18 March 2020 Ref No: J00784

Barker and Associates Limited

Attention: Ms R Sanders

RE: Oyster Capital – Waihoehoe Plan Change Request

We write in response to your request dated 17 February 2020 for further information under Clause 23(1) to Schedule 1 of the Resource Management Act 1991 relating to the above private plan change request. This letter sets out our responses to the matters raised in your letter.

Request for further information	Reason for request	Lander Comments
5.1 Waihoehoe Private Plan Change Request Section 32 Assessment Report		
Please update this section based on updates to the GAR (refer Section 5.3 of this memo).	Page 55, Section 10.11: There are several comments in Section 5.3 of this (Council) memo that could result in updates to the Geotechnical Appraisal Report, such updates should be reflected in the S32 Assessment Report.	The updates to the GAR requested as part of this request for further information require a level of testing and analysis associated with a specific development proposal which will happen through the resource consent process. Therefore, no updates to the Section 32 Assessment Report are considered necessary.
5.2 Appendix 6: Urban design statement		
Please provide comment around ground-related hazards, opportunities and constraints (land instability, settlement, liquefaction, earthworks) based on the information presented in the	The Urban Design Statement discusses flood hazard as the most prominent hazard at the site. Although this may be the case, other natural hazards must also be considered and discussed. For example, the presence of weak/compressible/expansive soils (if confirmed) would influence the environmental	Not applicable for a Plan Change geotechnical assessment. Lander has undertaken geotechnical investigations to support evaluation of geotechnical risks and a high-level ground model for the site to determine if urban development of the Plan Change area is appropriate. Section 5.0 of the geotechnical report which recommends further testing commensurate with a

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GAR (refer Section 5.3 of this memo).	impact associated with development within the site.	development proposal in order to address these issues. This is a matter for Resource Consent.
5.3 Appendix 12: Preliminary Geotechnical Appraisal Report for the Waihoehoe Plan Change Area, Drury The PGAR is concise and includes a desk-based assessment and review of information from a physical investigation carried out in the western portion of the site. While the results presented in the report appear realistic, there are some notable omissions and several typographical errors which introduce a degree of ambiguity to the appraisal. The following queries were identified in the course of the review:		
Please clarify the site area covered by the GAR.	Page 1, Figure A: The Oyster land holdings are stated to be shown in blue. This is inconsistent with Section 3.1.1 and Figure 01 of the PGAR which show the Oyster land includes properties within the sites shown in blue and red (labelled “Oyster Site” and “Western Sites”). The extent of the site would typically be clearly defined early in a report to provide context for the sections which follow. For the purposes of this assessment, it has been assumed that the Oyster site is as shown bounded blue on Figure 01 appended to the reviewed PGAR.	In reference to the PGAR. Page 1, Figure A therein shows the extent of the proposed Waihoehoe Plan Change Area. The Waihoehoe Plan Change area includes both the “western sites” outlined in blue and the “Oyster sites” outlined in red. Attachment 1 of the PGAR: Geology Overview Plan shows the extent of the study area for which Oyster (our Client) has provided site access for geotechnical investigations - outlined in light blue.
Please clarify the plan extent and slope batter of the stockpile (slope angle and condition,	Page 2, Section 3.1.1: The site is described as featureless alluvial plain with shallow drains and ditches. The paragraph then goes on to describe a 2.2 m high	An observed topsoil stockpile is on site and this is evidenced by the findings in HA104, which provides further detail around its consistency and thickness. There are no further details to be had about this, and recommendations

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vegetation, seepage etc.) in this section.	topsoil stockpile on the site, no further detail is provided.	around its removal or re-use are a matter for Resource Consent.
Please update the description of Puketoka Formation.	Page 3, Section 3.2: The first paragraph states that Puketoka Formation is best described as a "comminuted bed of alluvial clays silts and sands with occasional decayed organics and localised peat peds (sic)". The Puketoka formation is not typically described in published literature as comminuted. Published geological maps describe peat as being present in lenses rather than "localised". This is an important distinction to make, as peat lenses can be extensive rather than localised, particularly in the upper Puketoka Formation.	Update using Edbrooke, S. W. Institute of Geological and Nuclear Sciences. *Geology of the Auckland Area*: Scale 1:250,000. geological map 3. 2001: *Puketoka formation soils consist 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.*
Please clarify this paragraph.	Page 3, Section 3.4.1: Paragraph 1 states that foundations on inorganic natural ground on the site could be designed in accordance with NZS 3604. Laboratory testing carried out on two soil samples indicates that the soil liquid limit (LL) is greater than 50% and the linear shrinkage (LS) is greater than 15% and are therefore defined as expansive soils. Such soils are excluded from the definition of *good ground* in NZS3604:2011 and thus require specific foundation design.	Refer section 3.4.1 with points to AS2870:2011, which is also a standard that NZS3604 refers to. Nevertheless, this is a matter for Resource Consents and Building Consents.
Please clarify the reason for using NZS 1170.5 – 2004 rather than NZGS publication	Page 4, Section 3.4.2: Paragraph 2 details the parameters used to calculate the peak ground acceleration (PGA) in accordance with NZS 1170.5	In our experience a reduced value of PGA may commonly be adopted on account of the very short duration of the acceleration above this. Notwithstanding the value of PGA used,

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Earthquake Geotechnical Engineering Practice, Module 1: Overview. Please clarify the reason a 0.65 reduction factor was applied to PGA.	– 2004. The NZS 1170.5 – 2004 document specifically excludes geotechnical structures and current best practice for the derivation of PGA is presented in the NZGS publication Earthquake Geotechnical Engineering Practice, Module 1: Overview. Peak ground acceleration, when derived using the best practice guidance, does not include a seismic reduction factor of 0.65. A factor of 0.65 is included in the calculation of the cyclic stress ratio (CSR) used for liquefaction assessments; however, this factor converts CSR from a peak value to a uniform value and is not used to reduce the PGA value.	further analyses (using another PGA value) is considered to be an academic exercise, since the soils at this site are not considered suspectable to liquefaction based on compositional analyses and CPT testing to date.
Please clarify the location of the “front portion” of the property.	Page 2, Section 3.1.1, the second paragraph describes a forging factory located in the “front portion” of the property and numerous dwellings mainly towards the “southern portion” of the property.	The “front portion” is the land area starting at the Waihoehoe Road boundary, extending northwards to the middle of the site.
Please provide ground investigation information for the whole plan change area.	On the basis that the proposed plan change area is as shown bounded blue in Figure 01 appended to the Appraisal Report, the western part of the area has not been covered by any investigation. We note Section 3.4 proposes the 116 Waihoehoe investigation area is appropriate for the whole plan change area. This is insufficient information, considering the 116	No access was granted to the balance area (i.e. western portion). Notwithstanding, given that the geology does not change throughout the balance area, it is sensible to conclude with confidence that similar geotechnical conditions would prevail to those that have been characterised in the PGAR. Ground proving should therefore a matter for Resource Consent as part of a development proposal over this area.

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	Waihoehoe area is less than half the total plan change area.	
Please provide the following: - Settlement caused by dewatering associated with excavations (utilities). - Potential settlement caused by fill placement. - Areas where soakage may be appropriate, thus reducing the development cost by avoiding reticulated drainage. - Areas where acid sulphate soils may be a hazard that may require more robust buried infrastructure. - Faults in the vicinity of the site, including the Drury Fault. - Review and summary of other readily available reports	To give a clearer indication of development potential and the environmental impacts of developing the site.	We refer to section 5 of the PGAR, and consider all of these are matters for resource consent. - Settlement from groundwater drawdown is a matter for resource consent, as the extent of any excavations are not known . - Settlement from fill surcharge is a matter for resource consent, as the extent of any fills are not known - Soakage potential (e.g. for SMAF) is a matter for resource consent. - Acid sulphate soils do not prevail in Drury (or Auckland) to the best of our knowledge. - According to the GNS Active Faults database the nearest active fault is Wairoa North, approximately 7km east of the study area. Reoccurrence intervals and last event for Wairoa North are unknown by GNS. The Drury fault is not considered by GNS as active so it's location to the study area would not impact urban development on the site - We are not party to other geotechnical report pertaining to this study area.

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outlining the development potential of the site in question.		

For and on behalf of Lander Geotechnical Consultants Limited

S.G. Lander

Principal Geotechnical Engineer

Copy To: Oyster Capital Limited (Andrew McCarthy)