Woolston Family Trust

107 YORKE ROAD, HARURU, LOT 1 DP 166269

Flood Hazard Assessment

Vision Project Ref: 13050

10/08/2017



1 INTRODUCTION

Vision Consulting Engineers Limited (VISION) was engaged by the Woolston Family Trust to undertake a desktop flood hazard assessment and prepare an engineering report to determine finished floor level for as part of the proposed subdivision of a property at 107 Yorke Road, Haruru (Lot 1 DP 166269; 6,782m²).

2 SCOPE OF WORK

The scope of work for this report is to assess the flood hazard at the site and based on the assessment recommend finished floor levels for the site.

The report is based on published and unpublished information about the site, including:

- Information obtained from Northland Regional Council (NRC) and Far North District Council (FNDC) online hazard maps;
- Flood modelling data provided by the NRC;
- Published geology;
- Topography data: LiDAR;
- Proposed subdivision site plan provided by DMS Surveyors Limited (Appendix A).

3 FREEBOARD REQUIREMENT

Freeboard requirements as defined in the New Zealand Building Code and the Far North District Council (FNDC) Engineering Standards must be met at properties that are recognised to be at risk of flooding.

The FNDC Engineering Standards require:

Where flood plains, ponding areas or secondary flow paths are identified, the following restrictions shall apply:

• All habitable buildings shall be set above the 100 year return period flood level plus 500mm.

The New Zealand Building Code Clause E1 Surface Water requires:

The level of the floor shall be set at the height of the secondary flow plus an allowance for freeboard. The freeboard shall be:

• 500 mm where surface water has a depth of 100 mm or more and extends from the building directly to a road or car park, other than a car park for a single dwelling.



4 LOCATION AND PHYSIOGRAPHY

The site is located located in Haruru (Figure 1) and it lies at an elevation of 1.8 – 21 m One Tree Point Datum (OTP). The property is located immediately south of the Waitangi River and has residential properties to the west, east and south. The property is classified as Residential in the Far North District Plan. The northern portion of the property is relatively flat and generally covered in grass with some mature trees present. The southern portion of the site is an access way that slopes moderately down from Yorke Road.



Figure 1 Site map showing the location of the property.

5 GEOLOGY AND GROUNDWATER

The 1:250,000 geological map of Whangarei indicates that the site is underlain by Greywacke of the Waipapa Group, consisting of massive to thin bedded, lithic volcaniclastic sandstone and argillite (Edbrooke and Brook, 2009).

Ground investigations at the site carried out by VISION (reference 13050) indicate that the site is underlain by estuarine and alluvial deposits overlying the Waipapa Group.

6 FLOOD HAZARD ASSESSMENT

The site is shown as being affected by 10 and 100 year flooding on the FNDC hazard maps (Figure 2).

The NRC hazard maps also identify the site as being affected by the 10 and 100 year inland flooding (Figure 3) and the predicted current, 50-year and 100-year coastal flooding hazard (Figure 4).



Figure 2 Site in relation to the 10 and 100 yr flooding extents modelled by the FNDC. Source: FNDC Maps (modified).





Figure 3 Site in relation to the 10 and 100 yr flooding extents modelled by the NRC. Source: NRC Maps (modified).



Figure 4 Site in relation to the current (2015), 50-year (2065) and 100-year (2115) flooding hazards modelled by the NRC (Tonkin & Taylor 2016 model). Source: NRC Maps (modified).



7 FINISHED FLOOR LEVEL

In accordance with the FNDC Engineering Standards and Building Act requirements, the calculation of the Finished Floor Level (FFL) for the proposed building is to be based on the 100-year predicted flood levels.

Based on the LiDAR data and the approximate location of the proposed development, the Existing Ground Level (EGL) in the vicinity of the proposed development is:

• 1.5 to 2.5m OTP

The flood modelling data from the FNDC indicates that the maximum predicted flood depth for the 10year and 100-year event is 0.22and 0.27m respectively. The modelling indicates that inland flood is expected to flow down the right of way in a generally northern direction before flowing overland to the Waitangi River.

The flood modelling data provided by the NRC for inland-derived flooding indicates that the maximum predicted flood level for the 100-year event is 2.88m OTP. The NRC Coastal Flooding Hazard Zone 2 data indicates that the 100-year coastal sourced flood level is 2.7m OTP. In this case, the greater of the two results applies for the purpose of FFL calculation.

The Building Code Clause E1, requires a 0.5m freeboard for buildings (Housing, Communal Residential and Communal Non-residential buildings) for surface water up to the 50 year flood event. The FNDC Engineering Standards do not specify a freeboard for non-habitable buildings; only areas used for storage of hazardous chemicals or goods are required to be located at least 0.5m above the predicted 100 year flood level.

For non-habitable structures, Far North District Council generally requests that a 0.3 m freeboard above the 100 year flood level is adopted.

The freeboard for non-habitable structures is not defined in the FNDC Engineering Standards, therefore the council can only impose the requirements of the Building Code. The Building Act only relates to Housing, Communal Residential and Communal Non-residential buildings in terms of performance in relation to "*surface water*, resulting from an event having a 2% probability of occurring annually, shall not enter *buildings*." On this basis, no minimum floor level is required in terms of performance with Clause E1.3.2 of the Building Act 2004. However, the building must still comply with clauses B1 Structures & B2 Durability of the Building Code. This results in the need to either raise the building floor level or design the building in such a way to achieve compliance with the performance requirements under these clauses.

A summary of the flood depths from FNDC is provided in Table 1 below.

Table 1 Summary of flood	depth from FNDC in metres.
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FNDC			
Inland Flood			
10-year	100-year		
0.22	0.27		

A summary of the flood levels from NRC is provided in Table 2 below.



Table 2 Summary of flood levels from NRC given as elevations relative to One Tree Point 1964 datum.

NRC Inland Flood		NRC Coastal Inundation		Hazardous substances storage
10-year	100-year	50-year	100-year	FFL
2.44	2.88	2.1	2.7	3.38

8 DISCUSSION AND CONCLUSIONS

Opinions and recommendations given in this report are based on a desktop study. The calculation of the flood levels is based on the NRC modelling of inland flood depths for 100-year event, which is considered to be equivalent of 100-year event plus an allowance for climate change. The calculation of the flood levels is also based on the NRC modelling of coastal sourced flooding for 50- and 100- year events including an allowance for climate change.

It is recommended that habitable structures have a minimum Finished Floor Level of 3.38m OTP.

<u>It is recommended</u> that non-habitable structures have a minimum Finished Floor Level of 3.18m OTP and hazardous substances are stored at a minimum level of 3.38m OTP.

9 LIMITATIONS

This report has been completed exclusively for Woolston Family Trust with respect to the particular brief given to us for the particular purpose given above. Information, opinions and recommendations contained in this report cannot be used for any other purpose or by any other entity without our review and written consent. Vision Consulting Engineer Ltd accepts no liability or responsibility whatsoever for, or in respect of, any use or reliance upon this report by any other party. In preparing this report, all reasonable skill and care was exercised using best available data & methods. Nevertheless, VISION does not accept any liability, whether direct, indirect or consequential, arising out the use of the recommendations given in this report.

Vision Consulting Limited should be contacted immediately if variations are encountered. It is possible that further investigation or modification of recommendations is required.

References:

Edbrooke, S.W.; Brook, F.J. (compilers), 2009. Geology of the Whangarei area. Institute of Geological & Nuclear Sciences 1:250,000 geological map 2. 1 sheet +68 p. Lower Hutt, New Zealand. GNS Science.



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Yours faithfully VISION CONSULTING ENGINEERS LTD

Report prepared by:

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Dan Simmonds Senior Engineer

Report prepared and approved by:

Ben C. Perry MIPENZ, CPEng Managing Director

