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Plan Change 7 - Rotokauri North Private Plan Change
Geotechnical, Hydrogeology and Contamination Review (updated for August 2021 ICMP issue)

Dear Jamie

1 Introduction

Council instructed GHD to review geotechnical, contamination and hydrogeological information submitted in support of Plan Change 7. The review has been carried out as a regulatory peer review (according to Practice Note 2: Peer Review, version 2, April 2018, Engineering New Zealand). This letter sets out the conclusions of GHD's review.

2 Documents reviewed

GHD was provided the following documents for desktop review:

1. Rotokauri North SHA, Preliminary Site Investigation, 11 July 2018, HD Consultants NZ Limited.
2. Rotokauri North SHA, Preliminary Geotechnical Report, 27 July 2018, HDGeo.
3. Rotokauri North ICMP, Desktop review of hydrogeological conditions influencing stormwater design, 17 July 2018, Beca.
4. Rotokauri North SHA, Geotechnical Assessment Report, 25 October 2018, HDGeo.
5. Rotokauri North SHA, Response to HCC Peer Review, 27 February 2019, HDGeo [letter to Renee Fraser-Smith with attachment (Rotokauri North SHA, Site Geomorphology, Drawing Rev 0, HDGeo)].
6. Rotokauri North Development, Subcatchment ICMP – Stormwater Management Report. Memo from BBO to HCC, 23 July 2021.
7. Rotokauri North ICMP, Sub-Catchment Integrated Catchment Management Plan, August 2018, Green Seed Consultants.

3 Geotechnical review

3.1 Introduction

GHD Technical director – Dams & Geotechnical, Geoffrey Farquhar, reviewed the geotechnical report (Rotokauri North SHA, Geotechnical Assessment Report, 25 October 2018, HDGeo).

3.2 Further information

The Preliminary Geotechnical Report (27 July 2018, HDGeo) was supplied separately.

The following further information was requested from the applicant as part of our review:

1. Provide further information to substantiate the conclusion that mitigation of the moderate to severe liquefaction risk is achievable.
2. The extent of the liquefaction hazard should be discussed.
3. Feasible measures that might be employed to mitigate the risk should be identified and discussed.
4. The further information should demonstrate that the liquefaction risk can be managed at subdivision/land use stage.

HDGeo's response to the request for further information is contained in HDGeo's letter of 27 February 2019 and attached Site Geomorphology drawing.

3.3 GHD comments

The information provided identifies the two main geotechnical risks affecting the site's suitability for development, i.e. the potential for liquefaction during an earthquake and ground settlement under static conditions.

The key document in assessing liquefaction hazard for land development is 'Planning and Engineering Guidance for Potentially Liquefaction-Prone Land – Resource Management Act and Building Act Aspects, Rev 0.1, September 2017, MBIE'. The information provided by HDGeo constitutes a Level C Area-wide study which exceeds the Level B assessment at plan change recommended in the document.

We consider that sufficient investigations and assessment have been performed to adequately identify the geotechnical risks in developing the land. The geotechnical information provided to support the Private Plan Change satisfactorily demonstrates that the two principal geotechnical risks of liquefaction and settlement can be managed by engineering works at subdivision/land use stage.

4 Contaminated land review

4.1 Introduction

GHD Technical Director, Adam Gray has reviewed the Preliminary Site Investigation generated by HD Consultants NZ Limited, titled "Rotokauri North SHA Preliminary Site Investigation" and dated 11 July 2018 ('the **Preliminary Site Investigation**'). The purpose of the Peer Review of the **Preliminary Site Investigation**, was to addresses the following matters:

– A review of the **Preliminary Site Investigation** for compliance with the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health Regulations 2011 (the **NES Soil**).
– A review of the recommendations made in the **Preliminary Site Investigation**, relating to subsequent phases of work to enable completion of **the Project**.
– Provide relevant advice on the above matters.

4.2 Statutory framework

Regulation 5(1) of the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health Regulations 2011 (the **NES Soil**) defines the land and the activities controlled by the **NES Soil**. Regulation 5(1) of the **NES Soil** states the regulations "apply when a person wants to do an activity described in any of subclauses (2) to (6) on a piece of land described in subclause (7) or (8)".

The regulated activities listed in Regulation 5(2) to (6) of the **NES Soil** include 'subdividing land', 'changing the use' of a piece of land and 'disturbing the soil' of the piece of land.

Regulation 6 of the **NES Soil** prescribes two methods for establishing whether or not a piece of land is as described in regulation 5(7). One of these methods, as described in Regulation 6(3) of the NES Soil is by relying on a preliminary site investigation:

– stating that an activity or industry described in the current version of the Ministry for the Environment Hazardous Activities and Industries List (HAIL) is, or is not, being undertaken on the piece of land; or
– stating that an activity or industry described in the HAIL has, or has not, been undertaken on the piece of land; or
– stating the likelihood of an activity or industry described in the HAIL being undertaken, or having been undertaken, on the piece of land.

Regulation 3 of the NES Soil defines a preliminary site investigation as an investigation that:

a. "*is done by a suitably qualified and experienced practitioner; and*

b. *is reported on in accordance with the current edition of Contaminated Land Management Guidelines No. 1–Reporting on Contaminated Sites in New Zealand, Wellington, Ministry for the Environment; and*

c. *results in a report that is certified by the practitioner*."

Pursuant to regulation 5(8), the NES Soil also applies to 'production land' where:

– The land was subdivided land in a way that causes the piece of land to stop being production land.
– A 'change the use' of the piece of land was to occur that causes the piece of land to stop being production land.

Production land is defined in Section 2 of the Resource Management Act 1991 as

a. "*Means any land and auxiliary buildings used for the production (but not processing) of primary products (including agricultural, pastoral, horticultural, and forestry products):*

b. *does not include land or auxiliary buildings used or associated with prospecting, exploration, or mining for minerals."*

4.3 Review methodology

The assessment methodology we adopted followed the conventional approach taken when completing reviews of contaminated land reporting when undertaken for **NES Soil** purposes. We utilised the following documents to inform our review of the **Preliminary Site Investigation**.

– The **NES Soil.**
– The Ministry for the Environment document '*Contaminated land management guidelines No 1: Reporting on contaminated sites in New Zealand (Revised 2011)*', Published in April 2001 and Revised in October 2011 (**CLMG 1A**). At the time the **Preliminary Site Investigation** (July 2018) was written **CLMG 1A** was incorporated by reference into the **NES Soil**.
– The Ministry for the Environment document '*Contaminated land management guidelines No 1: Reporting on contaminated sites in New Zealand (Revised 2021)*', Published in June 2021 (CLMG 1B). **CLMG 1B**, replaced **CLMG 1A** and, at the time of writing this letter, **CLMG 1B** was incorporated by reference into the **NES Soil**.
– The Ministry for the Environment document '*Contaminated land management guidelines No 5: Site investigation and analysis of soils (Revised 2021)*', Published in June 2021 (CLMG 1B). **CLMG 5**. At the time of writing this letter, **CLMG 5** was incorporated by reference into the **NES Soil**.
– The Ministry for the Environment document '*Users' Guide: National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health*' Published April 2012 (the **Users' Guide**).
– The Ministry for the Environment document '*Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand (Revised 2011)*'. Published October 2011 (the **Petroleum Guide**).

4.4 Comments on regulation 3 requirements

The investigation "is done by a suitably qualified and experienced practitioner…"

In regard to Regulation 3 of the **NES Soil**, the **Preliminary Site Investigation** states that

– the "*report presents information from an environmental site investigation conducted by and under the oversight of a Suitably Qualified and Experienced Practitioner with contaminated land experience, as required by the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health and who is a Certified Environmental Practitioner – Soil Contamination".*

– "*Detailed qualifications (of the Suitably Qualified and Experienced Practitioner) are available upon request*."

The **Users' Guide**:

– Notes that the **NES Soil** does not define what a 'suitably qualified and experienced practitioner' is.

– Notes that Council has the discretion to decide who it considers is suitably qualified to prepare reports.

– Provides a guide to Councils for determining the suitability of a practitioner (e.g., completion of an appropriate degree, >10 years' experience).

While detailed qualifications were not included in the **Preliminary Site Investigation Report**, we note the following:

– The signatory acknowledges that they are certified under a recognised professional body that assesses and certifies environmental professionals. The **Users' Guide** notes that, while not a requirement, ideally a certifier would be certified by such a body.

– The certifier is specifically accredited as a Site Contamination Specialist under the Environment Institute of Australia and New Zealand. This particular accreditation mirrors the recommended requirements listed in the **Users' Guide** for report certifiers (e.g., completion of an appropriate degree, >10 years' experience).

Based on the above, in our opinion, the report was completed by suitably qualified and experienced practitioner.

The investigation "is reported on in accordance with the current edition of Contaminated Land Management Guidelines No. 1.

At the time of writing the **Preliminary Site Investigation**, the then current version of Contaminated land management guidelines No 1 was **CLMG1A**. Since the writing of **Preliminary Site Investigation** in July 2018, **CLMG1A** was replaced by **CLMG1B.** As a consequence, we have reviewed the **Preliminary Site Investigation** utilising both **CLMG1A** and **CLMG1B**.

Section 3 of **CLMG 1A** includes requirements for a preliminary site investigation. Table 1 (below) summarises the comparison of **CLMG 1A** requirements and the contents of the **Preliminary Site Investigation**.

Table 1 CLMG 1A requirements

CLMG 1A requirement	Preliminary Site Investigation content
Executive Summary	Included
Scope of work	Included
Site identification	Included
Site history	Included
Site condition and surrounding environment	Included
Basis of guideline values	Included
Site characterisation	Included
Conclusion and recommendations	Included

In regard to compliance with the 'basis of guideline values' requirement of **CLMG 1A**, in our opinion the **Preliminary Site Investigation**, meets the Section 3 requirements of **CLMG 1A**. We note that in our opinion the following points justify our position that this requirement was 'included' in the report:

– The stated objective of the **Preliminary Site Investigation** was to "evaluate whether there is potential risk to human health from contaminants in soil due to current or past activities".
– The **Preliminary Site Investigation** identifies that it utilised the presence or absence of **HAIL** activities to qualitatively evaluate potential risk to human health.

Table A1 in Appendix A of **CLMG 1B** includes requirements for a preliminary site investigation for determining if the **NES Soil** applies. Table 2 (below) summarises the comparison of Table 2 **CLMG 1B** requirements and the contents of the **Preliminary Site Investigation**.

Table 2 CLMG 1B requirements

CLMG 1B requirement	Preliminary Site Investigation content
Investigation objectives	Included
Site identification	Included
Site layout	Included
Current site uses	Included
Surrounding land uses	Included
Summary of site history	Included
Evaluate the probability that pursuant to regulation 6 (3): – an activity or industry described in the HAIL is, or is not, being undertaken on the piece of land, or – an activity or industry described in the HAIL has, or has not, been undertaken on the piece of land, or – the likelihood of an activity or industry described in the HAIL being undertaken, or having been undertaken, on the piece of land	Included
Evaluate the probability that pursuant to regulation 6 (3): – the likelihood that the soil is contaminated as a result of activity or industry occurring	Included
Description of the limitations of the data collected and the assumptions and uncertainties inherent in the data and models used.	Included
Conclusions	Included
Report limitations	Included
A Suitably Qualified and Experienced Practitioner (**SQEP**) certifies the report	Included
References	Included
Historical site information relied upon	Included
Statement of qualification as a SQEP	Included

In regard to compliance with the 'References' requirement of **CLMG 1B**, while a stand-alone reference section was not included, documents relied upon have been referenced within the document. Therefore, in our opinion the **Preliminary Site Investigation Report**, complies with this requirement.

In regard to compliance with the 'Statement of qualification as a **SQEP**' requirement of **CLMG 1B**, we note that while detailed qualifications were not included in the **Preliminary Site Investigation Report**, in our opinion the following points justify our position that this requirement was 'included' in the report:

– The signatory acknowledges that they are certified under a recognised professional body that assesses and certifies environmental professionals (i.e. the Environment Institute of Australia and New Zealand). The **Users' Guide** notes that, while not a requirement, ideally a certifier would be certified by such a body.

– The certifier, is specifically accredited as a Site Contamination Specialist under the Environment Institute of Australia and New Zealand. This particular accreditation mirrors requirements listed in the **Users' Guide** for report certifiers (e.g. completion of an appropriate degree, >10 years' experience).

Based on the above, in our opinion the **Preliminary Site Investigation**, meets the Section 3 requirements of **CLMG 1B.**

The Investigation "results in a report that is certified by the practitioner."

The **Preliminary Site Investigation** was certified by the practitioner (refer Table 2, above). Therefore, we consider this requirement has been met.

4.5 Comments on regulation 6 requirements

In our opinion, as described in **Section 4.4** of this document, a **Preliminary Site Investigation** has been generated in accordance with recommended guidance to establish if the land associated with **the Project** is a piece of land under regulation 5(7) of the **NES Soil**.

4.6 Regulation 5(2) to 5(6)

The **Preliminary Site Investigation** reported that the site will be subdivided and developed for residential purposes if **the Project** was to proceed. Therefore, regulation 5(5) and 5(6) of the **NES soil** would be relevant if **the Project** was to proceed.

We note that soil disturbance and soil sampling may also occur if **the Project** was to proceed, and that soil disturbance and soil sampling are regulated activities under regulation 5(3) and 5(4) of the **NES Soil**. Therefore, regulation 5(3) and 5(4) of the **NES soil** would be relevant if **the Project** was to proceed.

4.7 Comments on regulation 5(7) & 5(8) requirements

Several potential **HAIL** activities were identified that could result in the presence of contamination in soil of the land associated with **the Project**. The **Preliminary Site Investigation** reported that:

– *"while the pastures are not considered **HAIL** sites, there is potential for contamination if superphosphate fertilisers and/or persistent pesticides were used."*
– *"Orchards, animal spray or dip stations, fuel tanks, and areas where hazardous substances are stored are considered **HAIL** activities. "*
– *"Buildings which used asbestos-containing materials or lead-based paint may also contribute to soil contamination."*
– *"A workshop/scrap yard at one property is classified as a **HAIL** activity".*
– *"Some of the properties have other potentially contaminating activities present, such as rubbish dumps, an aboveground diesel storage tank, and offal pits."*

Based on the above, in our opinion the **Preliminary Site Investigation** has identified that regulation 5(7) of the **NES soil** would be relevant if **the Project** was to proceed.

We note that the **Preliminary Site Investigation**, also identified that the site is currently comprised of several land parcels; that the majority of the land parcels are used as for cattle grazing; an orchard is present at one parcel of land; dairy farms are present at parcels; a workshop/scrap yard is present at one property; and rural residential dwellings as well as sheds and barns are also present. Therefore, in our opinion, the **Preliminary Site Investigation** has also identified that several parcels of land associated with **the Project** are also *'production land'* and as a result, regulation 5(8) of the **NES soil** would also be relevant if **the Project** was to proceed.

4.8 Comments on investigation recommendations

Proposed staged approach to assessment

The **Preliminary Site Investigation** makes recommendations in regard to subsequent phases of contaminated land assessment to be completed. These include:

– The development of a strategic sampling plan to confirm the presence or absence of contamination. With individual plans: developed for each of the farm structures (current and historical) and the orchard; and tailored to the activities conducted in each area.
– Completion of site inspections at the cessation of **HAIL** activities.
– That completion of sampling and analysis should not be conducted until **HAIL** activities cease at the site and rubbish is removed.
– That **HAIL** activities are re-verified before sampling and analysis is conducted.
– All sample results should be compared with applicable guideline values to assess potential risk and whether remedial action will be required based on the new land use.

In our opinion, the staged approach applied by the **Preliminary Site Investigation** is consistent with standard practice in the contaminated land sector. We note that our opinion in this matter is consistent with **CLMG 1B**, which states "*Contaminated land investigation, remediation and management are typically approached and reported on in a number of stages. Some site investigations require no more than one stage of reporting, while others involve multiple investigation reports, remediation proposals and management plans*". We also consider that the recommended next phases of works described in the **Preliminary Site Investigation** are appropriately staged and the supplementary advice in relation to the timing of those works is also appropriate.

Based on the above, we recommend:

– A Detailed Site Investigation process undertaken in accordance with the **NES Soil** should be a condition of consent for this application.
– The Detailed Site Investigation should make recommendations in relation to the need to complete remedial or management works, if **the Project** was to proceed.

Identified Contaminants of Potential Concern

The **Preliminary Site Investigation** identified a range of potentially contaminating activities from historical land use records, aerial photographs, a site inspection and an interview with (only) one property owner, who purchased their property in 2001. We made a summary list of these activities in **Section 4.7** of this letter.

We note that given the uncertainties inherent in using historical information and as owners / occupiers who may have detailed (as opposed to recent) information on incidents (chemical spills etc.), work and management practices, waste disposal and any hazardous substance storage areas, were not interviewed, there is a potential that additional contaminating activities may have occurred, or these activities may have occurred in additional locations to those identified

Based on the land uses identified to have occurred / to be occurring, the **Preliminary Site Investigation** identified Contaminants of Potential Concern. In regard to the current list of Contaminants of Potential Concern documented in the **Preliminary Site Investigation**, we note the following:

– For the 'use of an above ground diesel tank' activity, hydrocarbons are listed only. Our reading is the **Preliminary Site Investigation** is referring to Total Petroleum Hydrocarbons only. We note that, based on our experience, Polycyclic Aromatic Hydrocarbons, may also be present in diesel. We acknowledge that the **Petroleum Guide** notes that a Tier 1 risk analysis for soils impacted with diesel can be performed using Total Petroleum Hydrocarbons only. However, the **Petroleum Guide** also notes that it may be necessary to obtain analytical results for Polycyclic Aromatic Hydrocarbons to complete the risk analysis.
– Our reading is that the rubbish dumps and offal pits identified in the **Preliminary Site Investigation** are not included in the areas / activities of concern and as a consequence associated contaminants of potential concern associated with these activities are not listed. We recommend that these activities are included and the list of contaminants of potential concern updated during the writing of the 'soil investigation design' generated as part of the detailed site investigation process.

We recommend that:

– The list of Contaminants of Potential Concern are incorporated into a 'soil investigation design', generated as part of the detailed site investigation process recommended for **the Project**.
– The list of Contaminants of Potential Concern is updated if any new information is identified prior to, or during, the detailed site investigation process or subsequent phases of work (remedial works etc.).
– Polycyclic Aromatic Hydrocarbons are included as a Contaminant of Potential Concern for the 'use of an above ground diesel tank' activity; and that the 'soil investigation design' generated as part of the detailed site investigation process addresses this potential contaminant (directly or indirectly). This could occur during the writing of the 'soil investigation design' generated as part of the detailed site investigation process.
– The rubbish dumps and offal pit activities identified are included in the areas / activities of concern and the list of contaminants of potential concern updated. This could occur during the writing of the 'soil investigation design' generated as part of the detailed site investigation process.

4.9 Conclusions of contaminated land review

We conclude the following in regard to the Peer Review undertaken:

– In our opinion, the information provided in **Preliminary Site Investigation** complies with the requirements of a preliminary site investigation as defined by Regulation 3 of the **NES Soil**.
– In our opinion, the **Preliminary Site Investigation** establishes that the site is a piece of land as described in regulation 5(7) of the **NES Soil**, by utilising one of the prescribed methods listed in regulation 6 of the **NES Soil**.
– In our opinion, the **Preliminary Site** Investigation has also identified that several parcels of land associated with **the Project** are 'production land' and therefore, Regulation 5(8) of the **NES Soil** would also apply if the **Project** was to proceed.
– In our opinion, the **Preliminary Site Investigation** recommends appropriate next phases of works, to enable the completion of **the Project**, including the potential for remedial action, where soil sampling results indicate such works are necessary.
– We consider that a Detailed Site Investigation process undertaken in accordance with the **NES Soil** should be a condition of consent for this application.
– We recommend that the Contaminants of Potential Concern listed in the **Preliminary Site Investigation** are updated based on the recommendations in this letter and if relevant additional information is obtained through the Detailed Site Investigation process and / or any subsequent phases of work (e.g. remedial works).

5 Hydrogeological review

5.1 Introduction

GHD Hydrogeology Technical Lead, Remalia Sharplin, reviewed the Beca's hydrogeology review (Rotokauri North ICMP: Desktop review of hydrogeological conditions influencing stormwater design, 17 July 2018, Beca).

5.2 Summary of Beca report

– Beca completed a desktop review of hydrogeological conditions in July 2018.
– Geology in the area is described as sands, silts and gravels of the Hinuera Formation.
– Peat was not identified in prior investigations, but is noted to be present in the area. The report concluded that there is the possibility of peat occurrence at the site.
– Two identified layers of soil: Layer one (surficial layer) comprises Clay and Sandy Silt and has a K value between 1x10-6 to 1x10-8 m/s. Layer two (deeper layer) comprises Sand and Gravelly Sand/Silt and has a K value of approximately 1x10-5 m/s.
– Groundwater levels are close to ground surface and vary between 0.1 and 1.1 m bgl. Groundwater levels were shown to fluctuate up to 0.5 m in response to rainfall.

– Preferred construction option is for a 2 m deep green corridor to drain the stormwater. It was noted that with a depth of 2 m it is likely that the corridor will intercept groundwater. Should the corridor be unlined, groundwater will also be drained and remove some of the available storage for surface water.
– In the event that groundwater is drained, drawdown of the groundwater table will also occur. This drawdown has been noted to have the potential to create drawdown induced settlement.
– Infiltration of stormwater is not expected to be significant, due to a combination of high water table and shallow low permeability layers.
– Should the channel be lined, this may pose other challenges such as upward groundwater pressure, which would need to be considered in the design.

5.3 Beca Recommendations

The Beca report makes a number of recommendations for further work. These include:

– Additional site investigations to better determine groundwater levels and permeability of soils at the site. Beca recommended one year of groundwater level monitoring to achieve a complete picture of annual groundwater variation.
– Seven piezometer locations were proposed in locations corresponding to the proposed drainage channels. Some dual piezometers were recommended to determine if any of the shallow groundwater could be perched.
– An update to the existing 3D groundwater model of the area to reflect this proposed development.

5.4 GHD comments

– The desktop review completed by Beca of hydrogeological conditions at the site has appropriately collated the available information. They have identified areas of knowledge gaps and made some recommendations for additional work in order to fill these gaps.
– The report is light on potential groundwater interactions with surface water bodies, noting that there did not appear to be any significant surface water bodies within the proposed housing area. Whilst shallow groundwater typically follows topography, deeper groundwater catchment areas can be larger than the surface water catchment area. Given the potential to drawdown the groundwater via the conveyance channels and the high permeability of the deeper soils at the site, any potential degree of impact to Lake Rotokauri to the south-west should be given specific consideration.
– It was commented that there is a lack of hydraulic conductivity or permeability data. This is something that should be considered to investigate further. Beca recommended work to investigate in-situ permeability and we support this recommendation.
– A full year of groundwater monitoring is not considered necessary to achieving a more complete understanding of groundwater conditions at the site. Beca mentioned in their report that they already have a winter groundwater level, which indicated that levels could be near surface. These levels already likely represent a conservative scenario for groundwater levels and could be relied on rather than monitoring for a full 12 months.
– It was noted that there is a gap in knowledge for summer groundwater levels, and if this is a concern, they could be monitored for a short duration in summer. It would be beneficial to understand the effects on groundwater levels during the summer of 2020. This period of time was particularly dry and would provide a good indicator of drought related effects. Another option could be to monitor during the construction period in bores that are outside the area of works.
– We would recommend capturing groundwater response after a rainfall event. This could be captured as part of the long-term monitoring.
– Any occurrence of peat at the site should be carefully considered in consultation with a geotechnical engineer, as dewatering induced settlement of this material can cause significant effects on structures. Where structures exist, we would recommend some ground monitoring during construction.
– The recent BBO stormwater review memo notes that HD Geo has presented additional data suggesting that groundwater levels fluctuate between 0.1 – 2.5 m bgl (currently reported as 0.1 – 1.5

m bgl). This change to groundwater levels of no material consequence to the desktop review outcomes, but is recommended to be checked and updated for consistency in the final document.

The hydrogeological review completed by Beca is considered to be adequate as it relates to the groundwater environment at the site. We advise that the recommendations outlined in the Beca report and our comments addressed above should be considered by HCC in any future discussion on the site.

6 Submissions

We have reviewed a summary of submissions and did not identify any comments on geotechnical, hydrogeology or contamination issues to address.

7 Limitation

This report has been prepared by GHD Limited for Hamilton City Council and may only be used and relied on by Hamilton City Council for the purpose agreed between GHD and Hamilton City Council as set out in Section 1 this report.

GHD otherwise disclaims responsibility to any person other than Hamilton City Council arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible. GHD accepts no responsibility for other use of the data.

The advice tendered in this report is based on information obtained from other parties. Their investigation locations, tests points and sample points are not warranted by GHD in respect to the ground and groundwater conditions that may be encountered across the site. It is emphasised that the actual characteristics of the subsurface materials may vary significantly between adjacent test points and sample intervals and at locations other than where observations, explorations and investigations have been made. Subsurface conditions, including groundwater levels and contaminant concentrations can change with time. This should be borne in mind when assessing the data. GHD does not accept responsibility arising from, or in connection with, any change to the site conditions. GHD is also not responsible for updating this report if the site conditions change. It should be noted that because of the inherent uncertainties in subsurface evaluations, changed or unanticipated ground and groundwater conditions may occur that could affect total project cost and/or execution. GHD does not accept responsibility for the consequences of significant variances in the conditions and the requirements for execution of the work.

The drill hole or test pit logs, cone penetration tests, laboratory tests, geophysical tests and similar work performed and recorded by others has been used by GHD in the form provided by others. The responsibility for the accuracy of such data remains with the issuing authority, not with GHD.

An understanding of the geotechnical site conditions depends on the integration of many pieces of information, some regional, some site specific, some structure specific and some experienced based. Hence this report should not be altered, amended or abbreviated, issued in part and issued incomplete in any way without prior checking and approval by GHD. GHD accepts no responsibility for any circumstances which arise from the issue of the report which have been modified in any way as outlined above.

Regards

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