.10.2.1 (a) to (e)
- Section 4.10.2.3
- Sections 4.10.3.2 to 4.10.3.4
- Section 4.10.4
- Section 4.10.6
- Section 4.10.7

These sections are set out in the table below, along with discussion and compliance. It should be noted that these requirements will typically be considered at the time of the Building Consent, as the subdivision does not generally have sufficient detail to assess these compliances.

RULE	REQUIREMENT	DISCUSSION	COMPLIANCE
Private Access - Section 4.10.2			
Section 4.10.2.1	*a) Be designed in accordance with the minimum specifications in Table 4-13.*	The RoW's exceed the minimum requirements of Table 4-13.	**Complies**
	b) Only serve up to six units.	All RoW's have less than six users.	**Complies**
	c) Give access to the lower ranked road in the Hierarchy if the site has frontage to more than on road.	Marriages Road and Mamaku Road are local roads.	**Complies**
	d) Not create a shorter through-route alternative for vehicles, cycles and pedestrians than the road network.	Access and RoW's do not create shorter routes.	**Complies**
	e) Intersect with the carriageway between 75 and 105 on classified roads.	All new vehicle crossings for the development will connect at 90 degrees to the legal road.	**Complies**
Section 4.10.2.3	*Not more than one crossing is provided per site.*	The new lots will have one vehicle crossing.	**Complies**
Section 4.10.3.2	*The maximum gradient of an access ramp for the first 6m from the property boundary line will be 1-in-20 (5%).*	The gradients for the new accesses can be designed to meet this requirement.	**Complies**
Section 4.10.3.3	*On roads where the footpath is located against or close to the kerb and where the target speed environment is 40km/h or lower, vehicle crossings will be designed with a mountable kerb.*	The proposed footpaths on vested roads are not located against the kerb with a grass berm being provided.	**Complies**
4.10.4	*The minimum sight distance that must be available from any vehicle access point along the frontage road is shown in Table 4-14.*	The new vehicle crossings will meet this requirement noting the lower operating speeds around intersections and certain sections of roadway.	**Complies**

		The sight distance required for an operating speed of 30 km/h is 23 metres and 40 metres for 40 km/h	
4.10.5.1	*For all vehicle access points, a minimum visibility splay with the dimensions shown in Figure 4-10 must be provided. Items may be located within the visibility splay provided they do not obstruct visibility to pedestrians. Generally, this means avoiding objects and vegetation with a height of more than 0.9m.*	The footpaths are located away from the adjacent property boundary which provides the pedestrian splay. No objects over 900mm will be within the required pedestrian splay.	**Complies**
4.10.6	*Section 4.10.6.2* *Tracking paths and turning circles on private land will be provided in accordance with AS/NZS 2890.1 "off-street carparking" 2004.*	The individual parking spaces will meet the tracking path requirements. It should be noted that the TRMP allows for vehicles to reverse onto the road.	**Complies**
	Section 4.10.6.3 *Vehicle access points must be located so that no part of the access, nor tracking path crosses any part of another site except where there is a right of way or other similar legal easement over those parts of the other site see Figure 4-12.*	None of the accesses cross over adjacent properties without appropriate RoW's in place.	**Complies**
4.10.7	*No part of a vehicle crossing shall be closer to a road intersection than the distances permitted in Table 4-15.*	The vehicle crossings are located more than 10 metres from the nearest road intersections.	**Complies**

Table 2: NTLDM 2020 TRMP Reference Compliance Table

As shown the development can meet all of the referenced requirements from the TRMP to the NTLDM.

Table 3 sets out the various rules from Section 16.3 that relate to subdivisions. The proposed subdivision is not a controlled activity and therefore the Rules do not apply. However, consideration of these Rules has been provided to assist in the assessment of effects.

RULE	REQUIREMENT		COMPLIANCE
16.3.7	**Rural Zone**		
(h)	*(h) The subdivision complies with the transport conditions in Schedule 16.3B.*	This rule is for a Controlled Activity. The proposed subdivision is not a controlled activity.	**See Below**
Schedule 16.3B	**Transport Conditions**		
Roads, Access and Parking	*(a) All roads, including indicative and connecting road, are laid out, constructed and vested in the Council in accordance with the road construction conditions specified in Section 18.8 for the relevant Road Class in the road Hierarchy shown on the planning maps.*	Section 18.8 has been modified to now reference the NTLDM 2019. It should be noted that the NTLDM has been updated in 2020. The planning framework still requires NTLDM 2019 to be used.	**See below**
	(b) Every allotment has vehicle access to a formed legal road other than a limited access road. Access to allotments is constructed in accordance with conditions specified in section 16.2.	All new lots will have access to a formed legal road or RoW and constructed to the requirements in Section 16.2.	**Complies**
	(c) Where subdivision creates or alters title boundaries of developed sites, every allotment created (including any balance title) has vehicle parking provided and constructed in accordance with the conditions specified in section 16.2.	All parking areas will be constructed in accordance with Section 16.2.	**Complies**
Linking Subdivision Roads to Existing Roads	*(e) Where any land to be subdivided is subject to a notation on the planning maps as an "Indicative Road", a road is laid out and constructed on the general alignment of the indicative road.*	There are no indicative roads through the site. The new roads to be vested meet the requirements.	**N/A**
	(f) Where any land to be subdivided is subject to a notation on the planning maps indicating that a "Connecting Road" is required through the land, the road is to be laid out, constructed and vested in the Council at the time of the subdivision.	The planning maps do not indicate connecting roads for the development site.	**N/A**
	(g) Where any new road extends or completes an existing road, the road is constructed at the developer's cost to the relevant conditions specified in section 18.8.	There are no road extensions. New roads will be built as part of the subdivision by the developer.	**Complies** **See Assessment**
	(h) Except in the Rural 3 Zone and Services Contribution Area, and in the	The proposed development is within the Rural 3 Zone and	**N/A**

	Lower Queen Street and McShane Road in the Richmond West Development Area, where any land to be subdivided has frontage to any existing road that is not constructed to the conditions set out in section 18.8 for the relevant level of the existing road in the Road Hierarchy, the road along the frontage adjoining the land to be subdivided is formed and upgraded by the developer to the conditions of road widths, kerb and channelling and associated drainage attributable to the subdivision, berm, footpath, crossings and street lighting specified in section 18.8.	therefore no upgrade is required.	
	(i) Where any land to be subdivided has a frontage to an existing council road which has inadequate road reserve width to meet the condition in the Plan, adequate land to meet the condition is vested in the Council at the time of subdivision, at no cost to the Council.	Marriages Road and Mamaku Road have a legal width of 20 metres. The NTLDM requires the legal road for a local road to be 14 metres wide.	**Complies**
	(j) The subdivision provides a safe and efficient road, cycleway and pedestrian access connection to adjoining roads, cycleways and pedestrian accessways.	Roads, shared paths and footpaths will be provided as part of the development. Road 1 provides a connection to the Tasman Great Taste Trail.	**Complies**

Table 3: Compliance Table for Section 16.3 of the TRMP

As set out in the table above, the development can meet the TRMP requirements set out in Schedule 16.3B.

For the purpose of the analysis of the requirements of Section 18.8 the new roading for the development is considered to be Local Roads.

There are three new vested roads within the development along with four right of ways.

Table 4 sets out the requirements of Section 18.8 of the TRMP.

RULE	REQUIREMENT	DISCUSSION	COMPLIANCE
18.8.3.1	**Road Construction**		
(b) *The activity meets the standards set out in the following sections of the Nelson Tasman Land Development Manual 2019: (assumed NTLDM 2020)*			
(i) Section 4.6.1.1: road design cross section	*A Local Road (rural) road requires the following parameters.*		
	A 6000 mm wide sealed moving lane.	New vested Roads 1, 2 and 3 has a sealed width of 7200mm.	**Complies**

	1 carpark/2 dwellings Or 2 x 2.0	Individual lots are able to provide at least one off-street car park. The road widths will allow vehicles to park on-street. The required car parks are 29 on-street. This is easily met.	**Complies**
	2 x 600mm metalled	The shoulders are sealed and are included in the overall sealed width of 7200mm.	**Complies**
	Footpaths – 1 x 2.5 Shared Path	Road 1 provides a 2500mm wide shared path. Roads 2 and 3 provide a 1500mm wide footpath. The reduced width is taken from the Residential Lane standard with less than 20 homes on these roads.	**Does not comply.** Roads 2 and 3 have under width footpaths by 1000mm.
	No service berm required.	Service berms will be provided.	**Complies**
	A legal road reserve width of 14 metres is required for a Local Road -Rural.	The legal road reserve for Road 1 is 18 metres and 17 metres for Roads 2 and 3.	**Complies**
(ii) Section 4.9.2: intersection spacing	*This section refers to Safe Intersection Sight Distances (SISD) and not intersection spacing.* *The SISD requirement for an operating speed of 40 km/h is 73 metres.*	Road 3 complies with the SISD requirements with more than 100 metres being available. Road 2 has around 75 metres to the left and 80 metres to the right.	**Complies**
(iii) Section 4.8.5: road alignment safe stopping distances	*This section sets out the Safe Stopping Distance (SSD) requirements for new intersections within Table 4-9.*	The new roads within the development will meet this requirement of 55 metres.	**Complies**
(iv)Section 4.6.4.2: cul de sac turning circles	*The minimum radius of the turning circle of a cul-de-sac will be eight metres in rural zones.*	The new cul de sacs within the development will meet the requirement turning head radius.	**Complies**

Table 4: Compliance Table for Section 18.8 of the TRMP

As shown in the table above the proposed road layout is able to meet the requirements of the NTLDM, except for the width of footpath for Roads 2 and 3.

The next section of this report considers the areas of non-compliance, along with other transportation matters that require further consideration. The next section also provides an assessment of effects.

6. Assessment of Effects

This section considers the areas of non-compliance and provides an assessment of the potential traffic effects of these matters on other road users.

6.1. Trip Generation

The calculation of trip generation for the developments are usually based on research undertaken by the NZ Transport Agency and is set out in Research Report 453 (RR453). While this document has been updated recently to reflect changes in travel choice that have occurred for a number of reasons, it is still useful as a conservative assessment tool for calculating the trip generation that could occur at the upper limits. The document RR453 provides figures of 10.7 per dwelling per day or around 1.3 trips per home in the peak hour.

More recent traffic count data shows that the trip generation rates being around six trips per dwelling per day. The same traffic count data also showed peak flows of around 0.6 trips per dwelling per hour. This is noticeably less than the older research carried out by the NZ Transport Agency. This traffic count data also aligns with other surveys of residential properties across the Top of the South.

The proposed subdivision is expected to accommodate 58 dwellings. Based on the 58 dwellings, the expected conservative number of trips generated by the development will be around 406 vehicles a day (assumed trip rate of seven per dwelling per day). Based on the calculated peak flows the development will generate around 40 vehicle movements in each of the peak hours (AM and PM).

The roads being Marriages Road and Aporo Road are all operating well below their operating capacity. The traffic flows generated by the development can be readily accommodated on the surrounding road network. The adjacent intersections are well designed and are also operating well below their operational capacity.

The increase in the vehicle flows from the development will have a less than minor effect on the other road users.

6.2. Road Design

The road design has been carried out by Eliot Sinclair. All of the other geometric elements required under Table 4-7 are met except for footpath widths.

It is proposed to provide one footpath along the one side of all of the roads to be vested. Road 1 has a 2.5 metre wide shared path and meets the NTLDM requirements.

Roads 2 and 3 have been designed to a Residential Lane standard with a footpath with a width of 1.5 metres wide. Roads 2 and 3 are in the Rural Zone and are required to have a shared path with a width of 2.5 metres, a shortfall of 1.0 metre. The reduced footpath width is proposed as these roads have a lower number of movements.

The SISD requirements are able to be met but should be checked at the Engineering Design Approval for Road 2 as they are close to the requirement.

Any effects of the road layout are considered to be less than minor and can be managed.

6.3. Right of Way Design

There are four right of ways planned for the subdivision. The RoW's with pedestrian connections to the wider balance land have included a turning head at the end of the access.

Table 5 sets out the design parameters for each of the RoW's.

RoW	No. of Users	Legal Width	Carriageway Width	Turning Head	Complies
One	Three	6.5	5.5	no	Yes
Two	Four	7.15	5.5	yes	Yes
Three	Four	7.15	5.5	yes	Yes
Four	Two	6.5	3.5	no	Yes

Table 5: RoW Design. (Source: Eliot Sinclair Plan 11460 – Sheet 4 Rev A)

The RoW's design complies with the NTLDM. For the RoW's with more than two users the carriageway is 5.5 metres for the full length of the road rather than providing passing bays.

The RoW's include a nib kerb and kerb and channel to control stormwater. This is different to the new vested roads which have grass swales.

Any effects created by the new RoW's are less than minor.

6.4. Marriages Road Intersection

A new intersection will be formed on Marriages Road. The new intersection will provide an appropriate connection for the development to the wider road network.

Figure 4 shows the proposed intersection layout.

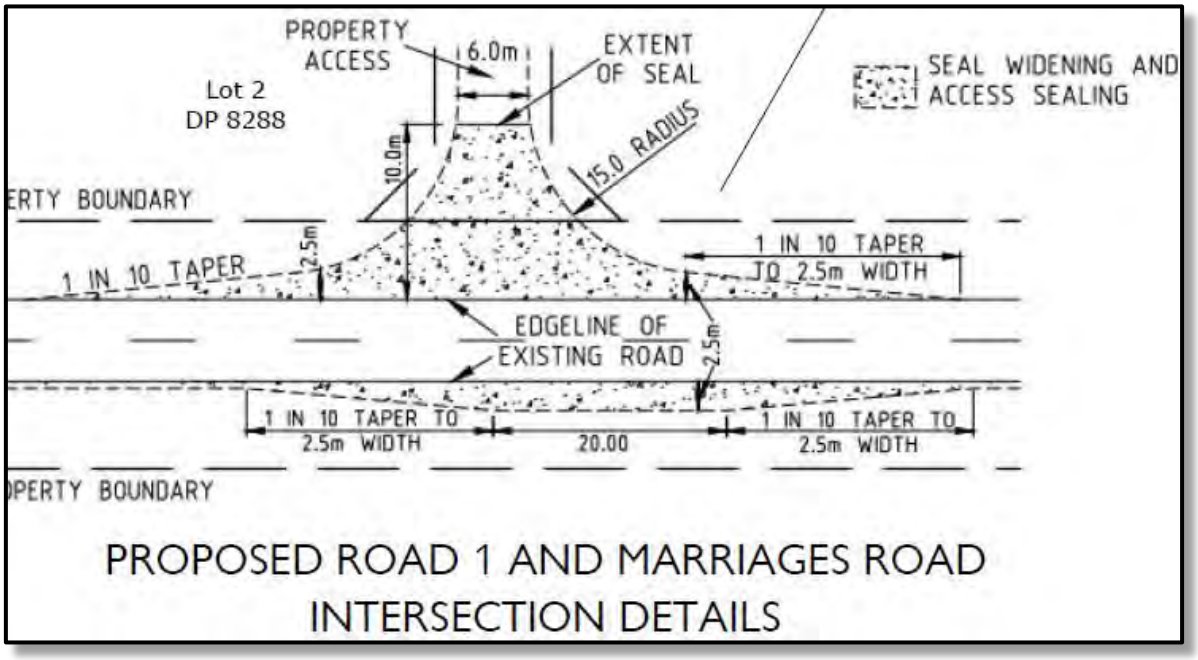


Figure 4: Marriages Road Intersection. (Source: Eliot Sinclair Plan 11460 – Sheet 2 Rev A)

The proposed intersection provides lead in and lead tapers for the left turns. Seal widening on the opposite side of the side road has been provided to accommodate through traffic when a vehicle is turning right into the development.

The intersection design is to a higher standard than other intersections from Marriages Road that have had recent subdivisions. The intersection will need give way signs and road markings for traffic control.

The intersection will be formed to a local road standard with no right turn bay. Most of the vehicle movements at the intersection are expected to be a right in and a left turn out. Most of the vehicle movements from the development are expected to be to the north and onto Aporo Drive.

The intersection sight distances are easily met with the new road being located on a straight section of Marriages Road. The sight distances are more than 200 metres which is greater than the minimum of 181 metres required by the NTLDM.

Consideration has been given to the need for a right turn bay. There are a number of matters that need to be considered in relation to the right turn bay. These include the volume of traffic that would use the access, the constructability of a right turn bay, the interaction between traffic and traffic flows.

The first matter that needs to be considered relates to the need for a right turn bay to access the proposed development which consists of 58 residential lots. The proposed development will generate around 40 vehicle movements in the peak hour. This would equate to around 26 vehicles turning right into the new development in the evening peak.

An analysis of the need for a right turn bay has been carried out using Austroads Guide to Road Design Part 4 and Figure A.10(b). This figure provides the warrants for right and left turn treatments for major roads with a design speed under 100km/h.

The turn warrant is based on the number of vehicles carrying out a certain movement (i.e., right turn) against the traffic flows on the main road (Marriages Road).

The peak hourly flows (Q_M) are less than 35 vehicles in the peak hour. For the purposes of the calculation this is Q_M with Q_R being 26 vehicles per hour and Q_L being seven vehicles per hour. Both Q_R and Q_L are inward movements as set out in Figure A.10.

Figure 5 shows Figure A 10 from Austroads Guide to Road Design Part 4 – Intersections and Crossings: General.

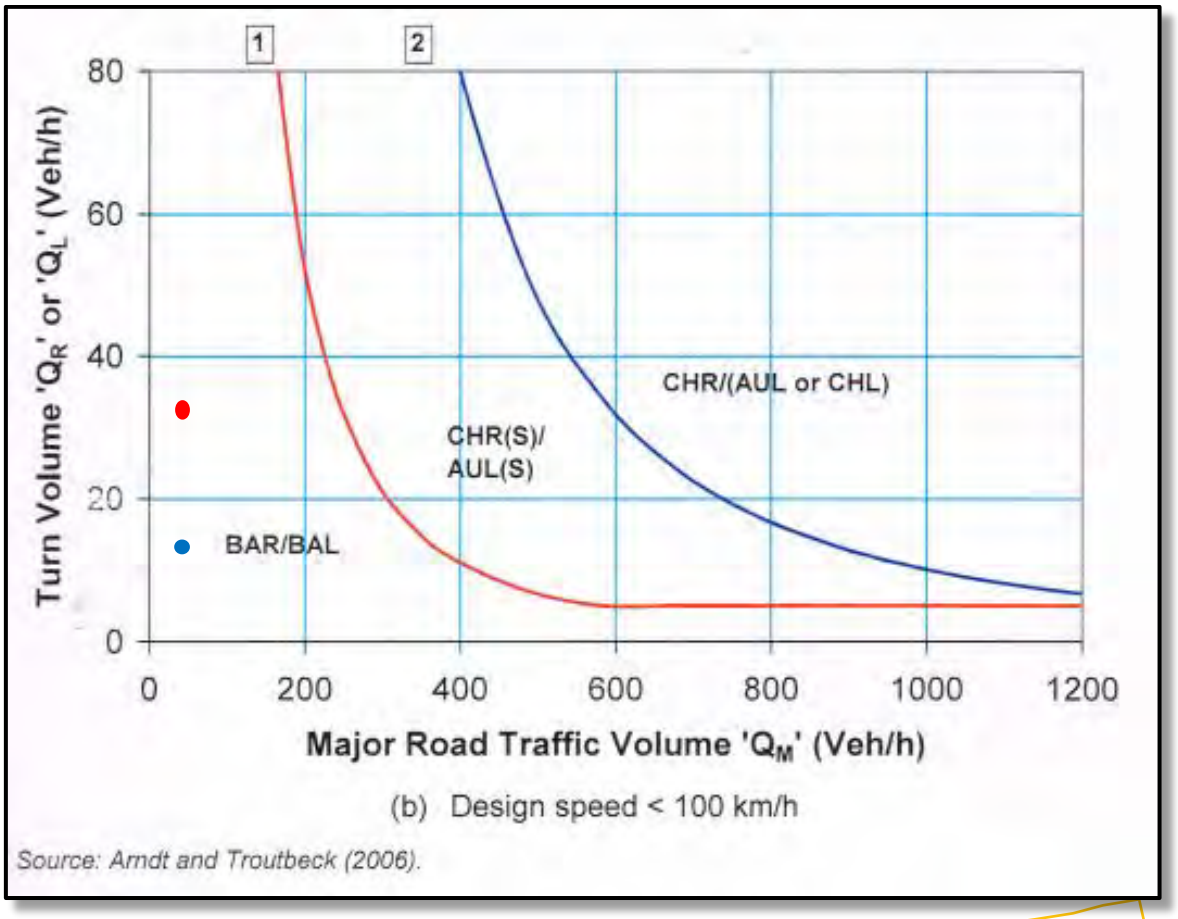


Figure 5: Figure A 10. (Source; Austroads)

As shown the red dot is below the red threshold line for a right turn bay (CHR). The blue dot is for the left slip lane.

Based on the values for QM, QR and QL it is considered that there is no requirement for a right turn bay or left turn slip lane for the new intersection based on expected traffic movements for this development. The Q values are well below the threshold for any treatment with site access being able to operate safely. This is mainly due to the low number of turning movements.

A right turning traffic flow at this level does not require the formation of a right turn bay. It should be noted that there are other existing intersections in the area of the development that do not have a right turn bay. This new intersection is able to operate safely and efficiently with no noticeable effect on other road users.

There are also excellent sight distances along Marriages Road at the new intersection which allows motorists to assess, react and stop should the need arise. Any inconvenience while waiting for a vehicle to turn is less than minor.

The intersection has been located to the south of the Tasman Great Taste Trail to remove any conflicts between cyclists and motorists using the new intersection.

In summary, the proposed intersection will provide a safe and efficient layout for vehicle movements associated with the proposed development. The number of vehicle movements does not require any special turning treatment based on Austroads. The accesses will operate safely and efficiently with any effects being less than minor.

6.5. Target Design Speed

The NTLDM 2020 requires roads with a posted speed limit of 50 km/h to be managed so the operating speed is 40km/h. This approach to road design can be achieved with relative ease for development and will need to be confirmed as part of the Engineering Plan Approval process.

The combination of meeting the NTLDM requirements around the road cross section, parking and berms can make it difficult to achieve the desired outcomes of the target design speed. However, there are a number of measures that can be implemented to achieve lower operating speeds.

The introduction of flush threshold treatments at intersections for the proposed development will help manage vehicle speeds.

6.6. Road Safety

The functional road design within the development have been designed in accordance with the NTLDM and is fit for purpose. Additional features such as the flush thresholds build outs and landscaping will assist in providing a safe road environment for the intended road users. The existing levels of safety in the area are excellent with no reported crashes on adjacent roads. Motorists are able to move freely along the road with excellent visibility and forward sight distances.

The subdivision roads provide excellent forward sight distance and accordingly are expected to operate safely as required by the TRMP.

A Road Safety Audit has been completed for the proposed subdivision and has been included in the consent process. The Audit identifies the road safety issues of the proposed design and provides recommendations to minimise harm.

Overall, there will be no noticeable change in the current levels of safety experienced by road users with any effects from the development being less than minor.

6.7. Parking

While there are no requirements for off-street parking as directed by the National Policy Statement for Urban Development, all lots will be provided with vehicle access, and it is expected that parking will be provided on the individual lots.

As set out in Table 4-7 and Section 4.12.1.1 of the NTLDM, the on-street parking rate of one space per two lots can be met. This requirement is inconsistent with the direction of the National Policy Statement which removes all parking requirements for developments. Regardless the proposed development can meet this requirement and there are no adverse effects from the parking provisions or arrangements.

7. Conclusion

The proposed development seeks to provide 58 lots that will be accessed via a new road with an intersection on Marriages Road.

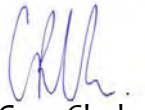
The analysis of the safety and capacity of the existing road and the proposed roads shows there are no safety or capacity constraints with the increased use of the road network.

The proposed development is able to meet most of the requirements under the NRMP and the NTLDM except for the width of the footpath for Roads 2 and 3. As noted above these non-compliances have no discernible effects on safety or efficiency of users of the new road network.

Overall, the proposed development will provide a road network that is safe and efficient with safe and convenient connections onto Marriages Road. The future residents are able to easily access the wider road network through the well-designed intersection and the connections to Aporo Road. Accordingly, any effects would be indiscernible to other road users.

We are happy to provide any further clarification if required.

Regards



Gary Clark
Director
NZCE (Civil), REA, CMEngNZ

Our Ref.: 22098
17 April 2024

Tasman Bay Estates Ltd.
By PDF to: s 9(2)(a)

Attention: Carsten Buschkuhele

Dear Carsten

GEOTECHNICAL ASSESSMENT REPORT
PROPOSED SUBDIVISION AT MAMAKU ROAD

Introduction

This report presents the results of a geotechnical assessment undertaken on a property zoned Rural 3 at Mamaku Road, for a proposed 61 lot subdivision. The work has been completed in accordance with IPENZ/ACENZ Short Form Conditions of Engagement as part of our ongoing engagement with Tasman Bay Estates Ltd and as instructed by Dave Paynter.

The proposal consists of subdivision of this former commercial orchard land to form 58 new residential lots. The subdivision layout is shown on Eliot Sinclair Ltd's Scheme Plan ref. 11460 Rev A dated 17 April 2024 provided to us in an email dated 17 April 2024. Approximately 146,000 m^3 of cut/fill bulk earthworks are planned to support the development of the roads and building sites.

The property is within Tasman District Council's Wastewater Management Area and special planning rules apply relating to on-site disposal of wastewater.

The general arrangement of the property is shown on attached Figure 22098-01S and 22098-01N. These drawings have been based on the Scheme Plan referenced above. The main development area is shown on the southern sheet Figure 22098-01S.

We initially met with Dave Paynter on site and completed a walkover inspection of the property on 24 May 2022. We subsequently carried out the majority of the investigation works described in this report on 10 October 2022, with additional confirmatory testing on 6 November 2023. We have been involved in various works on this and neighbouring properties over several years and are familiar with the underlying geological conditions.

This report presents the findings of the site investigation and provides our general recommendations for development of the sites defined in the subdivision Scheme Plan. The report is intended to support an application for resource consent (*subdivision & earthworks*). As almost all of the proposed lots are underlain by extensive cuts and fills, we intend to define Building Location Areas (BLA) and issue final site certification in terms of Schedule 2A of NZS 4404:2010 upon satisfactory completion of the subdivision earthworks.

s 9(2)(a)

Geotechnical Assessment

The current geotechnical assessment comprised:

- review of previous reports and data on the site and surrounding area;
- site inspection to assess approximate extent of proposed building sites;
- geomorphological assessment of the wider site situation;
- assessment of the proposed earthworks;
- assessment of the impact of development on overall slope stability;
- assessment of required silt control measures.

Subsurface investigations were undertaken as part of this investigation. We used a subcontract 1.8 tonne digger to excavate four test pits (TP1-4) on the property, in the approximate positions shown on attached Figure 22098-01S. The excavations took place on 10 October 2022 and the test pit logs are attached. We revisited the site to complete Scala penetrometer testing on 6 November 2023.

Site Assessment

Surface Characteristics

The site is situated in rolling Moutere country to the west of the old coastal highway to the south of Tasman village. The property occupies the triangle between Mamaku and Marriages Roads, and temporary access is available from both. Permanent and the majority of construction traffic access will be from Marriages Road, via a new culvert crossing of an unnamed stream (*referred to herein as Marriages Stream*), which runs northward in a substantial ditch along the eastern boundary of the proposed subdivision.

The general topography comprises a northerly trending ridge system, with three main ridges (*West, Central and East Ridges in this report*) separated by three relatively narrow valleys (*Far West, West and East Valleys*). Maximum slope angles on the flanking slopes are in the order of 12-15°. Flat ground is present in the east, near to Marriages Road and to the north, next to Mamaku Road. The entire development area was formerly apple orchard and two large irrigation reservoirs impounded by earth dams[1] have been constructed on the eastern side of the property. Lot 22 DP 328 (*56 Marriages Road*), located between the two ponds is owned by a third party and forms an enclave within the general development area but is not part of the subdivision. There is another dwelling (*77 Mamaku Road*) located in the centre of the property and this will be incorporated into the subdivision (*currently planned as proposed Lot 28*).

A trio of much smaller ponds (W1-W3 incl.) is located in the West Valley and a similar pond (E2) is adjacent to the old hail cannon in the East Valley. To the north, another small pond (E4) sits at the pinch point where the property narrows down at the northwestern corner of neighbouring Lot 22 DP 328. There is a cased water borehole at the head of the East Valley, within proposed Lot 35. We understand that this is currently in working order and will remain as a private asset in that lot.

The entire area is in grass and clover, with the apple trees having been removed and the area root raked. Current development is limited to some old farm buildings adjacent to the Southern pond and a barn at the end of Mamaku Road (*both to be demolished*). A small borrow site has been

[1] These are referred to as the Northern and Southern ponds in this report.

established on the ridge above Pond W2 and a small amount of material removed from this area for use elsewhere in the past. We are not aware of any other historic bulk earthworks.

Sub-Surface Characteristics

The underlying geology of the site is mapped (DSIR 1982 '*Richmond'* – 1:50,000) as clay bound gravel containing weathered, well rounded dominantly greywacke pebbles, cobbles and scattered boulders of the Moutere Gravel Formation (*tm*). This unit and the residual soils associated with it are well exposed in existing road cuts and drainage ditches on and close to the property. The soils encountered during the field investigations are generally consistent with the published geology.

No active faults are mapped close to the property. The inactive Surville Fault is shown a short distance to the west. The nearest active fault is the Waimea Fault approximately 18 km to the southeast.

We did not observe any evidence of slope instability on the site during any of our inspections.

We excavated four test pits on the property. The pits were located to provide a good spread of data across the proposed development area. Substantial bulk earthworks are planned to form building platforms and consequently there will be good opportunity to verify ground conditions during subdivision construction. Conditions in all the pits were broadly similar and numerous other construction excavations on nearby sites have revealed similar conditions. The Moutere Gravel Formation on this property consists of medium gravel to cobble size rounded to subrounded, generally moderately to highly weathered, low strength clasts in a low plasticity stiff silty clay matrix. The clastic content is variable and in some localised areas (*generally concordant lensoid structures*) clasts are absent completely. Elsewhere the formation is entirely clast supported with relatively little matrix. Much of the matrix that is present is formed from the weathering products of the clasts themselves and consequently is quite silt-rich and clay-poor, leading to its low plasticity.

TP1 comprised clearance of an existing cut face in the borrow site referenced above to a depth of around 2 m. It exposed heavily weathered, light brown silty clayey GRAVEL, inferred as Moutere Gravel Foundation. The topsoil had all been removed.

TP2 was a more conventional pit and exposed a typical sequence of thinly developed SILT topsoil overlying 250 mm of stiff silty CLAY with no clasts, inferred as residual soil. This graded at a depth of 400 mm into medium dense, silty clayey GRAVEL, inferred as undisturbed Moutere Gravel Formation. The pit ended in firm digging conditions at a depth of 1.0 m. No groundwater was encountered.

TP3 exposed 100 mm of SILT topsoil overlying 900 mm of firm to stiff silty CLAY inferred as residual soil, which graded in turn into silty clayey GRAVEL at a depth of 1.1 m. This unit, inferred as Moutere Gravel Formation continued to the bottom of the pit at a depth of 1.7 m. No groundwater was encountered.

TP4 was dug on a ridgetop in the north of the development area and exposed a mixed zone of 500 mm thickness where the topsoil had been root raked through the residual soil. Below this was an abrupt change to silty clayey GRAVEL inferred as Moutere Gravel Formation. The pit was terminated in firm digging conditions at a depth of 1.2 m. No groundwater was encountered.

The vertical sides of all of the pits remained stable for the duration of our inspection. The cohesive Moutere Gravel faces above the water table tend to exhibit good short term stability and we would not anticipate particular difficulty with service trench excavations and the like on the hill country.

Measurements of undrained shear strength in the more cohesive soils indicated stiff conditions ($S_u \geq 100$ kPa) in the residual soil. The underlying undisturbed Moutere Gravel Formation soils are inferred as being at least medium dense throughout, based on the difficulty of digging the test pits and the Scala testing.

On 16 November 2023 we returned to the site to examine an additional test pit (TP5) dug a short distance to the south of the Northern Pond in a possible borrow area. This area is mapped as Pleistocene (*geologically recent*) age alluvium - silty or clay bound gravel containing clasts reworked from the Moutere Gravel (*uk₃*). The pit was not formally logged, as its purpose was to assess only whether the soils in this area would be suitable for structural filling. The pit measured 9 × 1.5 × 2.6 m deep and had 1.1 m of water in its base at the time of our inspection. The sidewalls exposed tightly packed, sandy silty clayey subrounded medium to coarse GRAVEL which was moderately weathered to fresh and weak to moderately strong (*recent alluvium*). The unit was clast supported and there was a general lack of cohesion, resulting in the sidewalls of the pit becoming unstable as the pit got deeper. The gravel is overlain by a relatively thin silty clay layer which is relatively impermeable and results in parts of this area of the property being quite boggy.

We carried out six Scala penetrometer tests (SC1-SC6) on the property. The test results are attached. They show that in general, medium dense conditions are consistently present below a depth of around 700 mm, which in most instances coincides with the upper part of the Moutere Gravel Formation or the base of the residual soil.

The test results are summarised in Table 1 below.

Table 1: Scala penetrometer results summary.

Test No.	Location	Depth (mm) below cleared ground level to conditions with an inferred ultimate bearing capacity of 300 kPa for strip footings
SC1	Adjacent TP1	700
SC2	Adjacent TP2	500
SC3	Adjacent TP3	700
SC4	Adjacent TP4	100
SC5	Entry road west	650
SC6	Entry road east	700

The test locations are shown on attached Figure 22098-01S.

Development Considerations

Recommendations and opinions in this report are based on data from Council records, published mapping, five test pits, six Scala penetrometer tests and the walkover surveys undertaken as part of this engagement. The nature and continuity of sub-surface conditions away from the original test locations are inferred and it must be appreciated that actual conditions may vary from the assumed model.

As subsurface information has been obtained from discrete investigation locations, which by their nature only provide information about a relatively small volume of soils, there may be special conditions pertaining to this site that have not been disclosed by the investigation and that have not been taken into account in the report. If variations in the soil occur from those described or assumed to exist then the matter should be referred back to us immediately.

We have undertaken a site investigation in accordance with established engineering practice and consider that a building site suitable for a single dwelling should exist on each of proposed Lots 1-58 as defined in the attached Figure 22098-01S. We consider that these building sites are unlikely to be affected by natural hazards as defined in Section 106 of the Resource Management Act provided the recommendations below are incorporated into the development.

Recommendations for Development

Health & Safety Considerations

Development of this site will involve significant earthworks, excavations and plant access in a relatively remote location, on or close to moderate slopes and adjacent to large water bodies. Appropriate care must be taken to establish safe access for vehicles and people working on the site, as well as all normal best practice procedures for the actual construction works. All work proposals shall consider safety in design.

Seismic Considerations

Fault Rupture

The nearest active faults are the Bishopdale and Waimea Faults of the Waimea-Flaxmore Fault System, which trend in an approximate northeast-southwest direction approximately 18 km southeast of the site. The Waimea Fault is an active reverse fault with an estimated low slip rate and recurrence interval in the range 5,000-10,000 years[2].

No evidence of faulting was observed during the investigations and as no fault line hazards are identified on the site, per the Tasman Resource Management Plan the risk of fault rupture hazard does not require further assessment.

Liquefaction and Lateral Spreading

Due to the cohesive nature of the residual soil associated with the Moutere Gravel Formation and the elevated position of the proposed development, we do not consider that there is a significant risk of seismic liquefaction or lateral spreading affecting this site.

Structural Design Actions

In terms of NZS 1170.5:2004 Clause 3.1.3 a site subsoil class of D may be assumed in structural design.

[2] NZ Active Faults Database (https://data.gns.cri/af/)

Overall stability

We did not observe any evidence of deep-seated slope instability on the site and slope angles at or close to the proposed BLAs are generally moderate to low (<15°). Moutere Gravel Formation and derived soils are generally stable at low angles and where unsaturated conditions exist. Consequently we do not consider that there is an overall slope stability issue affecting the proposed building sites on the property. However, poor construction management practices during earthworks could lead to situations where cut batters and excavations become unstable and consequently cuts should be managed in an appropriate manner in accordance with their size. (*Refer 'Cuts' and 'Fills' below*).

Access

Access is proposed to the 58 new residential lots from Marriages Road via a new road (*Road 1 on the plan*) which will cross Marriages Stream via a culvert and then run across the alluvial flats before climbing up onto the ridge system to the west where the building sites will be located. Further roads (*Roads 2 & 3*) are proposed on each of the main ridges, with four smaller Rights of Way planned to serve smaller areas of housing. Much of the roading is to be constructed on engineered fill.

We consider that formation of an appropriately graded roadway to current Council Road and RoW standards will be possible along these alignments. Where softer areas are encountered during construction (*considered more likely on the alluvial flats at the eastern end of Road 1*), the subgrade will be undercut to good ground and the road formation constructed on top, under the direction of a GeoProfessional[3].

Siting

All buildings and other structures requiring a building consent shall be situated within BLAs which shall be defined within each of the proposed residential lots shown on the scheme plan. Our intention is to define and certify the BLAs based on testing and assessment once the earthworks are completed. Certification will be in the form of NZS 4404:2010 Schedule 2A.

Additional siting restrictions may be dictated by the Tasman Resource Management Plan. Interpretation of these is beyond our current scope.

Foundations

Foundation conditions within the undisturbed natural ground have been found to be generally satisfactory. However the likely BLAs within each of the planned 58 residential lots are all affected to a greater or lesser degree by proposed earthworks. Consequently we are unable to provide definitive foundation guidance at this initial assessment stage.

Certification of building sites at earthworks completion will include a full set of site specific foundation recommendations for each lot. Given the competence of the natural ground and the scale of earthworks proposed, we consider it likely that most of the sites thus formed should be suitable for foundations design in accordance with NZS 3604:2011. However this must be confirmed by a GeoProfessional once the earthworks are completed. The intention is to certify as large an area as possible on each site that will be suitable for shallow foundations. Additional areas may be certified subject to Specific Investigation and Design (SID) if ground conditions

[3] CPEng(*Geotechnical*) or PEngGeol, both as administered by Engineering NZ.

dictate. Should it exist, the balance area on each lot will be where development is not recommended from a geotechnical perspective.

Earthworks – General

The site is within LDA1 and under the Tasman Resource Management Plan (TRMP) the volume of proposed earthworks will require a resource consent. It is vital – and a likely condition of consent – that any earthworks are planned and executed in a manner that will not lead to excessive erosion and subsequent sedimentation. In order to help prevent excessive sedimentation, the works are to be staged per attached Figure 22098-02 and Table 2 below:

Table 2: Proposed Earthworks Staging.

Stage No.	Setting	Comments
1a	Alluvial flats to the west of Marriages Road	New culvert carrying Marriages Stream to be constructed immediately west of the current watercourse and the stream diverted through it. Make good the connection with Marriages Road formation. Form roadway on increasing thickness of fill across the flat ground to the base of the slope. Apply running course of road metal.
1b	East facing slope, ridge top land and west facing slope on East Ridge	Form the roadway on filled ground up the slope, including residential Lots 7, 8 and 9 and Lot 59. Stop works short of the culvert crossing of the East Valley. Apply running course of road metal.
2	East facing slope below East Ridge	Form building platforms on Lots 1-13 and RoW 1 by cut to fill methods. Realign existing watercourse at base of slope. Apply running course of road metal.
3	Ridgetop land and gentle flanking slopes on East Ridge	Form building platforms on Lots 14-22 and Road 3 by cut to fill methods. Apply running course of road metal.
4	Ridgetop and east facing flanking slopes below lower part of Central Ridge	Continue the road formation across the East Valley and install the culvert. Form building platforms on Lots 23-27 and RoW 2 by cut to fill methods. Apply running course of road metal. Lot 28 is already developed and will not be disturbed.
5	Ridgetop and valley land crossing Central Ridge and the West Valley.	Continue the road formation across Central Ridge and West Valley, terminating at the turning head on West Ridge. Form the culvert crossing at West Valley. Apply running course of road metal.
6	Ridgetop land and flanking slopes below the upper part of Central Ridge.	Form residential Lots 29-44 and Road 2 by cut to fill methods along the upper portion of Central Ridge. Apply running course of road metal.
7	Ridgetop land on West Ridge and an isolated knob west of Far West Valley.	Form remaining residential Lots 45-59 and RoW 3 & 4 by cut to fill methods. Apply running course of road metal.

A generalised erosion & sediment control plan has been provided to us by the developer[4] and this has been formalised as attached Figure 22098-03S and Figure 22098-03N. Silt controls shall utilise the existing Southern pond which will be dewatered and fitted with a decant structure and a forebay arrangement. Additional sediment control ponds will be formed at the northern end of the property to catch sediment laden water before it reaches the Northern pond. Proposed sediment controls shall generally comply with Council's Erosion and Sediment Control Guidelines (2019). Specific features of the sediment control plans are labelled A-G incl. on the Figures noted above and are discussed further in Table 3 below.

Table 3: Proposed Sediment Controls.

Label	Comments
A	Create diversion ditch drain above axis of Far West Valley to divert runoff from Lots 48, 49, 50, 55, 56 & 57 to Pond W3. Most of this area already drains naturally to W3 but the upper area will need diversion.
B	Enlarge Pond W3 as shown on Figure 22098-03S.
C	Create Pond E3 in lower section of the East Valley.
D	The existing ditch along the boundary of Lot 22 DP 328 acts as an effective clean water diversion to limit the amount of catchment flowing into Ponds E4 and E5.
E	Create temporary Pond E1 in upper part of East Valley during works in Stage 6 to limit effects on Ponds E2 and E3 further downstream.
F	Form a large forebay above the Southern Pond to deal with sediment coming off Stages 2 and 3.
G	Dewater Southern Pond and construct decants at outfall.
H	Rebuild the failed spillway at the existing discharge point of the Northern Pond. New spillway to be min. 3 across at invert level and 500 mm deep.

The recommended pond works are outlined in Table A on Figure 22098-03N. The intention is to avoid overloading of the water discharge system by topsoiling and/or stabilising completed earthworks stages as construction progresses, such that large areas can be considered treated before the subdivision is complete. All roadways will have a running course of road metal immediately applied as soon as the formation is satisfactory. This material will inevitably be contaminated to some degree by subsequent plant movement, but shall form an improved subgrade and shall not be included in the final pavement design.

Silt fencing and smaller scale diversion ditches will be employed in localised areas as the need arises, but the overall silt control plan is to capture and allow the fines to settle out in a series of ponds before the water leaves the property to the north.

[4] Ref. email Paynter/Palmer dated 21 September 2023.

Cuts

We have had some input into the current earthworks design and consider that the proposed permanent cuts should remain stable in high frequency rainfall or seismic events. Significant earthworks after completion of the subdivision works are considered unlikely to be beneficial and will be restricted as part of the future site certification.

Fills

All structural fill and any landscaping fill in excess of 800 mm thick shall be placed in full accordance with NZS 4431:2022. Landscape fill thinner than this may be placed by track rolling in thin incremental layers on a stripped and benched subgrade where approved by a GeoProfessional. No slope steeper than 2.5H:1V is to be steepened by the placement of fill material. Similarly to the proposed cuts, we have provided input into the current design and consider that the design fill slopes should not be adversely affected by high frequency rainfall or seismic events.

We will be monitoring the fill placement and amongst other items assessing the following:

- Stripped subgrade;
- The need for underdrainage and the installation of this as required;
- The suitability of borrow sites;
- Fill placement and density testing;
- Completed earthworks batters.

We intend to provide earthfill certification under NZS 4431:2022 at the satisfactory completion of the earthworks.

We note that a substantial amount of borrow is to be won from an area adjacent to the Northern Pond. It is intended that this area will be converted into a wetland upon completion of the subdivision. The locally high water table and impermeable nature of the surface soils will lend themselves to this eventual end use. Our assessment is that the bulk of the material exposed in test pit TP5 should be suitable for use as structural fill, if placed at an appropriate moisture content.

Retaining Walls

No retaining walls are planned as part of the subdivision. Should the need for retaining walls arise as part of the works, they shall be subject to specific investigation and designed by a Chartered Professional Engineer or GeoProfessional.

Access

Access is to be provided to the new residential lots via the new Roads and Rights of Way shown on the attached drawings. All trafficable roads will be formed in full accordance with the Nelson Tasman LDM. As noted above, a running course of metal will be applied to all completed roadways to help provide immediate sediment control. Access to the site is to be via Marriages Road, where a new culvert will be installed as part of the initial establishment works as noted above.

Temporary Cut Slope Stability

Large excavations have the potential to destabilise the site and for this reason it is important that all the earthworks are appropriately managed and staged. As with previous similar works with this developer, we will monitor construction and agree the general scope of any given area of excavation prior to works commencing.

Drainage

Permanent stormwater control is to be provided for each section in the form of a lateral which will discharge either into a piped system or directly into a suitable gully or stormwater flowpath. It is important that discharge of stormwater from sections does not occur on filled ground (*i.e. the piped system shall extend to a point(s) where it can discharge to natural ground and in a form that will not induce scour damage*). Water from roofs, hardstandings, tank overflows and other impermeable areas shall all be collected and piped to discharge to the stormwater laterals provided on each site.

Where any new pipes are to be laid in filled ground, an allowance for settlement of that fill should be made in system design.

Wastewater

All wastewater is to be piped to a centralised subdivision scheme which shall treat the effluent and disperse it within various Land Application Areas (LAA) located as shown on attached Figure 22098-01S. Design of this system is to be completed by others. Individual on-site disposal shall not be permitted.

We have reviewed the earthworks design for those areas of filled ground that are within the proposed LAAs and are satisfied that the fill slopes are sufficiently flat that the discharge should not unreasonably increase the risk of instability. The vast bulk of the proposed LAAs are on undisturbed natural ground. We consider that from a geotechnical perspective, these nominated dispersal areas are suitable for the proposed discharge, provided it does not exceed 2 mm/day for slopes <10% and 1.6 mm/day for slopes in the range 10%-20%.

Overland stormwater flows are to be permanently diverted away from any soakage field which may be achieved by construction of a simple swale/cut off drain upslope of the field.

HAIL

We understand that any HAIL issues on this property are to be addressed by others.

Planting

Planting can provide a degree of protection against small-scale instability and erosion of surficial soils. We recommend that where possible, sloping ground is planted out with species appropriate for the area, with an emphasis on deep rooting varieties. Pines, gums and wattles should be avoided.

Test Pits

Investigations on the site involved the excavation of five test pits. They have only been loosely backfilled. The pits were sited to minimise the impact on subsequent development, but where they clash with proposed hardstandings, services or shallow foundations, the pits must be undercut and backfilled in accordance with NZS 4431:2022.

Proposed Client Actions

We recommend that you complete designs for the subdivision and associated enabling and accessway earthworks, noting the requirements for specific design and/or review noted above.

Proposed Consultant Actions

- Complete design/review work as dictated by the scope of the proposed works;
- Provide input into obtaining the necessary consents to commence works;
- Complete construction monitoring to a satisfactory completion of physical works;
- Provide appropriate certification of building sites and earthworks.

We confirm that we have been engaged to complete the works outlined above.

Applicability

This report has been prepared solely for the use and benefit of Tasman Bay Estates Ltd., its professional advisers and Tasman District Council, in relation to the specific project described. No liability is accepted in respect of its use for any other purpose or by any other person or entity. Data or opinions contained in it may not be used in other contexts, by other parties or for any other purpose without our prior review and agreement.

Please refer any further enquiries or correspondence to Andrew Palmer.

Yours sincerely

Andrew Palmer
Principal

Attachments: Figure 22098-01S "*Investigations Location Plan - South*"
Figure 22098-01N "*Investigations Location Plan - North*"
Figure 22098-02 "*Earthworks Staging Plan"*
Figure 22098-03S "*Sediment Control Plan - South"*
Figure 22098-03N "*Sediment Control Plan - North"*
Test pit logs (TP1-4)
Scala penetrometer logs (SC1-6)

Cc: Hayden Taylor (*By email PDF*)

17/04/24
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TERRAFIRMA Engineering Ltd

TERRA FIRMA ENGINEERING LTD.

EXCAVATION LOG

REFERENCE: TP 1

SHEET 1 OF 1

PROJECT: Tasman Village Sub SITE: Mamaku Road JOB No.: 22098

GPS CO-ORDINATES: REFER PLAN

RL:

EXPOSURE TYPE: Test pit
EQUIPMENT: 1.7 t
OPERATOR: Forrest
DIMENSIONS: (LxWxD) Face 2m high

HOLE STARTED: 10/10/22
HOLE FINISHED: 10/10/22
LOGGED BY: ADDP
CHECKED BY: dlp

EXCAVATION & TESTING				ENGINEERING DESCRIPTION			GEOLOGY	
PENETRATION RATE (EASY → HARD)	SUPPORT	WATER	SAMPLES/TESTS PP = Pocket Penetrometer qu kPa; SV = Shear vane Corrected kPa	DEPTH (m)	GRAPHIC LOG	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION	SHEAR STRENGTH OR RELATIVE DENSITY	ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
	N/A.	N/E	PP SV 120 - 140 UTP (gravel)	0.5 1.0 1.5 2.0		Silty clayey GRAVEL - heavily weathered, rounded, fine - coarse gravels in low plasticity matrix. Clast supported. - Sandy silt lens - 100mm thick, fine sand	M	MD D	MOUTERE GRAVEL FORMATION	①
				2.5 3.0 3.5		End of pit @ 2.0m - bottom of face - similar throughout				

1m

Scraped down face in old borrow pit

Topsoil missing

173° ←

→ 353°

①

Faces 087°

TERRAFIRMA Engineering Ltd

TERRA FIRMA ENGINEERING LTD.

EXCAVATION LOG

REFERENCE: TP 2

SHEET 1 OF 1

PROJECT: Tasman Village Sub SITE: Mamaku Road JOB No.: 22098

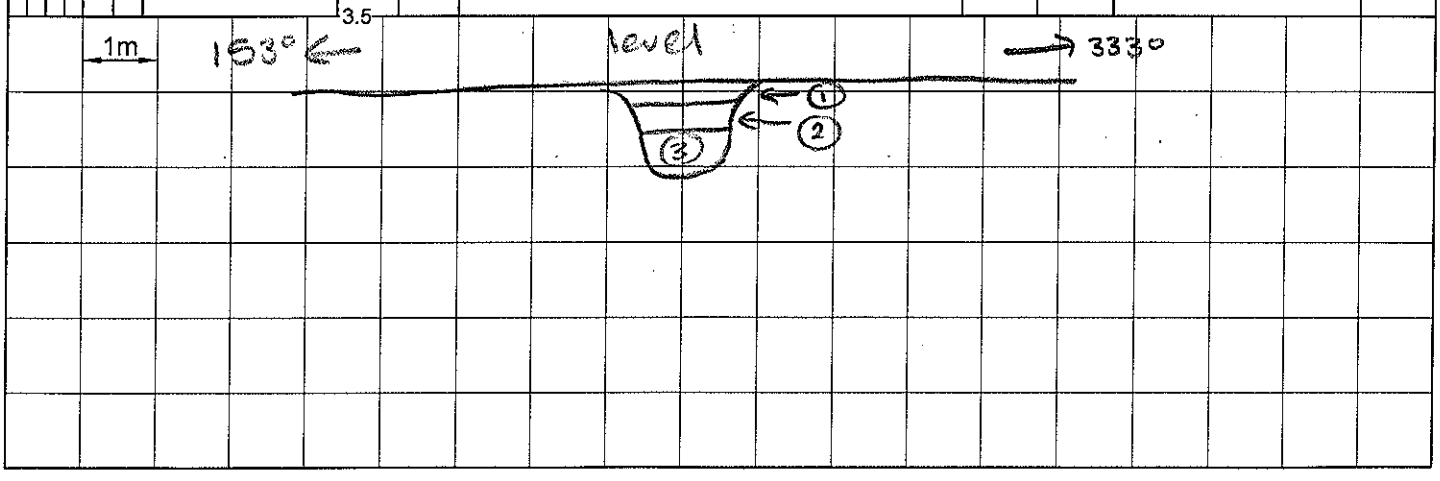
GPS CO-ORDINATES: REFER PLAN

RL:

EXPOSURE TYPE: Test pit
EQUIPMENT: 1.7 t
OPERATOR: Forrest
DIMENSIONS: (LxWxD) 1.5 x 0.5 x 1.0

HOLE STARTED: 10/10/22
HOLE FINISHED: 10/10/22
LOGGED BY: ADP
CHECKED BY:

EXCAVATION & TESTING					ENGINEERING DESCRIPTION			GEOLOGY	
PENETRATION RATE (EASY → HARD)	SUPPORT	WATER	SAMPLES/TESTS PP = Pocket Penetrometer qu kPa; SV = Shear vane Corrected kPa	DEPTH (m)	GRAPHIC LOG	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION	SHEAR STRENGTH OR RELATIVE DENSITY	ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
			PP SV	0		SILT- low plasticity, dark brown roots and tree roots and pipe	M	S	TOPSOIL	1
	NTL - 0/2	NIL	176-184	0.5		Silty CLAY - low plasticity, light yellowish-brown, no clasts	M	St	RESIDUAL SOIL	2
				1.0		Silty clayey GRAVEL - low plasticity, light yellowish-brown, clast supported. Medium-coarse, rounded, heavily weathered. Extremely weak gravels.	M	M_D	MANGAKINO GRAVEL FORMATION	3
				1.5		End of pit @ 1.0m - firm digging in natural ground				
				2.0						
				2.5						
				3.0						
				3.5						



TERRAFIRMA Engineering Ltd

TERRA FIRMA ENGINEERING LTD.

EXCAVATION LOG

REFERENCE: TP 3

SHEET 1 OF 1

PROJECT: Tasman Village Sub SITE: Mamaku Road JOB No.: 22098

GPS CO-ORDINATES: REFER PLAN

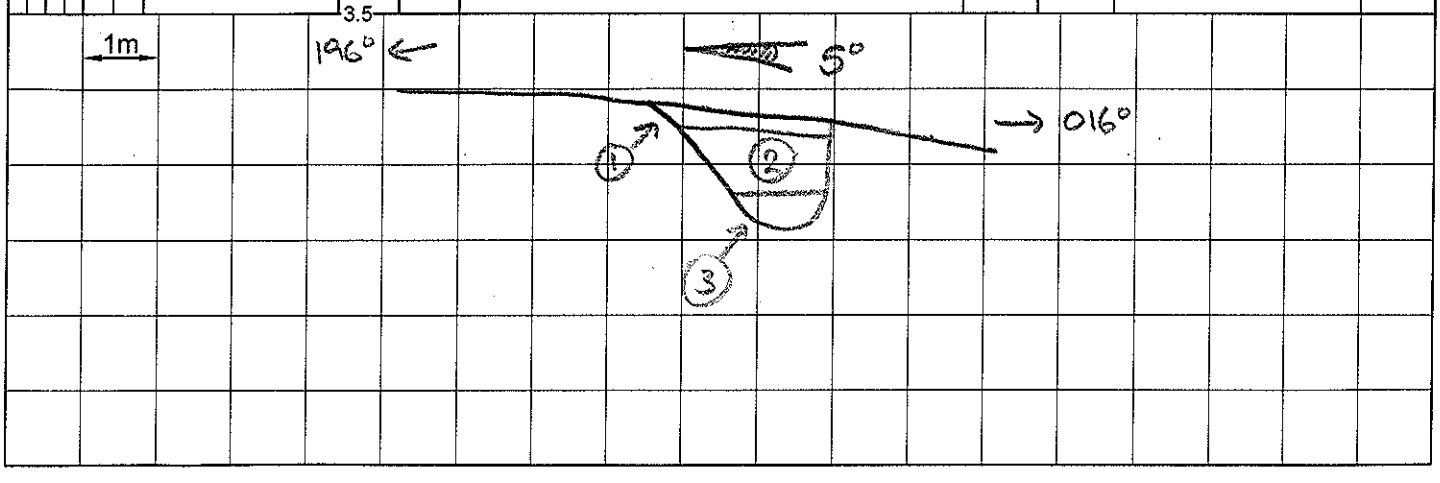
RL:

EXPOSURE TYPE: Test pit
EQUIPMENT: 1.7 t
OPERATOR: Forrest
DIMENSIONS: (LxWxD) 2.4 x 0.5 x 1.7

HOLE STARTED: 10/10/22
HOLE FINISHED: 10/10/22
LOGGED BY: ACDP
CHECKED BY:

EXCAVATION & TESTING | ENGINEERING DESCRIPTION | GEOLOGY

PENETRATION RATE (EASY → HARD)	SUPPORT	WATER	SAMPLES/TESTS (PP = Pocket Penetrometer qu kPa; SV = Shear vane Corrected kPa)	DEPTH (m)	GRAPHIC LOG	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION	SHEAR STRENGTH OR RELATIVE DENSITY	ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
	NIL-OK	NIL	PP SV 187 — 199	0.5		SILT - low plasticity, dark brown rootlets	M	S	TOPSOIL	1
				1.0		Silty CLAY - low plasticity, light orangey-brown. Few clasts of heavily weathered medium rounded gravel.	M	F - St	RESIDUAL SOIL	0.5 / 2 / 1.0
				1.5		Silty clayey GRAVEL Fine - medium - coarse, rounded, heavily weathered. Extremely weak clasts in low plasticity silty-clay matrix. Clast supported.	M	MD	MOUTERE GRAVEL FORMATION	3 / 1.5
				2.0		End of pit @ 1.7m - Firm digging in natural ground				2.0
				2.5						2.5
				3.0						3.0
				3.5						



TERRAFIRMA Engineering Ltd

TERRA FIRMA ENGINEERING LTD.

EXCAVATION LOG

REFERENCE: TP 4

SHEET 1 OF 1

PROJECT: Tasman Village Sub SITE: Mamaku Road JOB No.: 22098

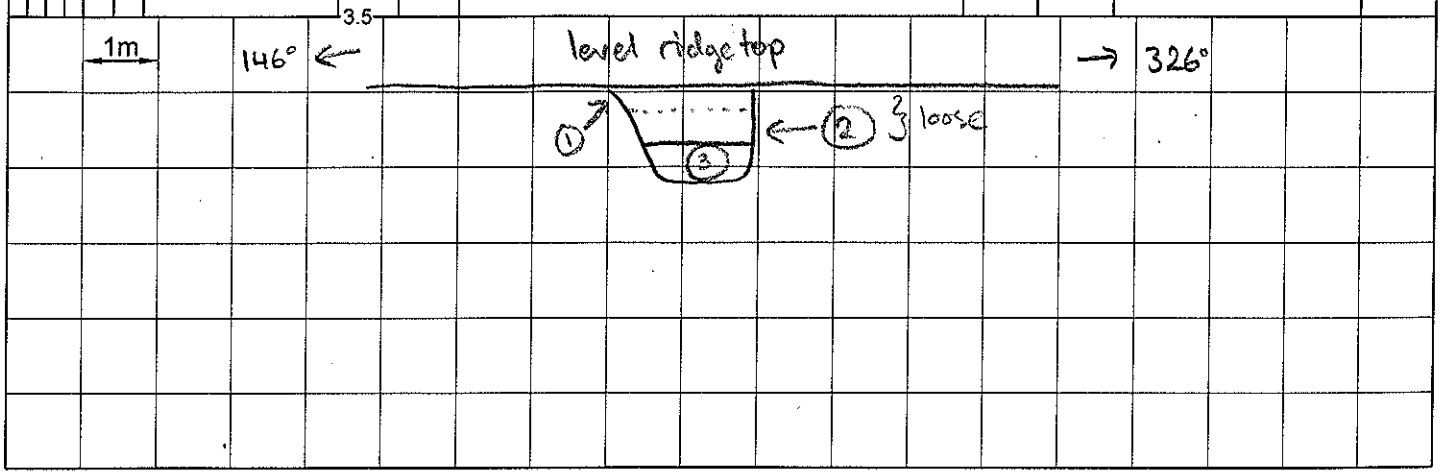
GPS CO-ORDINATES: REFER PLAN

RL:

EXPOSURE TYPE: Test pit
EQUIPMENT: 1.7 t
OPERATOR: Forrest
DIMENSIONS: (LxWxD) 2.0 x 0.5 x 1.2

HOLE STARTED: 10/10/22
HOLE FINISHED: 10/10/22
LOGGED BY: AGDP
CHECKED BY:

EXCAVATION & TESTING					ENGINEERING DESCRIPTION			GEOLOGY	
PENETRATION RATE (EASY → HARD)	SUPPORT	WATER	SAMPLES/TESTS (PP = Pocket Penetrometer qu kPa; SV = Shear vane Corrected kPa)	DEPTH (m)	GRAPHIC LOG	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION	SHEAR STRENGTH OR RELATIVE DENSITY	ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
			PP SV	0		SILT - low plasticity, dark brown rootlets	M	S	TOPSOIL	(1)
	NZL-OK	NZL				Has been rotary hoed: Silty CLAY - low plasticity, mixed, dark-brown, yellowish-brown. No clasts.	M	S-F	MIXED TOPSOIL / RESIDUAL SOIL	(2)
			162-184	0.5		Silty clayey GRAVEL - light yellowish-brown. Moderately-heavily weathered. Extremely weak gravels, rounded, fine-coarse.	M	MD	MOUTERE GRAVEL FORMATION	(3)
				1.0						1.0
				1.5		End of pit @ 1.2m. - firm digging in natural ground				1.5
				2.0						2.0
				2.5						2.5
				3.0						3.0
				3.5						



TERRA FIRMA ENGINEERING (2016) LTD

SCALA PENETROMETER LOG

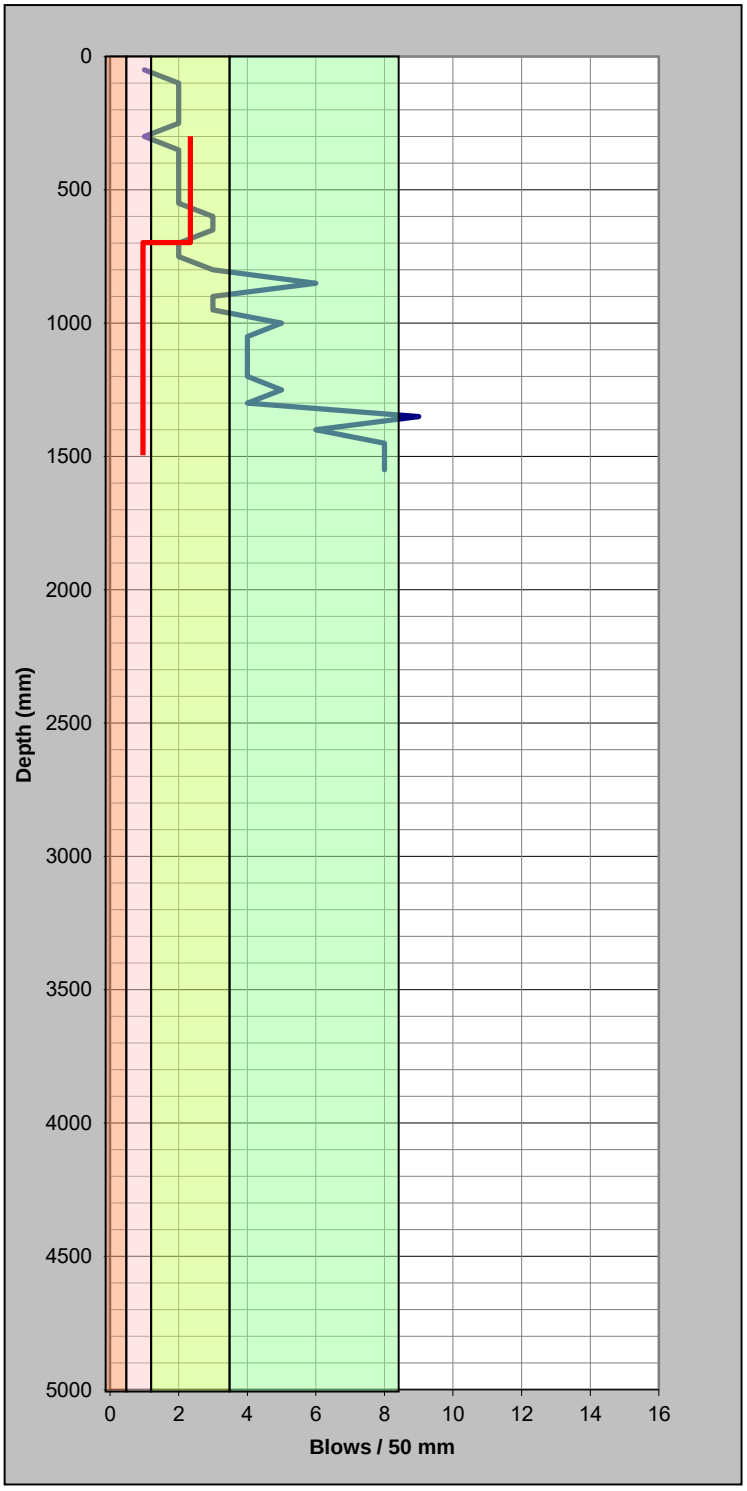
s 9(2)(a)

Job No:	*22098*	Date:	*6/11/2023*
Project:	*Tasman Village Sub*	Operated by:	*ACDP*
Location:	*Refer Plan*	Logged by:	*GCMP*
Position:	*-*	Checked by:	

Test No.

SC1

mm Driven	No. of Blows	mm Driven	No. of Blows
50	1	2550	
100	2	2600	
150	2	2650	
200	2	2700	
250	2	2750	
300	1	2800	
350	2	2850	
400	2	2900	
450	2	2950	
500	2	3000	
550	2	3050	
600	3	3100	
650	3	3150	
700	2	3200	
750	2	3250	
800	3	3300	
850	6	3350	
900	3	3400	
950	3	3450	
1000	5	3500	
1050	4	3550	
1100	4	3600	
1150	4	3650	
1200	4	3700	
1250	5	3750	
1300	4	3800	
1350	9	3850	
1400	6	3900	
1450	8	3950	
1500	8	4000	
1550	8	4050	
1600		4100	
1650		4150	
1700		4200	
1750		4250	
1800		4300	
1850		4350	
1900		4400	
1950		4450	
2000		4500	
2050		4550	
2100		4600	
2150		4650	
2200		4700	
2250		4750	
2300		4800	
2350		4850	
2400		4900	
2450		4950	
2500		5000	



Testing Complies with NZS 4402:1988 Test 6.5.2 Dynamic Cone Penetrometer

Interpretation based on Guidelines Published by NZ Geomechanics Soc. (1988) and NZS 3604:2011

2023-11-06 Scalas.xlsx

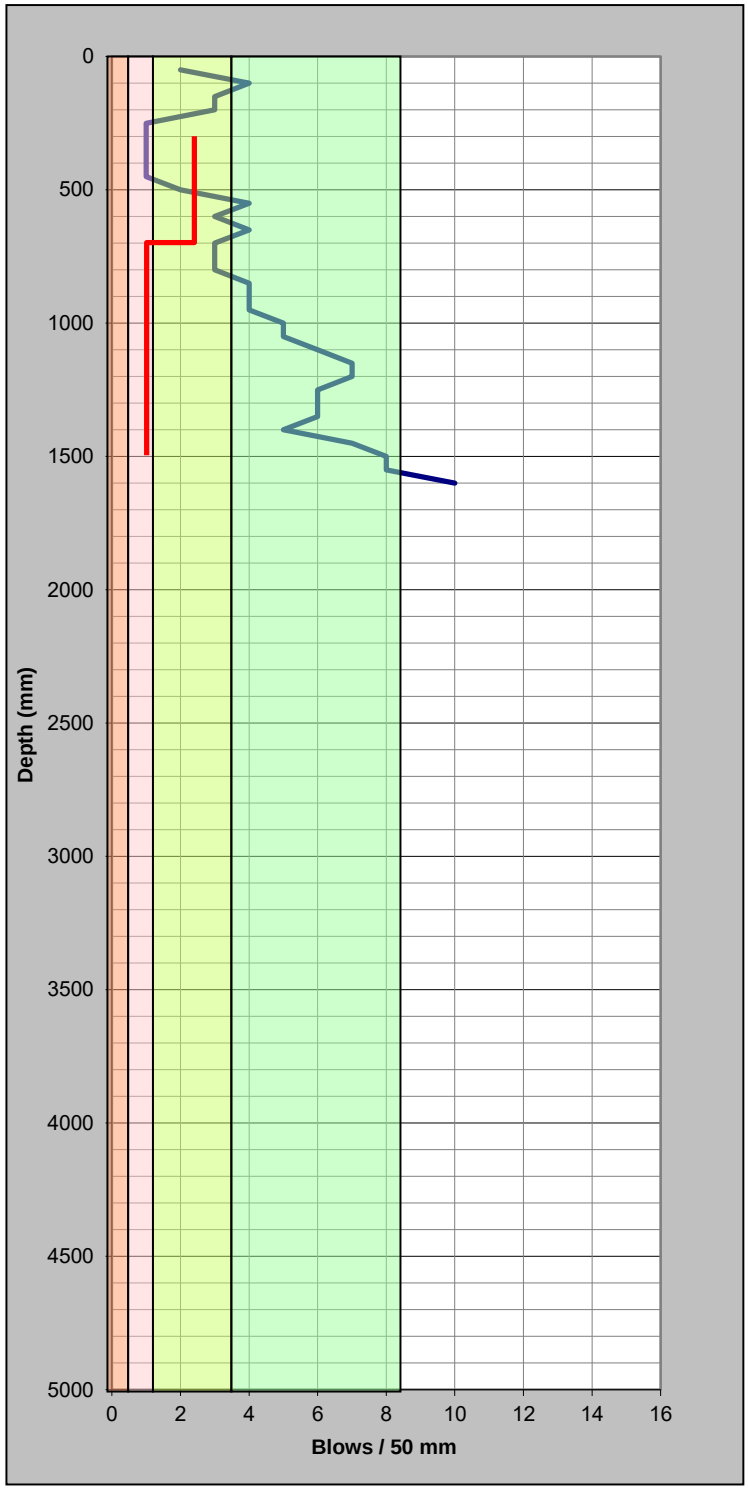
TERRA FIRMA ENGINEERING (2016) LTD

SCALA PENETROMETER LOG

s 9(2)(a)

Job No:	*22098*	Date:	*6/11/2023*	**Test No.**	
Project:	*Tasman Village Sub*	Operated by:	*ACDP*	**SC2**	
Location:	*Refer Plan*	Logged by:	*GCMP*		
Position:	*-*	Checked by:			

mm Driven	No. of Blows	mm Driven	No. of Blows
50	2	2550	
100	4	2600	
150	3	2650	
200	3	2700	
250	1	2750	
300	1	2800	
350	1	2850	
400	1	2900	
450	1	2950	
500	2	3000	
550	4	3050	
600	3	3100	
650	4	3150	
700	3	3200	
750	3	3250	
800	3	3300	
850	4	3350	
900	4	3400	
950	4	3450	
1000	5	3500	
1050	5	3550	
1100	6	3600	
1150	7	3650	
1200	7	3700	
1250	6	3750	
1300	6	3800	
1350	6	3850	
1400	5	3900	
1450	7	3950	
1500	8	4000	
1550	8	4050	
1600	10	4100	
1650		4150	
1700		4200	
1750		4250	
1800		4300	
1850		4350	
1900		4400	
1950		4450	
2000		4500	
2050		4550	
2100		4600	
2150		4650	
2200		4700	
2250		4750	
2300		4800	
2350		4850	
2400		4900	
2450		4950	
2500		5000	



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Interpretation based on Guidelines Published by NZ Geomechanics Soc. (1988) and NZS 3604:2011

TERRA FIRMA ENGINEERING (2016) LTD

SCALA PENETROMETER LOG

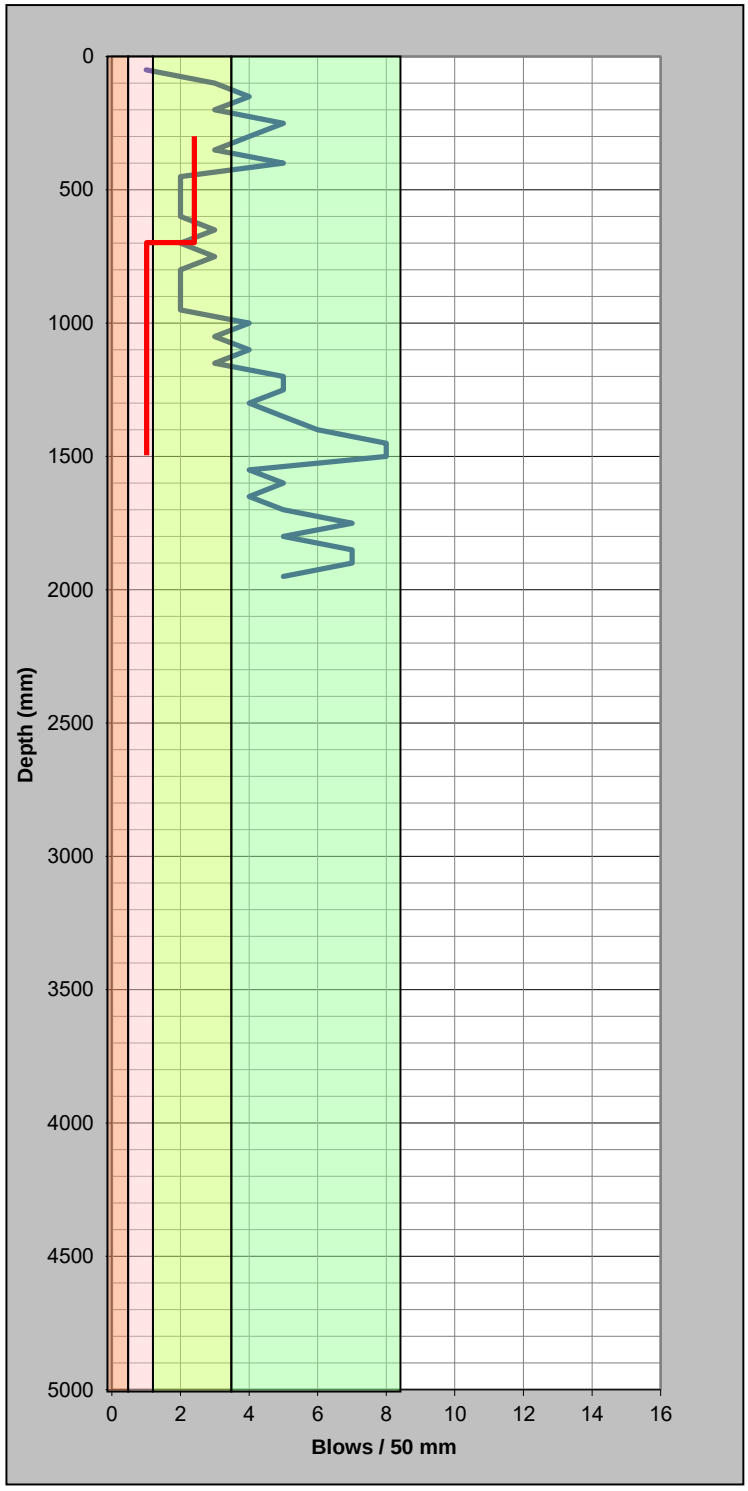
s 9(2)(a)

Job No:	*22098*	Date:	*6/11/2023*
Project:	*Tasman Village Sub*	Operated by:	*ACDP*
Location:	*Refer Plan*	Logged by:	*GCMP*
Position:	-	Checked by:	

Test No.

SC3

mm Driven	No. of Blows	mm Driven	No. of Blows
50	1	2550	
100	3	2600	
150	4	2650	
200	3	2700	
250	5	2750	
300	4	2800	
350	3	2850	
400	5	2900	
450	2	2950	
500	2	3000	
550	2	3050	
600	2	3100	
650	3	3150	
700	2	3200	
750	3	3250	
800	2	3300	
850	2	3350	
900	2	3400	
950	2	3450	
1000	4	3500	
1050	3	3550	
1100	4	3600	
1150	3	3650	
1200	5	3700	
1250	5	3750	
1300	4	3800	
1350	5	3850	
1400	6	3900	
1450	8	3950	
1500	8	4000	
1550	4	4050	
1600	5	4100	
1650	4	4150	
1700	5	4200	
1750	7	4250	
1800	5	4300	
1850	7	4350	
1900	7	4400	
1950	5	4450	
2000		4500	
2050		4550	
2100		4600	
2150		4650	
2200		4700	
2250		4750	
2300		4800	
2350		4850	
2400		4900	
2450		4950	
2500		5000	



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Interpretation based on Guidelines Published by NZ Geomechanics Soc. (1988) and NZS 3604:2011

2023-11-06 Scalas.xlsx

TERRA FIRMA ENGINEERING (2016) LTD

SCALA PENETROMETER LOG

s 9(2)(a)

Job No:	*22098*	Date:	*6/11/2023*	**Test No.**	
Project:	*Tasman Village Sub*	Operated by:	*ACDP*	**SC4**	
Location:	*Refer Plan*	Logged by:	*GCMP*		
Position:	*-*	Checked by:			

mm Driven	No. of Blows	mm Driven	No. of Blows
50	1	2550	
100	3	2600	
150	3	2650	
200	4	2700	
250	4	2750	
300	3	2800	
350	3	2850	
400	5	2900	
450	3	2950	
500	3	3000	
550	3	3050	
600	5	3100	
650	4	3150	
700	5	3200	
750	3	3250	
800	3	3300	
850	3	3350	
900	3	3400	
950	2	3450	
1000	3	3500	
1050	3	3550	
1100	3	3600	
1150	3	3650	
1200	3	3700	
1250	3	3750	
1300	3	3800	
1350	4	3850	
1400	5	3900	
1450	4	3950	
1500	4	4000	
1550	4	4050	
1600	5	4100	
1650	4	4150	
1700	5	4200	
1750	5	4250	
1800	5	4300	
1850	5	4350	
1900	6	4400	
1950	5	4450	
2000		4500	
2050		4550	
2100		4600	
2150		4650	
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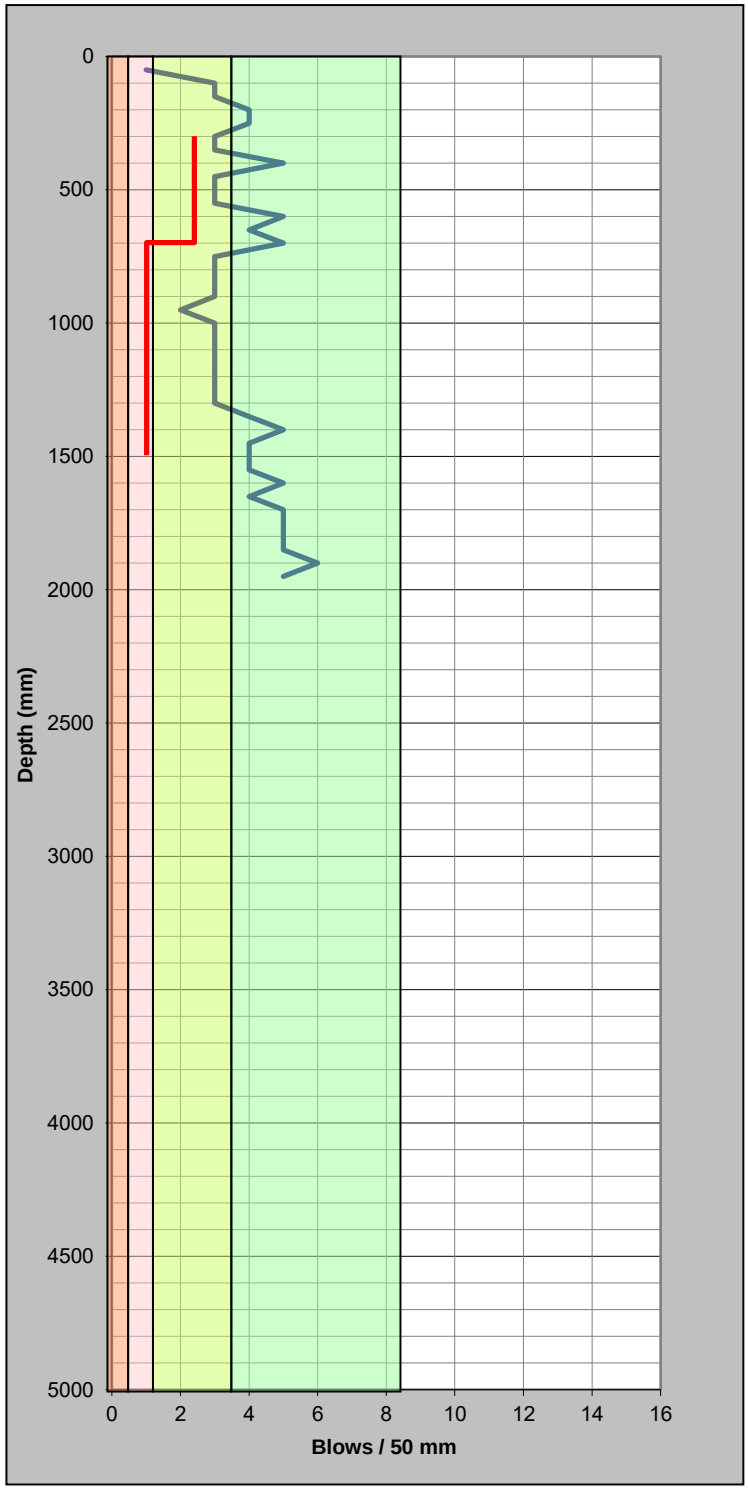
2500		5000	



Testing Complies with NZS 4402:1988 Test 6.5.2 Dynamic Cone Penetrometer

Interpretation based on Guidelines Published by NZ Geomechanics Soc. (1988) and NZS 3604:2011

TERRA FIRMA ENGINEERING (2016) LTD

SCALA PENETROMETER LOG

s 9(2)(a)

Job No:	*22098*	Date:	*6/11/2023*	**Test No.**	
Project:	*Tasman Village Sub*	Operated by:	*ACDP*	**SC5**	
Location:	*Refer Plan*	Logged by:	*GCMP*		
Position:	-	Checked by:			

mm Driven	No. of Blows	mm Driven	No. of Blows
50	*1*	2550	
100	*1*	2600	
150	*1*	2650	
200	*1*	2700	
250	*1*	2750	
300	*3*	2800	
350	*4*	2850	
400	*3*	2900	
450	*3*	2950	
500	*2*	3000	
550	*1*	3050	
600	*2*	3100	
650	*3*	3150	
700	*5*	3200	
750	*5*	3250	
800	*9*	3300	
850	*10*	3350	
900	*11*	3400	
950		3450	
1000		3500	
1050		3550	
1100		3600	
1150		3650	
1200		3700	
1250		3750	
1300		3800	
1350		3850	
1400		3900	
1450		3950	
1500		4000	
1550		4050	
1600		4100	
1650		4150	
1700		4200	
1750		4250	
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1900		4400	
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2150		4650	
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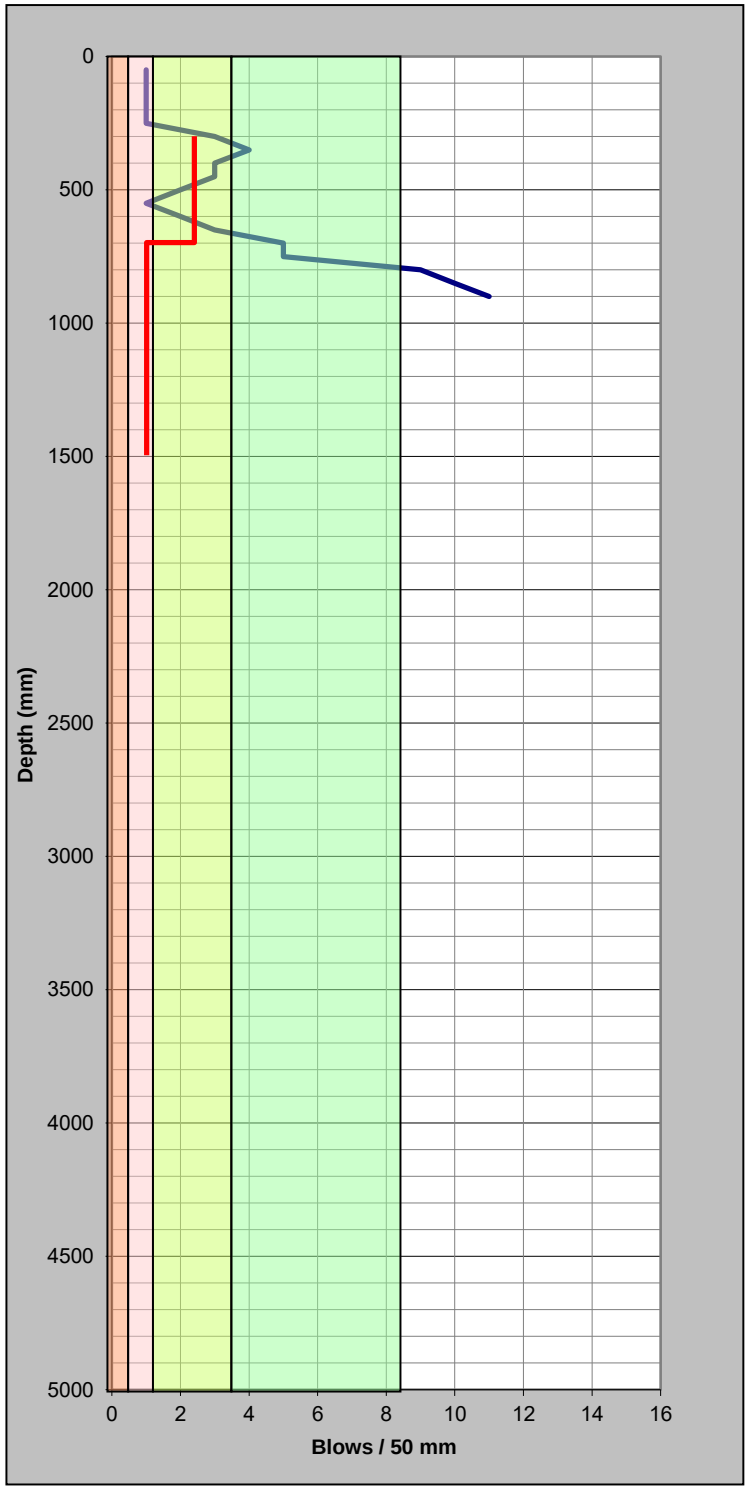
2500		5000	



Testing Complies with NZS 4402:1988 Test 6.5.2 Dynamic Cone Penetrometer

Interpretation based on Guidelines Published by NZ Geomechanics Soc. (1988) and NZS 3604:2011

TERRA FIRMA ENGINEERING (2016) LTD

SCALA PENETROMETER LOG

s 9(2)(a)

Job No:	*22098*	Date:	*6/11/2023*	**Test No.**	
Project:	*Tasman Village Sub*	Operated by:	*ACDP*	**SC6**	
Location:	*Refer Plan*	Logged by:	*GCMP*		
Position:	-	Checked by:			

mm Driven	No. of Blows	mm Driven	No. of Blows
50	1	2550	
100	1	2600	
150	2	2650	
200	2	2700	
250	4	2750	
300	5	2800	
350	5	2850	
400	5	2900	
450	3	2950	
500	2	3000	
550	1	3050	
600	1	3100	
650	2	3150	
700	3	3200	
750	4	3250	
800	4	3300	
850	5	3350	
900	4	3400	
950	3	3450	
1000	3	3500	
1050	4	3550	
1100	4	3600	
1150	3	3650	
1200	4	3700	
1250	7	3750	
1300	5	3800	
1350	6	3850	
1400	7	3900	
1450	6	3950	
1500	3	4000	
1550	5	4050	
1600	5	4100	
1650	5	4150	
1700	7	4200	
1750	14	4250	
1800		4300	
1850		4350	
1900		4400	
1950		4450	
2000		4500	
2050		4550	
2100		4600	
2150		4650	
2200		4700	
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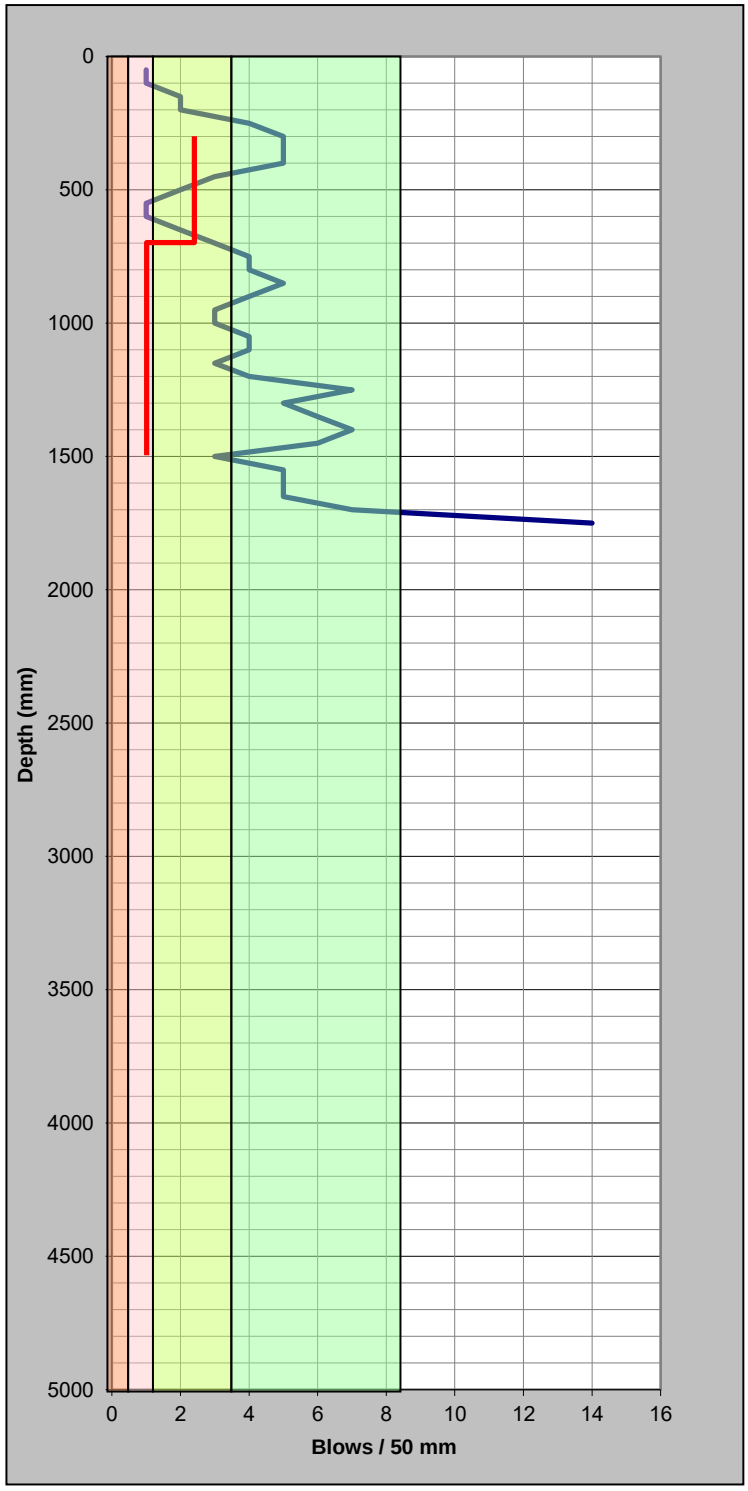
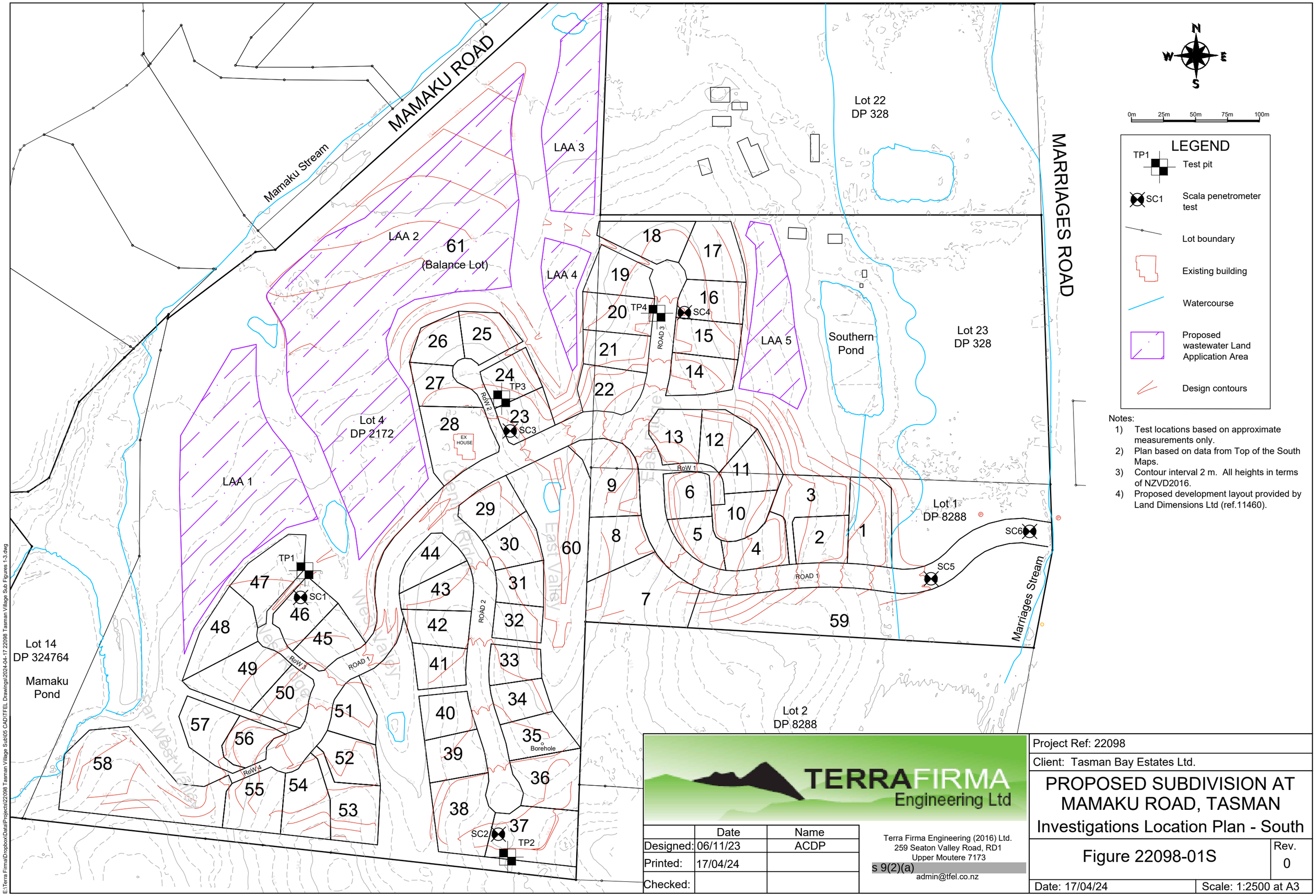
2300		4800	
2350		4850	
2400		4900	
2450		4950	
2500		5000	



Testing Complies with NZS 4402:1988 Test 6.5.2 Dynamic Cone Penetrometer

Interpretation based on Guidelines Published by NZ Geomechanics Soc. (1988) and NZS 3604:2011



Notes:

1) Test locations based on approximate measurements only.
2) Plan based on data from Top of the South Maps.
3) Contour interval 2 m. All heights in terms of NZVD2016.
4) Proposed development layout provided by Land Dimensions Ltd (ref.11460).

E:\Terra Firma\Dropbox\Data\Projects\22098 Tasman Village Sub\05 CAD\TFEL Drawings\2024-04-17 22098 Tasman Village Sub Figures 1-3.dwg

TERRAFIRMA Engineering Ltd

	Date	Name
Designed:	06/11/23	ACDP
Printed:	17/04/24	
Checked:		

Terra Firma Engineering (2016) Ltd.
259 Seaton Valley Road, RD1
Upper Moutere 7173
s 9(2)(a)
admin@tfel.co.nz

Project Ref: 22098

Client: Tasman Bay Estates Ltd.

PROPOSED SUBDIVISION AT MAMAKU ROAD, TASMAN

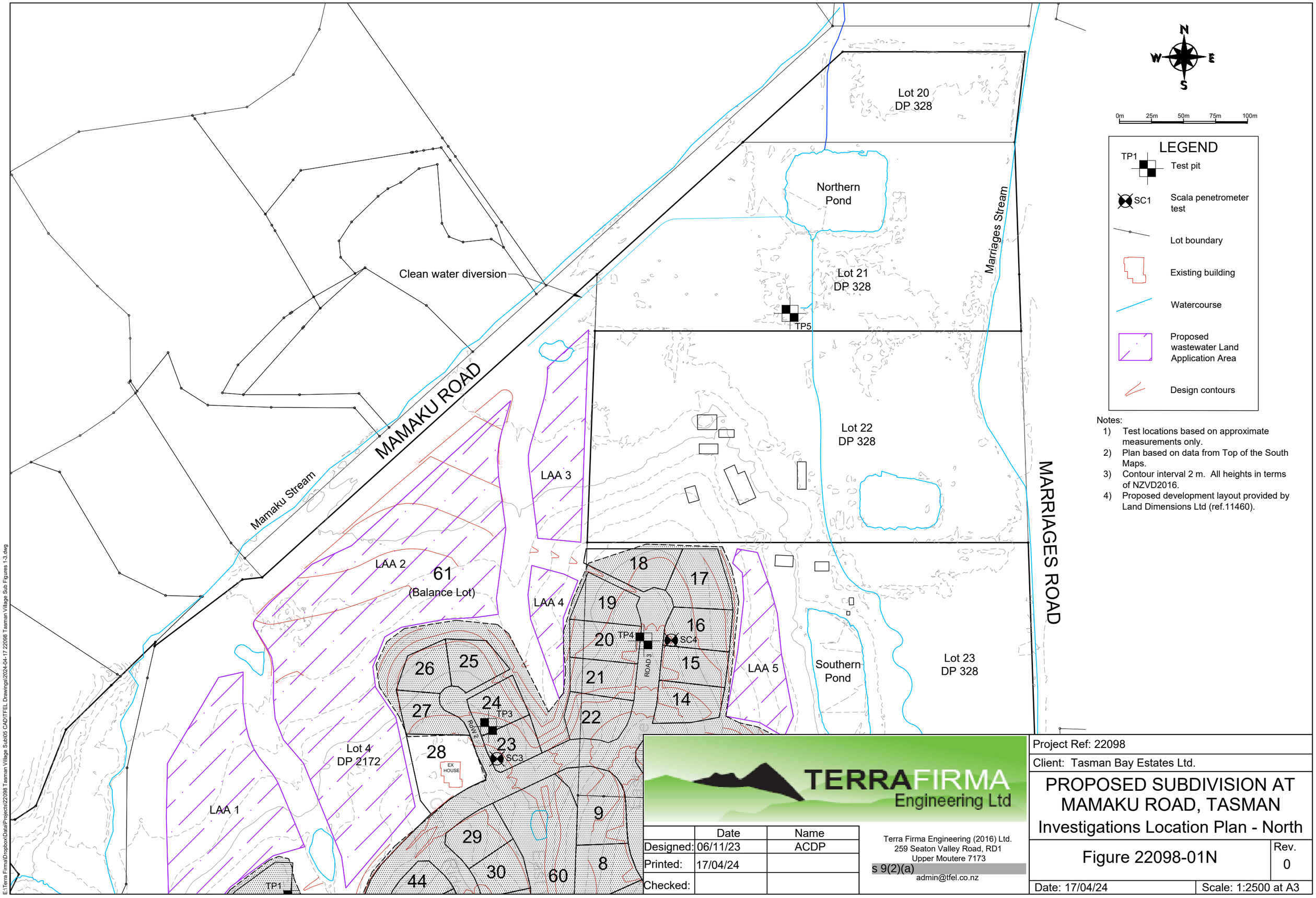
Investigations Location Plan - South

Figure 22098-01S

Rev. 0

Date: 17/04/24

Scale: 1:2500 at A3



Notes:

1) Test locations based on approximate measurements only.
2) Plan based on data from Top of the South Maps.
3) Contour interval 2 m. All heights in terms of NZVD2016.
4) Proposed development layout provided by Land Dimensions Ltd (ref.11460).

	Date	Name
Designed:	06/11/23	ACDP
Printed:	17/04/24	
Checked:		

Terra Firma Engineering (2016) Ltd.
259 Seaton Valley Road, RD1
Upper Moutere 7173
s 9(2)(a)
admin@tfel.co.nz

Project Ref: 22098

Client: Tasman Bay Estates Ltd.

PROPOSED SUBDIVISION AT MAMAKU ROAD, TASMAN

Investigations Location Plan - North

Figure 22098-01N

Rev. 0

Date: 17/04/24

Scale: 1:2500 at A3

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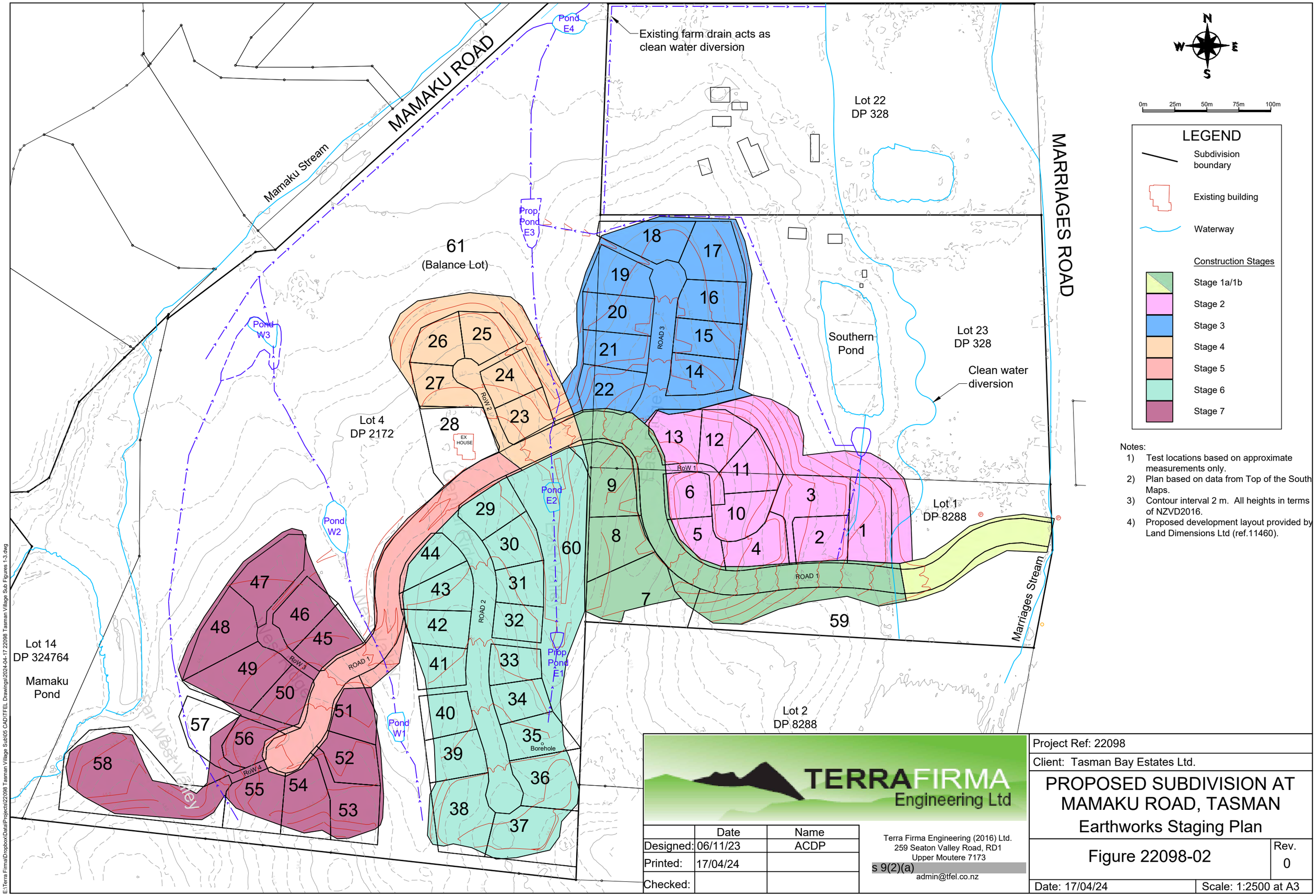

N
W E
S

0m 25m 50m 75m 100m

LEGEND

- Subdivision boundary
- Existing building
- Waterway

Construction Stages

- Stage 1a/1b
- Stage 2
- Stage 3
- Stage 4
- Stage 5
- Stage 6
- Stage 7

Notes:

1) Test locations based on approximate measurements only.
2) Plan based on data from Top of the South Maps.
3) Contour interval 2 m. All heights in terms of NZVD2016.
4) Proposed development layout provided by Land Dimensions Ltd (ref.11460).

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	Date	Name
Designed:	06/11/23	ACDP
Printed:	17/04/24	
Checked:		

Terra Firma Engineering (2016) Ltd.
259 Seaton Valley Road, RD1
Upper Moutere 7173
s 9(2)(a)
admin@tfel.co.nz

Project Ref: 22098

Client: Tasman Bay Estates Ltd.

PROPOSED SUBDIVISION AT MAMAKU ROAD, TASMAN

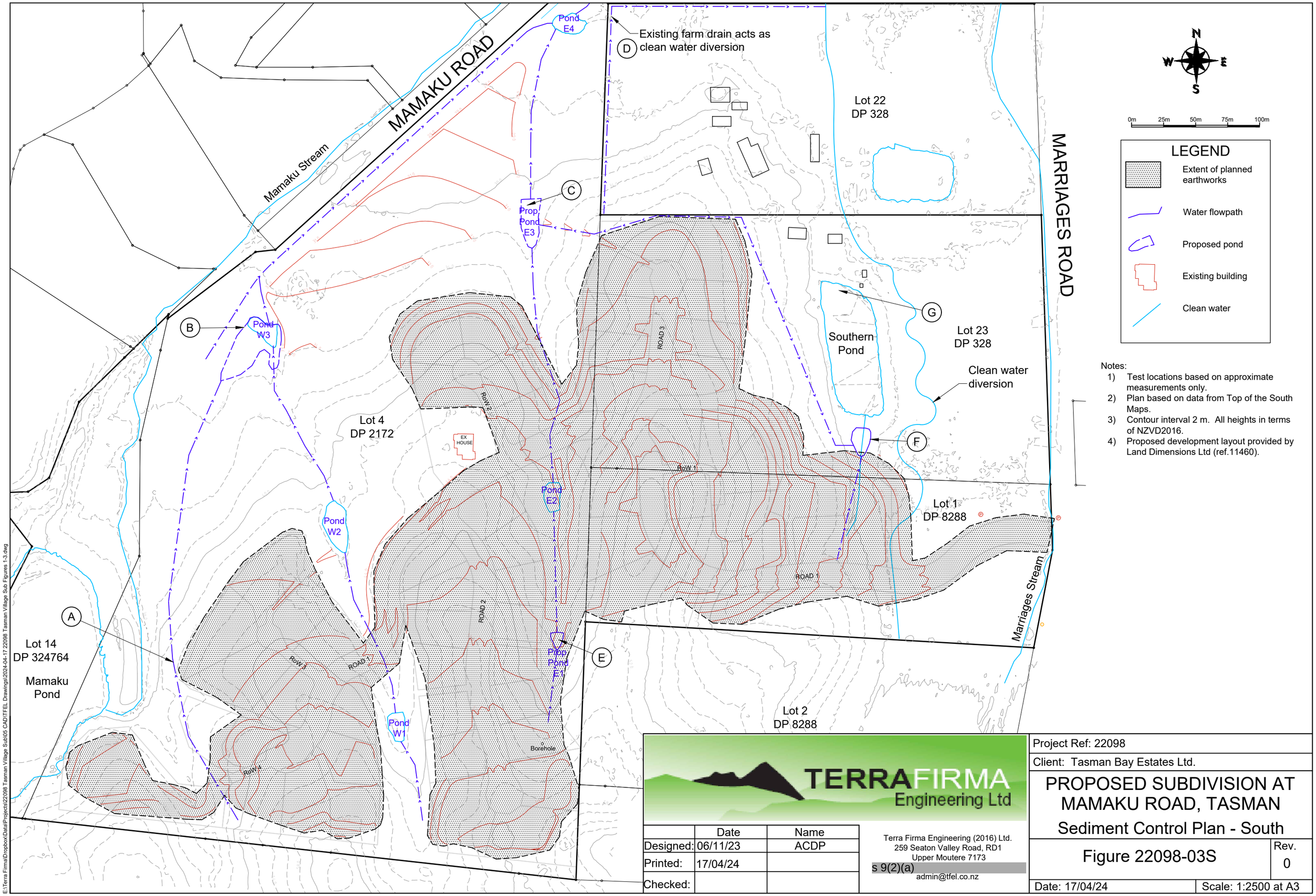
Earthworks Staging Plan

Figure 22098-02

Rev. 0

Date: 17/04/24

Scale: 1:2500 at A3



Notes:

1) Test locations based on approximate measurements only.
2) Plan based on data from Top of the South Maps.
3) Contour interval 2 m. All heights in terms of NZVD2016.
4) Proposed development layout provided by Land Dimensions Ltd (ref.11460).

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Project Ref: 22098

Client: Tasman Bay Estates Ltd.

PROPOSED SUBDIVISION AT MAMAKU ROAD, TASMAN

Sediment Control Plan - South

Figure 22098-03S

Rev. 0

Date: 17/04/24

Scale: 1:2500 at A3

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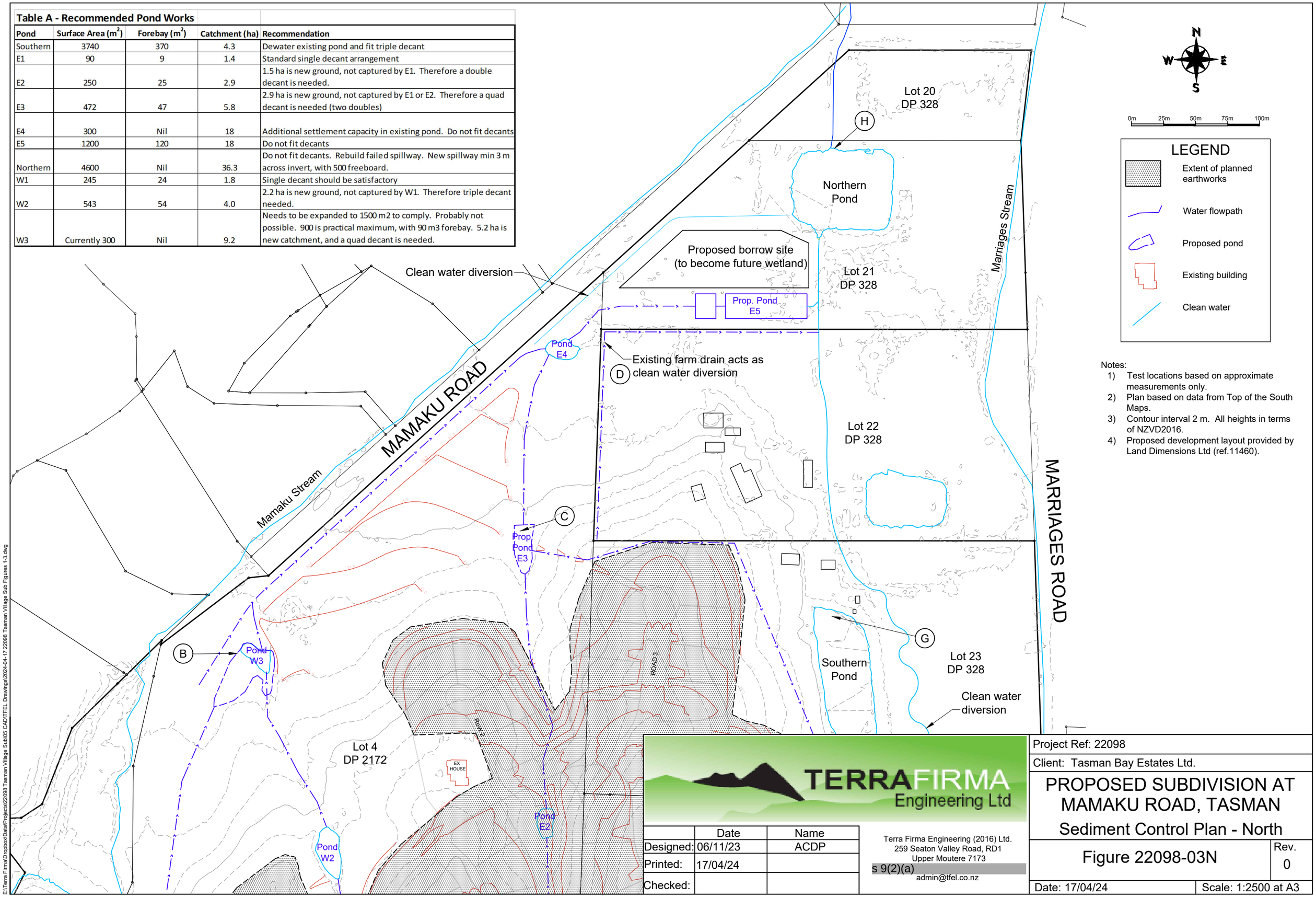
Table A - Recommended Pond Works

Pond	Surface Area (m^2)	Forebay (m^2)	Catchment (ha)	Recommendation
Southern	3740	370	4.3	Dewater existing pond and fit triple decant
E1	90	9	1.4	Standard single decant arrangement
E2	250	25	2.9	1.5 ha is new ground, not captured by E1. Therefore a double decant is needed.
E3	472	47	5.8	2.9 ha is new ground, not captured by E1 or E2. Therefore a quad decant is needed (two doubles)
E4	300	Nil	18	Additional settlement capacity in existing pond. Do not fit decants
E5	1200	120	18	Do not fit decants
Northern	4600	Nil	36.3	Do not fit decants. Rebuild failed spillway. New spillway min 3 m across invert, with 500 freeboard.
W1	245	24	1.8	Single decant should be satisfactory
W2	543	54	4.0	2.2 ha is new ground, not captured by W1. Therefore triple decant needed.
W3	Currently 300	Nil	9.2	Needs to be expanded to 1500 m2 to comply. Probably not possible. 900 is practical maximum, with 90 m3 forebay. 5.2 ha is new catchment, and a quad decant is needed.



0m 25m 50m 75m 100m

LEGEND

- Extent of planned earthworks
- Water flowpath
- Proposed pond
- Existing building
- Clean water

Notes:

1) Test locations based on approximate measurements only.
2) Plan based on data from Top of the South Maps.
3) Contour interval 2 m. All heights in terms of NZVD2016.
4) Proposed development layout provided by Land Dimensions Ltd (ref.11460).

	Date	Name
Designed:	06/11/23	ACDP
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Checked:		

Terra Firma Engineering (2016) Ltd.
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Project Ref: 22098

Client: Tasman Bay Estates Ltd.

PROPOSED SUBDIVISION AT MAMAKU ROAD, TASMAN

Sediment Control Plan - North

Figure 22098-03N | Rev. 0

Date: 17/04/24 | Scale: 1:2500 at A3

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Geo-Environmental Consultants (NZ) Ltd
PO Box 69270, Lincoln
Mobile: 021 262 3404

Ground Contamination Assessment: Detailed Site Investigation

Marriages and Mamaku Road, Tasman

Lots 1 – 64: Proposed subdivision of Lot 14 DP 324764, Lot 4 DP 2172, Lot 1 DP 8288, Lots 20, 21 and 23 DP 328, and Part Lots 3, 5 and 6 DP 328

Report prepared for Tasman Bay Estates Ltd

April 2024

Project reference: 22-015

Quality Assurance

Title:	Ground Contamination Assessment: Detailed Site Investigation Marriages and Mamaku Road, Tasman Lots 1 – 64: Proposed subdivision of Lot 14 DP 324764, Lot 4 DP 2172, Lot 1 DP 8288, Lots 20, 21 and 23 DP 328, and Part Lots 3, 5 and 6 DP 328
Client:	Tasman Bay Estates Ltd
Version:	Final
Date:	April 2024
Project Reference:	22-015

Prepared By:	Kristel Franklin	
	Senior Environmental Scientist *CMEngNZ (PEngGeol)* *BSc (Geology)* *MSc (Hazard and Disaster Management)*	**Signature:** 
Reviewed By:	Helen Davies	
	CEnvP SC *MSc Environmental Technology* *Diploma of Imperial College*	**Signature:** 

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Disclaimer

This report has been prepared by Geo-Environmental Consultants (NZ) Ltd ("Geo-Env") only for the intended purpose as a Detailed Site Investigation (DSI) for the proposed activity (subdivision and change of use) as described in Section 1. Data or opinions contained in this report may not be used in other contexts or for any other purpose without our prior review and agreement.

This report has been prepared based on site conditions as they exist at the time of the investigation. Where data supplied by the client or other external sources have been used it has been assumed that the information is correct unless otherwise stated. No responsibility is accepted by Geo-Env for incomplete and inaccurate data supplied by others.

If subsequent investigations or remedial actions are undertaken from the date of this report then certain aspects of this report may no longer be relevant or require amendment. In addition, if HAIL activities occur on the site after the date of this report, then the conclusions and recommendations presented in this report may no longer be relied on.

Discussion on the sampling methods and results in this report are based on current recognised guidelines and trigger values. These methods and assessment criteria may change and concentrations of a contaminant, which are currently deemed acceptable, may in the future become subject to new or updated standards. This may cause the contaminant concentrations to become unacceptable and require further management or remediation to enable the site to be deemed suitable for existing or proposed land use activities.

It is not practicable for any investigation to be so complete that it can accurately detect all contaminants and establish a detailed record of their concentrations throughout a site. The current investigation has been carried out to provide a level of characterisation commensurate with an acceptable assessment of site conditions.

This investigation was carried out solely for the purpose of assessing contaminants in the soil associated with the land being suitable for human occupation only. It has purposely not assessed the possible impacts of contaminants on ecological values that may be associated with the site. Any other investigations that are required to determine the suitability of this property are outside the scope of this report.

This report has been prepared for the benefit of Tasman Bay Estates Ltd and Tasman District Council for the purposes as stated above. No liability is accepted by Geo-Env or any of their employees with respect to the use of this report, in whole or in part, for any other purpose or by any other party.

1.0 Introduction

Geo-Environmental Consultants (NZ) Ltd (Geo-Env) was engaged by Tasman Bay Estates Ltd to prepare a Ground Contamination Assessment: Detailed Site Investigation (DSI) relating to the proposed subdivision of Lot 14 DP 324764, Lot 4 DP 2172, Lot 1 DP 8288, Lots 20, 21 and 23 DP 328, and Part Lots 3, 5 and 6 DP 328, located on Marriages Road, Tasman ('the site').

1.1 Proposed Activity

Subdivision:

- Proposed residential allotments 1 to 58, which range in area between ~1,064 m^2 to 6,400 m^2 as shown on the plans prepared by Eliot Sinclair (Appendix A).
- Allotments 59 to 64 comprise the balance of land that will be utilised for servicing purposes, general recreational use, and soil-based production.

Earthworks:

- To achieve the subdivision layout, earthworks will be required in the order of 117,000 m^3 of cut and 146,000 m^3 of fill (refer to the Earthworks Plan on Sheet 12 in Appendix A).
- A borrow area for the subdivision earthworks is currently indicated within Lot 59 (refer Sheet 13, Appendix A).

Change of use:

- The subdivision will result in the existing rural land being utilised for residential purposes across proposed allotments 1 to 58. The balance of land (Lots 59 to 64) will be utilised for servicing purposes, general recreational use, and soil-based production.
- No change of use is currently proposed within Lots 60 and 61 and accordingly these two allotments will remain as production land.

For the purposes of this report, the site comprising proposed residential allotments 1 to 58 within Lot 1 DP 8288, Lot 23 DP 328 and Lot 4 DP 2172 will be referred to as the **residential area**[1]. The allotments to the north (Lots 20 and 21 DP 328, and Part Lots 3, 5 and 6 DP 328) will be referred to as the **northern area**.

1.2 Investigation Objectives and Scope of Work

The National Environmental Standard for Assessing and Managing Contaminants in Soil (NESCS) to Protect Human Health[2] requires an investigation for properties that are undergoing a subdivision, a change of land use or significant land disturbance on a potentially contaminated site. The land use history of the site is assessed against the Hazardous Activities and Industries List (HAIL).

The site has a history of horticultural land use, which is an activity detailed on the HAIL, and accordingly the objective of the investigation is to prepare a DSI to assess the risk to human health as a result of the proposed activity (earthworks, subdivision and change of land use).

[1] Note: Lot 14 DP 324764 is located to the west of Lot 4 DP 2172, and no works are proposed within this allotment.
[2] Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011.

The scope of work for this assessment comprised the following:

- Desktop review of available information, including:
  - Regional geological and hydrological setting;
  - Historical aerial photography available from Tasman District Council (TDC), Retrolens, and Google Earth;
  - Property file review (Lot 1 DP 8288, Lot 23 DP 328, and Lot 4 DP 2172); and
  - Any other relevant information provided to Geo-Env by the client.
- Site walkover inspections and/or collection of shallow soil samples across the residential area on 21 and 22 October 2022, 13 November 2023, and 29 February 2024;
- Laboratory analysis for identified contaminants of concern;
- Development of a conceptual site model to facilitate a risk assessment;
- Preparation of this DSI report summarising the above and consistent with the requirements outlined in the Ministry for the Environment (MFE) Contaminated Land Management Guideline (CLMG) No. 1[3] (Revised 2021); and
- Recommendations to remediate the proposed residential allotments based on the DSI findings.

The results and recommendations included in this investigation are intended to accompany a resource consent application for the proposed subdivision.

[3] Ministry for the Environment. 2021. Contaminated land management guidelines No 1: Reporting on contaminated sites in New Zealand (Revised 2021). Wellington: Ministry for the Environment.

2.0 Site Identification

The site is located in the Tasman District, as shown on Figures 1 to 3. The legal description, records of title and areas associated with the site are summarised in Table 1.

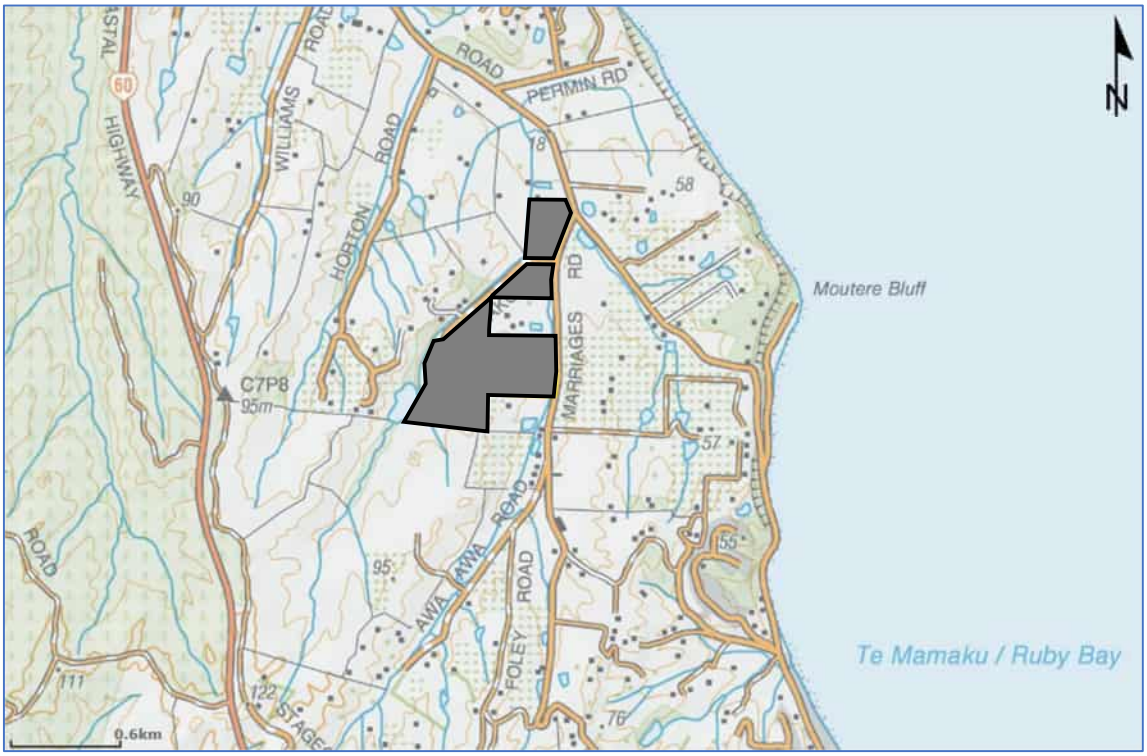

Figure 1: Site location – Marriages and Mamaku Road, Tasman (highlighted, approximate). Topographic map sourced from www.topofthesouthmaps.co.nz. Refer to Figure 2 for Lot 14 DP324674 location.

Table 1: Site identification summary

Legal Description (also refer to Figures 2 and 3)		Street Address	Record of title	Area
Residential area	Lot 1 DP 8288	Marriages Road, Tasman	4A/119	4.4502 hectares
	Lot 23 DP 328	64 Marriages Road, Tasman	6D/267	7.1554 hectares
	Lot 4 DP 2172	77 Mamaku Road, Tasman	100030 73/239	~20.0905 hectares*
Northern area	Lot 21 DP 328	Mamaku Road, Tasman	43/231	4.2567 hectares
	Lot 20 and Part Lots 3, 5 and 6 DP 328	Mamaku Road, Tasman	147/60	7.4247 hectares
* The record of title includes the adjacent allotment to the west (Lot 14 DP 324764), the area stated in this table is approximate and applies only to Lot 4 DP 2172				

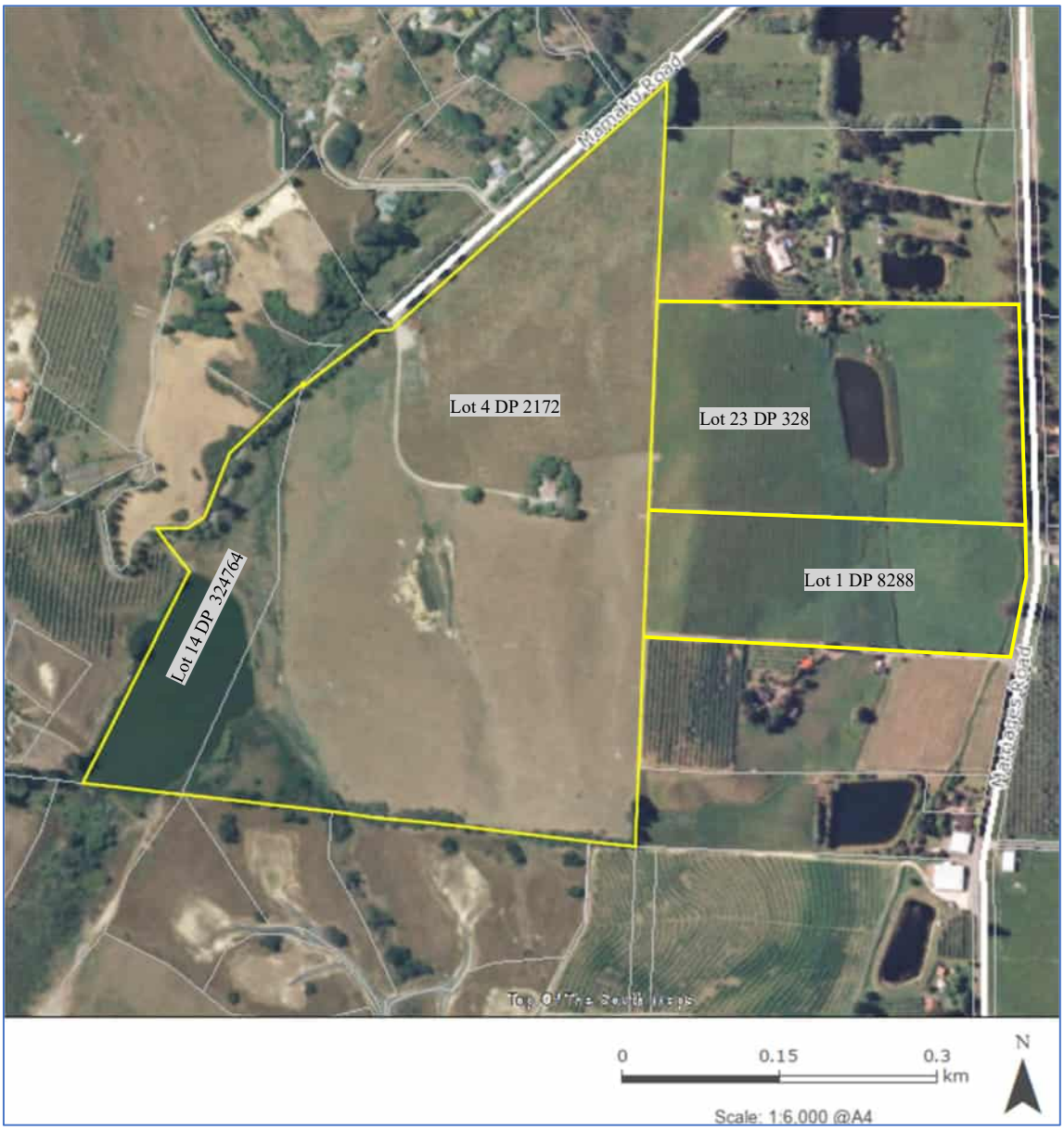

Figure 2: Land parcels within the proposed subdivision that incorporates proposed residential land use and Lot 14 DP 324764. Aerial map sourced from www.topofthesouthmaps.co.nz

Figure 3: Land parcels within the proposed subdivision (northern area). Aerial map sourced from www.topofthesouthmaps.co.nz

3.0 Site Description

3.1 Environmental Setting

The published geology[4] indicates the residential area is predominantly underlain by Moutere Gravel (Tadmor Group), described as *'Poorly to moderately well sorted clay bound gravel containing up to boulder sized clasts of quartzofeldspathic sandstone'* (Figure 4). The eastern and northern extent of the site is mapped as underlain by Holocene river deposits. A concealed reverse fault is mapped to the northeast of the site, noting that the feature is classified as 'inactive'.

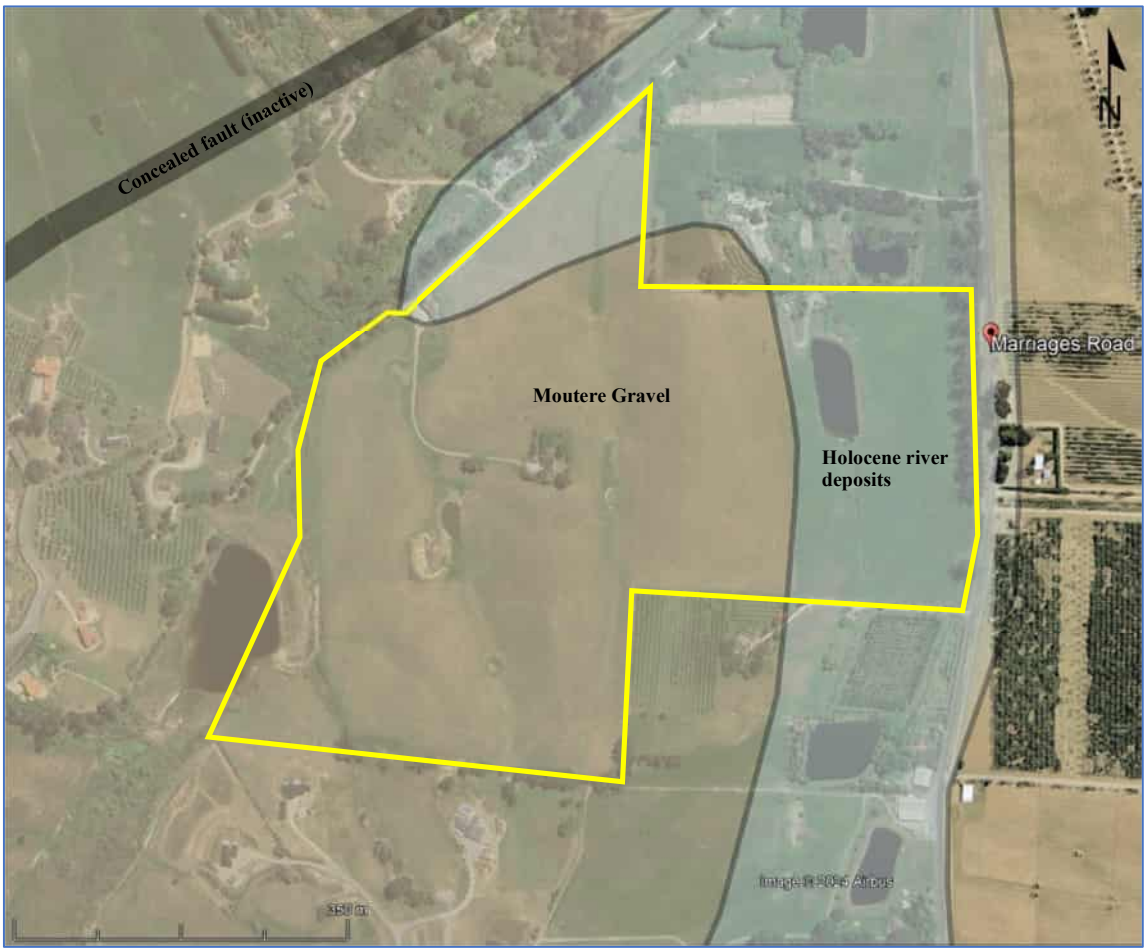

Figure 4: Geological units[3]. Lot 1 DP 8288, Lot 23 DP 328 and Lot 4 DP 2172 are outlined yellow (residential area).

The land topography comprises gently to moderately undulating hillslopes. The highest elevation is ~61 m above mean sea level (amsl) near the southern boundary of Lot 4 DP 2172. The lowest elevation area is adjacent to Marriages Road at ~25 m amsl. Numerous irrigation ponds and drainage features are present across the site. Tasman Bay is located ~1.2 km to the east.

[4] Rattenbury, M.S.; Cooper, R.A.; Johnston, M.R. 1998 Geology of the Nelson area. Lower Hutt: Institute of Geological & Nuclear Sciences Limited. Institute of Geological & Nuclear Sciences 1:250,000 geological map

3.2 Site Layout and Inspection

The current site layout is shown in Figures 2 and 3 and key features are summarised below, as observed during site walkover inspections in October 2022 and November 2023:

- An existing dwelling is located within Lot 4 DP 2172, which is included within proposed Lot 28 (refer Appendix A).
- A shed is located within Lot 4 DP 2172 near the entrance off Mamaku Road, which is used for general machinery storage. A soil stockpile was observed to the south of the shed. A burn pile comprising vegetation is also located in this area. The features described are highlighted on Figure 5, noting this area is within proposed Lot 59 (balance of land), and a servicing area (LAA Area 2, refer Appendix A, Sheet 13).

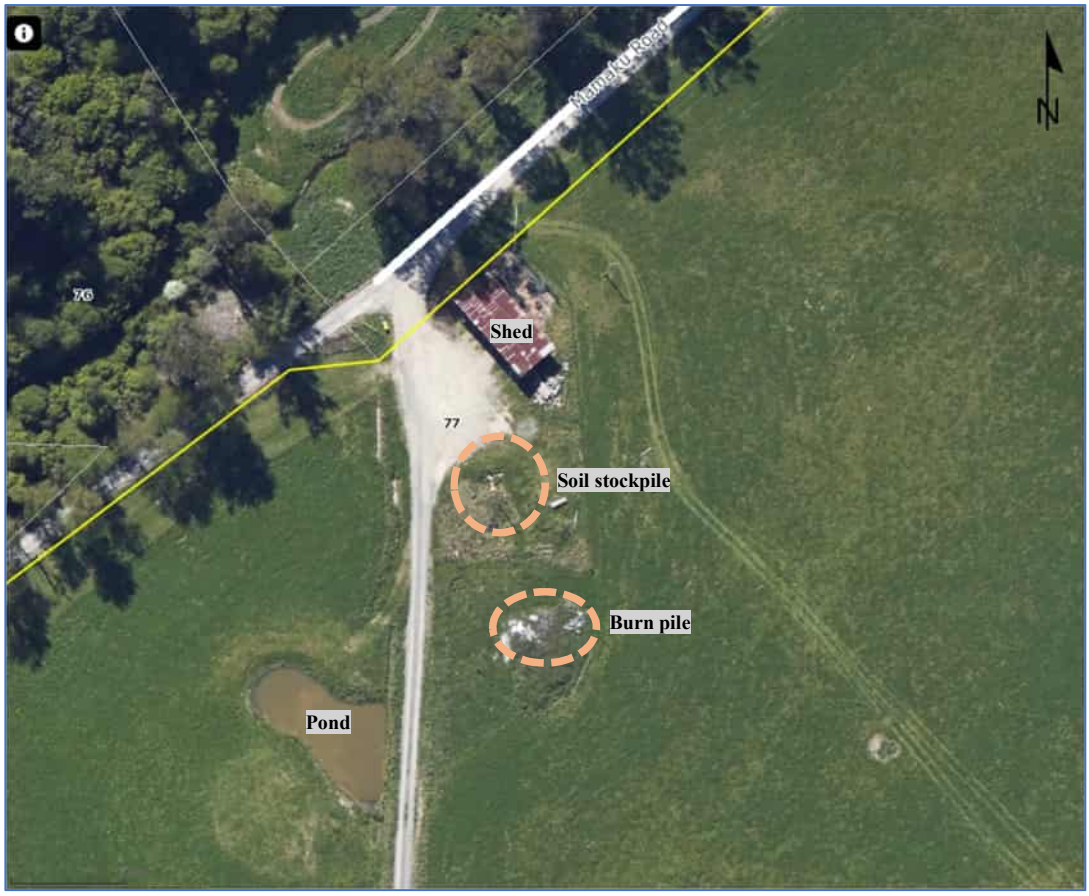

Figure 5: Site features – Lot 4 DP 2172. Base aerial sourced from www.topofthesouthmaps.co.nz

- Two recently constructed residential units and an original shed are located near the northern boundary of Lot 23 DP 328, as highlighted on Figure 6. These features are within Lot 59 (balance of land).
- There were no structures observed within Lot 1 DP 8288. Two drainage channels were observed within the eastern half of the allotment.
- At the time of the walkover inspection in October 2022 the residential area comprised recently ploughed terrain (no vegetation present). In November 2023 the residential area was covered in vegetation for stock feed (i.e., clover and plantain).

Figure 6: Site features near the northern boundary of Lot 23 DP 328. Base aerial sourced from www.topofthesouthmaps.co.nz

The northern area allotments were not included in the initial walkover inspection as the land was outside the scope of the original development area. No current structures or HAIL activities were identified within Lot 20 and Part Lots 3, 5 and 6 DP 328.

Timber fencing/yards were observed to the west of the pond in Lot 21 DP 328 in November 2023, as highlighted on Figure 7, and earthworks were occurring adjacent to the southern boundary of the allotment.

3.3 Current Site Uses

The current district plan zoning shown on the Tasman Resource Management Plan (TDC Map 86) for the site is Rural 3. Current site use includes the residential units in Lot 4 DP 2172 and Lot 23 DP 328. The remaining area is currently production land, comprising crop plant rotations for stock feed.

3.4 Surrounding Uses

Surrounding land use is rural and rural residential (Rural 3). An orchard is located adjacent to the southern boundary of Lot 1 DP 8288, and adjacent to the eastern side of Marriages Road.

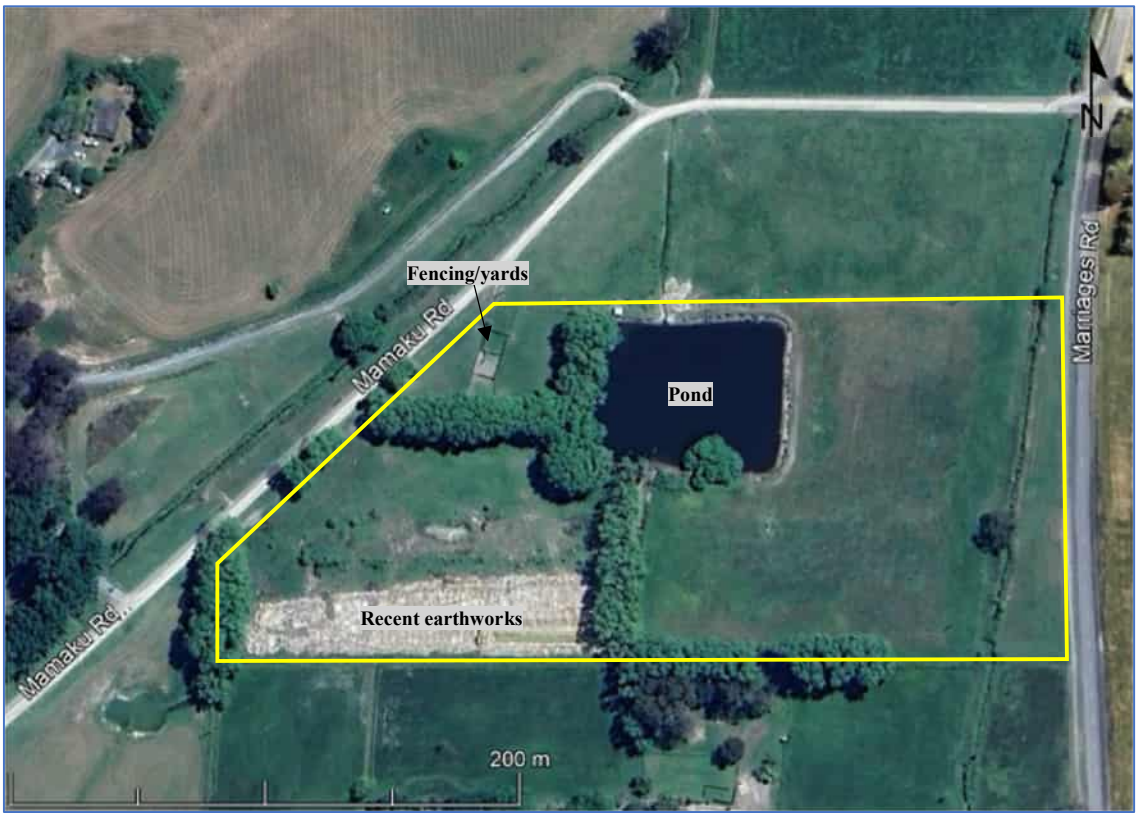

Figure 7: Site features within Lot 21 DP 328 – outlined yellow (approximate). Source: Google Earth, image dated November 2023.

4.0 Historical Site Use

4.1 Aerial photograph review – residential area

The site has a known history for horticultural land use, which has been confirmed by a review of aerial photographs retrieved from Retrolens, TDC images and Google Earth. A summary is provided in Table 2 and representative images are provided in Appendix B.

Table 2: Aerial photograph review – residential area (continued over page)

Year flown	Comments	Source and survey #/reference
1940	Lot 4 DP 2172: Dwelling near centre of Lot 4 is present and the shed near the entrance off Mamaku Road. Two smaller structures are visible to the immediate south of the shed. The land is predominantly covered in trees (horticultural land use). Lot 23 DP 328: Dwelling and a shed inferred adjacent to the northern boundary. Smaller structure, likely a shed, visible at the southern end of Lot 23. Horticultural land use within the western half of the site and rows of trees also visible adjacent to the northern boundary within the eastern area of Lot 23. Lot 1 DP 8288: Vacant allotment – no structures visible and no horticultural land use.	Retrolens SN141/56/7 Figure B1, Appendix B
1940s	Lot 4 DP 2172: No major changes in land use. One of the smaller sheds appears to have been removed to the south of the main shed. Horticultural land use. Lot 23 DP 328: No major changes. Horticultural land use. Lot 1 DP 8288: No major changes. No HAIL activities discernible.	TDC GIS Figure B2, Appendix B
1958	Lot 4 DP 2172: Similar to previous aerial, noting additional trees appear to have been planted in the southern area of Lot 4. Horticultural land use. Lot 23 DP 328: Similar to previous aerial. Horticultural land use. Lot 1 DP 8288: Some vegetation clearance visible. No HAIL activities discernible.	Retrolens SN1075 2656/6 Figure B3, Appendix B
1969	Lot 4 DP 2172: Similar to previous aerial. Horticultural land use. Lot 23 DP 328: Similar to previous aerial. Horticultural land use. Lot 1 DP 8288: Additional vegetation removal. No HAIL activities discernible.	Retrolens 4269/14
1985	Lot 4 DP 2172: Pond near centre of Lot 4 now present and large pond near the southwestern boundary. Horticultural land use. Lot 23 DP 328: Pond near centre of Lot 23 now present, trees planted within the eastern area of Lot 23. Horticultural land use. Lot 1 DP 8288: Western area of Lot 1 now planted. Horticultural land use inferred.	Retrolens, SN8531/C/13 Figure B4, Appendix B

Year flown	Comments	Source and survey #/reference
1980s	Lot 4 DP 2172: Similar to previous aerial. Trees now present in southwestern corner of Lot 4. Horticultural land use. Lot 23 DP 328: Similar to previous aerial. Horticultural land use. Lot 1 DP 8288: Entire area of Lot 1 now appears planted. Horticultural land use.	TDC GIS Figure B5, Appendix B
2000	Lot 4 DP 2172: Northern extent of allotment now planted in trees (first time plantings visible in the triangular northern area of Lot 4). The second small shed to the south of the main shed now appears removed. Horticultural land use. Lot 23 DP 328: Similar to previous aerial. Horticultural land use. Lot 1 DP 8288: Similar to previous aerial. Horticultural land use.	Retrolens, SN25020/B/7 Figure B6, Appendix B
2003	All orchard trees have been removed across all allotments.	Google Earth, Figure B7, Appendix B
2018	Earthworks visible within Lot 4 associated with ponds. Area to the south of the main shed appears cleared within Lot 4. The small structure near the southern boundary of Lot 23 has been removed. No structures visible in Lot 1.	Google Earth, Figure B8, Appendix B
2019	Soil and vegetation stockpiles inferred in the area to the immediate south of the main shed in Lot 4. No other discernible land use changes across the rest of the site in comparison to 2018 imagery.	Google Earth, Figure B9, Appendix B
2020	The original dwelling in Lot 23 has been removed and a new residential unit constructed. No other discernible land use changes across the rest of the site in comparison to 2019 imagery.	Google Earth, Figure B10, Appendix B

Northern area: horticultural land use is first apparent in the 1980s Trees had predominantly been removed by 2003. The exception is within the southwestern portion of Lot 21 DP 328 where orchard trees are inferred until ~2010. The pond within Lot 21 DP 328 is first visible in the 1980s, and the fencing/yard feature shown on Figure 7 was constructed between 2003 and 2006.

Lot 14 DP 324764: The aerial review has not identified any horticultural land use associated with this allotment. The existing pond that comprises the majority of the allotment was first visible in the 1980s.

4.2 Tasman Bay Estates Ltd interview

Dave Paynter was interviewed on behalf on Tasman Bay Estates Ltd in October 2022 by Geo-Env regarding the site history. In addition to broadacre horticultural use, an area within Lot 23 DP 328 was identified by Dave Paynter as a previous spray mixing area. The area is located to the north of proposed residential allotments 17 and 18, adjacent to the northern boundary.

During the walkover inspection in October 2022 the wider area had been ploughed/turned as part of the crop planting regime and the original surface associated with the former mixing area was not clearly identifiable aside from remnant concrete. A representative photograph is provided in Figure 8 of the northern boundary of Lot 23 DP 328.

Figure 8: 21 October 2022 - view looking east of the fence line and northern boundary of Lot 23, which comprises the general location of a former spray mixing area. Refer to sample locations A and B on Figure C1, Appendix C.

We understand that no chemical storage or mixing occurred within the balance of the site, and the use of the former structures identified in Lot 4 DP 2172 and Lot 23 DP 328 was for general storage.

4.3 Property file review

Property files were ordered from TDC and reviewed in February 2024 for the residential area allotments outlined in Table 1. No information was received relating to Lot 1 DP 8288. Information from Lot 23 DP 328 and Lot 4 DP 2172 is summarised below.

Resource Consents

- February 2008 – application for a bore for groundwater extraction for domestic use at the location shown below. Application was extended twice and transferred to 'Ruby Coast Estates 2017 Limited' in July 2017.

- Building application in 2020 to reduce the height of an existing redundant irrigation dam within Lot 4 DP 2172 that was originally constructed in the late 1970s. There are numerous communications and resource consent applications (RM191064 and RM191066) associated with this activity.
- Water Permit NN990249 (status: surrendered) – associated with 'Satherly Orchards' on Lot 1 DP 8288 and Lot 23 DP 328. Other resource consents associated with Lot 23 DP 328 relating to water takes (NN990250, NN811510 and NN811511) were withdrawn or expired.

TDC Site Contamination Register

Letter on file, dated 8 April 2010, confirming 64 Marriages Road (Lot 23 DP 328) is included on the Site Contamination Register (#449). HAIL activity listed as 'Market gardens, orchards glass houses or other areas where the use of persistent agricultural chemicals occurred' – Category V – Verified Hazardous Activity or Industry – not sampled.

Letter on file, dated 8 April 2010, confirming 77 Mamaku Road (Lot 4 DP 2172) is included on the Site Contamination Register (#452). HAIL activity listed as 'Market gardens, orchards glass houses or other areas where the use of persistent agricultural chemicals occurred' – Category V – Verified Hazardous Activity or Industry – not sampled.

The property files also included the following statement for Lot 23 DP 328 and Lot 4 DP 2172:

Hazardous Activities and Industries List (HAIL)

Tasman District Council monitors contaminated sites. This property has a record of the following contamination risks. If the site or any adjacent site has been used for industrial, horticultural or agricultural purposes, we suggest you make further enquiries.

LIM Statement

This site has been identified as being subject to the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011. Part or all of this property is in the mapped area of historic orchard land and has potential for soil to be contaminated with pesticide residues. Any future change of use, substantial earthworks or subdivision might require a site investigation report pursuant to the regulations. Please note this report may result in the need for resource consent under these regulations.

4.4 Summary

In summary, the site history review confirms the former land use for horticultural purposes (HAIL A10). Only the southwestern corner of Lot 4 DP 2172 and Lot 14 DP 324764 does not appear to have been planted in orchard trees between the 1940s and present day.

In addition to HAIL A10, the removal of the former structures within Lots 4 DP 2172 and Lot 23 DP 328 is a potential source of localised contamination (i.e., HAIL I). The soil stockpile and burn pile observed in Lot 4 DP 2172 are also potential sources of contamination, noting that the burn pile appeared to comprise vegetation only.

5.0 Sampling and Analysis Plan

The proposed subdivision will result in Lots 1 to 58 that will be used for residential purposes. The balance of land will be utilised for servicing the subdivision, general recreational use, and continued production land.

The sampling and analysis plan developed was a preliminary screening exercise to characterise any residual contamination across the proposed residential allotments that have been subject to previous long-term horticultural land use. Based on the aerial photograph review the only area that will be utilised for future residential use that has not been planted in orchard trees is the southwestern corner of Lot 4 DP 2172, which comprises proposed Lot 58.

Table 3: Sampling and analysis plan – residential area

Proposed Lot references and area	Current land use	Former land use / HAIL	Contaminants of concern	Sampling plan
Lots 4 to 57 ~9 hectares*	Existing dwelling on proposed Lot 28; balance of land used for crop rotations/ stock feed.	HAIL A10: inferred from the early 1940s to early 2000s.	Arsenic, lead, copper, and mercury as key indicators associated with persistent organochlorine pesticides.	Preliminary screening of surface soil on an approximate 45m grid spacing (97 samples in total). Targeted sampling within the inferred former spray mixing area (5 samples).
* Note: at the time of the site walkover and soil sampling in October 2022 the proposed development plan did not include Lots 1, 2 and 3. HAIL A10 was not identified within Lot 58.				

The investigation will include the collection and analysis of shallow soil samples on a systematic basis based on the former broadacre horticultural land use (HAIL A10), and targeted sampling in the inferred spray mixing area. The sampling plan is preliminary and further characterisation may be required to delineate the horizontal and vertical extent of contamination depending on the initial results, or if fill material that could be associated with former structures within proposed the development area is identified that would necessitate a broader analytical suite, including organochlorine pesticides (OCPs), heavy metals and asbestos.

The chemical analysis results for each soil sample will be compared to the soil contaminant standards for health listed in Table B2 (inorganic substances) and Table B3 (organic compounds) of the NESCS (2011) based on a residential (10% produce) land use scenario.

The analytical results will also be compared to the TDC *'revised interim background'* values, as summarised in Figure 9. Geo-Env understand that the background concentrations presented in Figure 9 also represent clean fill criteria.

Table 1 Revised Interim Background from 29 September 2023

Element	95th percentile background [1] and revised clean fill (mg/kg)
Arsenic	9.5
Cadmium[2]	0.35
Chromium [3]	290
Copper[3]	55
Lead[2]	21
Nickel[3]	154
Zinc	92
DDT [4]	0.7
PAHs[4]	2

1 Landcare Research 2021 report- Table 9 Regional 95th percentile based on upper range of trace element background determined for geological groupings in Tasman District.

2 Landcare Research 2023 report - 99th percentile predicted background (rural ambient) value for New Zealand

3 Excludes the Dun Mountain mineral belt. Further evaluation will need to be carried out to delineate areas of, and establish appropriate criteria for managing soils with, naturally elevated concentrations of copper, nickel and chromium. In the interim these sites should be considered on a site-by-site basis.

4 WasteMINZ 2023 Table H-2 Class 5 WAC for Organic Elements.

Figure 9: Updated background / clean fill concentrations – Tasman District

5.1 Quality Assurance/Quality Control

Fieldwork was conducted in accordance with MfEs CLMG No. 5, and followed a uniform and systematic approach, including the following procedures:

- Samples were collected using a stainless-steel trowel on 20 and 21 October 2022 and 29 February 2024.
- Field staff wore clean disposable gloves when collecting each sample to minimise the potential for cross contamination.
- All sampling equipment was cleaned of residual soil using Decon 90 and rinsed in freshwater before collecting each sample.
- Each sample was labelled with a unique identifier, sampling date and job reference.
- Soil samples were delivered to Hill Laboratories in Christchurch under chain of custody documentation.

Soil samples were analysed by Hill Laboratories. Hill Laboratories is accredited by International Accreditation New Zealand (IANZ), which represents New Zealand in the International Laboratory Accreditation Cooperation (ILAC). Through the ILAC Mutual Recognition Arrangement (ILAC-MRA) the accreditation is internationally recognised.

6.0 Sampling Results

Soil sample locations are shown on Figure C1 (Appendix C), and analytical results are summarised in Tables C1 and C2 (Appendix C). Hill Laboratories results are provided in Appendix D.

6.1 Former spray mixing area

Two soil samples were analysed for arsenic, copper, and lead in October 2022 (Samples A and B). Based on the elevated arsenic result from Sample B additional sampling and analysis for OCPs was undertaken in February 2024. The results indicate elevated concentrations of DDT (Samples M1 to M3) and lindane (Sample M2).

Results for Sample B and M1 are above NESCS residential (10% produce) criteria for arsenic and DDT at concentrations of 37 mg/kg and 103 mg/kg respectively. Based on the results obtained the inferred spray mixing location is assessed as confirmed.

6.2 Former broadacre horticultural area

Analytical results generally indicate low level contaminant concentrations. Concentrations of arsenic above the NESCS residential guideline criterion of 20 mg/kg were reported in 9 of 97 the grid-based samples. The distribution of the elevated arsenic concentrations ranged between 21 and 26 mg/kg, which includes eight samples (Samples 66, 79, 80, 82, 96-99) within the western area of Lot 23 DP 328 and one sample (Sample 55) within Lot 4 DP 2172 (refer Figure C1, Appendix C).

In addition to the samples that exceeded the NESCS residential (10% produce) criteria for arsenic, 45 surface soil samples were above the background concentration of 9.5 mg/kg. Results for 77 surface samples were above the recently revised background concentration for lead of 21 mg/kg.

Every tenth soil sample was specified for mercury analysis (10 samples in total), plus the two targeted soil samples A and B. All results for mercury were below the NESCS residential criterion of 310 mg/kg. The highest mercury concentration was reported in targeted Sample B (3.1 mg/kg). Eight results for mercury were reported below the laboratory detection limit of 0.1 mg/kg. We note that there is currently no published background concentration for mercury in the area of investigation.

7.0 Risk Assessment

7.1 Conceptual Site Model – residential area

A conceptual site model (CSM) is a representation of the source (contaminants) and receptors (i.e., site users or the environment), and any exposure pathways. Risk is considered to exist where a receptor is exposed to a contaminant by means of a complete pathway. Future site users in a residential scenario are considered to be the only on-site receptors.

Based on the information presented in this DSI, the following CSM has been developed for the proposed residential allotments:

Contaminant Source	Exposure Pathway	Receptor	Risk Assessment
HAIL A10: Former horticultural land use.	• Inhalation • Ingestion • Dermal contact • Produce consumption	Future site occupiers	**Former spray mixing area:** • Soil sample results has identified a **medium risk** to human health, particularly due to elevated DDT concentrations above the NESCS criteria for a residential land use scenario (10% produce). Remediation is required. **Former broadacre horticultural land use:** • Soil sample results across proposed allotments 4 to 57 has identified a **low risk** to human health based on some analytical results for arsenic marginally above the NESCS criteria for a residential land use scenario (10% produce). Management of soil disturbance/disposal is required.

The depth of contamination is considered to likely extend to the depth of any soil disturbance associated with ploughing activities for planting crops. The site walkover inspection and testing completed by Geo-Env identified very limited topsoil cover across the paddocks, with in situ clayey silt (Moutere Gravel) at a shallow depth (i.e., typically <200 mm below existing ground level). Samples 'A' and 'B', and M1 to M3 within Lot 23 DP 328 were the only two samples representative of topsoil.

The ploughing of the soil will have mixed contamination laterally and vertically within the ploughed zone and may have resulted in the observed elevated concentrations recorded within samples collected from Lot 23 DP 328 within which the former spray mixing area was located. It is noted that orchard trees are present in both Lot 4 DP 2172 and Lot 23 DP 328 from the 1940s so the difference in contaminant concentrations/distribution in samples taken from these two land parcels is considered likely as a result of the former spray mixing area within Lot 23 DP 328.

7.2 Balance of land

Potential HAIL areas outside of the residential allotments are highlighted on Figure E1 (Appendix E) within Lot 4 DP 2172 and Lot 23 DP 328. Further characterisation is recommended in these areas if soil is disturbed or removed to an off-site location.

8.0 Development Implications

8.1 Activity status

NESCS (2011) regulations 8(5) and 8(6) indicate that resource consent is required for activities that cannot meet permitted activity requirements. Under regulation 9, the subdivision application can be considered as a controlled activity if the DSI shows that the soil contamination does not exceed the appliable standard for the intended land use.

Based on the results reported in this DSI, the results do not comply with the guidelines within Lot 4 DP 2172 and Lot 23 DP 328 and the activity status is considered as a restricted discretionary activity under regulation 10.

8.2 Proposed earthworks and remediation options

Proposed earthworks comprise a combination of cut and fill to develop the residential allotments, as shown on the earthworks plan in Appendix A. To ensure the appropriate management of soils with elevated arsenic and DDT concentrations, a Remediation Action Plan (RAP) will be required. The RAP will outline the remediation strategy and management works to mitigate the risk posed to human health as a result of the former horticultural land use.

The contaminant distributions within surface soil and proposed remediation is highlighted on Figure E1 (Appendix E) within the following categories:

- **Green**: No remediation required – results below NESCS and background criteria
- **Orange**: Soil management required during the earthworks programme to control the disturbance and redistribution of soil that typically reported contaminant concentrations below NESCS criteria but above background criteria
- **Red**: Remediation required – results above NESCS criteria and background criteria associated with the former spray mixing area

Targeted remediation is considered appropriate for the area comprising the former spray mixing area, with off-site disposal proposed to a facility authorised to receive the soil.

A designated area for unsuitable soil has been identified in the subdivision plan. With the exception of the former spray mixing area, the designated disposal area can be used to dispose of soil deemed as unsuitable from an environmental perspective. The recorded low-level contaminant concentrations are below the NESCS recreational guidelines (i.e., 80 mg/kg recreational criterion for arsenic), and this area is therefore considered appropriate for surface soils requiring removal from the orange shaded areas on Figure E1.

There are no restrictions to earthworks in terms of contaminant concentrations within Lot 1 DP 8288.

The depth of contamination is considered limited to surface soils, or the maximum depth of shallow disturbed soil associated with ploughing activities within Lot 4 DP 8288 and Lot 23 DP 328. Validation sampling of the stripped surface will be required within Lot 4 DP 8288 and Lot 23 DP 328 following removal of soil to verify the ground conditions and to determine any restrictions for future residential use.

Further testing to enable characterisation of soils associated with potential HAIL areas within the balance of land is recommended prior to any future soil disturbance in these areas that relate to subdivision activities (i.e., wastewater land application areas, stormwater channels and walking paths).

Soil disturbance activities in future allotments associated with ongoing land use for production land is excluded from the requirements of the NESCS.

8.3 Off-site soil disposal

Based on the results for soil samples collected within Lot 4 DP 2172 and Lot 23 328, the soil is not considered suitable for disposal to a clean fill facility. If soil is required to be removed from the site it must be disposed of at a facility authorised to accept it, which is particularly relevant to the former spray mixing area.

There are no restrictions for off-site disposal of soil in terms of contaminant concentrations within Lot 1 DP 8288.

8.4 Importing soil

Any soil imported to site for residential purposes should comply with the adopted background limits outlined in Figure 9 of this report, and verification via analytical testing is recommended prior to importing/relocating soil.

9.0 Conclusions and Recommendations

Tasman Bay Estates Ltd is proposing a subdivision of Lot 14 DP 324764, Lot 4 DP 2172, Lot 1 DP 8288, Lots 20, 21 and 23 DP 328, and Part Lots 3, 5 and 6 DP 328, located on Marriages and Mamaku Roads, Tasman. The subdivision will result in 58 new residential allotments. Allotments 59 to 64 comprise the balance of land that will be utilised for servicing purposes, general recreational use, and soil-based production. A borrow area for the subdivision earthworks is currently indicated within Lot 59.

The site has a history of horticultural land use (HAIL A10), and a former spray mixing area was identified near the northern boundary of Lot 23 DP 328. The contaminants of concern identified associated with long-term broadacre horticultural land use in shallow soils are arsenic, copper, lead, mercury and OCPs.

Soil sampling across the proposed residential allotments has identified elevated arsenic concentrations in 10 of the 97 surface soil samples collected. Elevated DDT concentrations were confirmed in the former spray mixing area.

The highest concentrations of arsenic are considered related to the former spray mixing area identified by Tasman Bay Estates Ltd. This area has been periodically ploughed and planted, which likely distributed contaminated soil from a previously localised source area. The depth of contamination is considered to likely extend to the depth of any soil disturbance associated with ploughing activities.

In comparison, results from Lot 4 DP 2172 are generally below NESCS residential (10% produce) criteria, but above background/clean fill guidelines. Results from the area tested within Lot 1 DP 8288 were consistently below both NESCS residential (10% produce) criteria and background/clean fill guidelines.

Based on the results reported in this DSI, the results do not comply with the residential criteria within Lot 4 DP 2172 and Lot 23 DP 328 and the activity status is considered a restricted discretionary activity under regulation 10 (NESCS, 2011).

A RAP will be required to outline the remediation strategy and management works to mitigate the risk posed to human health as a result of the former horticultural land use. If managed correctly, the proposed subdivision earthworks can effectively remediate the new allotments where elevated arsenic concentrations have been recorded in conjunction with targeted remediation within the former spray mixing area.

A designated area for unsuitable soil has already been established on the subdivision plan. Given the compliant contaminant concentrations in comparison to NESCS recreational guidelines across the majority of the development area, this option of relocating soil to an area that will not be utilised for residential occupation is considered appropriate.

The depth of contamination is considered limited to surface soils, or the maximum depth of shallow disturbed soil associated with ploughing activities. Validation sampling of the stripped surface will be required within Lot 4 DP 8288 and Lot 23 DP 328 following removal of soil to verify the ground conditions and to determine any restrictions for future residential use.

Further testing to enable characterisation of soils associated with potential HAIL areas within the balance of land is recommended prior to any future soil disturbance in these areas that relate to subdivision activities.

Soil disturbance activities in future allotments associated with ongoing land use for production land is excluded from the requirements of the NESCS.

Based on the results for soil samples collected within Lot 4 DP 2172 and Lot 23 328, the soil is not considered suitable for disposal to a clean fill facility. If soil is required to be removed from the site it must be disposed of at a facility authorised to accept it. There are no restrictions for earthworks or off-site disposal of soil in terms of contaminant concentrations within Lot 1 DP 8288.

Any soil imported to site for residential purposes should comply with the adopted background limits, and verification via analytical testing is recommended prior to importing/relocating soil.

Appendix A – Application Plans, Sheets 1 to 13 (Eliot Sinclair)

N

Lot 2
DP 328

Pt Lot 3
DP 328
(RT NL147/60)

LOT 61
38242m²

Lot
DP 1376

Pt Lot 5
DP 328
(RT NL147/60)

Pt Lot 6
DP 328
(RT NL147/60)

LOT 60
23520m²

APORO ROAD

Lot 8
DP 328

Lot 20
DP 328
(RT NL147/60)

CT CT

Lot 21
DP 328
(RT NL43/231)

MAMAKU ROAD

Lot 2
DP 439193

Lot 3
DP 17368

MARRIAGES ROAD

Lot 1
DP 17827

LOT 22
DP 328

Lot 1
DP 484896

Lot 1
DP 516289

CT

LOT 59
23.24Ha
(BALANCE)

Lot 23
DP 328
(RT NL6D/267)

Lot 2
DP 516289

Lot 4
DP 2172
(RT NL73/239)

LOT 63
8277m²

CT CT CT CT

Lot 1
DP 8288
(RT NL4A/119)

Lot 13
DP 324764

Lot 14
DP 324764
(RT 100030)

LOT 62
1.23Ha

LOT 64
6838m²

LOT 2
DP 8288

Pt Lot 2
DP 1262

DISCLAIMER

NOTES

AMALGAMATION CONDITIONS:
THAT LOTS 59, 60, 61, 62, 63 & LOT 64 HEREON BE HELD TOGETHER IN ONE COMPUTER FREEHOLD REGISTER

REV.	DRAWN	DATE	NOTE

CLIENT

TASMAN BAY ESTATES LTD

DESIGNED	**RJG**
DRAWN	**MDW**
REVIEWED	**SE**
APPROVED	
STATUS	
SCALE	**1:2500 [A1]**

RECORD OF TITLE OVERVIEW PLAN

LOTS 1 - 64 BEING PROPOSED SUBDIVISION OF LOT 14 DP 324764, LOT 4 DP 2172, LOT 1 DP 8288, LOTS 20, 20 & 23 DP 328 & Pt LOTS 3, 5 & 6 DP 328

PROJECT	SET	SHEET	REV.
11460	**1**	**1**	**A**

eliot sinclair

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N

SCHEDULE OF EASEMENTS

PURPOSE	SHOWN	OWNED BY	USED BY
RIGHT OF WAY RIGHT TO CONVEY WATER, ELECTRICITY AND TELECOMMUNICATIONS	ROW 1	LOT 6	LOTS 10, 11 & 12
	ROW 2	LOTS 25 & 26	LOTS 24, 27 & 28
	ROW 3	LOTS 47 & 48	LOTS 46 & 49
	ROW 4	LOTS 57 & 58	LOTS 55 & 56

SCHEDULE OF EASEMENTS IN GROSS

PURPOSE	SHOWN	OWNED BY	GRANTEE
PEDESTRIAN WALKWAY/ CYCLE WAY	A	LOT 59	TASMAN DISTRICT COUNCIL

NOTES

1. LOT AREAS SHOWN ARE NET AREAS NOT INCLUDING ANY SHARE OF THE RIGHT OF WAY OWNERSHIP.
2. NO UNDERLYING EASEMENTS
3. AMALGAMATION CONDITIONS:
   THAT LOTS 59, 60, 61, 62 & LOT 63 HEREON BE HELD TOGETHER IN ONE COMPUTER FREEHOLD REGISTER

CONCRETED ROAD AREAS

PERMANANTLY SURFACED CARRIAGEWAY AND FOOTPATH

STAGING BOUNDARIES

STAGE 1
STAGE 2
STAGE 3
STAGE 4
STAGE 5

PROPERTY ACCESS
Lot 2 DP 8288
6.0m
EXTENT OF SEAL
SEAL WIDENING AND ACCESS SEALING
10.0m
15.0 RADIUS
PROPERTY BOUNDARY
1 IN 10 TAPER
2.5m
1 IN 10 TAPER TO 2.5m WIDTH
EDGELINE OF EXISTING ROAD
1 IN 10 TAPER TO 2.5m WIDTH
20.00
1 IN 10 TAPER TO 2.5m WIDTH
PROPERTY BOUNDARY

PROPOSED ROAD 1 AND MARRIAGES ROAD INTERSECTION DETAILS

REV.	DRAWN	DATE	NOTE

CLIENT

TASMAN BAY ESTATES LTD

DESIGNED	RJG
DRAWN	MDW
REVIEWED	SE
APPROVED	
STATUS	
SCALE	1:1250 [A1] 625

SUBDIVISION AND ROADING LAYOUT PLAN

LOTS 1 - 64 BEING PROPOSED SUBDIVISION OF LOT 14 DP 324764, LOT 4 DP 2172, LOT 1 DP 8288, LOTS 20, 21 & 23 DP 328 & Pt LOTS 3, 5 & 6 DP 328

PROJECT	SET	SHEET	REV.
11460	1	2	A

eliot sinclair

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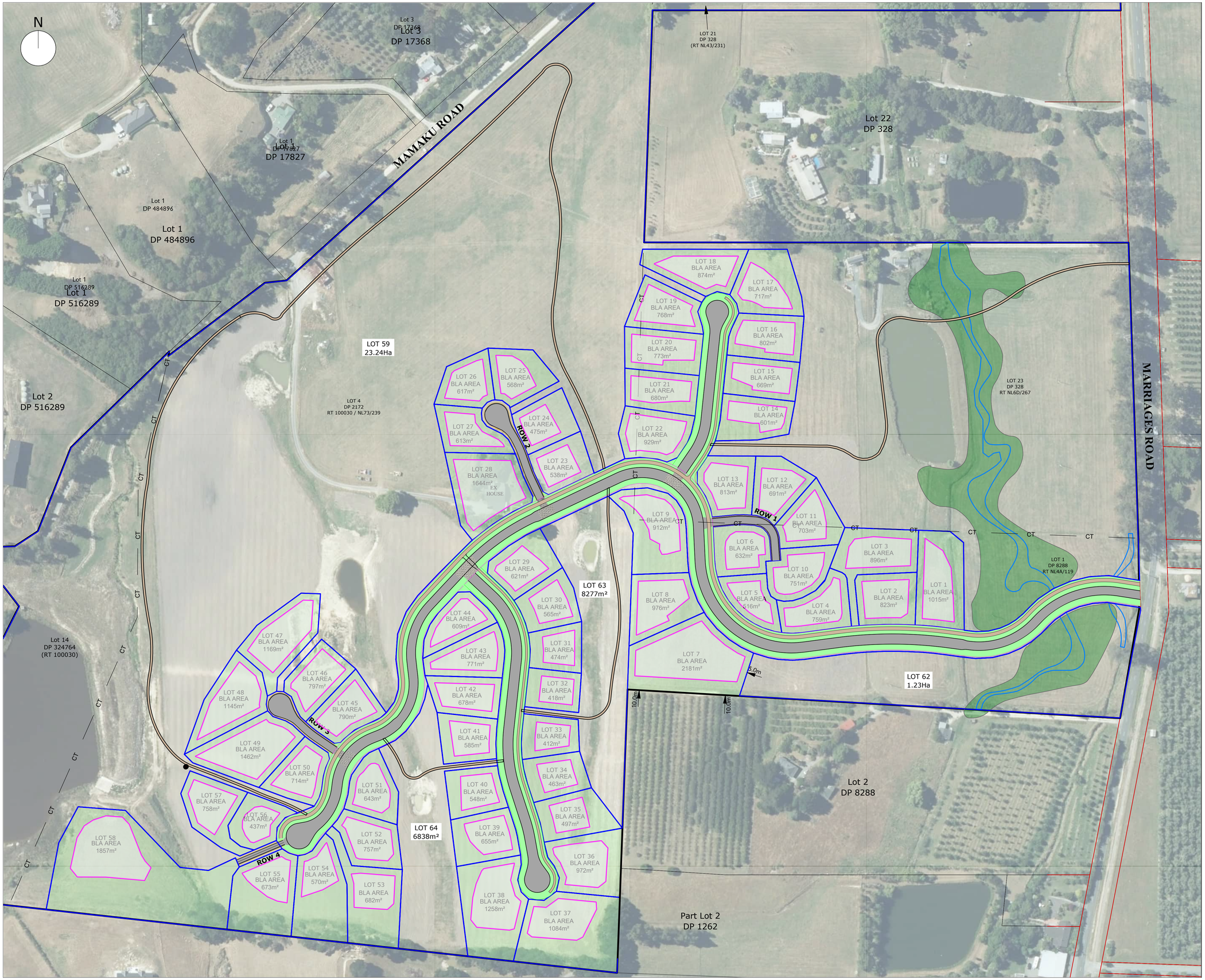


DISCLAIMER

NOTES

1. ALL BLA SET-BACKS ARE 5.0m UNLESS OTHERWISE SHOWN.

REV.	DRAWN	DATE	NOTE

CLIENT

TASMAN BAY ESTATES LTD

DESIGNED	**RJG**
DRAWN	**MDW**
REVIEWED	**SE**
APPROVED	
STATUS	
SCALE	**1:1250 [A1] 625**

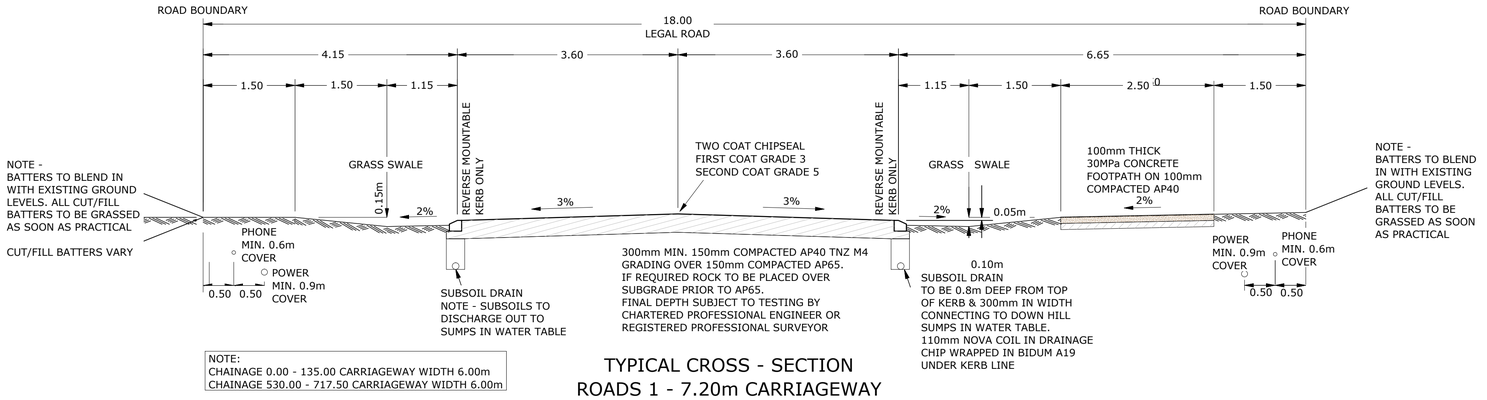
SUBDIVISION BLA PLAN

LOTS 1 - 64 BEING PROPOSED SUBDIVISION OF LOT 14 DP 324764, LOT 4 DP 2172, LOT 1 DP 8288, LOTS 20, 21 & 23 DP 328 & Pt LOTS 3, 5 & 6 DP 328

PROJECT	SET	SHEET	REV.
11460	**1**	**3**	**A**

eliot sinclair

N



NOTE:
CHAINAGE 0.00 - 135.00 CARRIAGEWAY WIDTH 6.00m
CHAINAGE 530.00 - 717.50 CARRIAGEWAY WIDTH 6.00m

TYPICAL CROSS - SECTION
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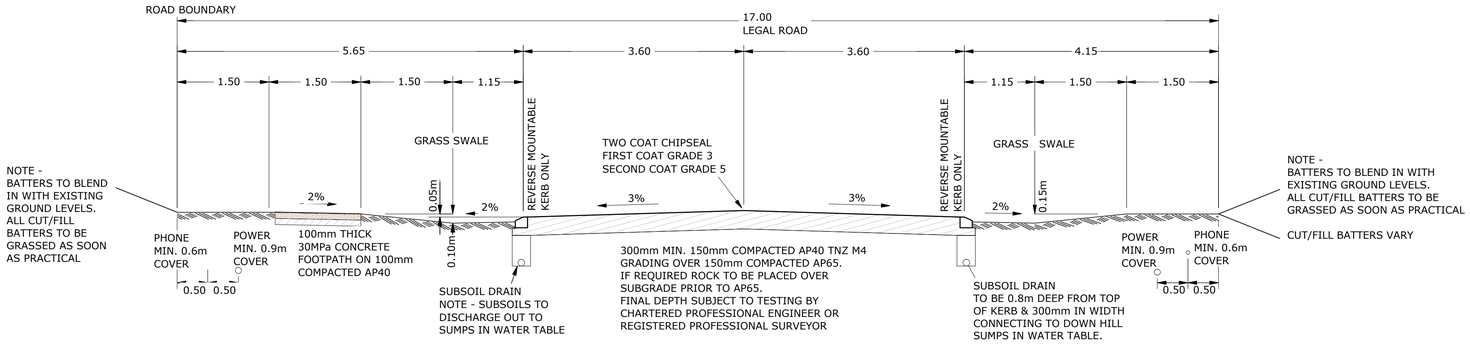
SCALE 1:50 [A1]



TYPICAL CROSS - SECTION
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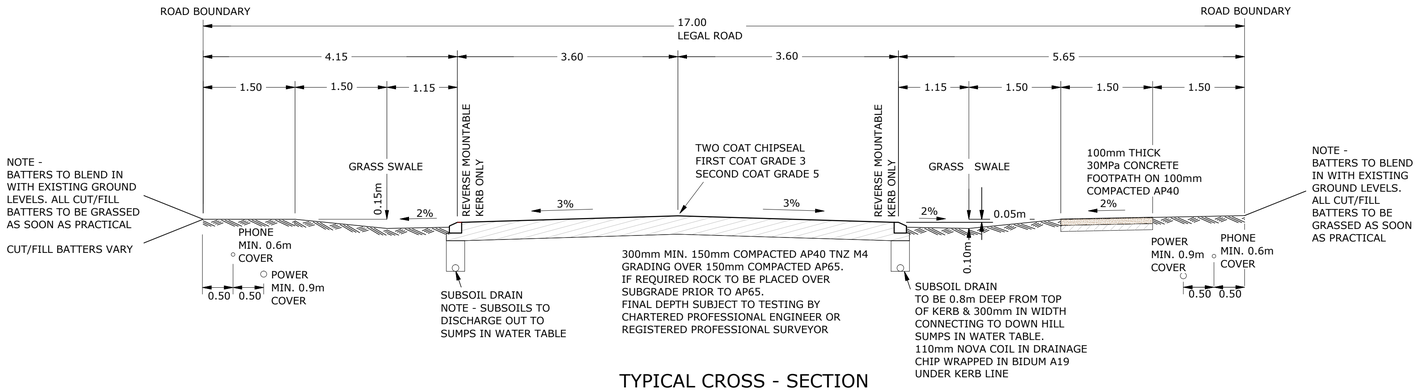
SCALE 1:50 [A1]



TYPICAL CROSS - SECTION
ROADS 3 - 7.20m CARRIAGEWAY
SCALE 1:50 [A1]

NOTES

REV.	DRAWN	DATE	NOTE

CLIENT

TASMAN BAY ESTATES LTD

DESIGNED	**RJG**
DRAWN	**MDW**
REVIEWED	**SE**
APPROVED	
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TYPICAL CROSS SECTIONS
APPLICATION PLAN

PROJECT	SET	SHEET	REV.
11460	**1**	**4**	**A**

eliot sinclair

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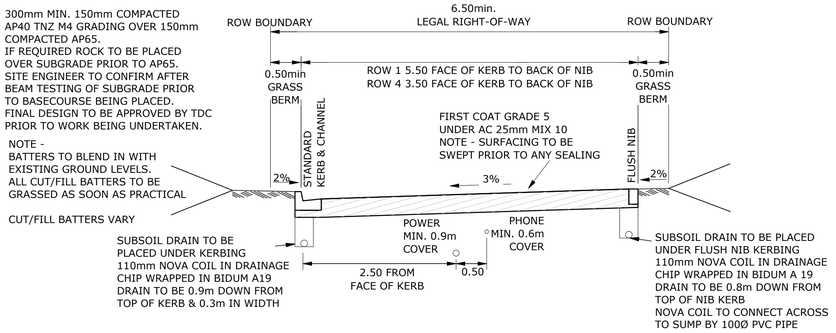
TYPICAL CROSS - SECTION
ROW 1 5.50m & ROW 4 3.50m CARRIAGEWAY
SCALE 1:50 [A1]



TYPICAL CROSS - SECTION
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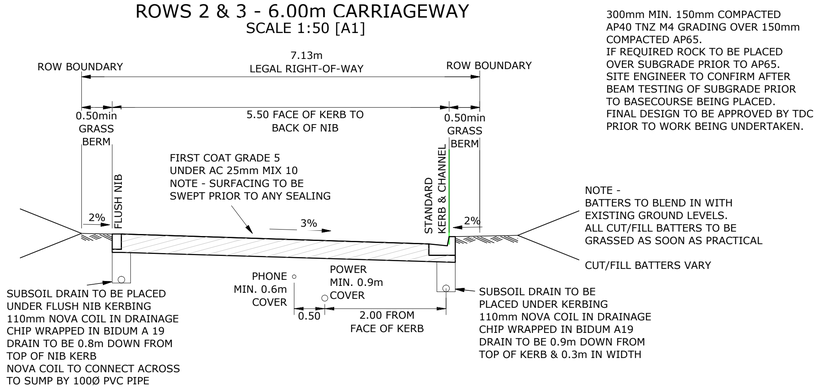

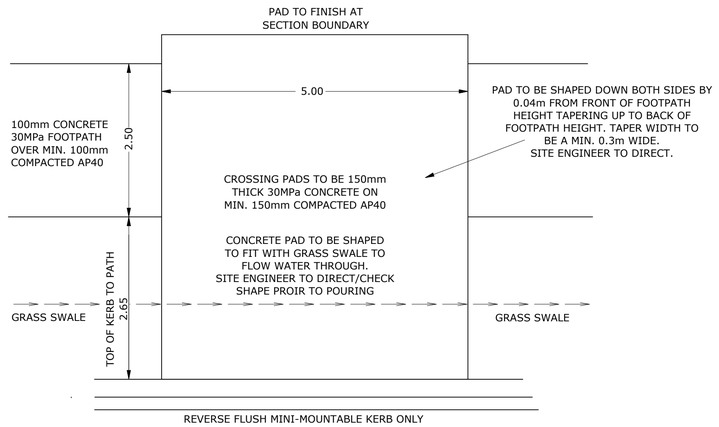

TYPICAL DETAIL
PRIVATE VEHICLE CROSSING
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NOTES

REV.	DRAWN	DATE	NOTE

CLIENT

TASMAN BAY ESTATES LTD

DESIGNED	**RJG**
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APPROVED	
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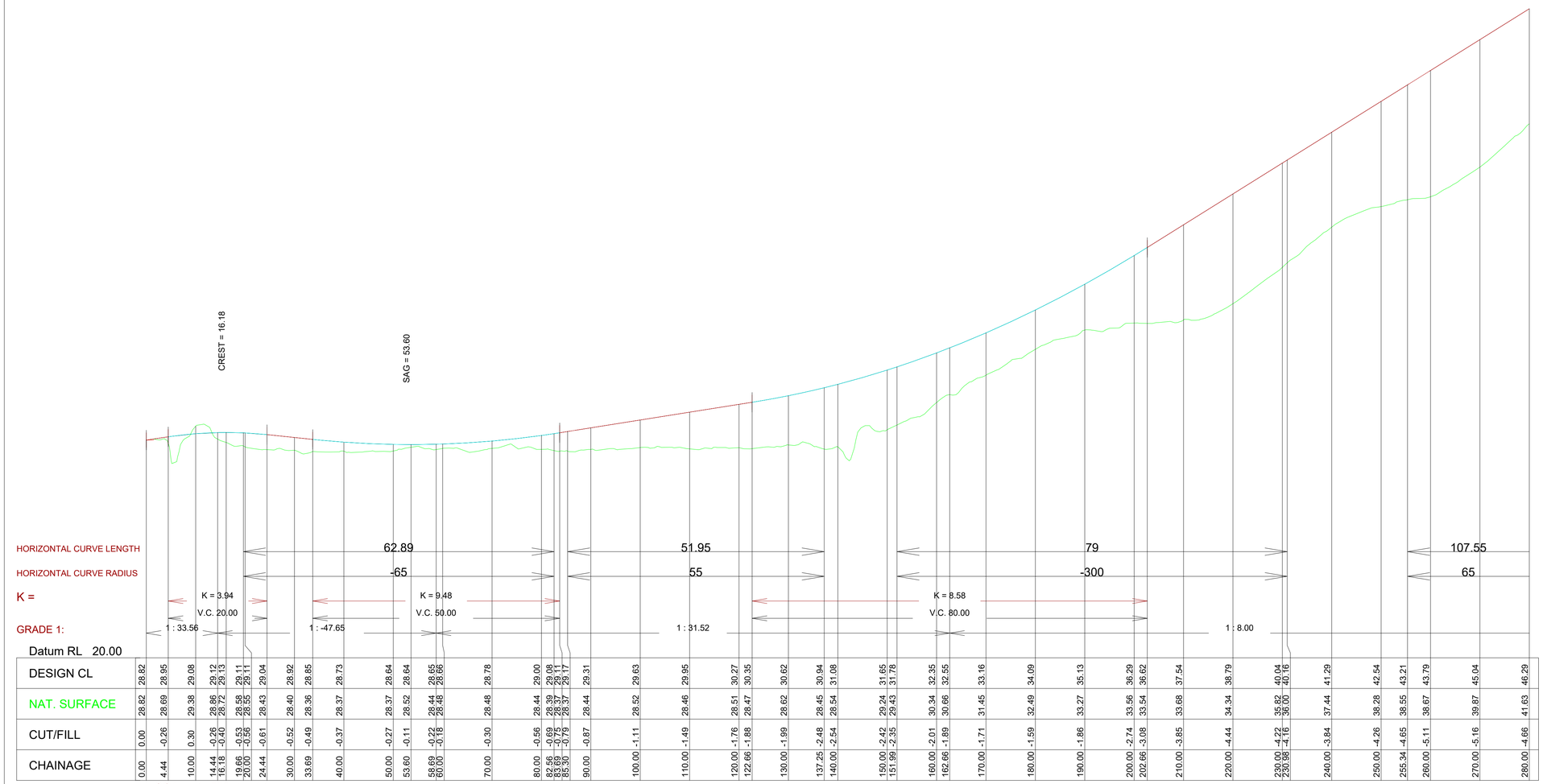
TYPICAL CROSS SECTIONS
APPLICATION PLAN

PROJECT	SET	SHEET	REV.
11460	**1**	**5**	**A**

eliot sinclair



Datum RL 20.00

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NAT. SURFACE	28.82	28.69	29.38	28.86	28.72	28.58	28.55	28.43	28.40	28.36	28.37	28.37	28.52	28.44	28.48	28.48
CUT/FILL	0.00	-0.26	0.30	-0.26	-0.40	-0.53	-0.56	-0.61	-0.52	-0.49	-0.37	-0.27	-0.11	-0.22	-0.18	-0.30
CHAINAGE	0.00	4.44	10.00	14.44	16.18	19.66	20.00	24.44	30.00	33.69	40.00	50.00	53.60	58.69	60.00	70.00

DESIGN CL	29.00	29.08	29.11	29.17	29.31	29.63	29.95	30.27	30.35	30.62	30.94	31.08	31.65	31.78	32.35	32.55
NAT. SURFACE	28.44	28.39	28.37	28.37	28.44	28.52	28.46	28.51	28.47	28.62	28.45	28.54	29.24	29.43	30.34	30.66
CUT/FILL	-0.56	-0.69	-0.75	-0.79	-0.87	-1.11	-1.49	-1.76	-1.88	-1.99	-2.48	-2.54	-2.42	-2.35	-2.01	-1.89
CHAINAGE	80.00	82.56	83.69	85.30	90.00	100.00	110.00	120.00	122.66	130.00	137.25	140.00	150.00	151.99	160.00	162.66

DESIGN CL	33.16	34.09	35.13	36.29	36.62	37.54	38.79	40.04	40.16	41.29	42.54	43.21	43.79	45.04	46.29
NAT. SURFACE	31.45	32.49	33.27	33.56	33.54	33.68	34.34	35.82	36.00	37.44	38.28	38.55	38.67	39.87	41.63
CUT/FILL	-1.71	-1.59	-1.86	-2.74	-3.08	-3.85	-4.44	-4.22	-4.16	-3.84	-4.26	-4.65	-5.11	-5.16	-4.66
CHAINAGE	170.00	180.00	190.00	200.00	202.66	210.00	220.00	230.00	230.98	240.00	250.00	255.34	260.00	270.00	280.00

HZ SCALE 1: 500 AT A1
VERTICAL SCALE 1: 100 AT A1

LONGSECTION OF ROAD 1

NOTES

REV.	DRAWN	DATE	NOTE

CLIENT

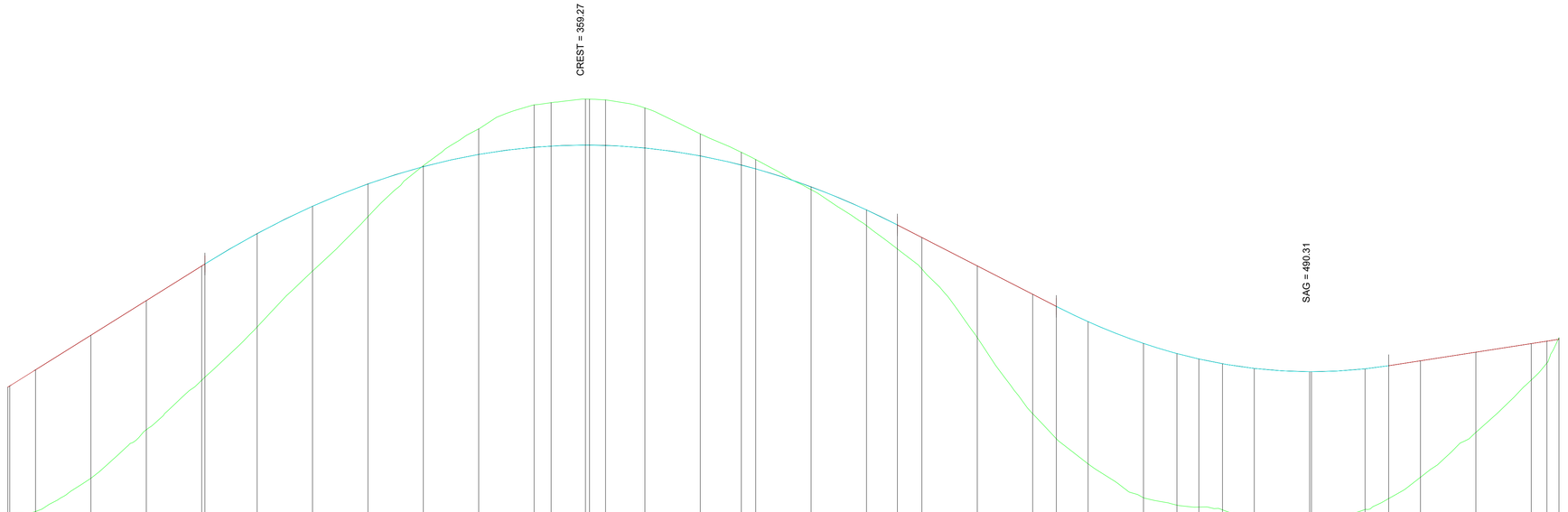
TASMAN BAY ESTATES LTD

DESIGNED	**RJG**
DRAWN	**MDW**
REVIEWED	**SE**
APPROVED	
STATUS	
SCALE	

ROADING LONGSECTION PLANS
APPLICATION PLAN

PROJECT	SET	SHEET	REV.
11460	**1**	**6**	**A**

eliot sinclair



DESIGN CL	43.16	43.21	43.79	45.04	46.29	47.54	47.61	48.71	49.69	50.50	51.12	51.57	51.83	51.87
NAT. SURFACE	38.54	38.55	38.67	39.87	41.63	43.41	43.52	45.34	47.36	49.32	51.16	52.49	53.36	53.44
CUT/FILL	-4.63	-4.65	-5.11	-5.16	-4.66	-4.12	-4.09	-3.37	-2.34	-1.18	0.04	0.92	1.53	1.57
CHAINAGE	255.00	255.34	260.00	270.00	280.00	290.00	290.57	300.00	310.00	320.00	330.00	340.00	350.00	353.07

DESIGN CL	51.90	51.90	51.89	51.80	51.51	51.18	51.04	50.39	49.56	49.02	48.57	47.54	46.52	46.08
NAT. SURFACE	53.56	53.56	53.53	53.24	52.31	51.64	51.38	50.29	49.00	48.15	47.43	44.95	42.20	41.30
CUT/FILL	1.66	1.66	1.64	1.44	0.79	0.46	0.34	-0.10	-0.56	-0.86	-1.14	-2.59	-4.31	-4.78
CHAINAGE	359.27	360.00	362.90	370.00	380.00	387.41	390.00	400.00	410.00	415.57	420.00	430.00	440.00	444.26

DESIGN CL	45.53	44.74	44.38	44.18	44.01	43.84	43.72	43.72	43.82	43.94	44.11	44.43	44.74	44.82	44.89
NAT. SURFACE	40.39	39.17	38.90	38.83	38.73	38.45	38.00	37.99	38.75	39.14	39.91	41.53	43.42	44.03	44.95
CUT/FILL	-5.14	-5.57	-5.47	-5.35	-5.27	-5.39	-5.72	-5.73	-5.08	-4.80	-4.21	-2.90	-1.32	-0.79	0.06
CHAINAGE	450.00	460.00	466.04	470.00	474.26	480.00	490.00	490.31	500.00	504.26	510.00	520.00	530.00	532.82	535.00

HZ SCALE 1: 500 AT A1
VERTICAL SCALE 1: 100 AT A1

LONGSECTION OF ROAD 1

NOTES

REV.	DRAWN	DATE	NOTE

CLIENT

TASMAN BAY ESTATES LTD

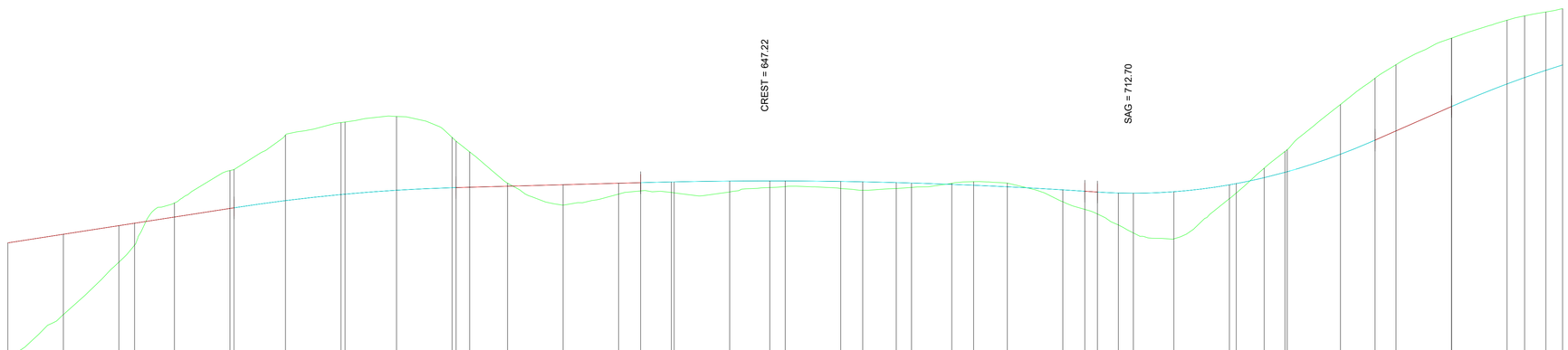
DESIGNED	**RJG**
DRAWN	**MDW**
REVIEWED	**SE**
APPROVED	
STATUS	
SCALE	

ROADING LONGSECTION PLANS

APPLICATION PLAN

PROJECT	SET	SHEET	REV.
11460	**1**	**7**	**A**

eliot sinclair



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Datum RL 20.00

DESIGN CL	44.11	44.43	44.74	44.82	45.05	45.36	45.38	45.64	45.86	45.87
NAT. SURFACE	39.91	41.53	43.42	44.03	45.55	46.72	46.76	48.00	48.45	48.47
CUT/FILL	-4.21	-2.90	-1.32	-0.79	0.51	1.36	1.38	2.36	2.59	2.60
CHAINAGE	510.00	520.00	530.00	532.82	540.00	550.00	550.73	560.00	570.00	570.73

DESIGN CL	46.01	46.10	46.11	46.12	46.16	46.21	46.26	46.29	46.31	46.31
NAT. SURFACE	48.67	47.92	47.78	47.39	46.26	45.48	45.87	45.99	45.93	45.92
CUT/FILL	2.66	1.81	1.68	1.27	0.11	-0.73	-0.39	-0.30	-0.38	-0.40
CHAINAGE	580.00	590.00	590.73	593.17	600.00	610.00	620.00	623.96	629.50	630.00

DESIGN CL	46.34	46.35	46.35	46.33	46.32	46.29	46.27	46.22	46.19	46.14
NAT. SURFACE	45.95	46.10	46.14	46.07	46.01	46.07	46.11	46.26	46.32	46.27
CUT/FILL	-0.39	-0.25	-0.21	-0.25	-0.31	-0.21	-0.16	0.04	0.13	0.13
CHAINAGE	640.00	647.22	650.00	660.00	663.96	670.00	672.75	680.00	683.93	690.00

DESIGN CL	46.03	45.98	45.95	45.91	45.90	45.96	46.21	46.25	46.47	46.66
NAT. SURFACE	45.60	45.33	45.17	44.76	44.48	44.26	45.71	45.92	46.81	47.41
CUT/FILL	-0.43	-0.65	-0.78	-1.15	-1.42	-1.70	-0.50	-0.34	0.34	0.75
CHAINAGE	700.00	703.96	706.23	710.00	712.70	720.00	730.00	731.23	736.26	740.00

DESIGN CL	46.68	47.31	47.82	48.15	49.03	49.03	49.84	50.07	50.34	50.53
NAT. SURFACE	47.47	49.10	50.05	50.54	51.49	51.50	52.14	52.30	52.44	52.56
CUT/FILL	0.79	1.79	2.23	2.39	2.46	2.46	2.30	2.22	2.10	2.03
CHAINAGE	740.41	750.00	756.23	760.00	770.00	770.01	780.00	783.17	787.00	790.00

HZ SCALE 1: 500 AT A1
VERTICAL SCALE 1: 100 AT A1

LONGSECTION OF ROAD 1

NOTES

REV. DRAWN DATE NOTE

CLIENT

TASMAN BAY ESTATES LTD

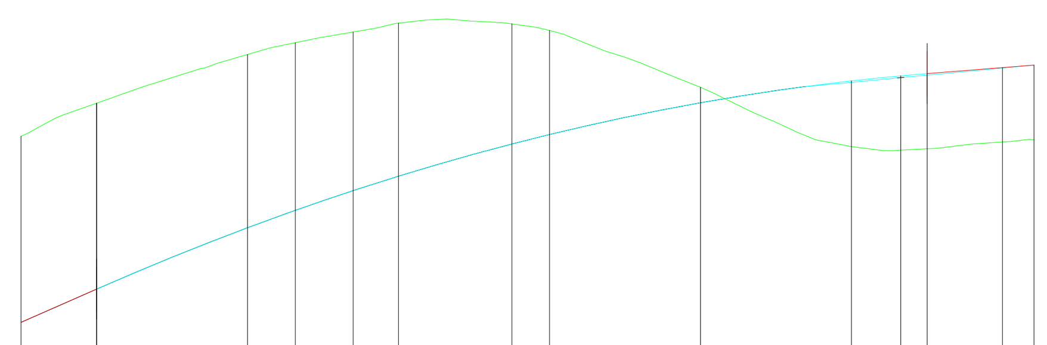
DESIGNED	**RJG**
DRAWN	**MDW**
REVIEWED	**SE**
APPROVED	

STATUS
SCALE

ROADING LONGSECTION PLANS
APPLICATION PLAN

PROJECT	SET	SHEET	REV.
11460	**1**	**8**	**A**

eliot sinclair



HORIZONTAL CURVE LENGTH		42.75						36.27									
HORIZONTAL CURVE RADIUS		-40						40									
K =								K = 7.63									
								V.C. 55.00									
GRADE 1:		1 : 11.37									1 : 62.86						
Datum RL 20.00																	
DESIGN CL	48.59	49.03	49.03	49.84	50.07	50.34	50.53	50.95	51.08	51.50	51.79	51.86	51.89	51.97	52.00		
NAT. SURFACE	51.06	51.49	51.50	52.14	52.30	52.44	52.56	52.55	52.46	51.71	50.92	50.87	50.89	50.98	51.01		
CUT/FILL	2.47	2.46	2.46	2.30	2.22	2.10	2.03	1.59	1.38	0.20	-0.87	-0.98	-1.00	-0.99	-0.99		
CHAINAGE	765.00	770.00	770.01	780.00	783.17	787.00	790.00	797.51	800.00	810.00	820.00	823.26	825.01	830.00	832.09		

HZ SCALE 1: 500 AT A1
VERTICAL SCALE 1: 100 AT A1

LONGSECTION OF ROAD 1

DISCLAIMER

NOTES

REV.	DRAWN	DATE	NOTE

CLIENT

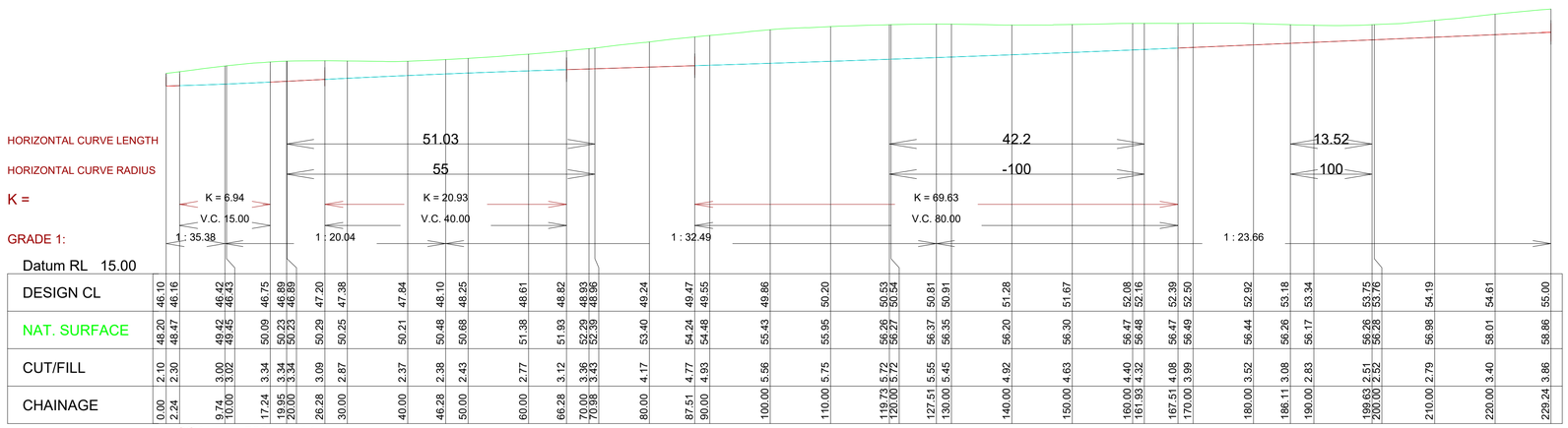
TASMAN BAY ESTATES LTD

DESIGNED	**RJG**
DRAWN	**MDW**
REVIEWED	**SE**
APPROVED	
STATUS	
SCALE	

ROADING LONGSECTION PLANS
APPLICATION PLAN

PROJECT	SET	SHEET	REV.
11460	**1**	9	**A**

eliot sinclair



LONGSECTION OF ROAD 2

NOTES

REV. DRAWN DATE NOTE

CLIENT

TASMAN BAY ESTATES LTD

DESIGNED	**RJG**
DRAWN	**MDW**
REVIEWED	**SE**
APPROVED	
STATUS	
SCALE	

ROADING LONGSECTION PLANS

APPLICATION PLAN

PROJECT	SET	SHEET	REV.
11460	**1**	10	**A**

eliot sinclair

Datum RL 15.00

DESIGN CL	48.14	47.80	47.67	47.38	47.07	46.90	46.27	45.55	45.29	45.27	44.95	44.31	43.99	43.64	43.41	43.23	42.87	42.50	42.14	41.77	41.50
NAT. SURFACE		46.82	46.79	46.67	46.42	46.26	45.81	45.55	45.48	45.48	45.41	45.25	45.15	44.94	44.72	44.53	44.10	43.80	43.27	42.91	42.58
CUT/FILL		-0.98	-0.89	-0.70	-0.65	-0.63	-0.46	-0.01	0.19	0.20	0.46	0.93	1.16	1.31	1.31	1.30	1.24	1.29	1.13	1.13	1.08
CHAINAGE	-0.00	7.40	10.00	15.35	20.00	22.40	30.00	37.40	40.02	40.10	43.19	50.00	54.19	60.00	65.19	70.00	80.00	90.00	100.00	110.00	117.52

HZ SCALE 1: 500 AT A1
VERTICAL SCALE 1: 500 AT A1

LONGSECTION OF ROAD 3

NOTES

REV.	DRAWN	DATE	NOTE

CLIENT

TASMAN BAY ESTATES LTD

DESIGNED	**RJG**
DRAWN	**MDW**
REVIEWED	**SE**
APPROVED	
STATUS	
SCALE	

ROADING LONGSECTION PLANS

APPLICATION PLAN

PROJECT	SET	SHEET	REV.
11460	**1**	**11**	**A**

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NOTES

1. LOT 58 EARTHWORKS TO BE SET-BACK 10.0m FROM THE EDGE OF WETLAND.
2. EARTHWORKS WILL BE REQUIRED AROUND THE OUTLET OF THE NORTHERN POND THROUGH TO MAMAKU ROAD. THIS WILL INCLUDE REPLACEMENT OF THE EXISTING CULVERT UNDER MAMAKU ROAD.
3. CONTOUR INTERVAL: 2.0m

N

MAMAKU ROAD

MARRIAGES ROAD

Lot 3 DP 17368

Lot 1 DP 17827

Lot 1 DP 484896

Lot 1 DP 516289

Lot 2 DP 516289

LOT 21 DP 328 (RT NL43/231)

Lot 22 DP 328

UNSUITABLES/ SOIL DISPOSAL AREA

LOT 59 23.24Ha

LOT 4 DP 2172 RT 100030 / NL73/239

LOT 18 1785M²

LOT 17 1925M²

LOT 19 1480M²

LOT 16 1595M²

LOT 20 1615M²

LOT 15 1435M²

LOT 21 1430M²

LOT 14 1510M²

LOT 22 1635M²

LOT 26 1240M²

LOT 25 1395M²

LOT 27 1330M²

LOT 24 1320M²

LOT 23 1260M²

LOT 28 2570M²

EX HOUSE

ROAD 3

ROW 2

MINOR FILLING TO BLEND POND EMBANKMENT INTO SURROUNDING GROUND

LOT 23 DP 328 RT NL6D/267

LOT 13 1515M²

LOT 12 1420M²

LOT 9 2395M²

LOT 11 1510M²

ROW 1

STREAM DIVERSION

LOT 1 DP 8288 RT NL4A/119

LOT 6 1349M²

LOT 10 1450M²

LOT 3 2030M²

LOT 5 1130M²

LOT 4 1525M²

LOT 2 1535M²

LOT 1 2245M²

LOT 29 1500M²

LOT 63 8277m²

LOT 30 1335M²

LOT 8 1883M²

LOT 7 3679M²

ROAD 1

LOT 62 1.23Ha

LOT 44 1265M²

LOT 43 1505M²

LOT 42 1350M²

LOT 31 1135M²

LOT 32 1064M²

ROAD 2

LOT 41 1295M²

LOT 33 1115M²

LOT 34 1240M²

LOT 40 1285M²

LOT 35 1513M²

LOT 39 1525M²

LOT 36 2065M²

LOT 38 2921M²

LOT 37 3538M²

LOT 64 6838m²

LOT 47 2100M²

LOT 46 1490M²

LOT 48 2045M²

LOT 45 1485M²

ROW 3

LOT 49 2395M²

LOT 50 1365M²

LOT 57 NETT 1600M²

LOT 51 1350M²

LOT 56 1155M²

LOT 52 1455M²

ROW 4

LOT 58 NETT 7461M²

LOT 55 2432M²

LOT 54 2379M²

LOT 53 2326M²

Lot 14 DP 324764 (RT 100030)

EARTHWORKS TO BE SET BACK 10m FROM THE EDGE OF THE WETLAND

Lot 2 DP 8288

Part Lot 2 DP 1262

TOTAL SITE CUT 117 000M³
TOTAL SITE FILL 146 000M³

EXTRA TOTAL FILL REQUIRED
LOW WESTERN LAA
17800M³ - 5000M3 SW CHANNELS = 12800M³

REV.	DRAWN	DATE	NOTE

CLIENT

TASMAN BAY ESTATES LTD

DESIGNED	**RJG**
DRAWN	**MDW**
REVIEWED	**SE**
APPROVED	
STATUS	
SCALE	**1:1250 [A1]**

EARTHWORKS PLAN

Application Plan

PROJECT	SET	SHEET	REV.
11460	**1**	**12**	**A**

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NOTES
WASTEWATER LAND APPLICATION AREAS
ARE OFFSET 5.0m FROM PROPERTY BOUNDARIES
AND 10.0m FROM STORMWATER CHANNELS UNLESS
SHOWN OTHERWISE.
NO WASTEWATER LAND APPLICATION AREAS LOCATED
ON FILL AREAS.

TOTAL WASTEWATER LAND APPLICATION AREA = 52500m² (5.25Ha)

WASTEWATER LAND APPLICATION AREAS

STORMWATER FLOW DIRECTION

CULVERTED CROSSINGS

N

Lot 2 DP 439193

Lot 3 DP 17368

Lot 1 DP 17827

Lot 1 DP 484896

Lot 1 DP 516289

Lot 2 DP 516289

Lot 14 DP 324764 (RT 100030)

MAMAKU ROAD

SW DISCHARGE INTO EXISTING POND

BORROW AREA (INDICATIVE ONLY)

LOT 21 DP 328 (RT NL43/231)

Lot 22 DP 328

LAA AREA 3 5485M²

LAA AREA 4 2110M²

LAA AREA 5 4450M²

LAA AREA 2 28114m²

LAA AREA 1 12328m²

UNSUITABLES/ SOIL DISPOSAL AREA

CULVERTED ACCESS TO WASTEWATER TREAMENT PLANT

WASTEWATER TREATMENT PLANT 1000m²

LOT 59 23.24Ha

LOT 4 DP 2172 RT 100030 / NL73/239

STORMWATER CHANNEL

SECONDARY FLOW PATH 1

SECONDARY FLOW PATH 2

SECONDARY FLOW PATH 3

PRIMARY/SECONDARY FLOW ROUTE

ROAD 1

ROAD 2

ROAD 3

ROW 1

ROW 2

ROW 3

ROW 4

LOT 18 1785M²
LOT 19 1480M²
LOT 20 1615M²
LOT 21 1430M²
LOT 22 1635M²
LOT 17 1925M²
LOT 16 1595M²
LOT 15 1435M²
LOT 14 1510M²
LOT 13 1515M²
LOT 12 1420M²
LOT 11 1510M²
LOT 10 1450M²
LOT 9 2395M²
LOT 8 1883M²
LOT 7 3679M²
LOT 6 1349M²
LOT 5 1130M²
LOT 4 1525M²
LOT 3 2030M²
LOT 2 1535M²
LOT 1 2245M²
LOT 62 1.23Ha

LOT 25 1395M²
LOT 26 1240M²
LOT 27 1330M²
LOT 24 1320M²
LOT 23 1260M²
LOT 28 2570M²
EX HOUSE

LOT 29 1500M²
LOT 30 1335M²
LOT 31 1135M²
LOT 32 1064M²
LOT 33 1115M²
LOT 34 1240M²
LOT 35 1513M²
LOT 36 2065M²
LOT 37 3538M²
LOT 38 2921M²
LOT 39 1525M²
LOT 40 1285M²
LOT 41 1295M²
LOT 42 1350M²
LOT 43 1505M²
LOT 44 1265M²
LOT 63 8277m²
GULLY SWALE

LOT 47 2100M²
LOT 48 2045M²
LOT 49 2395M²
LOT 50 1365M²
LOT 51 1350M²
LOT 52 1455M²
LOT 53 2326M²
LOT 54 2379M²
LOT 55 2432M²
LOT 56 1155M²
LOT 57 NETT 1600M²
LOT 58 NETT 7461M²
LOT 45 1485M²
LOT 46 1490M²
LOT 64 6838m²

EXISTING POND

MINOR FILLING TO BLEND POND EMBANKMENT INTO SURROUNDING GROUND

LOT 23 DP 328 RT NL60/267

STREAM DIVERSION

LOT 1 DP 8288 RT NL4A/119

Lot 2 DP 8288

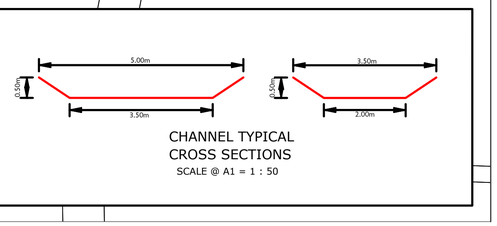
MARRIAGES ROAD

Part Lot 2 DP 1262

EARTHWORKS TO BE SET BACK 10m FROM THE EDGE OF THE WETLAND

TOTAL SITE CUT 117 000M³
TOTAL SITE FILL 146 000M³

EXTRA TOTAL FILL REQUIRED
LOW WESTERN LAA
17800M³ - 5000M3 SW CHANNELS = 12800M³



CHANNEL TYPICAL CROSS SECTIONS
SCALE @ A1 = 1 : 50

REV.	DRAWN	DATE	NOTE

CLIENT

TASMAN BAY ESTATES LTD

DESIGNED	**RJG**
DRAWN	**MDW**
REVIEWED	**SE**
APPROVED	
STATUS	
SCALE	**1:1500 [A1] 1500**

STORMWATER MANAGEMENT PLAN & WASTEWATER LAND APPLICATION AREAS

Application Plan

PROJECT	SET	SHEET	REV.
11460	**1**	**13**	**A**

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Appendix B – Aerial Photographs

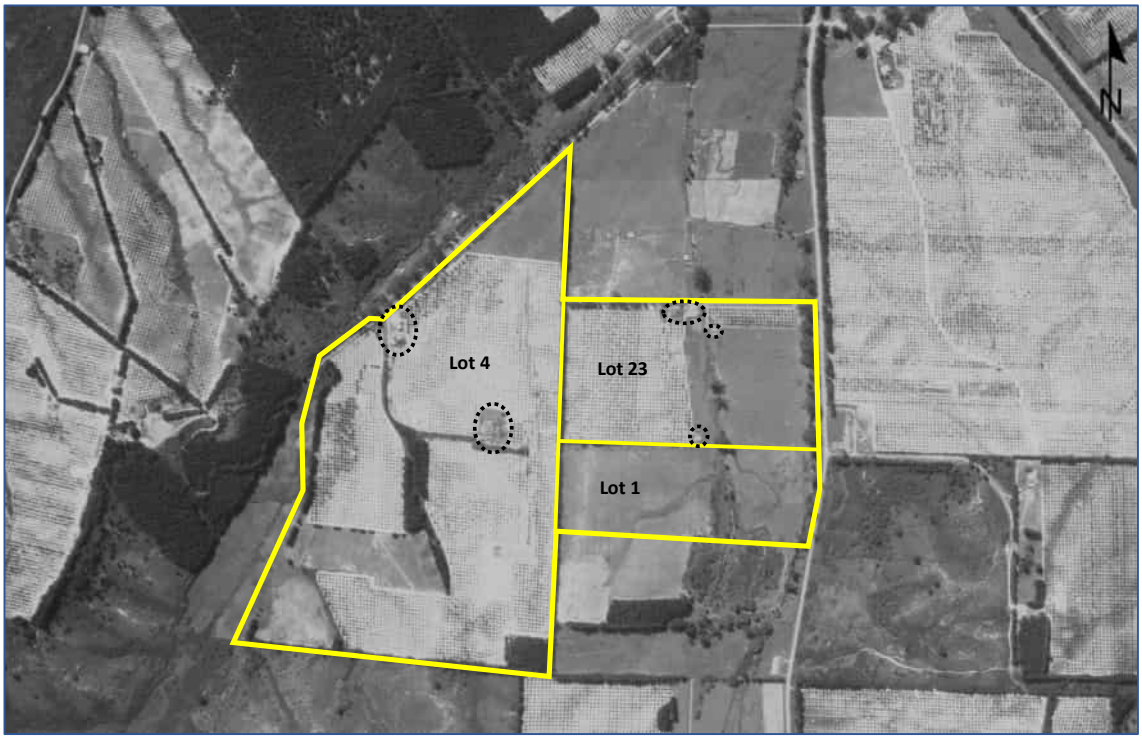

Figure B1: Retrolens, 1940. Circled features are referred to in Section 4 of the DSI report.

Figure B2: TDC GIS, 1940s

Figure B3: Retrolens, 1958

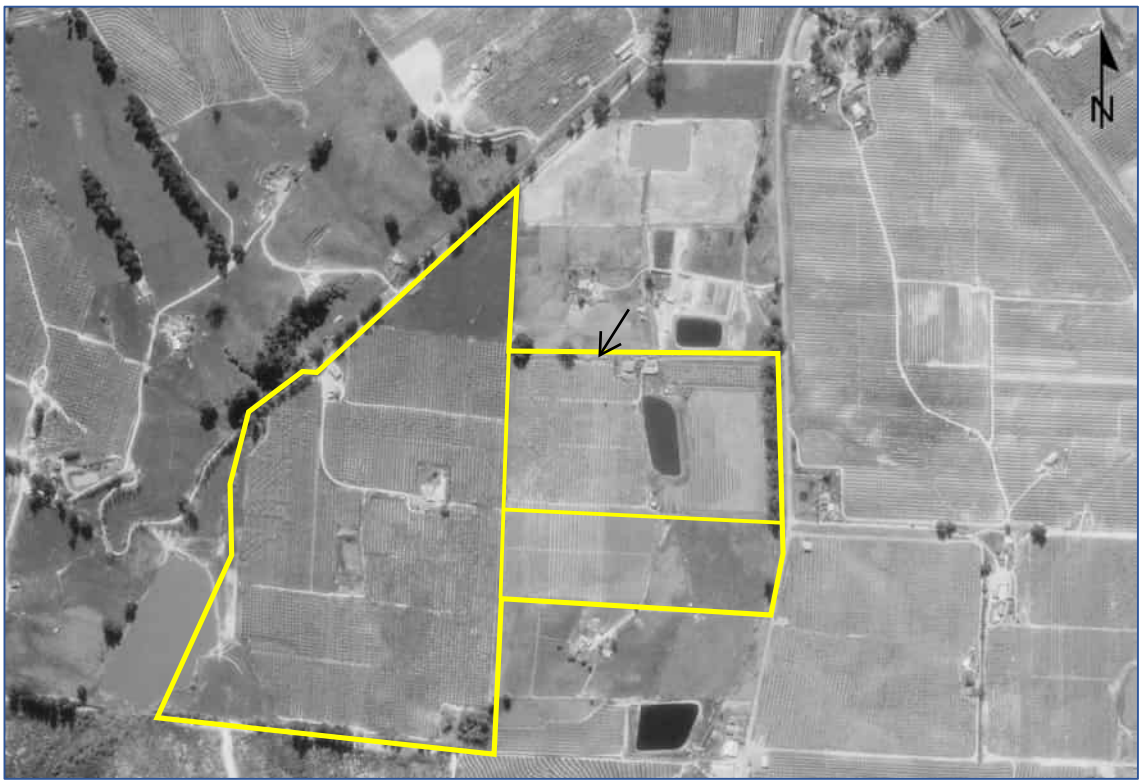

Figure B4: Retrolens, 1985. Former inferred spray mixing area highlighted by arrow within Lot 23.

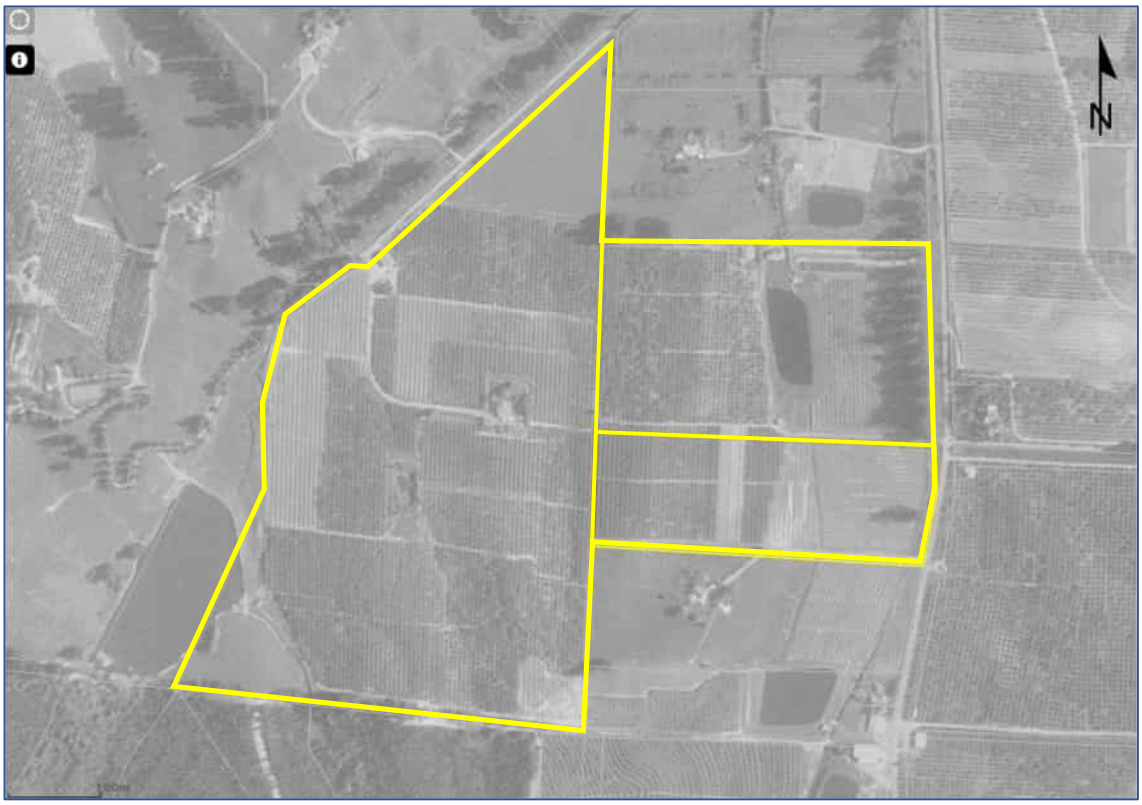

Figure B5: TDC GIS, 1980s

Figure B6: Retrolens, 2000

Figure B7: Google Earth, 2003

Figure B8: Google Earth, 2018

Figure B9: Google Earth, 2019

Figure B10: Google Earth, 2020

Appendix C – Figure C1: Soil Sample Location Plan and Tables C1 and C2: Results Summary

Figure C1: Soil sample location plan - October 2022

Red highlighted locations reported an arsenic concentration above the NESCS residential (10%) criterion for arsenic

Green highlighted locations reported contaminant concentrations below the NESCS residential (10%) produce criteria

Note: locations are approximate, based on GPS output

NOTES

1. LOT AREAS SHOWN ARE NET AREAS NOT INCLUDING ANY SHARE OF THE RIGHT OF WAY OWNERSHIP.
2. NO UNDERLYING EASEMENTS
3. AMALGAMATION CONDITIONS:
   THAT LOTS 59, 60, 61, 62 & LOT 63 HEREON BE HELD TOGETHER IN ONE COMPUTER FREEHOLD REGISTER

CONCRETED ROAD AREAS

PERMANANTLY SURFACED CARRIAGEWAY AND FOOTPATH

STAGING BOUNDARIES

STAGE 1
STAGE 2
STAGE 3
STAGE 4
STAGE 5

PROPOSED ROAD 1 AND MARRIAGES ROAD INTERSECTION DETAILS

REV.	DRAWN	DATE	NOTE

CLIENT

TASMAN BAY ESTATES LTD

DESIGNED	RJG
DRAWN	MDW
REVIEWED	SE
APPROVED	
STATUS	
SCALE	1:1250 [A1] 625

SUBDIVISION AND ROADING LAYOUT PLAN

LOTS 1 - 64 BEING PROPOSED SUBDIVISION OF LOT 14 DP 324764, LOT 4 DP 2172, LOT 1 DP 8288, LOTS 20, 21 & 23 DP 328 & Pt LOTS 3, 5 & 6 DP 328

PROJECT	SET	SHEET	REV.
11460	1	2	A

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Table C1: Results Summary (continued over page)

Sample Reference	Laboratory Number	Sample Date	Sample depth	Parameter (mg/kg dry wt)			
				Arsenic	Copper	Lead	Mercury
1	3120041.1	20/10/22	0 - 75 mm	< 2	7	14.4	< 0.10
2	3120041.2	20/10/22	0 - 75 mm	6	9	25	-
3	3120041.3	20/10/22	0 - 75 mm	4	8	16.6	-
4	3120041.4	20/10/22	0 - 75 mm	3	7	15	-
5	3120041.5	20/10/22	0 - 75 mm	4	12	25	-
6	3120041.6	20/10/22	0 - 75 mm	7	13	28	-
7	3120041.7	20/10/22	0 - 75 mm	11	14	55	-
8	3120041.8	20/10/22	0 - 75 mm	9	18	57	-
9	3120041.9	20/10/22	0 - 75 mm	6	16	40	-
10	3120041.10	20/10/22	0 - 75 mm	14	16	74	-
11	3120041.11	20/10/22	0 - 75 mm	12	14	58	< 0.10
12	3120041.12	20/10/22	0 - 75 mm	4	10	18.7	-
13	3120041.13	20/10/22	0 - 75 mm	4	9	23	-
14	3120041.14	20/10/22	0 - 75 mm	17	13	81	-
16	3120041.15	20/10/22	0 - 75 mm	11	10	67	-
17	3120041.16	20/10/22	0 - 75 mm	19	13	85	-
18	3120041.17	20/10/22	0 - 75 mm	16	13	74	-
19	3120041.18	20/10/22	0 - 75 mm	9	13	41	-
20	3120041.19	20/10/22	0 - 75 mm	5	12	21	-
21	3120041.20	20/10/22	0 - 75 mm	4	10	21	< 0.10
22	3120041.21	20/10/22	0 - 75 mm	17	19	81	-
23	3120041.22	20/10/22	0 - 75 mm	12	16	67	-
24	3120041.23	20/10/22	0 - 75 mm	11	16	61	-
25	3120041.24	20/10/22	0 - 75 mm	13	17	73	-
26	3120041.25	20/10/22	0 - 75 mm	15	17	69	-
27	3120041.26	20/10/22	0 - 75 mm	4	9	18.8	-
28	3120041.27	20/10/22	0 - 75 mm	3	10	18	-
29	3120041.28	20/10/22	0 - 75 mm	6	11	22	-
30	3120041.29	20/10/22	0 - 75 mm	10	11	54	-
31	3120041.30	20/10/22	0 - 75 mm	19	11	60	0.12
32	3120041.31	20/10/22	0 - 75 mm	16	14	87	-
33	3120041.32	20/10/22	0 - 75 mm	15	19	85	-
34	3120041.33	20/10/22	0 - 75 mm	18	18	81	-
35	3120041.34	20/10/22	0 - 75 mm	12	19	60	-
36	3120041.35	20/10/22	0 - 75 mm	11	18	57	-
37	3120041.36	20/10/22	0 - 75 mm	6	15	32	-
38	3120041.37	20/10/22	0 - 75 mm	17	22	100	-
39	3120041.38	20/10/22	0 - 75 mm	8	10	34	-
40	3120041.39	20/10/22	0 - 75 mm	9	14	42	-
41	3120041.40	20/10/22	0 - 75 mm	4	11	22	< 0.10
42	3120041.41	20/10/22	0 - 75 mm	5	11	26	-
43	3120041.42	20/10/22	0 - 75 mm	11	14	47	-
44	3120041.43	20/10/22	0 - 75 mm	18	17	88	-
45	3120041.44	20/10/22	0 - 75 mm	10	12	49	-
46	3120041.45	20/10/22	0 - 75 mm	6	19	44	-
47	3120041.46	20/10/22	0 - 75 mm	15	17	69	-
48	3120041.47	20/10/22	0 - 75 mm	16	17	76	-
49	3120041.48	20/10/22	0 - 75 mm	14	12	58	-
50	3120041.49	20/10/22	0 - 75 mm	16	11	63	-
51	3120041.50	20/10/22	0 - 75 mm	8	12	34	< 0.10
52	3120041.51	20/10/22	0 - 75 mm	13	12	59	-
53	3120041.52	20/10/22	0 - 75 mm	16	12	75	-
54	3120041.53	20/10/22	0 - 75 mm	15	16	78	-
55	3120041.54	20/10/22	0 - 75 mm	**24**	20	86	-
56	3120041.55	20/10/22	0 - 75 mm	15	21	84	-
57	3120041.56	20/10/22	0 - 75 mm	12	12	70	-
58	3120041.57	20/10/22	0 - 75 mm	13	12	73	-
59	3120041.58	20/10/22	0 - 75 mm	15	19	77	-
60	3120041.59	20/10/22	0 - 75 mm	20	22	72	-
NESCS Residential, 10% produce (mg/kg)				20	> 10,000	210	310
95th percentile background and revised cleanfill (mg/kg)				9.5	55	21	-

- red highlighted results exceed NESCS residential criteria
- yellow shaded results exceed recommended background and cleanfill criteria

Table C1: Results Summary

Sample Reference	Laboratory Number	Sample Date	Sample depth	Parameter (mg/kg dry wt)			
				Arsenic	Copper	Lead	Mercury
61	3120041.60	21/10/22	0 - 75 mm	17	36	92	< 0.10
62	3120041.61	21/10/22	0 - 75 mm	10	22	52	-
63	3120041.62	21/10/22	0 - 75 mm	17	32	78	-
64	3120041.63	21/10/22	0 - 75 mm	11	25	66	-
65	3120041.64	21/10/22	0 - 75 mm	13	26	67	-
66	3120041.65	21/10/22	0 - 75 mm	22	36	96	-
67	3120041.66	21/10/22	0 - 75 mm	2	4	12.1	-
68	3120041.67	21/10/22	0 - 75 mm	2	4	11.2	-
69	3120041.68	21/10/22	0 - 75 mm	3	5	14.7	-
70	3120041.69	21/10/22	0 - 75 mm	3	5	16.7	-
71	3120041.70	21/10/22	0 - 75 mm	3	6	12.7	< 0.10
72	3120041.71	21/10/22	0 - 75 mm	2	5	10.2	-
73	3120041.72	21/10/22	0 - 75 mm	2	5	10.7	-
74	3120041.73	21/10/22	0 - 75 mm	3	6	12.6	-
75	3120041.74	21/10/22	0 - 75 mm	16	32	90	-
76	3120041.75	21/10/22	0 - 75 mm	20	34	87	-
77	3120041.76	21/10/22	0 - 75 mm	14	27	74	-
78	3120041.77	21/10/22	0 - 75 mm	18	34	99	-
79	3120041.78	21/10/22	0 - 75 mm	21	38	121	-
80	3120041.79	21/10/22	0 - 75 mm	25	44	134	-
81	3120041.80	21/10/22	0 - 75 mm	20	44	119	0.13
82	3120041.81	21/10/22	0 - 75 mm	22	47	127	-
83	3120041.82	21/10/22	0 - 75 mm	20	43	127	-
84	3120041.83	21/10/22	0 - 75 mm	20	45	130	-
85	3120041.84	21/10/22	0 - 75 mm	17	40	114	-
86	3120041.85	21/10/22	0 - 75 mm	19	36	100	-
87	3120041.86	21/10/22	0 - 75 mm	8	23	44	-
88	3120041.87	21/10/22	0 - 75 mm	2	6	10.5	-
89	3120041.88	21/10/22	0 - 75 mm	2	6	9.6	-
90	3120041.89	21/10/22	0 - 75 mm	2	6	9.9	-
91	3120041.90	21/10/22	0 - 75 mm	2	5	10.2	< 0.10
92	3120041.91	21/10/22	0 - 75 mm	< 2	4	6.7	-
93	3120041.92	21/10/22	0 - 75 mm	2	5	10.9	-
94	3120041.93	21/10/22	0 - 75 mm	2	5	11.2	-
96	3120041.94	21/10/22	0 - 75 mm	21	47	120	-
97	3120041.95	21/10/22	0 - 75 mm	26	49	127	-
98	3120041.96	21/10/22	0 - 75 mm	25	54	147	-
99	3120041.97	21/10/22	0 - 75 mm	21	53	133	-
NESCS Residential, 10% produce (mg/kg)				20	> 10,000	210	310
95th percentile background and revised cleanfill (mg/kg)				9.5	55	21	-

- red highlighted results exceed NESCS residential criteria
- yellow shaded results exceed recommended background and cleanfill criteria

Table C2: Results Summary - spray mixing area

Sample Reference	Laboratory Number	Sample Date	Sample depth	Parameter (mg/kg dry wt)					
				Arsenic	Copper	Lead	Mercury	DDT (total)	Lindane
A	3120041.98	21/10/22	0 - 75 mm	12	27	62	0.22	-	-
B	3120041.99	21/10/22	0 - 75 mm	37	67	191	3.1	-	-
M1	3482481.3	21/10/22	0 - 75 mm	-	-	-	-	103	0.32
M2	3482481.1	21/10/22	0 - 75 mm	-	-	-	-	30	<0.011
M3	3482481.2	21/10/22	0 - 75 mm	-	-	-	-	12	<0.012
NESCS Residential, 10% produce (mg/kg)				20	> 10,000	210	310	70	140*
95th percentile background and revised cleanfill (mg/kg)				9.5	55	21	-	0.7	-

* Reference: Identifying, Investigating and Managing Risks Associated with Former Sheep-dip Sites (MfE, 2006).
Table 4: Soil guideline values for human health 'standard residential'

- red highlighted results exceed NESCS residential criteria

- yellow shaded results exceed recommended background and cleanfill criteria

Appendix D – Analytical Results (Hill Laboratories)

Hill Laboratories
TRIED, TESTED AND TRUSTED

R J Hill Laboratories Limited
28 Duke Street Frankton 3204
Private Bag 3205
Hamilton 3240 New Zealand

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E mail@hill-labs.co.nz
W www.hill-laboratories.com

Certificate of Analysis

Client:	Geo-Environmental Consultants (NZ) Limited	**Lab No:**	3120041	SPv1
Contact:	K Franklin	**Date Received:**	21-Nov-2022	
		Date Reported:	25-Nov-2022	
		Quote No:		
		Order No:		
		Client Reference:	TBE-01	
		Submitted By:	K Franklin	

Sample Type: Soil

	Sample Name:	1 20-Oct-2022	2 20-Oct-2022	3 20-Oct-2022	4 20-Oct-2022	5 20-Oct-2022
	Lab Number:	3120041.1	3120041.2	3120041.3	3120041.4	3120041.5
Total Recoverable Arsenic	mg/kg dry wt	< 2	6	4	3	4
Total Recoverable Copper	mg/kg dry wt	7	9	8	7	12
Total Recoverable Lead	mg/kg dry wt	14.4	25	16.6	15.0	25
Total Recoverable Mercury	mg/kg dry wt	< 0.10	-	-	-	-

	Sample Name:	6 20-Oct-2022	7 20-Oct-2022	8 20-Oct-2022	9 20-Oct-2022	10 20-Oct-2022
	Lab Number:	3120041.6	3120041.7	3120041.8	3120041.9	3120041.10
Total Recoverable Arsenic	mg/kg dry wt	7	11	9	6	14
Total Recoverable Copper	mg/kg dry wt	13	14	18	16	16
Total Recoverable Lead	mg/kg dry wt	28	55	57	40	74

	Sample Name:	11 20-Oct-2022	12 20-Oct-2022	13 20-Oct-2022	14 20-Oct-2022	16 20-Oct-2022
	Lab Number:	3120041.11	3120041.12	3120041.13	3120041.14	3120041.15
Total Recoverable Arsenic	mg/kg dry wt	12	4	4	17	11
Total Recoverable Copper	mg/kg dry wt	14	10	9	13	10
Total Recoverable Lead	mg/kg dry wt	58	18.7	23	81	67
Total Recoverable Mercury	mg/kg dry wt	< 0.10	-	-	-	-

	Sample Name:	17 20-Oct-2022	18 20-Oct-2022	19 20-Oct-2022	20 20-Oct-2022	21 20-Oct-2022
	Lab Number:	3120041.16	3120041.17	3120041.18	3120041.19	3120041.20
Total Recoverable Arsenic	mg/kg dry wt	19	16	9	5	4
Total Recoverable Copper	mg/kg dry wt	13	13	13	12	10
Total Recoverable Lead	mg/kg dry wt	85	74	41	21	21
Total Recoverable Mercury	mg/kg dry wt	-	-	-	-	< 0.10

	Sample Name:	22 20-Oct-2022	23 20-Oct-2022	24 20-Oct-2022	25 20-Oct-2022	26 20-Oct-2022
	Lab Number:	3120041.21	3120041.22	3120041.23	3120041.24	3120041.25
Total Recoverable Arsenic	mg/kg dry wt	17	12	11	13	15
Total Recoverable Copper	mg/kg dry wt	19	16	16	17	17
Total Recoverable Lead	mg/kg dry wt	81	67	61	73	69

	Sample Name:	27 20-Oct-2022	28 20-Oct-2022	29 20-Oct-2022	30 20-Oct-2022	31 20-Oct-2022
	Lab Number:	3120041.26	3120041.27	3120041.28	3120041.29	3120041.30
Total Recoverable Arsenic	mg/kg dry wt	4	3	6	10	19
Total Recoverable Copper	mg/kg dry wt	9	10	11	11	11
Total Recoverable Lead	mg/kg dry wt	18.8	18.0	22	54	60
Total Recoverable Mercury	mg/kg dry wt	-	-	-	-	0.12

Sample Type: Soil						
	Sample Name:	32 20-Oct-2022	33 20-Oct-2022	34 20-Oct-2022	35 20-Oct-2022	36 20-Oct-2022
	Lab Number:	3120041.31	3120041.32	3120041.33	3120041.34	3120041.35
Total Recoverable Arsenic	mg/kg dry wt	16	15	18	12	11
Total Recoverable Copper	mg/kg dry wt	14	19	18	19	18
Total Recoverable Lead	mg/kg dry wt	87	85	81	60	57

	Sample Name:	37 20-Oct-2022	38 20-Oct-2022	39 20-Oct-2022	40 20-Oct-2022	41 20-Oct-2022
	Lab Number:	3120041.36	3120041.37	3120041.38	3120041.39	3120041.40
Total Recoverable Arsenic	mg/kg dry wt	6	17	8	9	4
Total Recoverable Copper	mg/kg dry wt	15	22	10	14	11
Total Recoverable Lead	mg/kg dry wt	32	100	34	42	22
Total Recoverable Mercury	mg/kg dry wt	-	-	-	-	< 0.10

	Sample Name:	42 20-Oct-2022	43 20-Oct-2022	44 20-Oct-2022	45 20-Oct-2022	46 20-Oct-2022
	Lab Number:	3120041.41	3120041.42	3120041.43	3120041.44	3120041.45
Total Recoverable Arsenic	mg/kg dry wt	5	11	18	10	6
Total Recoverable Copper	mg/kg dry wt	11	14	17	12	19
Total Recoverable Lead	mg/kg dry wt	26	47	88	49	44

	Sample Name:	47 20-Oct-2022	48 20-Oct-2022	49 20-Oct-2022	50 20-Oct-2022	51 20-Oct-2022
	Lab Number:	3120041.46	3120041.47	3120041.48	3120041.49	3120041.50
Total Recoverable Arsenic	mg/kg dry wt	15	16	14	16	8
Total Recoverable Copper	mg/kg dry wt	17	17	12	11	12
Total Recoverable Lead	mg/kg dry wt	69	76	58	63	34
Total Recoverable Mercury	mg/kg dry wt	-	-	-	-	< 0.10

	Sample Name:	52 20-Oct-2022	53 20-Oct-2022	54 20-Oct-2022	55 20-Oct-2022	56 20-Oct-2022
	Lab Number:	3120041.51	3120041.52	3120041.53	3120041.54	3120041.55
Total Recoverable Arsenic	mg/kg dry wt	13	16	15	24	15
Total Recoverable Copper	mg/kg dry wt	12	12	16	20	21
Total Recoverable Lead	mg/kg dry wt	59	75	78	86	84

	Sample Name:	57 20-Oct-2022	58 20-Oct-2022	59 20-Oct-2022	60 20-Oct-2022	61 21-Oct-2022
	Lab Number:	3120041.56	3120041.57	3120041.58	3120041.59	3120041.60
Total Recoverable Arsenic	mg/kg dry wt	12	13	15	20	17
Total Recoverable Copper	mg/kg dry wt	12	12	19	22	36
Total Recoverable Lead	mg/kg dry wt	70	73	77	72	92
Total Recoverable Mercury	mg/kg dry wt	-	-	-	-	< 0.10

	Sample Name:	62 21-Oct-2022	63 21-Oct-2022	64 21-Oct-2022	65 21-Oct-2022	66 WP122 21-Oct-2022
	Lab Number:	3120041.61	3120041.62	3120041.63	3120041.64	3120041.65
Total Recoverable Arsenic	mg/kg dry wt	10	17	11	13	22
Total Recoverable Copper	mg/kg dry wt	22	32	25	26	36
Total Recoverable Lead	mg/kg dry wt	52	78	66	67	96

	Sample Name:	67 21-Oct-2022	68 21-Oct-2022	69 21-Oct-2022	70 21-Oct-2022	71 21-Oct-2022
	Lab Number:	3120041.66	3120041.67	3120041.68	3120041.69	3120041.70
Total Recoverable Arsenic	mg/kg dry wt	2	2	3	3	3
Total Recoverable Copper	mg/kg dry wt	4	4	5	5	6
Total Recoverable Lead	mg/kg dry wt	12.1	11.2	14.7	16.7	12.7
Total Recoverable Mercury	mg/kg dry wt	-	-	-	-	< 0.10

	Sample Name:	72 21-Oct-2022	73 21-Oct-2022	74 21-Oct-2022	75 21-Oct-2022	76 21-Oct-2022
	Lab Number:	3120041.71	3120041.72	3120041.73	3120041.74	3120041.75
Total Recoverable Arsenic	mg/kg dry wt	2	2	3	16	20
Total Recoverable Copper	mg/kg dry wt	5	5	6	32	34
Total Recoverable Lead	mg/kg dry wt	10.2	10.7	12.6	90	87

	Sample Name:	77 21-Oct-2022	78 21-Oct-2022	79 21-Oct-2022	80 21-Oct-2022	81 21-Oct-2022
	Lab Number:	3120041.76	3120041.77	3120041.78	3120041.79	3120041.80
Total Recoverable Arsenic	mg/kg dry wt	14	18	21	25	20
Total Recoverable Copper	mg/kg dry wt	27	34	38	44	44
Total Recoverable Lead	mg/kg dry wt	74	99	121	134	119
Total Recoverable Mercury	mg/kg dry wt	-	-	-	-	0.13

Sample Type: Soil						
	Sample Name:	82 21-Oct-2022	83 21-Oct-2022	84 21-Oct-2022	85 21-Oct-2022	86 21-Oct-2022
	Lab Number:	3120041.81	3120041.82	3120041.83	3120041.84	3120041.85
Total Recoverable Arsenic	mg/kg dry wt	22	20	20	17	19
Total Recoverable Copper	mg/kg dry wt	47	43	45	40	36
Total Recoverable Lead	mg/kg dry wt	127	127	130	114	100

	Sample Name:	87 21-Oct-2022	88 21-Oct-2022	89 21-Oct-2022	90 21-Oct-2022	91 21-Oct-2022
	Lab Number:	3120041.86	3120041.87	3120041.88	3120041.89	3120041.90
Total Recoverable Arsenic	mg/kg dry wt	8	2	2	2	2
Total Recoverable Copper	mg/kg dry wt	23	6	6	6	5
Total Recoverable Lead	mg/kg dry wt	44	10.5	9.6	9.9	10.2
Total Recoverable Mercury	mg/kg dry wt	-	-	-	-	< 0.10

	Sample Name:	92 21-Oct-2022	93 21-Oct-2022	94 21-Oct-2022	96 21-Oct-2022	97 21-Oct-2022
	Lab Number:	3120041.91	3120041.92	3120041.93	3120041.94	3120041.95
Total Recoverable Arsenic	mg/kg dry wt	< 2	2	2	21	26
Total Recoverable Copper	mg/kg dry wt	4	5	5	47	49
Total Recoverable Lead	mg/kg dry wt	6.7	10.9	11.2	120	127

	Sample Name:	98 21-Oct-2022	99 21-Oct-2022	A 21-Oct-2022	B 21-Oct-2022	66 WP123 21-Oct-2022
	Lab Number:	3120041.96	3120041.97	3120041.98	3120041.99	3120041.102
Total Recoverable Arsenic	mg/kg dry wt	25	21	12	37	5
Total Recoverable Copper	mg/kg dry wt	54	53	27	67	8
Total Recoverable Lead	mg/kg dry wt	147	133	62	191	23
Total Recoverable Mercury	mg/kg dry wt	-	-	0.22	3.1	-

Summary of Methods

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request. Unless otherwise indicated, analyses were performed at Hill Laboratories, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Environmental Solids Sample Drying*	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1-99, 102
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation May contain a residual moisture content of 2-5%.	-	1-99, 102
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	1-99, 102
Total Recoverable Arsenic	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	2 mg/kg dry wt	1-99, 102
Total Recoverable Copper	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	2 mg/kg dry wt	1-99, 102
Total Recoverable Lead	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	0.4 mg/kg dry wt	1-99, 102
Total Recoverable Mercury	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	0.10 mg/kg dry wt	1, 11, 20, 30, 40, 50, 60, 70, 80, 90, 98-99

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Testing was completed between 24-Nov-2022 and 25-Nov-2022. For completion dates of individual analyses please contact the laboratory.

Samples are held at the laboratory after reporting for a length of time based on the stability of the samples and analytes being tested (considering any preservation used), and the storage space available. Once the storage period is completed, the samples are discarded unless otherwise agreed with the customer. Extended storage times may incur additional charges.

This certificate of analysis must not be reproduced, except in full, without the written consent of the signatory.

Ara Heron BSc (Tech)
Client Services Manager - Environmental

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Certificate of Analysis

Client:	Geo-Environmental Consultants (NZ) Limited	**Lab No:**	3482481 SPv1
Contact:	K Franklin	**Date Received:**	29-Feb-2024
		Date Reported:	06-Mar-2024
		Quote No:	
		Order No:	22-015
		Client Reference:	
		Submitted By:	K Franklin

Sample Type: Soil

	Sample Name:	M2 28-Feb-2024	M3 28-Feb-2024	M1 28-Feb-2024
	Lab Number:	3482481.1	3482481.2	3482481.3
Individual Tests				
Dry Matter	g/100g as rcvd	92	92	88
Organochlorine Pesticides Screening in Soil				
Aldrin	mg/kg dry wt	< 0.011	< 0.011	< 0.012
alpha-BHC	mg/kg dry wt	0.021	< 0.011	< 0.012
beta-BHC	mg/kg dry wt	0.193	< 0.011	< 0.012
delta-BHC	mg/kg dry wt	0.075	< 0.011	< 0.012
gamma-BHC (Lindane)	mg/kg dry wt	0.32	< 0.011	< 0.012
cis-Chlordane	mg/kg dry wt	< 0.011	< 0.011	< 0.012
trans-Chlordane	mg/kg dry wt	< 0.011	< 0.011	< 0.012
2,4'-DDD	mg/kg dry wt	2.2	1.87	2.3
4,4'-DDD	mg/kg dry wt	4.3	4.5	3.1
2,4'-DDE	mg/kg dry wt	< 0.11	0.023	0.136
4,4'-DDE	mg/kg dry wt	1.32	0.96	22
2,4'-DDT	mg/kg dry wt	4.8	0.77	14.5
4,4'-DDT	mg/kg dry wt	17.3	3.9	61
Total DDT Isomers	mg/kg dry wt	30	12.0	103
Dieldrin	mg/kg dry wt	< 0.011	< 0.011	< 0.012
Endosulfan I	mg/kg dry wt	< 0.011	< 0.011	< 0.012
Endosulfan II	mg/kg dry wt	< 0.011	< 0.011	< 0.012
Endosulfan sulphate	mg/kg dry wt	< 0.011	< 0.011	< 0.012
Endrin	mg/kg dry wt	< 0.011	< 0.011	< 0.012
Endrin aldehyde	mg/kg dry wt	< 0.011	< 0.011	< 0.012
Endrin ketone	mg/kg dry wt	< 0.011	< 0.011	< 0.012
Heptachlor	mg/kg dry wt	< 0.011	< 0.011	< 0.012
Heptachlor epoxide	mg/kg dry wt	< 0.011	< 0.011	< 0.012
Hexachlorobenzene	mg/kg dry wt	< 0.011	< 0.011	< 0.012
Methoxychlor	mg/kg dry wt	< 0.011	< 0.011	< 0.012

Summary of Methods

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request. Unless otherwise indicated, analyses were performed at Hill Labs, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Soil

Test	Method Description	Default Detection Limit	Sample No
Organochlorine Pesticides Screening in Soil	Sonication extraction, GC-ECD analysis. Tested on as received sample. In-house based on US EPA 8081.	0.010 - 0.06 mg/kg dry wt	1-3
Dry Matter	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed). US EPA 3550.	0.10 g/100g as rcvd	1-3

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Testing was completed between 02-Mar-2024 and 06-Mar-2024. For completion dates of individual analyses please contact the laboratory.

Samples are held at the laboratory after reporting for a length of time based on the stability of the samples and analytes being tested (considering any preservation used), and the storage space available. Once the storage period is completed, the samples are discarded unless otherwise agreed with the customer. Extended storage times may incur additional charges.

This certificate of analysis must not be reproduced, except in full, without the written consent of the signatory.

Martin Cowell - BSc
Client Services Manager - Environmental

Appendix E – Figure E1: Contaminant Distribution

C:\12dSynergy\data\SQL01\11460_106053\12d\Engineering Design Plan Drawings.12dmodel\Engineering Design Plan Drawings [Tue Apr 9 07:42:35 2024] [MDW]

Figure E1: Contaminant Distribution and Proposed Remediation

Legend

- **Green**: No remediation required – results below NESCS and background criteria
- **Orange**: Soil management required during the earthworks programme to control the disturbance and redistribution of soil that typically reported contaminant concentrations below NESCS criteria but above background criteria
- **Red**: Remediation required – results above NESCS criteria and background criteria associated with the former spray mixing area

NOTES

1. LOT AREAS SHOWN ARE NET AREAS NOT INCLUDING ANY SHARE OF THE RIGHT OF WAY OWNERSHIP.
2. NO UNDERLYING EASEMENTS
3. AMALGAMATION CONDITIONS:
   THAT LOTS 59, 60, 61, 62 & LOT 63 HEREON BE HELD TOGETHER IN ONE COMPUTER FREEHOLD REGISTER

CONCRETED ROAD AREAS

PERMANANTLY SURFACED CARRIAGEWAY AND FOOTPATH

STAGING BOUNDARIES

STAGE 1
STAGE 2
STAGE 3
STAGE 4
STAGE 5

PROPOSED ROAD 1 AND MARRIAGES ROAD INTERSECTION DETAILS

REV.	DRAWN	DATE	NOTE

CLIENT

TASMAN BAY ESTATES LTD

DESIGNED	RJG
DRAWN	MDW
REVIEWED	SE
APPROVED	
STATUS	
SCALE	1:1250 [A1] 625

SUBDIVISION AND ROADING LAYOUT PLAN

LOTS 1 - 64 BEING PROPOSED SUBDIVISION OF LOT 14 DP 324764, LOT 4 DP 2172, LOT 1 DP 8288, LOTS 20, 21 & 23 DP 328 & Pt LOTS 3, 5 & 6 DP 328

PROJECT	SET	SHEET	REV.
11460	1	2	A

eliot sinclair