

**IN THE MATTER** OF APPLICATIONS PURSUANT TO THE RESOURCE MANAGEMENT  
ACT 1991

AMBERFIELD APPLICATION FOR SUBDIVISION AND LAND USE  
CONSENTS FOR DEVELOPMENT

**APPLICANT** WESTON LEA LIMITED

**APPLICATION  
NUMBER** 010.2018.00009853.001  
011.2018.00006695.001

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**EVIDENCE-IN-REPLY OF CALEB CLARKE  
STORMWATER AND FLOOD HAZARD RISK  
7th June 2019**

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## **INTRODUCTION**

### **QUALIFICATIONS AND EXPERIENCE**

- 1 My full name is Caleb Clarke. My qualifications and experience are set out in my evidence in chief dated 29<sup>th</sup> March 2019.
- 2 I repeat the confirmation given in my evidence in chief that I have read the Code of Conduct for expert witnesses contained in the 2014 Environment Court Practice Note and that I agree to comply with it.
- 3 I confirm that the topics and opinions expressed in this statement are within my area of expertise except where I state that I have relied on the evidence of other persons. I have not omitted to consider materials or facts to me that might alter or detract from the opinions I have expressed.

### **SCOPE OF EVIDENCE**

- 4 In this statement, I address stormwater related matters raised in the applicant's evidence where I do not concur with the opinions expressed:
  - a Evidence in Chief (EIC) of Mr Raymond O'Callaghan, specifically paragraphs 134-140.
  - b Legal Counsel's Opening Submissions paragraphs 124, 125 and 126.

### **STATEMENT OF MR RAY O'CALLAGHAN**

- 5 As per section 4.2.3.4 of the Regional Infrastructure Technical Specifications (RITS), easements are required within Hamilton City Council (HCC) for secondary flows on private land with no minimum requirement on flow size. The purpose of the easement is to prevent alteration of the ground surface and prohibit the location of structures that will impede the secondary flow across the land. Without an easement new owners would be free to construct walls, gardens, fences and other items that would divert secondary flows and/or be vulnerable to damage from them.
- 6 Paragraph 135 of Mr O'Callaghan's EIC discusses the flowpath lengths, which are short in stormwater catchment terms but I consider are still significant for the management of secondary flows. These lengths and ground features such as driveways will tend to concentrate flows and increase the nuisance of secondary flows from above. The development should be designed so that driveways convey the secondary flows to the road reserve, meaning the easements can follow the driveways.
- 7 Paragraph 136 of Mr O'Callaghan's EIC states a calculation of 5 l/s from an upstream catchment for a modest event, allowing for losses to primary soakage. The critical situation to manage for flooding effects under the RITS adopted by HCC is the 100 year design storm. This event would exceed the

design capacity of the upstream soakage and as such the whole peak flow would reach the downstream properties. My calculations indicate 100yr peak flow from the three lots using the rational method is 15l/s and using the Auckland Regional Council TP108 method is 30 l/s.

- 8 Paragraphs 138 and 140 of Mr O'Callaghan's EIC put forward the premise that runoff will remain as sheet flow and shouldn't be concentrated. I would expect this secondary flow to become concentrated by topography and other ground features with the capacity to cause nuisance flooding of downslope properties.
- 9 A brief review of other jurisdictions in New Zealand reveals a range of approaches to the issue of private easements for secondary flow management with varying controls:
  - a Auckland Councils Code of Practice requires an easement for secondary flows when 100 year annual recurrence interval (ARI) flows exceed 100 l/s.
  - b Christchurch City Council Infrastructure Design standard requires easements for secondary flows on private property with no minimum catchment size.
  - c Dunedin adopts NZS 4404 however amends to require a 100 year ARI level of service for primary systems where no downstream public secondary flow paths exists, and to require easements on private lots for secondary flow paths.

Therefore the RITS requirements do not seem overly onerous.

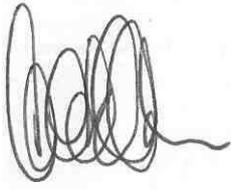
#### **LEGAL COUNSELS OPENING SUBMISSIONS**

- 10 Paragraph 125 of the applicant's legal counsel opening submissions indicates that Mr O'Callaghan's position, that easements are not appropriate for secondary flows, is consistent with the legal position of natural servitude. However in my view the potential discharge from the upstream property will have been the subject of change in magnitude and location as rainwater is concentrated by roofs and impervious areas and conveyed to a soak pit designed with 10 year ARI at a lower portion of the site. When the soakage is overwhelmed by greater than 10 year events the peak flow will overflow either at stormwater downpipes or the soakhole in a concentrated flow with potential to create nuisance.

#### **CONCLUSION**

11. In summary, it is my opinion that Condition 141 as proposed in the recommended conditions appended to the s42A report is not deleted. This condition reads as follows:

*'The consent holder shall provide private easement boundaries for all down slope properties in order to convey secondary stormwater flows from upstream properties to the relevant road reserve or Jointly Owned Access Lots (JOALs). Any necessary easements shall be shown on the survey plan for the relevant subdivision stage.'*

A handwritten signature in black ink, appearing to read 'Caleb Clarke', with a long horizontal tail extending to the right.

Caleb Clarke  
7th June 2019