

THE MATTER

of the Resource Management Act 1991

AND

IN THE MATTER

of an application for subdivision and land use
consents SUB-2015-58, LUC-2015-310 and LUC-
2015-319 at 326 Factory Road, Mosgiel.

BY GLENELG GOSPEL TRUST

Applicants

TO DUNEDIN CITY COUNCIL

The Council

**EVIDENCE OF DERRICK EDMUND RAILTON
ON BEHALF OF
GLENELG GOSPEL TRUST**

INTRODUCTION

- 1.1 My name is Derrick Railton. I am a Director of Fluent Infrastructure Solutions Ltd in Dunedin and have 40 years' experience in the field of infrastructural and environmental engineering, with a particular focus on wastewater engineering. I hold a degree of Bachelor of Engineering (Civil) from the University of Auckland; I am a Chartered Engineer and a member of the Institution of Professional Engineers of New Zealand and of Water New Zealand.
- 1.2 Over the past 25 years I have developed a particular interest and expertise in the area of on-site wastewater management, attending conferences in New Zealand and Australia. I have also presented papers on On-site Wastewater systems, and related aspects to those conferences. I am conversant with the two key technical standards for on-site and small scale wastewater management most commonly used in New Zealand, namely the National standard AS/NZS 1547:2012 "On-site domestic wastewater management", and Auckland Regional Council's Technical Publication 58 "On-site Wastewater Systems: Design and Management Manual".
- 1.3 I also have particular expertise in the design of pressure sewer systems commonly used to convey wastewater off-site to other wastewater systems.
- 1.4 In regard to stormwater management, I have also had wide experience in the design of such systems. In this case, I acknowledge the assistance Gary Dent, Civil Engineer and fellow Director at Fluent Solutions Ltd, with the preparation of my evidence. Gary has extensive and more specialised experience in the field of stormwater management and hydrology generally.
- 1.5 While this is a local authority hearing, I have read and agree to comply with the Code of Conduct for Expert Witnesses set out in the Environment Court Practice Note on Alternative Dispute Resolution, Expert Witnesses, and Amendment to Practice Note on Case Management. My evidence has been prepared on that basis.

SCOPE OF MY EVIDENCE

- 1.6 In this matter I have been asked by the applicant, Glenelg Gospel Trust, to review and assess the stormwater related wastewater management aspects for the proposed church development at 326 Factory Road, Mosgiel.
- 1.7 I have previously prepared a report on these aspects titled "Proposed Brougham Park Development, 326 Factory Road – Preliminary Wastewater and Stormwater Management Study" dated June 2015. This report was prepared with the assistance of Gary Dent and was submitted with the resource consent application.

- 1.8 In regard to this report I note that there has been a recent change to the subdivision development application in that construction of a manse no longer forms part of the application. This only serves to reduce the degree of stormwater and wastewater management required on site and therefore does not change the findings in that report.
- 1.9 The early part of my evidence commences with a restatement of the main background and findings of the Fluent Solutions report, noting that I have summarised a number of matters to avoid unnecessary repetition.
- 1.10 Given Dunedin City Council objections to the discharge of wastewater from the church development to Council's sewer some distance back down Factory Road towards Mosgiel, I now only address the option for on-site wastewater management.
- 1.11 Following my introduction, I respond to stormwater and wastewater matters raised in submissions to the proposal.
- 1.12 Finally, I address comments and matters raised by Council's reporting officers.

EXECUTIVE SUMMARY

- 1.13 Having evaluated and assessed the stormwater and wastewater management aspects of the proposal, I confirm my view that both can relatively simply and sustainably be managed within the site boundaries. This can all be achieved in accord with the Otago Regional Council's bylaw for the Discharge of Stormwater into Council's Scheduled Drains "Flood Protection Management Bylaw 2012" and in accord the NZ standard for on-site wastewater management AS/NZS1547:2012.

2.0 STORMWATER MANAGEMENT

Introduction

- 2.1 The development is located at 326 Factory Road, 3.6km east of the Mosgiel town centre and is approximately 2.4 ha in size. The land generally slopes gently towards the southern point of the property.
- 2.2 The proposed development plans are to include the construction of a new church and associated carpark.
- 2.3 Dunedin City Council (DCC) standards require management of post-development outflows off site to be equal to or less than flows existing on the pre-developed property.

Stormwater Detention Pond Design

- 2.4 Stormwater runoff flows from the site ultimately drain to the southern point of the site. Because of sensitivity downstream, increased runoff due to development is to be mitigated

through the use of a grassed detention pond system, tentatively sized at 240m³ as described in the Fluent Solutions report. The size of the proposed detention facility is subject to review at the time of final design, but the currently identified sizing is expected to be close to that finally established.

- 2.5 The detention pond facility will be designed to provide storage of stormwater runoff from the site to limit outflows to the adjacent ORC Scheduled Drain O10 to a flow equal to or less than those of the site in the pre-developed state. A pipe reticulation system and/or overland flow paths will be designed to capture and channel stormwater runoff from the site for the 10 and 100 year ARI storms towards the detention area.

Proposed Stormwater Management Approach

- 2.6 Under the ORC Flood Protection Management Bylaw 2012 approval is required to discharge stormwater into a scheduled Council drain (O10 in this instance). . The stated purpose of the Bylaw is that it is *“only intended to control those activities which may affect the integrity or operation of flood protection works.”*
- 2.7 Scheduled drain O10 runs along the northern portion of the site and continues to drain south along the western border. The drain ultimately flows into the Owhiro Stream, which is part of the East Taieri Drainage Scheme and Lower Taieri Flood Protection Scheme.
- 2.8 Stormwater runoff from all of the developed (paved and roofed areas) is intended to be collected in the detention pond system located at the southernmost point of the site, and will discharge directly into the Scheduled Drain O10 at this point. I acknowledge that other runoff from the northern portion of the site will enter the Scheduled Drain upstream of this point, but as this area essentially remains in its present vegetated state little change will occur in this area in regard to stormwater runoff.
- 2.9 Because the stormwater runoff from the site is being mitigated to pre-development flows through the use of the detention pond system, I confirm that the planned development at 326 Factory Road will have no greater impact on the downstream waterways than what is currently occurring for the present level of development.
- 2.10 In addition to attenuation, the detention pond system will also provide some treatment. The detention pond allows sediment and contaminants to settle at the bottom of the pond. When the runoff drains from the pond, the sediments will be trapped and will not be carried downstream. Instead, trapped sediments and contaminants are able to be treated by the plants and grasses in the detention pond. Therefore, I confirm that the treatment aspect of the detention pond is an added measure to provide protection downstream in the Owhiro Stream.

3.0 WASTEWATER MANAGEMENT

Introduction

- 3.1 There is currently no reticulated sewerage system servicing the property at 326 Factory Road, with the nearest connection being approximately 1.4km along Factory Road to Wingatui Road. The property is, however, serviced by a reticulated water supply.
- 3.2 A preliminary geological site assessment conducted by Jon K Lindqvist, Geological Consultant, identifies the soil characteristics of the property and enables the suitability of the in-situ soils to support on-site wastewater dispersal to be assessed. That investigation identifies the subsoils to be predominantly of variable clay and silt content, leading me to classify these soils as Category 6 soils, as set out in the previously referred to standard; AS/NZS:1547:2012 "On-site Domestic-Wastewater Management". This category is the highest (least permeable) and therefore most conservative soils category in the standard.
- 3.3 For a Category 6 soil on a moderately flat site (as is the case here) the standard prescribes an application rate to land for secondary treated wastewater of 2.0mm/d. Secondary treated wastewater is that which has passed first through a conventional septic tank, followed by additional treatment to further stabilise the wastewater. Secondary treatment of the wastewater is proposed in this instance as the application of septic tank treated effluent only is not considered appropriate for the site.
- 3.4 Further permeability tests will be necessary for detailed design and could potentially determine a slightly higher loading rate than assumed for the purposes of preliminary design and for the purposes of this consent application. I have at this stage therefore taken a conservative approach.
- 3.5 I note that there are several 'triggers' under the Otago Regional Council's "Regional Plan: Water" that will require a resource consent to be obtained for the proposed discharge of treated wastewater to land. In particular the proximity to a Scheduled Drain, and the potential for flows at times to exceed 2000L/d will require such resource consent. This will require a rigorous approach to the wastewater system final design and to the assessment of environmental effects. I am satisfied that these aspects can readily be managed and addressed on the subject site and I expand further on this as follows.

Wastewater Management Design Flows

- 3.6 The nature of a church development is such that wastewater flows will generally be high on weekends and significantly lower during the week. A variety of flow scenarios have been considered for the purposes of preliminary design and these are set out in the Fluent Solution's report. Flow buffering of peak day flows over the following week, especially for occasional high attendance events, forms a key part of the proposed strategy for managing

wastewater flows. This allows for economic sizing of both the treatment plant and the effluent dispersal system, and in particular reduces the area required for effluent dispersal.

- 3.7 From the foregoing flow scenario assessment I have established that balanced daily flows will likely vary between 500-700 l/d for regular events, and up to 2,500-3,000 l/d for occasional special events. Importantly this means that for most of the year the proposed effluent dispersal system, which will be designed for the peak event scenario, will be loaded at around 20% of the design application rate, or around only 0.4mm/d. This is a very low loading rate for wastewater application to land.

Proposed Wastewater Management Approach

- 3.8 The design of an on-site wastewater management system is dependent on many variables, including soil drainage properties, contours, ground steepness, available area for effluent dispersal and effluent flows. For the site in question, areas available for wastewater dispersal are limited by planned development, use of the site, and the proximity of the ORC Schedule Drain. This, together with the low permeability of the soils on site, means that primary treated only (e.g. septic tank) effluent dispersal is not feasible, as I have just mentioned. Instead, secondary or advanced secondary treatment is proposed prior to effluent dispersal by a pressure compensating dripperline irrigation system.
- 3.9 Pressure compensating dripperline is small 16mm diameter pipe with effluent “emitters” spaced at regular intervals. The pipe is laid in the topsoil layer at shallow depth (typically at 100 – 150mm depth), or even laid on the surface and covered with mulch or woodchips. Drip irrigation applies the effluent directly to the surface topsoil layer to help disperse the effluent to encourage both ground soakage and plant or grass uptake of moisture.
- 3.10 Dripperline is particularly suited to incorporation within landscaped areas and gardens, providing beneficial irrigation to such areas. For the proposed development dripperline will be laid in landscaped and planted areas wherever possible. Preliminary design has shown that an area of 1300 to 1500m² is required to accommodate peak wastewater flows and that this area can likely be accommodated within such areas. Figure 1 of my evidence, which is extracted from the Fluent Solutions report, shows how this may be achieved. There is, however, plenty of other land that could be utilised if a little more land is needed to fully and sustainably complete the dispersal system.
- 3.11 Some reduction in the dispersal field area may prove possible at the time of detailed design due to the infrequent nature of special events, but this is a matter for future consideration.

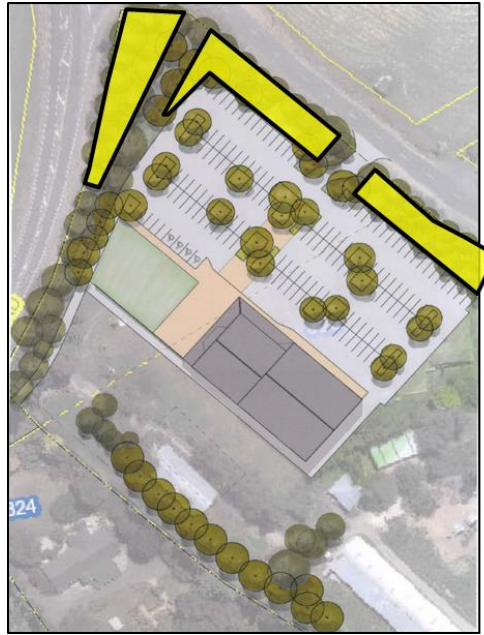


Figure 1: Proposed Areas for Dripperline Irrigation

Environmental Effects Assessment

- 3.12 It is important to consider any adverse environmental effects when discharging wastewater to land. In order to protect the integrity of the environment, the preliminary design of the on-site wastewater management system includes low effluent loading rates to land, below that prescribed by the standard for such practice. This ensures that the soil, together with moisture uptake by plants, trees and shrubs, will be able to accommodate the applied effluent without runoff beyond the confines of the dripline areas to adjacent land or waterways.
- 3.13 Most importantly, application of wastewater to land at low application rates provides for a high level of further effluent renovation in respect of wastewater stabilisation, pathogen reduction and nutrient uptake by plants. Any seepage of applied wastewater within the soil, beyond the boundaries of the dripperline areas, is likely to be minimal. However, where this occurs (potentially under infrequent peak loadings), the rate of seepage will be slow and will thereby achieve ongoing renovation of the wastewater to low contaminant levels within relatively short distances of travel (of the order of 1 or 2m).
- 3.14 As an overarching precautionary measure, a separation distance of dripperline areas from scheduled drains of at least 5m will be maintained.
- 3.15 Overall I am satisfied that on-site wastewater management can be simply and readily achieved on site in a safe and sustainable manner without any offsite effects of any significance.

4.0 SUBMISSIONS

4.1 I have read each of the submission to identify those which raise stormwater or wastewater management concerns. Some concerns are not particularly specific, in which case my response is sometimes generalised.

4.2 **Submitter:** Andrew Young & Shona Carruthers

Submitter Concern:

- Wastewater: Question raised regarding Wastewater Management System capacity and potential effluent runoff.
- Stormwater: Question raised regarding removal of contaminants from stormwater run-off and capacity.

Response:

Wastewater:

My foregoing evidence has described how peak wastewater flows are to be buffered to even out flows over the week. Effluent loading rates are low to avoid the potential for effluent runoff.

Stormwater:

As discussed previously, any contaminants and sediments picked up in the runoff from the carpark and other hard surfaces will be contained in the detention pond. The attenuation period in the pond will allow sufficient settling time to achieve this.

Regarding petrol and diesel runoff, this is expected to be minimal, but will in any event float on the surface and be captured in the grassed base of the pond when the pond drains.

I note that the stormwater detention pond is not designed to store all rainfall runoff, but is rather designed to continuously discharge at pre-development outflow levels throughout the storm. This design helps to limit the total detention volume needed. As per the Fluent Solutions report, the stormwater detention pond system will be designed for large storm events including the 1 in 10 and 1 in 100 year ARI events.

4.3 **Submitter:** Kevin Meehan

Submitter Concern:

- Wastewater: No questions raised.
- Stormwater: Question raised regarding significant run-off of stormwater in and around the sealed carpark area.

Response:

The runoff from the carpark and church roof will make up the majority of the total runoff from the site. All of the runoff from the developed areas are to be directed to the stormwater detention pond through a series of pipes or overland flow channels. As discussed above, the

stormwater detention pond is adequately sized to handle large storm events, as well as limit the outflow from the site to that of the pre-developed amount.

4.4 **Submitter:** AgResearch Limited – Graeme Mathieson

Submitter Concern:

- Wastewater: Question raised regarding the design capacity of the wastewater system and vehicular traffic over dripperline areas.
- Stormwater: Question raised regarding number of carparks used in the assessment of the stormwater management options.

Response:

Wastewater:

The design capacity of the proposed wastewater system has been addressed earlier in my evidence.

Dripperline will be installed in landscaped areas not easily accessible to vehicles.

Stormwater:

The preliminary design has allowed for about 12,000m² of impervious area on the site. The actual impervious area will be confirmed at the time of final design.

4.5 **Submitter:** Otago Regional Council

Submitter Concern:

- Wastewater: Question raised regarding wastewater disposal to land on Lot 2.
- Stormwater: Question raised regarding stormwater management design and Lot 2.

Response:

Lot 2 is effectively a residential allotment and both stormwater and wastewater management will accordingly be addressed in accordance with normal procedure at the building consent stage. I am satisfied that such matters can be readily addressed on site.

Stormwater:

The proposed stormwater detention pond requires Bylaw approval from the ORC and requires an application relating to the management of stormwater discharge. This will be addressed at the time of final design.

The quality of the stormwater being discharged will be mitigated by the detention pond as I have already established.

4.6 **Submitter:** Peter Wilson

Submitter Concern:

- Wastewater: Question raised regarding wastewater connection to mains sewerage system and concern regarding on-site wastewater management.
- Stormwater: Question raised regarding significant run-off of stormwater from building causing potential flooding to neighbouring properties.

Response:

Wastewater:

Given Dunedin City Council objections to the discharge of wastewater from the church development to Council's sewer, this option is no longer being considered. I have already addressed the ability to manage wastewater successfully on-site.

Stormwater:

As discussed, the stormwater detention pond has been designed for large storm events, and will mitigate flows to match pre-development outflows.

5.0 PLANNER'S REPORT

- 5.1 I find some inconsistency in the Planner's report and am a little confused about some statements made. In [110], the report concludes "*Matters such as infrastructure, ... appear to be able to be sufficiently managed by way of consent conditions.*" I agree with this statement. However, in other parts of the report, concerns are raised about specific stormwater and wastewater management aspects and I consider these briefly as follows.
- 5.2 Regarding stormwater, under [Objective 21.2.4 and Policy 21.3.6] the Water & Waste Services Department have raised concerns about the ability to cope with stormwater disposal. No further justification is given for this statement. I consider that I have now adequately addressed all matters relating to stormwater management.
- 5.3 Regarding wastewater, under [Objective 21.2.4 and Policy 21.3.6] the Water & Waste Services Department have raised concerns about the disposal of wastewater during periods of high rainfall, expressing concern regarding potential nutrient or bacterial migration beyond the site. I consider that I have now adequately addressed this matter, particularly in regard to the low effluent loading rate to land.
- 5.4 In regard to the forgoing points under [Objective 21.2.4 and Policy 21.3.6] the Water & Waste Services Department then conclude that "*the proposal is considered to be inconsistent with this proposal.*" I am unclear as to what this statement means. In fact, I conclude to the contrary. In my view, quoting [Objective 21.2.4], I have now identified that the proposed "*disposal of wastes is undertaken in a manner that avoids, remedies or mitigates adverse*

effects on the health and amenity of people and communities with the City, and on their environment.”

5.5 Finally, I refer to [72] wherein the Planner’s report states, in reference to wastewater management: *“It is my opinion that both options have challenges, although none are insurmountable. Issues surrounding on-site disposal hinge on how the system will accommodate high rain events and potential surface flood flows. Nutrients and bacterial loading will certainly migrate beyond the site during high rain events.”*

5.6 I disagree with the Planner’s opinion and am not sure on what basis he comes to these conclusions. Given the proposed low loading rates, there is little risk of wastewater migrating very far at all from the proposed effluent dispersal areas and therefore, minimal risk of any nutrient or bacterial impacts beyond the confines of the dispersal areas themselves.

6.0 CONCLUSION

Having evaluated and assessed the stormwater and wastewater management aspects of the proposed development at 326 Factory Road, I confirm my view that both aspects can relatively simply and sustainably be managed within the site boundaries. This can all be achieved in accord with the Otago Regional Council’s bylaw for the Discharge of Stormwater into Council’s Scheduled Drains “Flood Protection Management Bylaw 2012” and in accord the NZ standard for on-site wastewater management AS/NZS1547:2012. I am satisfied in this regard that any potential off-site effects due to the proposed activities will certainly be less than minor.