Increased Flooding Vulnerability (IFV) Engineering Assessment

Tonkin & Taylor

Property details

Property address	17 SAMPLE STREET, SAMPLEVILLE, CHRISTCHURCH
Property ID (QPID)	ABCDEFG
Master claim number	CLM/2010/ABCDE
Date	05 May 2015

Engineering assessment

This engineering assessment identifies that the Property	DOES have potential IFV land damage

Introduction

This report sets out the engineering assessment results for the individual property above (the Property) to determine whether potential IFV land damage has occurred.

IFV is a type of land damage recognised by EQC. In some parts of Canterbury the earthquakes caused changes to residential land that mean that some properties are now vulnerable to flooding, where previously they were not, and some are now more likely to experience a greater depth and/or frequency of flooding.

More information on IFV, including the supporting policy documents, can be found on the EQC website (see the "References and Further Information" section below for details).

Engineering assessment methodology

Tonkin & Taylor Ltd (T&T) has undertaken the engineering assessment of the Property in accordance with the methodology set out in the report Canterbury Earthquake Sequence: Increased Flooding Assessment Methodology; April 2014 (see the "References and Further Information" section below).

To identify land with potential IFV, T&T has assessed the change in flood depth in a 1 in 100 year flood event or less caused or contributed to by the reduction in the height of the land (exacerbated flood depth) as a result of the earthquake events. T&T has

- Undertaken flood modelling to identify properties that satisfy all three of EQC's engineering thresholds (refer below) for site specific assessment
- Identified additional properties that meet EQC's exceptions to the thresholds, for inclusion in the site specific assessment
- Undertaken a brief site inspection for each identified property, and
- Undertaken a final engineering review to compare the Property results with that of the wider neighbourhood, and identify any additional properties for inclusion in the site specific assessment.

If this engineering assessment process confirms that the property has potential IFV land damage, then EQC will undertake a valuation assessment to confirm whether or not IFV land damage has occurred. This valuation assessment is undertaken by others, so is not part of this report.

Engineering Assessment results

Threshold 1: Has the exacerbated flood depth on the residential land increased by 0.2m or more as a result of the Canterbury earthquake sequence?	Yes
Threshold 2: Has the exacerbated flood depth on the residential land increased by 0.1m or more as a result of a single earthquake event?	Yes
Threshold 3: Has the residential land suffered observable land damage as a result of the Canterbury earthquake sequence?	No
Have any exceptions to the three engineering thresholds been identified for the Property? EQC requires consideration of Event exception, Uplift exception and Land damage exception.	No
What is the finding of the site specific assessment?	
Land has potential IFV	
What is the finding of the final engineering review including consideration of the vulnerability of properties to higher frequency events and patterns of exacerbated flood depths of between 0.1m and 0.2m?	
Land has potential IFV	

Flood modelling approach

T&T has used the following inputs to develop flood models for the assessment of IFV.

Flood modelling	Models assess flooding caused by rivers, drainage channels and stormwater run-off from rainfall. Flood depths are assessed before and after each main earthquake.
Rainfall event	Run-off from up to and including a 1 in 100 year (also known as 1% Annual Exceedance Probability) rainfall event based on current climate conditions and existing urban development.
River and drainage channels	Capacity and location of rivers, drainage channels and major stormwater pipes. Temporary stop banks on the Avon are not considered.
Topography	Terrain and elevation derived from LiDAR before and after each main earthquake.
Tidal conditions	Based on a 1 in 10 year sea level combined with the rainfall event, except for lower rivers where a 1 in 100 year sea level is used.

EQC's flood model maps are available to technical professionals on the Canterbury Geotechnical Database.

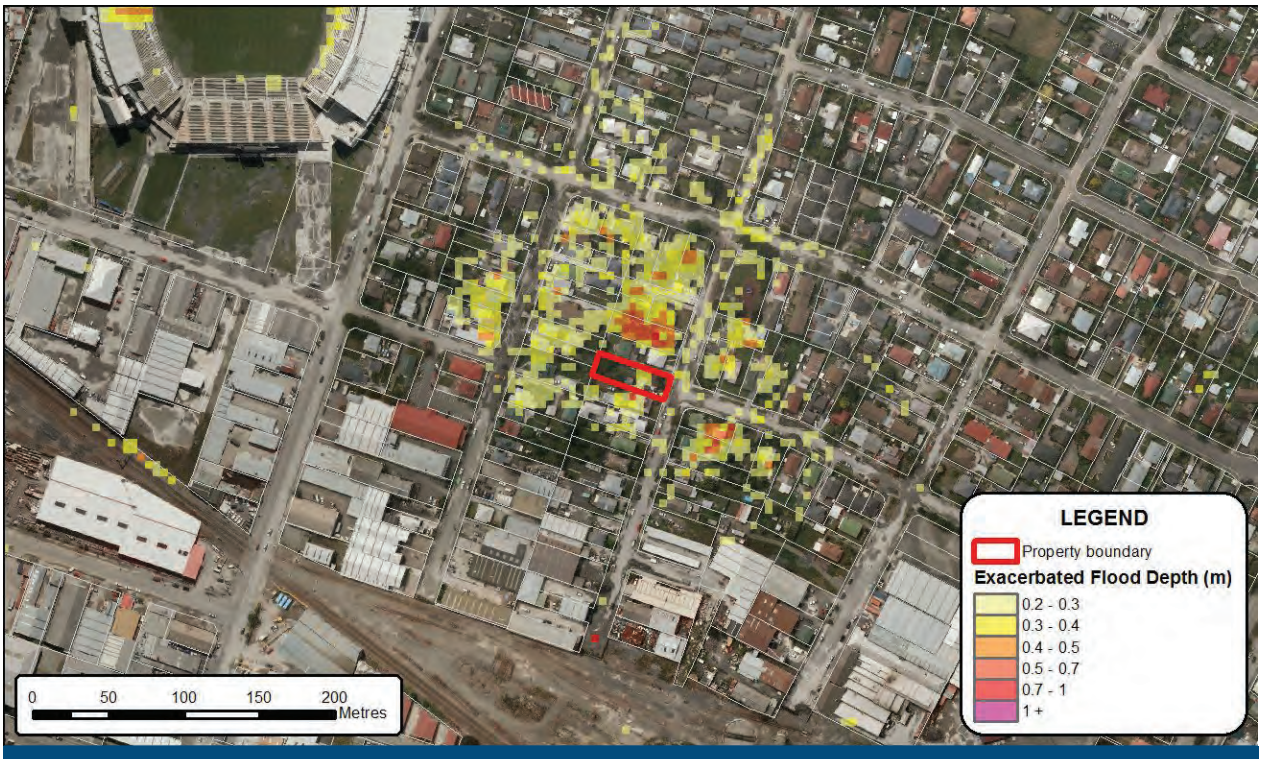
Flood modelling results

The flood model results for this Property and the surrounding area are included in Maps 1, 2 and 3. The Property considered in this report is outlined in red in the middle of the maps.

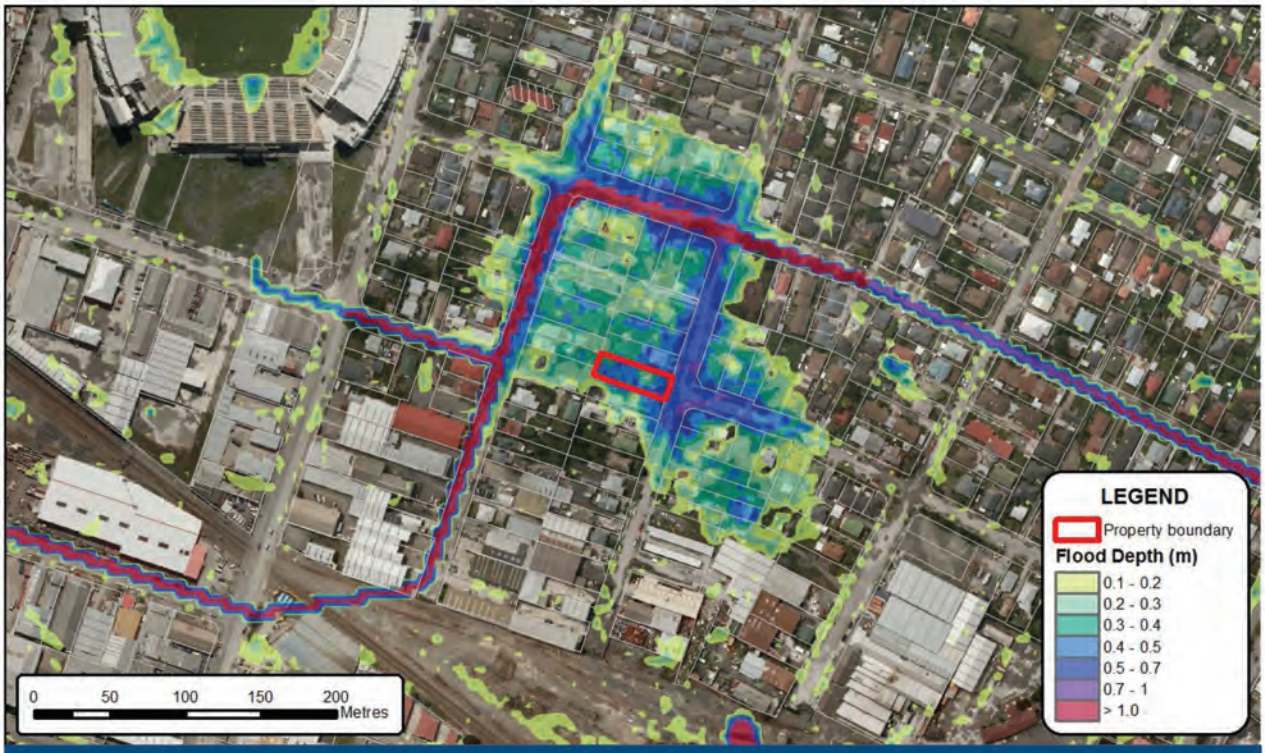
Map 1 shows exacerbated flood depth caused by the Canterbury earthquake sequence. The exacerbated flood depth is used as a measure of IFV. The exacerbated flood depth is defined as the increase in flood depth due to onsite land subsidence. This does not include changes in flood depth that may have occurred due to off-site factors, such as changes to river heights, river banks, river beds and damage to stormwater infrastructure.

Map 2 shows flooding for the 1 in 100 year flood event before the Canterbury earthquake sequence.

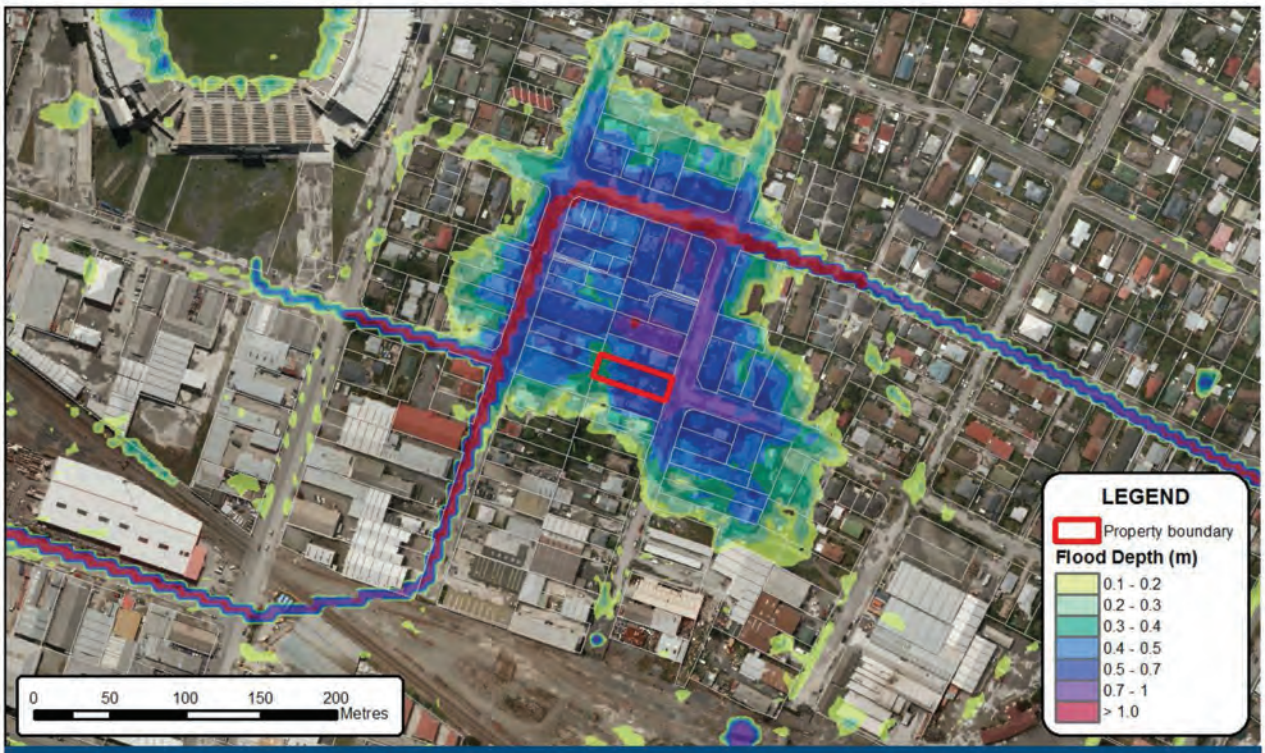
Map 3 shows flooding for the 1 in 100 year flood event after the Canterbury earthquake sequence. EQC's flood model maps are available to technical professionals on the Canterbury Geotechnical Database.



Map 1: Exacerbated flood depth 1 in 100 year flood event



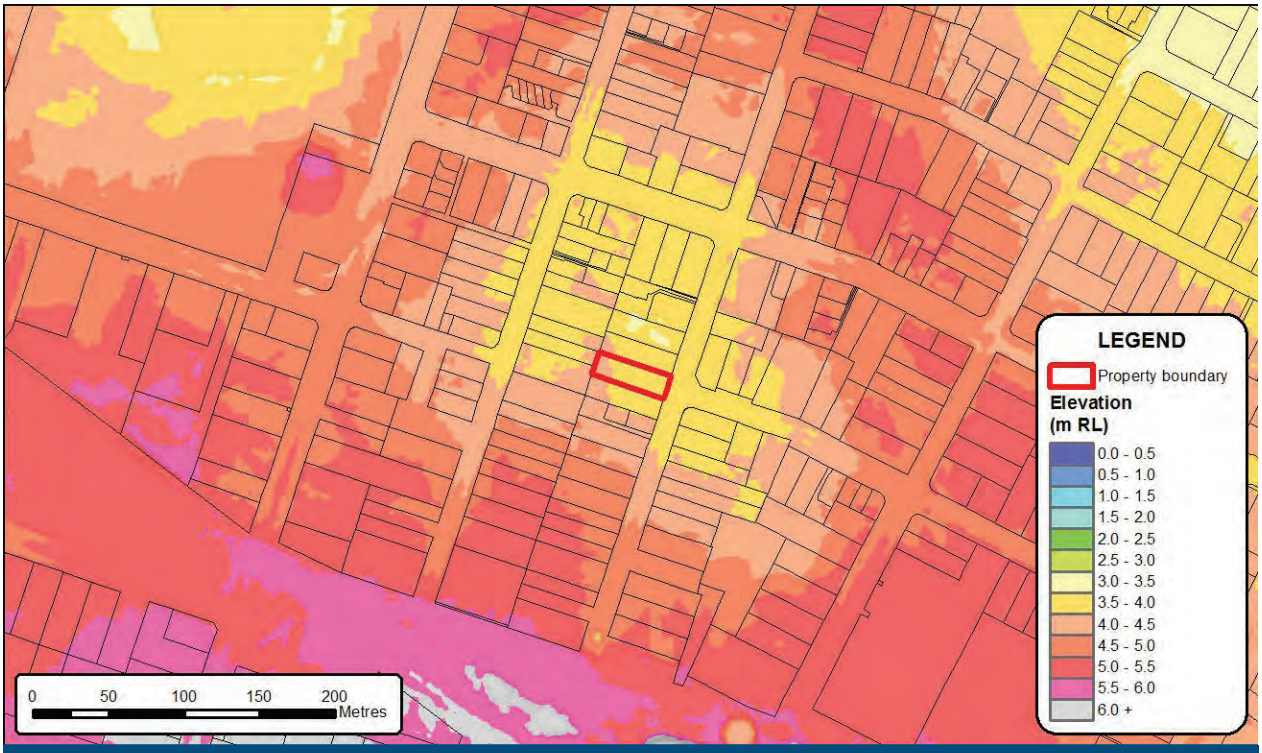
Map 2: Modelled flood depths for a 1 in 100 year flood event before Canterbury earthquake sequence



Map 3: Modelled flood depths for a 1 in 100 year flood event after the Canterbury earthquake sequence

Topography

Map 4 shows the ground elevation (i.e. the height of the land) following the Canterbury earthquake sequence. The ground surface elevation was measured using an aerial LiDAR survey (which involved scanning the ground surface from an aircraft). This post-earthquake ground elevation survey is a key input into the modelling of the post-earthquake flood depth. Similar surveys were used as an input into the modelling of pre-earthquake flood depths.



Map 4: Ground surface elevation post December 2011

Disclaimer

This report was produced for EQC purely for the purposes of assisting EQC to determine whether it has any liabilities under the Earthquake Commission Act 1993. The report is not meant to be used for any other purpose. T&T understands that EQC will provide this report to the EQC customer.

The engineering assessment has been undertaken in accordance with EQC's Increased Flooding Vulnerability Policy Statement Document; September 2014 and the Canterbury Earthquake Sequence: Increased Flooding Vulnerability Assessment Methodology; April 2014 (refer below).

References and further information

For more information about IFV land damage and the engineering assessment, refer to the following reports which are available on the EQC website:

- EQC Increased Flooding Vulnerability Policy Statement Document; September 2014
- Canterbury Earthquake Sequence: Increased Flooding Vulnerability Assessment Methodology; April 2014
- Canterbury Earthquake Sequence: Increased Flooding Vulnerability River Modelling and Coastal Extensions Report; August 2014
- Increased Flood Vulnerability: Geological Processes Causing Increased Flood Vulnerability; August 2014
- Increased Flood Vulnerability: Overland Flow Model Build Report; August 2014
- EQC Stage 3 Land Report; July 2012

Data references

Parcel database sourced from the LINZ Data Service and licensed by LINZ for re-use under the Creative Commons Attribution 3.0 New Zealand licence. Aerials supplied by NZAM (Date of Photo: Feb 2011).

Important notice: The maps in this report were created from maps and/or data extracted from the Canterbury Geotechnical Database (https://canterburygeotechnicaldatabase.projectorbit.com), which were prepared and/or compiled for the Earthquake Commission (EQC) to assist in assessing insurance claims made under the Earthquake Commission Act 1993. The source maps and data were not intended for any other purpose. EQC and its engineers, Tonkin & Taylor, have no liability for any use of the maps and data or for the consequences of any person relying on them in any way. This “Important notice” must be reproduced wherever these maps or any derivatives are reproduced.