



10 May 2021

District Plan - Resource Management Policy Team
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Waikato District Council

Attention: Lily Campbell

2-WLASS.CW

Technical Specialist Review, Geotechnical; Submissions 778.2 and 778.3; Shand Properties Limited; 'Areas 1 & 1 A' and 'Area 6', Huntly

1 Experience and Qualifications

My name is John Matthew Warrington.

I am currently employed as a Principal Geotechnical Engineer with WSP New Zealand Limited.

I hold the following qualifications:

- a) Bachelor of Science in Civil Engineering (2:1 Honours), 1980, from the University of Salford
- b) Master of Science in Civil Engineering, 1986, from the University of Salford, United Kingdom.

I hold the following Registrations and Memberships:

- a) Registered Chartered Professional Engineer (CPEng) with Engineering New Zealand. Registration No. 1030020
- b) Chartered Member of Engineering New Zealand (CMEngNZ)
- c) Member of the New Zealand Geotechnical Society.
- d) Chartered Engineer with the Engineering Council (CEng) (UK)
- e) Member of the Institution of Civil Engineers (MICE) (UK)

I have 41 years experience in total, 25 years spent in geotechnical and civil engineering consultancy, 13 years in operational management with a Public Corporation and 3 years undertaking university research. I have spent the last 10 years in New Zealand specialising in geotechnical work with the previous 31 years in the UK. My experience in geotechnical consulting has included projects involving sites impacted by coal mining activities primarily within the UK (North-West England, North-East England and the English Central and East Midlands).

2 Purpose of Report

I have been engaged by Waikato District Council to provide a Technical Specialist Review of information submitted as evidence in support of an application by Shand Properties Limited with respect to the re-zoning of areas within the Proposed Waikato District Council District Plan Review. The submission covers two land areas in the Huntly North Area. One is referred to as 'Areas 1 and 1A', two parcels of land located east of the Great South Road and to either side of the Northern KiwiRail line, seeking Commercial/ Industrial Zone. The second area of land, referred to as 'Area 6', is located between East Mine Road and Russell Road, seeking Residential Zone.

seeking Residential Zone.

The review will include an assessment of the following:

- Whether sufficient and appropriate information has been included in the evidence;
- Whether the assumptions, methods and conclusions are sound and reasonable;
- Whether any proposed solutions are technically feasible and realistic;
- Advice on any potential or actual issues that the Planner and Hearings Panel may need to be made aware of.

3 Source Information

I have reviewed reports prepared by CMW Geosciences and plans/ figures drawn from reports prepared by BBO Planning and Engineering and IRBA Geological Consultants. In undertaking this review, I have used the information provided therein and drawn on my general experience with relation to work involving sub-division developments and coal mining areas. I have not undertaken further investigations or visited the specific areas involved in the re-zoning submissions.

The documents I have reviewed are:

Statement of Evidence of Kenneth John Read, CMW Geosciences, 17 February 2021 including:

- High Level Mining Risk Review, North Huntly Land Development (Areas 1, 2 and 3), CMW Geosciences, February 2020
- Land Holding Plan; BBO Drawing No. 144370-02 Rev C; January 2020
- Figures 2, 10 and 11 from "Huntly East Land subsidence due to coal mining – Investigation and analysis of potential hazard; IRBA Geological Consultants, Project Ref: 1003;
- North Huntly Development, East Mine Road, Huntly; Geotechnical Investigation Report; CMW Geosciences; July 2020

4 Principal Observations

4.1 Areas 1 and 1A

'Areas 1 and 1A' comprise two parcels of land located east of the Great South Road and to either side of the Northern KiwiRail line. The applicant is seeking the re-zoning of this area of land from Rural Zone to Residential Zone.

The areas under consideration are essentially level having a gentle undulating topography and are locally overgrown where not used as grazing.

A review of available records of the coal mine workings underlying the site has identified that the reduced level to the top of the workings in the area lies as at approximately -200m RL. The ground level in the area is at approximately 10m RL giving a thickness of overburden above the mineworking of approximately 210m below ground level (bgl).

It is stated that the risk of settlement due to collapse of mine workings is low based on the mining methods used in the vicinity and the depth of overburden which would mitigate any surface manifestation of subsidence should this occur. Additionally, the risk of settlement of any areas overlying mine roadways was considered to be very low due to their inherently stable 'cavern' type construction.

The risk of mine gas migration has been assessed as being 'very low'.

Ground Investigations and Geotechnical Assessments have been undertaken within the areas. These indicate the presence of liquefiable soils beneath the site that have been assessed as having the potential for liquefaction induced settlements of up to 150mm. The ultimate bearing capacity of soils within the areas has been assessed as being less than 300kPa requiring the adoption of Specific Engineer Designed (SED) foundations.

4.2 Area 6

'Area 6' comprises a section of land lying between Russell Road and East Mine Road. The applicant is seeking re-zoning of this land from Rural Zone to Residential Zone.

The topography within the area comprises elevated ground to the south side grading steeply down to a level area adjacent to East Mine Road. The central section of the lower lying area is primarily wetland with grazing to the east and west.

A review of available records of the coal mine workings underlying the site has identified that the reduced level to the top of the workings in the area lies as at depths of between -180m RL to the west rising to -60m RL to the east. The ground level to the south Russell Road side of the site has a level of about 28m RL reducing to approximately 10m RL within the lower lying area of the site. The thickness of overburden present beneath the site may therefore extend from a minimum of 70m bgl up to 208m bgl.

It is stated that the risk of settlement due to collapse of mine workings is low based on the mining methods used in the vicinity and the depth of overburden which would mitigate any surface manifestation of subsidence should this occur. Additionally, the risk of settlement of any areas overlying mine roadways was considered to be very low due to their inherently stable 'cavern' type construction.

The risk of mine gas migration has been assessed as being 'very low'.

Ground Investigations and Geotechnical Assessments within the area indicates the presence of predominantly firm to stiff cohesive soils within the upland area of the site and are considered capable of providing a minimum ultimate bearing pressure in excess of 300kPa allowing the use of shallow foundations in accordance with NZS 3604:2011.

The stability of slopes have been assessed and determined as being 'suitably stable'. It has been advised that localised areas of soil creep should be reviewed during detailed design.

5 Technical Assessment

Common risks for all areas are presented by the deep mining activities which have taken place beneath the sites. These risks principally comprise settlement due to the collapse/subsidence of mine workings and migration of gas, primarily methane, from the worked areas.

With respect to settlement due to subsidence/ collapse of workings, the extent of workings for the Huntly East Mine are clearly defined and recorded. It is noted that all the areas under consideration overly the access roadways into the mine. As stated within the CMW High Level Mining Risk Review (February 2020), "The area over the mine roadways is stated by RDCL to be 'unlikely to exhibit settlement due to their cavern stability'".

Additionally, the depth of overburden above the level of the mine workings is significant, ranging from a minimum thickness of 70m to the east of Area 6 (this within the lower lying area which is intended will not be developed) up to 210m to the west beneath Areas 1 & 1A. In the event that any subsidence due to collapse of mine workings occur, the manifestation of this at ground level would consequently be spread over a wide area.

In view of the above, it is agreed that the risk of subsidence/ collapse of mine workings within the areas of interest can be considered as being low. Should any occur, the resulting value of settlement observed at ground level would likely be small.

With respect to the potential migration of mine gas, the studies undertaken detail a potential gas trap location beneath the central section of Area 6. Further assessment of the potential for gas migration however consider that the accumulation of gas to hazardous levels within overlying buildings is very low. It is agreed that the risk of gas migration impacting on the development of the sites is minimal.

Within Areas 1 & 1A, ground investigations have identified the presence of liquefiable soils beneath the site. It is agreed that development within this area will require consideration of this and the adoption of appropriate foundation types with ground improvement to mitigate the impact of settlements due to liquefaction.

Within Area 6, it is stated that proposed development will be primarily restricted to the higher ground present within the site. The soils forming the slopes have been recorded as being 'firm to stiff' although surface creep of soils has been noted. It is agreed that development of the upland areas within the site can take place with appropriate consideration of slope stability.

6 Conclusions

The reports presented have been written to a high standard and have considered all key aspects considered as being relevant to the assessment of geotechnical issues and risks pertaining to the potential development of the areas under review.

The submitted information relating to 'Areas 1 & 1A' and 'Area 6' area has been reviewed and it is considered that the information provided for both is sufficient to support the re-zoning.

The risk of subsidence/ collapse of mine workings within the areas of interest can be considered as being low. Should any occur, the resulting value of settlement observed at ground level would likely be small.

Assessment of the potential for gas migration indicates that the accumulation of gas to hazardous levels within overlying buildings is very low.

Within Areas 1 & 1A, presence of liquefiable soils beneath the site will necessitate the adoption of appropriate foundation solutions to mitigate the impact of settlements due to liquefaction.

Within Area 6 the development of the upland areas within the site can take place with appropriate consideration of slope stability.

7 Limitations

This report has been prepared by WSP New Zealand Limited exclusively for Waikato District Council in relation to a Technical Specialist Review of information submitted as evidence in support of an application by Shand Properties Limited with respect to the re-zoning of areas within the Proposed Waikato District Council District Plan Review and in accordance with the Framework Agreement (the "Agreement") dated 1 August 2019 between Waikato District Council and WSP New Zealand Ltd., and incorporates the terms and conditions set out in Schedule 2 of the Agreement. WSP accepts no liability whatsoever for any use or reliance on this Report, in whole or in part, for any purpose other than the Purpose or for any use or reliance on this Report by any third party.

For and on behalf of WSP New Zealand

Prepared by:



John Warrington CPEng, CMEngNZ

Principal Geotechnical Engineer