

Andrea Vincent

09/01/2020

By email

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cc: Courtenay Isherwood  
Isherwood Consultants Limited

Job Title	205 Lud Valley Road Subdivision
Job Reference	19029-LET-002-A

Flow Environments Limited (FEL) have been engaged by Andrea and Paul Vincent (the Client) to respond to a request for further information related to a Resource Consent application for the subdivision of 205 Lud Valley Road, Hira.

### Scope

The original site investigation for onsite wastewater and stormwater disposal for the proposed subdivision was undertaken by CGW Consulting Engineers (CGW). CGW prepared a report detailing geotechnical conditions together with stormwater and wastewater servicing following this investigation. This report was subsequently submitted to Nelson City Council (NCC) as part of the subdivision application. NCC responded with a request for further information (RFI), dated 19 September 2019. FEL staff were present at the site investigation and were subsequently engaged by the Client to prepare a response to the RFI; this was provided to Isherwood Consultants as letter 19029-LET-001-A. Following this letter, NCC have requested additional clarification in a letter dated 5 November 2019. Responses to these questions are provided below.

### RFI Response

#### Stormwater

11. It is proposed to direct runoff from the developed area on Proposed Lot 2 into a 5,000l detention tank and then into the stream via a pipe. This requires an additional discharge permit under rule FWr.22. It would be prudent to add this to your current application(s). Alternatively, you would need to obtain a separate consent at a later stage. **Please address and advise how you wish to proceed.**

Please note: the installation of an outlet structure in the stream, including erosion protection is not a permitted activity either and would require consent under section 13 of the RMA.

*The response from FEL states that it is not necessary nor recommended to pipe directly to the stream as originally proposed. This is accepted. However, if discharge to land is proposed instead you would need to show compliance with FWr.25.1.f). Alternatively, you would need to obtain a separate consent at a later stage if compliance cannot be achieved. **Please advise how you wish to proceed.***

Requirements of FWr.25.1.f) are included below:

- f) Discharge of point source stormwater to land is permitted if:
- i) the discharge is not within 25m of a surface water body, and
  - ii) the discharge is not within 50m of any bore, well or spring used for water supply, and
  - iii) the discharge is not noxious, dangerous, offensive or objectionable to such an extent that it has, or is likely to have, an adverse effect on the environment, and
  - iv) the water is not discharged onto adjoining properties.

The point of discharge will be determined at detailed design however based on the presently understood site layout, it is possible to install a discharge point more than 25m from the stream. FEL are unaware of any bore, well or spring used for water supply within 50m of the proposed discharge, there is a NCC rural water scheme servicing the area which makes use of bore water unlikely. The discharge will contain roof and driveway runoff. The site is domestic in nature and no commercial activities are proposed. It is highly unlikely that the discharge will contain any dangerous substances which could have an adverse effect on the environment. The water discharged will flow to the stream and not onto adjoining properties, therefore full compliance with the permitted activity requirements of FWr.25.1.f) can be achieved.

### **Wastewater discharge**

12. The tests pits used to determine the soil type/ category of the disposal area are located outside the area proposed for the wastewater field. Please provide a soil evaluation, including soil investigations of the actual disposal area (Note: as per ANZS1547:2012 a detailed subsoil investigation shall examine and record the soil profile and solid features within the expected available areas).

*Addressed.*

13. As noted in the CGW report, all elements of the proposed onsite wastewater management system require detailed design – this information is required for Council to process the discharge permit, please provide. In particular, the following information is required:

- a. Proposed effluent quality for secondary treatment (BOD<sub>5</sub>, TSS) and location of a sampling point;
- b. Tank size;
- c. Exact location of the proposed disposal field and reserve area, including proposed drip line layout;
- d. Setback from nearest water body (I note the report, and FWr.291. recommend a minimum setback of 20m, but no exact measurement/ setback has been provided);
- e. Distance to nearest other disposal field, incl. existing field on Propose Lot 1;
- f. Distance to nearest bore;
- g. The requirement for and location of stormwater cut off drains;

- h. The requirement for visual and audible alarms;
- i. Recommendations/ requirements for vegetation cover of the field;
- j. Maintenance requirements & frequency.

*The FEL response has provided general information for the majority of the above items, however it is understood that the tank size (b), exact location of the disposal field and reserves area (c), and specific maintenance requirements (j) can only be provided once a system has been selected, following detailed design.*

*As noted above, Council usually requires a detailed design to process a discharge permit for a specific system. The information provided demonstrates that waste water disposal for Proposed Lot 2 is feasible (as far as the subdivision consent is concerned). So, one option would be to remove the wastewater consent component (RM195192) from this proposal and pursue this at a later stage, along with the earthworks consent etc.*

*You argue that provided the system is designed to comply with AS/NZS1547:2012, detailed design is not necessary, and any effects would be no more than minor – however, AS/NZS1547:2012 does require a 100% reserve area, which has not been provided, nor does this seem feasible.*

*In my opinion, it may be possible to 'ring fence' the proposal and effects, based on the information provided by FEL and some volunteered conditions. As noted above, AS/NZS1547:2012 does require a 100% reserve area (which "may be reduced if an improved wastewater treatment and improved land application system is provided; if dose loading or alternating loading of the design land application area areas are employed; or where a standard procedure for site evaluation (see Appendix D of AS/NZS1547:2012) supports a reduction in area"). This information has not yet been provided but needs to be.*

*Therefore, can you please confirm the following parameters/ conditions of consent:*

- a. Proposed effluent quality in accordance with FEL response (i.e. max. BOD of 30mg/l and max. TSS of 45mg/l), with sampling point to be installed;*
- b. Tank size in accordance with AS/NZS1547:2012;*
- c. Specify max. flow allowance – 1320l as per CGW report (based on 8 people and water reduction fixtures being installed) or a lesser amount to ensure there is sufficient room for a reserve area – and confirm sufficient disposal and reserve area available (Note: the 1220m<sup>2</sup> in Figure 2, FEL response is not sufficient for the required 880m<sup>2</sup> disposal field and 100% reserve area, so you would either need to decrease the loading/ flow allowance or provide information/ justification from FEL that supports a reduction in reserve area to 38%);*
- d. Location of the discharge field in general accordance with Figure 2 of FEL response – I accept this is indicative only – subject to the min. 20m setback from the stream being met for disposal area and reserve field;*
- e. Requirement for stormwater cut off drains to be confirmed prior to system being installed;*
- f. A visual and/or audible alarm will be installed;*
- g. Maintenance requirements & frequency as per system requirements/ maintenance contract to be entered into, but at least 12 monthly.*

**Item a**

The treatment standard of 30mg/L BOD and 45mg/L TSS is considered appropriate to the site and is recommended to be applied as a condition of the wastewater discharge consent.

**Item b**

As per the original RFI response, a range of secondary effluent treatment systems are available which can comply with the volunteered effluent quality conditions. The minimum tank capacities stated in Appendix J of AS/NZS1547:2012 are provided for all waste septic tanks disposing of primary treated effluent and are not specifically relevant to a secondary treatment plant.

Proprietary treatment units will have a range of tank sizes and hence the tank size is not necessarily relevant to an assessment of environmental effects, provided compliance with the proposed effluent quality standard has been demonstrated, preferably by an independent test such as the On Site Effluent Testing (OSET) trials managed by Water New Zealand. As an example, the Oasis S2000 is a commonly installed secondary treatment plant installed in the Nelson region, tank sizes are included below.

• Primary Pre-Treatment Chamber	3,500 litres
• Secondary Filter Chamber A100 (1.6mm)	750 litres
• Aeration Chamber & Clarifier	2,150 litres
• Clarifier-Filter A600 (0.4mm)	70 litres
• Pump Chamber	1,050 litres
• Total Operating Capacity	7,450 litres
• Total Holding Capacity	9,400 litres

A different treatment plant may be selected by the Client, subject to achievement of the recommended treatment standards.

**Item c**

A maximum design daily flow allowance of 1,320L/day is considered appropriate for the proposed dwelling. As per item C5.5.3.4 of AS/NZS1457:2012, “the 100% reserve area requirement is normally applied to septic tank units followed by conventional trench land application system”. This requirement is not considered relevant to the proposed disposal which involved drip irrigation of secondary treated effluent.

A conventional trench land application system most commonly fails due to ‘creep failure’ whereby continual trickle loading of effluent leads to saturation of sections of the disposal field. Over the long term, an anaerobic biofilm builds up in the vadose zone which blocks pathways in the soil, substantially reducing infiltration rates. Biomass fouling is made worse by the higher nutrient loads associated with primary treated effluent, particularly if there is no outlet filter fitted to the septic tank. Fouling of sections of the field leads to heavier loading of the remaining field which in turn causes the eventual failure of the entire field.

When this occurs the soil structure is permanently affected and unsuitable for future effluent disposal without substantial remediation. The AS/NZS1547:2012 requirement for a 100% reserve area for this type of system is a prudent contingency however it is not applicable to the system proposed for this development.

AS/NZS1547:2012 states that the 100% reserve area requirement may be reduced if improved treatment or disposal is provided, eg “even distribution of secondary treated effluent”, as is proposed in this case. For the proposed development, effluent will be secondary treated and filtered, reducing the nutrient load and hence biomass build up in the disposal field. Effluent will be dose loaded to the disposal field via the pump, supplied with the treatment plant, allowing the field to undergo periods of irrigation followed by drying. Effluent will be dosed to the disposal field with pressure compensating drip line at rates roughly one tenth of that typically used for a conventional gravity system. Correctly installed, pressure compensating dripline provides even dosing of effluent into the field regardless of changes in line elevation (typically changes in the order of +/-5m are tolerable). Correctly installed and maintained, there is an extremely low probability that soils in an entire drip irrigation field will be made permanently unsuitable for effluent disposal due to biomass fouling leading to creep failure.

Reasons why the reserve area could be required include:

- 1) If the primary disposal field fails.
- 2) If the dwelling is extended and additional bedrooms are added.
- 3) If the disposal rate turns out to be excessive.

Two failure mechanisms are typically associated with disposal fields using pressure compensating dripline fields:

- 1) Substantial failure of a single fitting or line, such as a line coming off a fitting or a shallow line being mechanically damaged.
- 2) Blocked or perished drippers leading to uneven effluent distribution.

In the event of the first failure mechanism, effluent will flow out of the ground. Such a failure is typically clearly evident and will be identified and addressed before any permanent damage to soil in the disposal field occurs. There will be no need to use any reserve area once the pipe is repaired or a replacement fitting is installed as necessary.

The second failure mechanism is typically associated with either poor effluent quality from the treatment plant, or dripline which is reaching the end of the service life. In the worst case, an entire disposal field can be replaced by installing new drip lines in between the old lines. In my experience I am yet to see a dripline disposal field where soil structure has been affected to the point where effluent disposal is no longer possible, and a new disposal field location is required. Occasionally, wet areas will develop in dripline disposal fields. These are typically lower areas, where pressure sustaining valves should have been installed in the original system, or naturally wetter or poorer draining areas. If isolated wet areas of the field are identified, effluent disposal in these areas can be avoided by installing solid line with additional dripline installed in the reserve area to compensate for the loss in primary disposal field. The proposed 38% reserve area is ample to allow for such works to be undertaken.

The present flow allowance assumes a maximum of 8 occupants with 4 bedrooms. This is already a relatively high occupancy, if an additional bedroom was added and occupancy was increased to 10

persons, a total primary disposal area of 1,100m<sup>2</sup> would be required. Again, the proposed reserve area is ample for this occurrence.

The application rate of 1.5mm/day is considered appropriately conservative for the site and compliant with AS/NZS1547:2012. There is a very low probability that this rate will later be found to be too high, requiring use of the reserve disposal area to reduce the disposal rate.

In summary, the proposed reserve area is considered adequate, and in compliance with AS/NZS1547:2012 considering the flow allowances and both the mechanism and rate of disposal.

***Item d***

I can confirm the Client accepts a consent condition requiring the field location to be in general accordance with Figure 2 of letter 19029-LET-001-A.

***Item e***

I can confirm the Client accepts a consent condition requiring stormwater cut-off drains to be installed, as required in the opinion of a suitably qualified and experienced person in accordance with AS/NZS 1547:2012, prior to operation of the effluent disposal field.

***Item f***

I can confirm the Client accepts a consent condition requiring a visual and/or audible alarm to be installed on the treatment plant control cabinet, or at a suitable, visible location adjacent to the dwelling or shed.

***Item g***

I can confirm the Client accepts a consent condition requiring 12 monthly inspection by a suitably qualified and licenced plumber/drainlayer who is experienced in the management of onsite wastewater treatment plants.

The owner's manual prepared by the wastewater treatment plant supplier will specify operation and maintenance activities for the treatment plant. Recommended maintenance for the disposal field is specified below.

*2-3 months or as required*

Clean the outlet filter on the effluent field pump. This is simple maintenance which can be undertaken by the owner.

*6 months*

Walk over the disposal field and look for wet areas, exposed dripline etc

Inspect air/vacuum release valve (if installed) to ensure it is not weeping liquid

Again, these are simple maintenance tasks which can be undertaken by the owner.

*12 months*

Inspect disposal field as outlined above. Open flush valves to confirm flow is getting to all lines. Confirm flow stops at the lowest and highest driplines within an acceptable time (typically several minutes)

Flush all driplines until flow runs clear

Undertake treatment plant maintenance as per Oasis manual

These maintenance tasks should be undertaken by a licenced plumber.

### **Duration for waste water discharge permit**

17. Please specify the duration of consent you wish to apply for. Note: the serviceable life span required under AS/NZS 1547:2012, On-site domestic-wastewater management, Section 6.2.1 is 15 years. If the system has been designed by an Engineer to the above standard and in line with the Building Code then the minimum serviceable life must be 15 years. If the applicant wants resource consent for longer than this duration then the disposal field must be designed for this and supported with a statement from the Engineer to this effect.

Correctly installed and maintained, the service life of an onsite treatment plant is considerably longer than 15 years. Mechanical and electrical components are likely to require replacement to match the service life of the tank structure. The dripline is likely to be the constraint limiting service life. Whilst manufacturers typically state that the service life of dripline is up to 20 years, they do not guarantee this service life. The requirement to renew the consent after 15 years is considered reasonable.

### **Conclusions**

Based on the work undertaken to date, it is considered possible to design a wastewater treatment and disposal system for the proposed development in full compliance with AS/NZS1547:2012 and the NRMP. The level of detail provided to date is consistent with industry good practice. It should be possible to understand the environmental effects of the proposed discharge from information provided to date and hence grant a wastewater discharge consent. Please contact the undersigned should you require any further clarification.

Regards



David Carlson-McColl

**Water and Wastewater Engineer | CP.Eng**

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