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## Memorandum

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To	<b>Andrew McCarthy</b>	From	<b>Shane Lander</b>
Email	s 9(2)(a)	Date	<b>12 February 2021</b>
Company	<b>Oyster Capital Limited</b>	Reference	<b>J00784_Rev B</b>
cc		Pages	<b>1 of 4</b>
Subject	<b>Geotechnical Memorandum – Oyster Capital Fast Track Referral Application – Waihoehoe Road, Drury East</b>		

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## 1 INTRODUCTION

Oyster Capital ("Oyster") propose to lodge an application for a referred project under the Covid-19 Recovery (Fast-track Consenting) Act 2020 (the "Act") to utilise the fast-track consenting process via an expert consenting panel. This application relates to the development of a contiguous landholding at 76, 76A, 116, 136 and 140 Waihoehoe Road ("the site"). This landholding forms part of a larger land area within Drury East that is currently subject to a private plan change process - Waihoehoe Precinct Private Plan Change ("PC50") - to rezone the land from Future Urban to the Terraced Housing and Apartment zone under the Auckland Unitary Plan ("AUP") which will enable quality urban development and well-functioning urban environments. Oyster has a sale and purchase agreement for the site, and has full control of the site for the purpose of rezoning and future residential development. This proposal for a referred project will give effect to the purpose of the Act to promote employment and New Zealand's recovery to the economic and social impacts of Covid-19 through enabling the construction and delivery of a comprehensive development that offers employment opportunities and an accelerated supply of quality housing choice and diversity.

To support the application for a referred project, this memo provides a high-level review of the geotechnical aspects of the proposal, including:

- Summary of the proposal and site description;
- Summary of work completed to date;
- High level geotechnical assessment of proposal; and
- Overview of works required to achieve the proposal.

## 2 SITE DESCRIPTION AND PROPOSAL

### 2.1 Site Description

The site comprises 34.65ha of land at 76, 76A, 116, 136 and 140 Waihoehoe Road which is currently zoned Future Urban ("FUZ") under the AUP.

The geomorphology / topography of the site is defined as featureless alluvial plains, apart from shallow manmade farm drains / drainage ditches.

Edbrooke, S. W. Institute of Geological and Nuclear Sciences. *Geology of the Auckland Area*: Scale 1:250,000. geological map 3. 2001 describes the lithology as Puketoka formation soils consisting of Pliocene to Pleistocene alluvial sedimentary soils. Composition includes inorganic rock derived sediments, pumiceous sediments and organic and peat soils. The Puketoka formation is generally more consolidated and therefore stiffer than younger Tauranga group soils.

**Figure 1** shows the regional geological units in relation to the site. The site is contained within the Blue outline below (refer **attached** HUE Limited figures also).



## 2.2 Proposal

Oyster are proposing the staged development of this land into a mix of terrace and detached housing, 9 residential superlots and supporting roading and servicing infrastructure. A total of 376 dwellings are proposed.

The HUE Limited Figures **attached** depicts the Masterplan.

## 3 BACKGROUND ANALYSIS

Fieldwork was undertaken in No 116 Waihoehoe Road on 21 and 22 January 2019 and involved the drilling of 12 hand auger boreholes to depths of up to 5 metres, plus CPT (Cone Penetration Test) soundings to depths of up to 14m.

Laboratory testing comprising soil plasticity (Atterberg Limit) and particle size distributions to characterise soil composition were also undertaken.

Published geology maps (Section 2.1 above) show that Puketoka Formation soils are present beneath the entire study area which were confirmed by the preliminary site investigations. It is sensible to conclude that ground conditions identified via the site investigations in No. 116 Waihoehoe Road will persist across the entire site.

## **4 ASSESSMENT**

### **4.1 Liquefaction Assessment**

#### **4.1.1 Earthquake Risk and Liquefaction Potential**

A seismic liquefaction assessment has been carried out in accordance with the guidelines of MBIE module 3. PGA (peak ground acceleration) was determined in accordance with NZS 1170.5 – 2004, assuming Class C soils across the site (based on our investigation). Calculations also take account for the seismic reduction factor of 0.65. Building Importance Level 2 has been assumed and based on this, a SLS (1/25yr return period) and ULS (1/500yr return period) PGA have been calculated as 0.03g and 0.12g respectively.

This analysis confirms that under an ULS earthquake the calculated maximum vertical settlements are up to 140mm. The maximum Liquefaction Potential Index (LPI) and Liquefaction Severity Number (LSN) are up to 1.546 and 20.416 respectively. These LPI and LSN figures indicate that a performance level of L2 can be assumed (based on Module 3 Guidelines, Table 5.1) and thus liquefaction effects can be considered to be moderate.

The zone of liquefaction is beyond 4m depth. It is considered likely the liquefaction induced settlement will occur relatively uncommonly (i.e. in a total fashion) across the landform, and accordingly excessive differential settlements are unlikely to be a cause for concern, as indicated by the SLS results. However, because of the potential for total settlements any subdivision will need to be designed with this in mind, with regard to overland flows and flood plains.

No lateral displacements have been calculated as the landform for the site is a featureless alluvial plan (which is overall flat).

#### **4.1.2 Soil Composition and Liquefaction Susceptibility**

In soils consisting of greater than 30% fines (classified as dry mass passing through a 0.075mm sieve consistent with the particle size distribution tests carried out), liquefaction susceptibility can be classified as follows:

- Plasticity Index < 7: Susceptible to liquefaction;
- 7 < Plasticity Index < 12: Potentially susceptible to liquefaction;
- Plasticity Index > 12: Not susceptible to liquefaction.

The preliminary Atterberg classification results from the near surface soils indicate that the near surface soils are not susceptible to liquefaction, as Plasticity Indexes were reported in excess of 40 (i.e. >12).

### **4.2 Foundations for Buildings**

#### **4.2.1 Bearing Capacity**

Bearing capacity is expected to be in accordance with the limitations imposed by NZS 3604 where 300kPa geotechnical ultimate bearing capacity should be adopted. Softer ground or lenses of organics

which can occur in Puketoka Formation can pose constraints to NZS3604 building foundations and residential end use, necessitating remediation during earthworks construction or specifically designed foundation solutions (i.e. “raft” foundations).

#### 4.2.2 Expansive Soils

The soils are likely to fall within MBIE Class M to H expansive Site Class, and this is subject to laboratory testing of soil samples collected during later more intensive investigation for the Resource Consent phase(s). Foundation design for end use will mitigate adverse effects from expansive soils via structural design.

### 4.3 Earthworks and Infrastructure

The natural deposits encountered across the site are typically of high strength and have good engineering characteristics for service line foundations and earthworks handling.

## 5 CONCLUSIONS

The site comprises topography and ground conditions that are reasonably well understood geotechnically. Precedence in this type of geology has been set via large residential developments in similar geology nearby to Drury East (e.g. at Opaheke, Karaka & the Hingaia Peninsular). Provided there is due consideration to prevailing or perceived geotechnical issues during detailed site investigation for Resource Consent to support a subdivision scheme, then **the site is considered geotechnically suitable for the Masterplan.**

To support future development (i.e. Resource Consent / Subdivision design), further physical geotechnical site investigation that are commensurate with subdivision and earthworks scheme(s) should be undertaken to substantiate ground conditions and address any geotechnical constraints. Such investigations are expected to comprise (but are not limited to) further hand auger boreholes, trial pits using a hydraulic excavator, and soil sampling for laboratory testing.

For and on behalf of Lander Geotechnical Consultants Limited



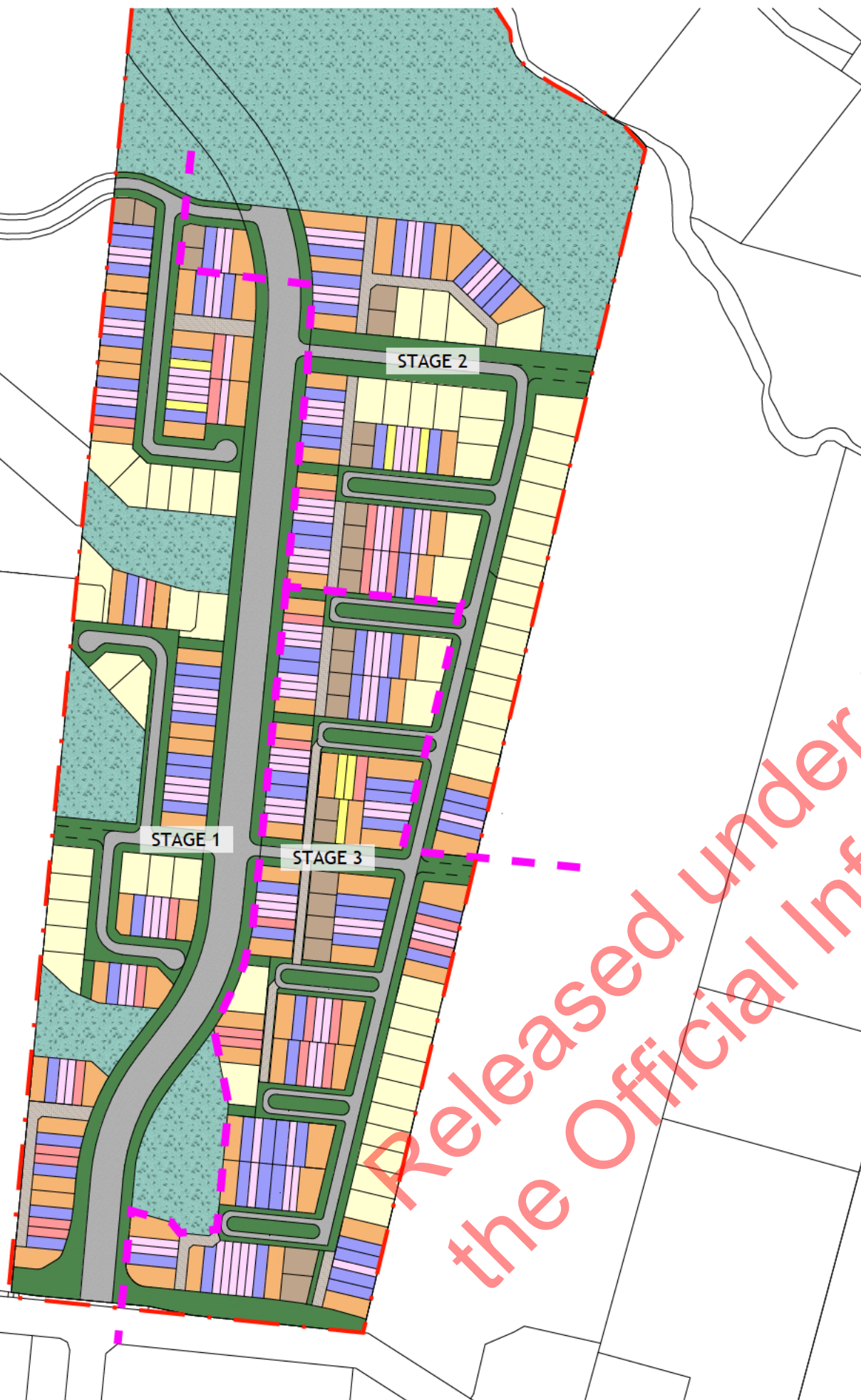


# LEGEND

- - - 76 & 76A WAIHOEHOE RD SITE BOUNDARY
- - - 116, 136 & 140 WAIHOEHOE RD SITE BOUNDARY

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	WAIHOEHOE ROAD MFE PROCESS	PAGE	1	AUTHOR	AM	DRAWING #	WAHH-MFE-100-1
		STATUS	DRAFT				



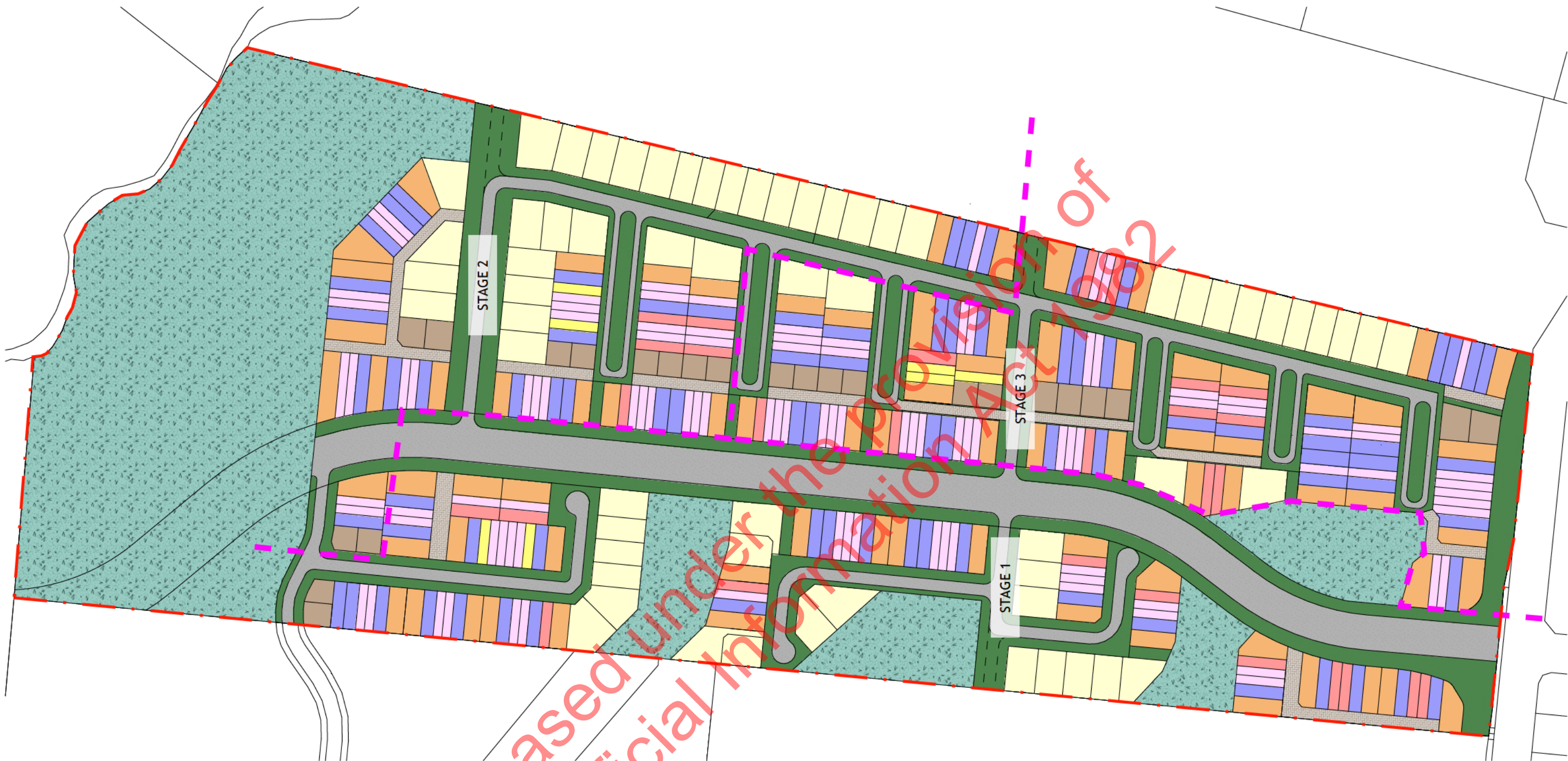


Stage 1	HUE - MfE	
	#	%
Detached	20	18%
7.5m Terrace	25	22%
Bookend Terrace	2	2%
6.5m Terrace	25	22%
5.3 Terrace	11	10%
5.1 Terrace	2	2%
4.5m Terrace	28	25%
Total Units	113	100%
Stage 2	HUE - MfE	
	#	%
Detached	28	25%
7.5m Terrace	17	15%
Bookend Terrace	10	9%
6.5m Terrace	21	19%
5.3 Terrace	5	4%
5.1 Terrace	2	2%
4.5m Terrace	30	27%
Total Units	113	100%
Stage 3	HUE - MfE	
	#	%
Detached	14	9%
7.5m Terrace	32	21%
Bookend Terrace	12	8%
6.5m Terrace	34	23%
5.3 Terrace	12	8%
5.1 Terrace	3	2%
4.5m Terrace	43	29%
Total Units	150	100%
GRAND TOTAL	376	

#### LEGEND

- STAGE BOUNDARIES
- 116, 136 & 140 WAIHOEHOE RD SITE BOUNDARY





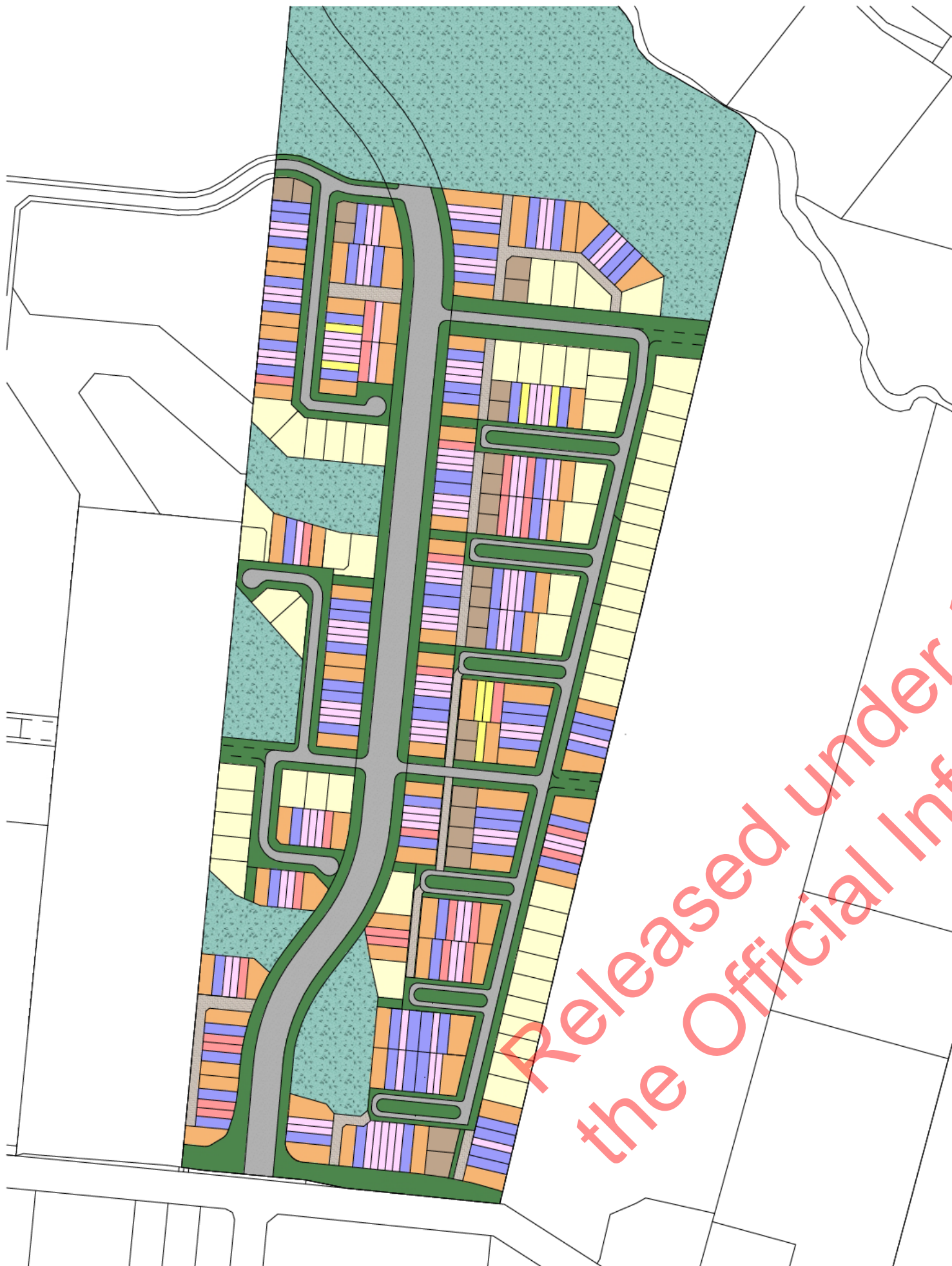
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	#	%		#	%		#	%	
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Bookend Terrace	2	2%	Bookend Terrace	10	9%	Bookend Terrace	12	8%	
6.5m Terrace	25	22%	6.5m Terrace	21	19%	6.5m Terrace	34	23%	
5.3 Terrace	11	10%	5.3 Terrace	5	4%	5.3 Terrace	12	8%	
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#### LEGEND

  STAGE BOUNDARIES

  116, 136 & 140 WAIHOEHOE RD SITE BOUNDARY





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	WAIHOEHOE ROAD MFE PROCESS	PAGE	6	AUTHOR	AM	DRAWING #	WAHH-MFE-105-1
		STATUS	DRAFT				