

BEFORE THE TASMAN DISTRICT COUNCIL

Under The Resource Management Act 1991

In the matter of Resource Consent Applications RM120928V2 (land use change of conditions), RM190790 (land use), RM190789 (subdivision), RM190791 (land disturbance), and RM191308 (water permit)

By The Integrity Care Group Limited
Applicant

And In respect of the proposed construction and operation of a retirement village (Olive Estate Lifestyle Village) at 109 Hill Street, Richmond

**EVIDENCE OF RONALD JAMES O'HARA
ON BEHALF OF THE APPLICANT**

5th February 2021

INTRODUCTION

- 1 My name is Ronald James O'Hara (Ron).
- 2 I hold the qualification Bachelor of Engineering (Civil) (Canterbury University).
I am a Chartered Member of Engineering New Zealand (CMEngNZ).
I am a Principal of Tasman Consulting Engineers Limited (TCEL) and have been in engineering practice in the Nelson Province since 1987.
- 3 In my practice I specialise in stormwater disposal, wastewater disposal, building site certification, subdivision construction, structural engineering and foundation engineering.

CODE OF CONDUCT

- 4 Although not required for this hearing, I confirm that I have read and agree to be bound by the Environment Court Code of Conduct for Expert Witnesses and confirm that I have not omitted to consider material facts known to me that might alter or detract from the opinions that I express in the following evidence. The evidence I give is within my expertise.
- 5 I have been asked to address stormwater disposal and engineering design & construction specifications for earthworks for the Hill Street Block development.

REPORTS PREPARED BY TCEL

- 6 TCEL Prepared an initial report on stormwater attenuation through the existing detention pond adjacent to the Lake House. The report is dated 2nd October 2019. This report concluded that following full development of the Hill St Block, the increase in stormwater flows entering the pond was minor, amounting to 2.6%. Outflow from the detention pond was calculated to increase by 1.7%. The increased outflow from the detention pond of **302** L/s was still well below the permitted outflow to Hart stream of **344** L/s.
- 7 Following the Tasman District Council's (TDC) section 92 request for further information, TCEL carried out a peer review of catchment calculations provided by Verrall & Partners Ltd and Envirolink including the capacities of the three outlets to be used as a combined solution. Subsequently the TDC requested a further assessment of the existing Olive pond capacities

- 8 TCEL prepared a report on the findings of the peer review of stormwater discharge including the stormwater attenuation provided by the existing pond for submission to the TDC. This report is dated 27th February 2020.
- 9 The TCEL Peer Review report assessed the following aspects of the stormwater discharge calculations.
 - 9.1 **Runoff Coefficients.** Runoff Coefficients define the percentage of rainfall falling upon a ground surface that will runoff and enter a stormwater system, as opposed to infiltrating into the underlying soil. The runoff coefficients appropriate for various ground cover types was independently assessed. In particular the runoff coefficient for pasture and grass cover was investigated using data derived from TCEL infiltration testing at the Olive Estate site in 2012. The findings of that infiltration testing were included in a TCEL report to the TDC dated 13 November 2012. The investigation concluded that the infiltration testing supported the use of a 'Medium Soakage' runoff coefficient of **0.30**. The runoff coefficients used in the Verrall and Envirolink reports were considered appropriate.
 - 9.2 **Surface Ground Cover Evaluation.** TCEL evaluated the ground surface cover types using data supplied by Canopy (Landscape Architects). The final working plans for the main block and the proposed layout for the Hill St Block were used by Canopy to generate a summary of areas for each cover type. TCEL's calculated Area Weighted Runoff Coefficient (AWRC) was compared to those used by Verrall and Envirolink. The assessment concluded that the AWRC for Verrall and Envirolink were within **3%** of the TCEL value and were appropriate.
 - 9.3 **Pre-Development Time of Concentration (ToC).** TCEL evaluated the pre-development ToC for the whole catchment including the new Hill St block using a combination of Time of Entry and Time of Flow. The Pre-Development ToC calculated by this method was **30** minutes. A further check on pre-development ToC using the Modified Friends Equation gave a value of **28.7** minutes. The ToC used by Verrall (**30** minutes) and Envirolink (also **30** minutes) were considered appropriate.

- 9.4 **Post-Development Time of Concentration (ToC).** TCEL evaluated the post-development ToC for the whole catchment including the new Hill St block using a combination of Time of Entry and Time of Pipe-Flow. The Post-Development ToC calculated by this method was **10** minutes. The ToC used by Verrall was **17** minutes. Envirolink also used a ToC of **17** minutes. TCEL concluded that the ToC for Verrall and Envirolink may have used an inappropriately large 'Time of Entry' value. TCEL recommended the use of a **10** minute ToC for calculation of Post-development stormwater flows.
- 9.5 **Stormwater Flow Calculations (Rational Method).** TCEL evaluated stormwater flows using Rainfall Intensities based on the peer reviewed ToC values. The Pre and Post Development rainfall Intensities were then used with the AWRC to determine peak flows for rainfall events with a 20 year and 50 year Average Recurrence Interval (ARI).
- 9.6 The possible future addition of 6,579 m² area of the Nicoll Block to Olive Estate was also considered in determining the peak Pre and Post Development stormwater flows.
- 9.7 Diversion of some stormwater into existing TDC drainage systems in Fairrose Drive (**296** L/s for 20 yr ARI, **346** L/sec for 50 yr ARI) and Wilkinson PI (**98** L/s for 20 yr ARI, **120** L/sec for 50 yr ARI) was taken into account in the stormwater flow calculations.
- 9.8 The peak flows calculated by TCEL were **1,859** L/s for 20 yr ARI, **2,287** L/s for 50 yr ARI.
- 9.9 These values are 20% higher than the Verall peak post development flow for 20 yr ARI (**1,476** L/s) and 30% higher than the Verall peak post development flow for 50 yr ARI (**1,730** L/s). It should be noted that due to the different ToC for the TCEL and Verall Peak flows, direct comparisons are not possible since the ToC's are taken into account when calculating the stormwater flows in and out of the Detention Pond.

STORM WATER DETENTION POND ASSESSMENT

- 9.10 TCEL evaluated the attenuation of peak stormwater flows in the existing detention pond for both 20 yr ARI and 50 yr ARI stormwater events.
- 9.11 The modelling of detention pond performance took into account the different ToC for the TCEL peer review compared to the earlier Verrall and Envirolink calculations.
- 9.12 The revised detention calculations for the pond and orifice outlet to Hart Stream showed that the net effect of the shorter time of concentration (and hence storm duration) and increased peak inflows to the pond is to **reduce** both the maximum water depth in the pond (by approximately **135mm** in both 20 yr ARI and 50 yr ARI cases) and the maximum outflow from the pond (by **36 L/s** for 20 yr ARI and **32 L/s** for 50 yr ARI).
- 9.13 The reason for the reduction in outflow and pond depth is that the while the 10 min ToC results in a much higher rainfall intensity (28% higher than the 17 min ToC) the storm duration is also much shorter (41% shorter duration). Thus the net effect is that the total volume of stormwater arriving at the detention pond is significantly lower for the rainfall event with a lower ToC.
- 9.14 The maximum outflow (to Hart Stream) from the Detention Pond for a 20 yr ARI rainfall event is **266 L/s** (Maximum allowed is 344 L/s). For a 50 yr ARI rainfall event is **302 L/s**.

SUMMARY OF STORM WATER PEER REVIEW

- 10 The TCEL Peer Review concluded '*stormwater discharge from the original Olive Estate Main Block and also the additional Hill St Block, with allowance for future addition of the Nicol Home Block has confirmed that the original pond design and construction is adequate to mitigate the design stormwater flows*'.

CIVIL WORKS FOR HILL STREET BLOCK

- 11 TCEL will be providing civil engineering consultation for the Olive Estate Lifestyle Village extension in the Hill St Block. The work will include a continuation of our existing involvement with the main block plus specific additional work associated with the Care Facility.

- 12 Continuation of existing engineering consultation services will include:-
 - 12.1 Access road pavement investigation and design plus inspections during construction.

 - 12.2 Building platform investigation and design plus inspections during construction.

 - 12.3 Stormwater investigation and design. If required this may include investigation, design and construction inspections for stormwater detention systems.

- 13 In addition to the items listed in 12 above, TCEL will also provide civil engineering services for the construction of a building platform for the proposed new Care Facility. The preliminary estimated earthworks will comprise 13 000m³ cut and 8000m³ fill, over an area 8500m², with a maximum cut height of 5m.

- 14 This work will likely include:-
 - 14.1 Evaluate Erosion and Sedimentation control measures in compliance with TDC guidelines.

 - 14.2 Divert incoming stormwater from Hill St.

 - 14.3 Investigate the adequacy of the existing pond embankment and if necessary, provide for the removal and disposal of the soil in the embankment.

 - 14.4 Investigate, design and inspect the construction of sub-soil drains beneath engineered filling.

- 14.5 Design and inspect the construction of the certified earth fill for the proposed building platform. All fill will comply with the requirements of NZ4431:1989.
- 14.6 Investigate, design and inspect the construction of the rear cut face to building platform downslope from Hill St.
- 14.7 The preliminary estimated earthworks will comprise 13 000m³ cut and 8000m³ fill, over an area 8500m², with a maximum cut height of 5m.

Ron O'Hara
5 February 2021