

IN THE MATTER of the Resource Management Act 1991

AND

IN THE MATTER of Proposed Private Plan Change 2 to
the Hamilton City Operative District
Plan: Te Awa Lakes Private Plan
Change

**JOINT STATEMENT OF EVIDENCE OF KORI LENTFER AND BERNIE MILNE FOR THE
APPLICANT**

(INPUTS INTO INDUSTRIAL FEASIBILITY ANALYSIS)

29 OCTOBER 2019

1. EXECUTIVE SUMMARY

- 1.1 A significant amount of time and effort has been spent by the project development team to consider the geotechnical and civil engineering inputs, remedial works options and outcomes for the industrial feasibility assessment for the site.
- 1.2 Key constraints on the development (regardless of end land use) are: the Waikato River, Waikato Expressway, Te Rapa Road, Hutchinson Road, the high pressure gas main and the existing natural gully to the south.
- 1.3 A significant amount of geotechnical investigation has been completed from 2007 to 2018 which has led to development of a geotechnical ground model for the site. This data was used to produce landform (soil) zones to identify the extent of main soil types on site and show the high variability of ground conditions.
- 1.4 Considering the soil zones, a series of site classes (A, B, C1 and C2) were adopted with respect to development constraints for industrial development. The approach taken was to incorporate a design that provided for large, flat sites suitable for light industrial activities.
- 1.5 Based on the work undertaken as described herein, we are of the opinion that the geotechnical and civil engineering process and inputs provided are of a satisfactory standard and level of detail to support the industrial feasibility assessment.

2. QUALIFICATIONS AND EXPERIENCE

- 2.1 Our full names are Kori Alfred Warren Lentfer and Bernard Jack Milne.
- 2.2 Kori refers to paragraphs 2.2 to 2.6 of his separate statement of evidence on geotechnical issues in relation to his qualifications and experience, and his compliance with the Code of Conduct.
- 2.3 Bernie has a Bachelor of Surveying and is a full member of the New Zealand Institute of Surveyors. Bernie is a Licensed Cadastral Surveyor.
- 2.4 Bernie previously owned Focus Surveying, a Hamilton based surveying consultancy, before that firm integrated with Burnett Bloxam and Olliver (BBO) in 2007.
- 2.5 Bernie has been engaged by the Applicant since 2013 on a range of projects, commencing with civil engineering inputs to the industrial Indicative Development Plan (IDP) for 30ha of the site which was approved in 2015. Associated with this work Bernie developed the earthworks design for the proposed industrial development across the whole site. Following this work, Bernie was involved in the detailed engineering design for Stage 1 of the industrial development (including the service centre), construction management of the stage 1 works, then compliance and certification and legal survey in order to obtain titles. Bernie has also been involved extensively with the development of alternative options on the site including rationalisation of the industrial development levels.
- 2.6 Bernie has undertaken a similar role on a number of other large scale projects within the Waikato, notably Northgate Industrial Park, Titanium Park (industrial development) and Temple View redevelopment (large residential development with considerable earthworks in difficult ground conditions)
- 2.7 Bernie confirms that he has read the Code of Conduct for Expert Witnesses contained in the Environment Court Practice Note 2014 and to the extent that I am giving expert evidence, have complied with it in preparing this evidence. He confirms that the issues addressed in this evidence are within my area of expertise and he have not omitted to consider material facts known to me that might alter or detract from the opinions expressed in my evidence.

3. SCOPE OF EVIDENCE

- 3.1 We have been asked to provide evidence in relation to the inputs we provided into the industrial feasibility analysis undertaken by Martin Udale of Essentia Consulting Group Ltd (the Essentia report) dated August 2019, and the Rough Estimates of Costs provided by Andrew Millard of Millard Construction Costs Consultants Ltd appended to the Essentia Report for both industrial development and rural remediation.
- 3.2 The two key documents that formed part of the analysis by Essentia that we were involved in was:
- a) for Kori, the CMW Geosciences Technical Memorandum dated 1 August 2019 titled “Geotechnical remedial process for industrial feasibility assessment – Hutchinson Road, Horotiu” (the CMW memorandum) annexed to the Essentia report at Appendix 2; and
 - b) for Bernie, the earthworks plans annexed to Attachment A of the CMW memorandum demonstrating:
 - i. the cut and fill contours to achieve an industrial site on the subject site;
 - ii. the design contours for the hypothetical end development;
 - iii. the extent of preloading required; and
 - iv. the ultimate end soil zones following remediation.
- 3.3 Both Kori and Bernie were involved in an earlier industrial feasibility exercise undertaken by Essentia for the Special Housing Area (SHA) application dated March 2018, and provided memoranda and plans as part of that process. Those have now been updated and superseded by the August 2019 documents referred to above.
- 3.4 The purpose of this evidence is to respond to comments made in the peer review assessment of the Essentia report undertaken by Hamish Anderson of The Development Room (TDR) dated 16 September 2019, included within the Hamilton City Council’s section 42A report on Proposed Plan Change 2 to the Hamilton City District Plan: Te Awa Lakes (PPC2) at pp 61 and onwards of Appendix F, and in relation to the inputs we provided to the feasibility analysis in the Essentia Report.

4. PROCESS

- 4.1 Geotechnical investigations were commenced in 2007 through to 2018 across the whole quarry site which has led to development of a geotechnical ground model for the site that started with Coffey Geotechnics and that Kori then continued when he joined CMW Geosciences (CMW). This data was used to produce landform zones to identify the extent of main soil types on site as is contained in the CMW Geotechnical Summary Report (GSR).
- 4.2 During the preparation of the IDP, the layout of the site was developed by BBO with assistance of Chow Hill. The layout was developed to meet key urban design principles such as sight lines and road connectivity. Site constraints were considered such as;
- The Waikato River;
 - The Waikato Expressway, with no access allowed from NZTA;
 - Te Rapa Road, with no access allowed from HCC;
 - Hutchinson Road;
 - The existing high-pressure gas main; and
 - Existing natural gully area to the south.
- 4.3 The IDP approval was granted for 30 hectares as that was all that could be sought at the time under the relevant zoning. Regardless of this, the whole site was considered with respect to services (water, waste water and stormwater) as well as earthworks and site layout. Discussions were had with Perry Group personnel on the best way to remediate and treat the soils. Generally, the outcome was that largely the site would only be suitable for smaller buildings and bigger yards due to the potential for differential settlement.
- 4.4 In the interim, Stage 1 was developed along with the Service Centre on land which was not ever quarried.
- 4.5 Further investigations from the private plan change and Qualifying Development processes helped to further inform the inputs into industrial feasibility assessment,

increasing the level of knowledge around the variability of ground conditions, which in turn led to updates to the landform plans.

4.6 The geotechnical assessment for industrial feasibility purposes involved review of landform (soil) zones across the site. These zones are based on the site investigation data, site mapping and anecdotal evidence from sand quarry staff. Landform (soil) zones across the site as follows:

- Zone 1 – Predominantly natural Hinuera Formation soils;
- Zone 2 – Uncontrolled fill – predominantly overburden stripping's comprising;
- Zone 3A – Uncontrolled fill – predominantly imported cleanfill/organics;
- Zone 3B – Uncontrolled fill – predominantly plant washings or lake sediments.

4.7 Considering the above landform (soil) zones with respect to development constraints for industrial development to develop the following site classes:

- Class (A) – Can support industrial buildings with minimal additional foundation work, comparable to the majority of industrial sites in the Hamilton Region;
- Class (B) – Can support industrial buildings however requires specific foundation design, may require non-standard foundations or ground improvement measures above those generally required in the region;
- Class (C1) – Significant risk of unacceptable total or differential settlement, can only support small lightweight buildings or large buildings if piled, or following significant ground improvement or structural measures to mitigate/eliminate the risk; and
- Class (C2) – Significant risk of unacceptable total or differential settlement unless fully remediated by removal of all plant washing / lake sediments down to competent natural ground, then backfill with structural earth fill.

4.8 The initial geotechnical assessment in March 2018 had only Class A, B and C. Subsequent site investigation, interpretation and ground model updates resulted in subdivision of Class C into Classes C1 and C2.

- 4.9 Soil zone 1 is Class A. Soil zone 2 is Class B. Prior to remediation soil zone's 3A and 3B fall into Class C1 and C2 development zones respectively.
- 4.10 The geotechnical risks that are relevant to industrial development are described in the CMW memorandum.
- 4.11 Remedial works recommendations for the site are provided in the CMW GSR. Those recommendations were reviewed, adopted and where necessary modified to address the geotechnical issues relating to industrial development of the site as follows:
- Appropriate measures for soil conditioning for earthworks;
 - Measures to manage low bearing capacity of uncontrolled fill materials;
 - Measures to manage static settlement including preloading;
 - Slope stability risks and management methods;
 - Liquefaction risk and management methods;
 - Lateral spreading risks and management methods with in particular, mitigation of lateral spreading into the central stormwater swale by ground improvement using soil/cement mixed columns;
 - Road subgrade formation and allowing for robust subgrade improvement where low-strength materials are present.
- 4.12 The site levels and grades have been developed to support the site layout as well as other constraints such as:
- The Waikato River 100yr flood level;
 - Stormwater overland flow;
 - The level of Hutchinson Road; and
 - Earthworks cut/fill balance, all of which are discussed briefly below.

4.13 Site levels were made as low as possible to achieve an earthworks cut/fill balance so additional soil did not need to be imported to the site wherever possible and to support the pre-loading strategy. Site grading was developed to enable stormwater water to flow off the sites then along the roads and overland flow paths. The existing gully area to the south was identified as a stormwater treatment area that could be enhanced with planting to form a wetland

5. RESPONSE TO COMMENTS

5.1 At a general level, Mr Anderson concludes that the inputs provided are generally appropriate:

a) At paragraph 3.2, Mr Anderson states that the development scheme in the scheme plan prepared by BBO “is an efficient use of the land and an appropriate layout for the assumed modern industrial subdivision proposed”.

b) At paragraph 3.3, Mr Anderson states that “overall, I consider the CMW report and memorandum to have been prepared thoroughly and supported by a sufficient level of site investigations”.

5.2 However, he also makes some comments about a perceived lack of available information, which, while not affecting his overall conclusion that “based on the construction technology available today it is unlikely that an industrial development of the nature proposed by Essentia will be viable in the foreseeable future”, were not addressed at the time of this report.

5.3 We respond to each of those comments below.

5.4 Para 3.2 – use of the central swale. The central swale combined water quality treatment and conveyance most economically and enabled a large part of the site to be developed to the lowest practicable point and reducing the cut and fill requirements. An alternative solution such as using pipes would require steeper pipe gradients and produce negatively affect the cut fill balance. This would also impact the strategy for pre-load, which due to higher ground levels would increase potential for settlement.

5.5 Para 3.3 – change in soil classifications from March 2018 to August 2019. The plans are not the same due because the latter was updated following the additional site

investigations completed that enable subdivision of soil zone 3 into 3A - Uncontrolled fill – predominantly imported cleanfill/organics and 3B - Uncontrolled fill – predominantly plant washings or lake sediments.

- 5.6 Para 3.3 – provision for preloading over C2 areas in the preload plan: The intent in the CMW memorandum was to undercut area C2 due to the very poor ground conditions comprising very soft highly compressible plant washings and lake sediments as these materials in their current state would not be able to accommodate any building or related infrastructure development. If these materials are fully undercut and replaced with engineered fill, then they would then not require preloading. There is still potential that they could remain in place and be preloaded, but due to their thickness, high clay content and very low strength it is likely that wick drains and associate aggregate drainage blanket would be required that add a significant amount to the construction costs. In error, the preload plan was not updated to reflect the intent to undercut, however we note there has already been an allowance in the construction costings to cover the additional remediation of Class C2 soils (Item U at pg 2 of the elemental estimates in Mr Millard’s Rough Order of Costs Estimates).
- 5.7 Para 3.3 – change of soil type classification for land adjacent to Te Rapa Road: the plans are not the same due because the latter was updated following the additional site investigations. This area has a significant amount of topsoil stockpiled but does not appear to have been backfilled with uncontrolled fill.
- 5.8 Para 3.4 – feasibility engineering report: It is not totally clear from Mr Anderson’s report what sort of ‘feasibility engineering report’ he was suggesting, but we note that in his peer review it appears to be made up of preliminary engineering plans. The IDP had infrastructure reports which assessed the engineering viability with aspects such as flooding, serviceability, traffic, geotech, site layout, services, and three waters. Those reports formed the basis of the engineering feasibility for the IDP development, separate from any financial feasibility which was not requested at that time.
- 5.9 Para 3.4 – earthwork options assessments: In a similar manner as above, as part of the IDP work, Kori investigated and considered various remediation options when at Coffey. That work provided an option assessment for different earthworks methods that were considered suitable to remediate the site for future industrial / commercial development.

The assessment process involved review of available geotechnical investigation data and dividing the site into Class A, B and C land that was later adapted for the CMW report. In summary, the remedial earthworks considered included the following:

- assessment of current vs proposed backfill methodologies;
- different fill specifications for different end purposes;
- site monitoring of imported cleanfill materials.

5.10 Para 5.5 – volume information for industrial redevelopment: This information sat behind the CMW memorandum and the BBO scheme plans. The site was divided into a number of areas based on assumed soil boundaries. Cut/fill volumes were derived for each of these areas between the design surface and existing ground surface. Volumes were collated and additional factors such as compaction factor, an allowance for known unsuitable and quality of fill values were applied. Those volumes were then provided to MCCL for costing.

5.11 Para 5.6 – volume information and assumptions for rural remediation: In terms of the rural remediation costs, preliminary sketches were undertaken which comply with the consent, which were then used for costing. Having reviewed the information on which the estimated cut/fill volume was based, we are comfortable that it is sufficient for the reshaping of the site to support a rural grazing activity under the existing conditions of consent.

5.12 Para 5.11 – volume information for non-engineered fill on-site: see above response in relation to Mr Anderson’s para 5.5.

6. FURTHER CAUCUSING

6.1 Following the Joint Witness Statement for Industrial Feasibility, and during the expert conferencing on Strategic Economic and Planning matters, Fonterra advised that it was seeking advice from an expert on the feasibility of industrial development and would provide an opinion by the end of October (after the deadline for evidence exchange for the Applicant).

6.2 On 14 October 2019, Michael Martin of Babbage Consultants on behalf of Fonterra sent a list of agenda items through to PGL which, rather than raising queries with the feasibility analyses undertaken by Martin Udale of Essentia Consulting, identified a number of queries in relation to the geotechnical, civil engineering and cost inputs into that analysis. At that point, we organised a meeting between Michael and ourselves which took place on 23 October 2019.

6.3 On the morning of that meeting, Mr Martin sent us a list of queries in relation to the rural remediation and industrial development inputs into the industrial feasibility analysis undertaken by Mr Udale. During the course of that meeting, we responded to his queries, explaining the processes which sat behind the inputs we provided and we understood that he was largely satisfied with them.

6.4 In general, and under the following headings, we record our responses below:

Rural remediation

6.5 We explained to Mr Martin the processes which sat behind the volumes given in the Rough Estimate of Costs for Rural Remediation. That involved our detailed understanding of the conditions of consent for the existing quarrying operation, and the minimum requirements to reach that standard. We also addressed issues such as the treatment of water bodies as part of that remediation, the maximum gradient allowed, and how that design incorporated areas of existing uncontrolled fill and other materials for grazing (without the need for ground improvements).

Industrial development

6.6 We also explained to Mr Martin the process which took place during the initial IDP phase, discussed in more detail above, regarding the basis for the industrial development layout, including site constraints and urban design input. This included consideration of alternative layouts, which was undertaken at the time before the final assumed layout was settled on. An important part of this was talking Mr Martin through the approach, due to the variability of soil conditions across the site, to provide a range of soil types across lots to provide at least some space for potential building platforms and other space which could be used as open or unsealed areas.

- 6.7 We also explained to Mr Martin the purpose of the designed central swale for stormwater conveyance, quantity control (detention) and quality control (treatment). We also noted the Waikato Regional Council's preference for centralised control measures near source, and the role of the swale in allowing the site to be developed to the lowest practicable point and reducing the cut and fill requirements. We ran him through our consideration of alternative stormwater designs (eg pipe reticulation and ponds), but noted that this had a necessary flow-on effect for the amount of earthworking required.
- 6.8 We also talked him through the settlement tolerances for industrial uses in different soil classes consistent with the Building Code tolerances. Class B and C without remedial works would not achieve that. For this feasibility assessment a risk-based approach was taken from Low Risk (Class A) to High Risk (Class C). For both earthquake induced and static (fill / building load) induced settlements in general Class A is based on good ground, Class B is based on differential settlement outside Building Code limits of 20 mm over 6 m (1:300) and Class C is based on total settlement over about 100 mm.
- 6.9 Finally, we discussed static ground and liquefaction settlement risks, and the approaches taken to them; and a number of other minor points of detail around inclusion of undercuts in construction costs and the point at which earthworking poor soils becomes cost-prohibitive (which depends on a range factors, but for this site would typically be anything greater than 5m).

7. CONCLUSION

- 7.1 We are of the opinion that from a geotechnical and civil engineering perspective the work as discussed above is of a satisfactory standard and level of detail to support the industrial feasibility assessment.

Kori Lentfer & Bernie Milne

29 October 2019