

**From:** [Georgina Hamilton](#)  
**To:** [Plan Hearings](#)  
**Cc:** [mwebb](#); [Judy Blakemore](#); [Julia Crossman](#); "[Andrew Mockford](#)"; [Keri Johnston](#); [Greg Ryder](#); [grantporter@xtra.co.nz](#); [Saunders, Caroline](#); [Tim Ensor](#)  
**Subject:** Plan Change 7: Opihi Flow and Allocation Working Party (PC7-382) - Evidence in Chief  
**Date:** Friday, 17 July 2020 5:50:39 pm  
**Attachments:** [Evidence of Mark Webb 17.7.20.pdf](#)  
[Evidence of Gregory Anderson 17.7.20.pdf](#)  
[Evidence of Mark Hawkins 17.7.20.pdf](#)  
[Evidence of Grant Porter 17.7.20.pdf](#)  
[Evidence of Caroline Saunders 17.7.20.pdf](#)  
[Evidence of Murray Bell 17.7.20.pdf](#)  
[Evidence of Dan Davies 17.7.20.pdf](#)  
[Evidence of Keri Johnston 17.7.20.pdf](#)  
[Evidence of Dr Gregory Ryder 17.7.20.pdf](#)  
[Evidence of Gregory McAlister 17.7.20.pdf](#)  
[Evidence of Timothy Ensor 17.7.20.pdf](#)  
[Evidence of Jonathan Sutherland 17.7.20..pdf](#)

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Dear Tavisha

We act for the Opihi Flow and Allocation Working Party (**OFAWP**), submitter no. PC7-382.

We **attach** for filing, in relation to the above matter, statements of evidence in chief of the following witnesses on behalf of the OFAWP:

1. Mark Webb (OFAWP representative – Fish & Game);
2. Gregory Anderson (OFAWP representative – North Opuha);
3. Murray Bell (OFAWP representative – Upper Opihi);
4. Deiniol Davies (OFAWP representative – South Opuha);
5. Mark Hawkins (OFAWP representative – Te Ana Wai);
6. Keri Johnston (hydrology);
7. Dr Gregory Ryder (ecology/freshwater quality);
8. Grant Porter (economics);
9. Dr Caroline Saunders (economics);
10. Tim Ensor (planning);
11. Gregory McAlister (drone footage);
12. Johnathan Sutherland (drone footage).

Kind regards,

Georgina Hamilton  
Partner



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**BEFORE INDEPENDANT HEARING COMMISSIONERS  
APPOINTED BY THE CANTERBURY REGIONAL COUNCIL**

**UNDER:** the Resource Management Act 1991

**IN THE MATTER OF:** Proposed Plan Change 7 to the  
Canterbury Land and Water Regional  
Plan – Section 14: Orari-Temuka-Opihi-  
Pareora

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**STATEMENT OF EVIDENCE OF GREGORY JOHN MCALLISTER ON BEHALF OF  
THE OPIHI FLOW AND ALLOCATION WORKING PARTY  
(SUBMITTER NO. PC7-382)**

Dated: 17 July 2020

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## **1. INTRODUCTION**

- 1.1 My full name is Gregory John McAllister.
- 1.2 I am a Director of Vector Charlie Charlie (**VCC**) and also hold the role of Technical Processing Lead. VCC is a commercial drone data company that specialises in data gathering and mapping for engineering, precision agriculture and resource management project work. VCC is authorised to operate under Part 102 of the Civil Aviation Act.
- 1.3 I am a Helicopter Pilot with an Airline Transport Pilots licence and have been operating as a commercial helicopter pilot in NZ, Australia, Canada and the United Kingdom for 20 years. At VCC I have been responsible for the processing and management of client data, in addition to gathering drone data with our various machines for the last five years- since the inception of the company. I employ various software suites to complete the required processing of the raw imagery gathered via drones. I have over 5 years of experience using post processing software and general 3D modelling software.
- 1.4 We were tasked by Opuha Water Limited and The Opihi Flow and Allocation Working Party in January 2019 to capture and process drone data in specified reaches of the Te Ana Wai, Upper Opihi, Opihi and North and South Opuha rivers.
- 1.5 The purpose of this evidence is to describe how the various drone data was processed.

## **2. IMAGERY**

- 2.1 VCC were charged with producing high resolution, 2D ortho rectified images (using photogrammetry) at varying flows for the purposes of ecological assessment and comparison.
- 2.2 The locations and flight parameters were specified by Dr Greg Ryder and usual adjustments required in the field to ensure useful data was gathered are described in the statement of Chief Pilot Johnny Sutherland who gathered the data (both video and still) in each case. The processing actions and software are the same for each 2D ortho.

- 2.3 Photogrammetry is the process of using many images to generate accurately georeferenced images, referred to as orthorectified images (or sometimes simply orthoimages or orthomosaics). Orthorectified images are processed using software to apply corrections for optical distortions from the sensor system, and apparent changes in the position of ground objects caused by the perspective of the sensor view angle and ground terrain.
- 2.4 Repeat surveys followed identical flight path, altitude and processing parameters to ensure comparison between flows at the same site where relevant.
- 2.5 Raw data was delivered to me as series of hundreds of photos for each site that was then uploaded. These photos were geotagged and delivered in .jpg file type
- 2.6 Photogrammetry takes multiple steps to complete such as aligning the photos, creating a point cloud and mesh, depth maps, elevation map and then an Orthomosaic. During processing, adjustments need to be made to improve visual outcomes including adjusting brightness, removing distorted images and removing points that make the model less accurate.
- 2.7 The final orthos were then delivered to Dr Greg Ryder for assessment.
- 2.8 In addition to the still imagery, VCC conducted video footage. This footage required processing and was delivered in mp4 film format and geo-tiff and jpeg orthomosaic format to Dr Greg Ryder and Julia Crossman at Opuha Water Limited for review. The imagery/footage accompanies Dr Greg Ryder's evidence.

**GREGORY JOHN MCALLISTER**

17 July 2020