

**Proposed Canterbury Land & Water Regional Plan, Volume 1 Section 5.
Relevant to Rules 5.7, 5.8 and 5.9.**

3 February 2013
Due 4 Feb

This submission is in support of and to be considered with ecoEng Submission # 243

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Andrew Dakers is Director and Principal Engineer with ecoEng Ltd, based in Christchurch. His first professional appointment (1972) was as engineer with the Ministry of Agriculture and Fisheries. From 1979 to 1999 he was a member of the academic staff at Lincoln University where he was Senior Lecturer and Assistant Head and then Head of Department in the Department of Natural Resource Engineering. Since 1999 he has been involved in private engineering consulting and has expertise in agricultural irrigation and wastewater systems, small scale domestic wastewater, stormwater and water supply systems mostly in New Zealand but also in Cook Islands and Fiji. He has been involved in infrastructure assessment in small tourist towns and has extensive experience in site and risk assessment, modeling, design, resource consenting, auditing, environmental impact assessment, installation supervision, preparing servicing and maintenance programmes and reporting for on-site wastewater management systems (more than 350 individual sites, the majority in the Canterbury region), decentralized wastewater systems and remote site systems. He is a key member of the Centre for Environmental Training (CET) team and since 2003 to present, has been involved as both organizer and senior tutor in more than forty five 2-3 day in-servicing training course on on-site wastewater engineering in both Australia, New Zealand and the Cook Islands. Since early 2009 he has been an appointed member of the Management Audit Group for the On-site Effluent Treatment (OSET) National Testing Programme (based in Rotorua). Andrew is a member of Water NZ and Small Wastewater and Natural Systems Special Interest Group (SWANS-SIG) and is a Board Member of the International Ecological Engineering Society (IEES).

1 ACRONYMS

AS/NZS	Australian and NZ Standards (New Zealand Standards Association)
CRC	Canterbury Regional Council
CRI	Crown Research Institute
LAS	Land application system
NRRP	Natural Resources Regional Plan
OWSG	On-site wastewater stakeholders group
OWM	On-site wastewater management
OWMS	On-site wastewater management service(s)
PA	Permitted activity
pLWRP	Proposed Land and Water Regional Plan
RMA	Resource Management Act
RC	Resource consent
S32	pLWRP Section 32 Report
S42	pLWRP Section 42 Report
STSA	Septic tank suitability area

2 INTRODUCTION

This submission addresses the following:

1. The objective and context of OWMS.
2. The responsibility of CRC with respect to OWMS.
3. The responsibility of the OWMS stakeholders .
4. Comment on whether the pLWRP is the most cost effective means of achieving the responsibilities of the CRC and integrate well with the responsibilities of the OWMS stakeholders.
5. Comment on the adequacy of the STSA map and AS/NZS1547:2012 as key tools adopted by the pLWRP.
6. Recommendations.

3 THE OBJECTIVE AND CONTEXT OF OWMS

- 3.1 OWMS is a distributed wastewater infrastructure service for dwelling occupiers in areas where community reticulated sewer services are unavailable.
- 3.2 According to an unpublished report to CRC by Barry Loe, (2012) there are about 37,000 OWMS within the Canterbury Region serving a population of approximately 100,000.
- 3.3 There are a number of engineering standards relating to the design of both the technologies and the OWM system; in particular AS/NZS1547 2012 and AS/NZS 1546 Pts 1,2 and 3, 2008.

- 3.4 The generally agreed desired outcome from on-site wastewater management is defined in AS/NZS1547:2012 as **effective and sustainable on-site wastewater management service(s)**. (OWMS). AS/NZS1547 goes on to explain that **effective** means the provision to the end-user of a convenient amenity service that mitigates risks to public health, private health, local ecosystem health, at the same time being protective of resources. (Refer to AS/NZS 1547:2012, 1.1, and Ch 4). For the purposes of this submission I would add protection and respect for key cultural values. **Sustainable** means the service will endure effectively for a desirable length of time.
- 3.5 **The success or failure OWMS is, by its nature, very site specific.** The services' successes, impacts, failures and risks are very variable and very dependent on the specific site conditions. This provides a significant challenge to regional and district planning and rule setting, which seeks certainty in the rules and regulations.

4 THE RESPONSIBILITY OF CRC WITH RESPECT TO OWMS

- 4.1 The RMA provides for the management of environmental effects, including those which arise from the discharge from OWMS to land or water.
- 4.2 Section 15 of the RMA provides for the discharge of contaminants (such as from OWMS) into the environment and stipulates that no person may discharge any contaminants into water, onto land where it may enter water, or from an industrial premises into air or onto land unless the discharge is expressly allowed by a rule in a regional plan or a resource consent. Therefore, unless the relevant regional plan specifies the discharge as permitted, a resource consent will be required for any discharge from an on-site wastewater treatment facility.

5 THE RESPONSIBILITY OF THE ON-SITE WASTEWATER STAKEHOLDERS GROUP (OWSG)

For the purposes of this submission the OWSG includes:

- Site assessors and designers
- Technology providers
- Installers
- Servicing agents
- End users
- Regulators

I submit that the primary responsibility of the OWSG is to achieve **effective and sustainable on-site wastewater management service**, as described in the above in Section 1.

6 COST EFFECTIVENESS OF THE PLWRP

It is my view that the S32 report failed to:

- Provide robust correlation between areas mapped as high risk with evidence of actual and real risk and therefore requiring input from the CRC consent processes;

- Provide a robust assessment of the relative cost effectiveness of the pLWRP (relative to alternative management plans) in the context of the responsibilities of the CRC.

The S42 report notes that (my emphasis):

*..... the general approach of relying on NZS1547:2012 and the mapping system is **sound** and has **benefits**, in terms of certainty and requiring resource consents for those areas where “standard” disposal systems are less likely to function adequately. These are typically areas with poor drainage, high groundwater levels or steeper slopes.*

The causes of poorly function OWMS are not just due to **site specific poor drainage, high groundwater levels or steeper slopes (although good design can address these constraints)** but many of us who work in this industry are very well aware that there are a number other more important causal factors. These are discussed in more detail later in this section.

There has been no robust evidence (in the S32 report, S42 report or special request for such evidence by ecoEng (refer to Submission 243. Appendix A)) that supports the above claim that the mapping system is **sound** and has **benefits**. I submit that as a tool for defining permitted and discretionary activity status for OWMS, the STSA map is fundamentally flawed and therefore the benefits will be tenuous. Refer to discussion on the STSA map, **Section 4**.

The S32 report states (my emphasis):

*While the new New Zealand Standard will be effective for the majority of onsite effluent disposal systems developed in Canterbury, there are significant areas of Canterbury that suffer from high groundwater levels, poor drainage or steep slopes, **where more detailed design consideration** is required in order to safely and effectively mitigate the environmental, and particularly water quality effects of on-site effluent treatment and disposal. In particular, this relates to the lower plains areas, Port Hills and hill and high country areas of Canterbury. These areas have been mapped and identified as areas where resource consents will still be required under the pLWRP and it is expected that specific on-site design and mitigation of the circumstances of the topography and soil conditions will be required.*

It is my experience that **all** sites require **site specific detailed design consideration**. To imply that it is acceptable not to apply detailed design considerations to sites within the STSA is irresponsible and I suspect not intended by the authors of the S42 report. There is a higher risk of failure if the standard of design is low, irrespective of whether the site is inside or outside the STSA

As submitted by ecoEng (243):

If the real risks to public and private health, ecosystems and cultural values are high in areas outside that STSA one would expect to be seeing the hard evidence of these.

The Section 32 report provides no bench mark data for sites inside the STSA and sites outside the STSA that would enable a reasonably robust assessment of the risk

mitigation benefits under the LWRP rules.

ecoEng obtained a listing of 172 complaints relating to OWMS and lodged with CRC since 2006. A preliminary analysis of these complaints by ecoEng found that:

Of the 86 complaints related to likely OWMS component failure:

- 37% of these were within the STSA;
- 63% were outside the STSA;
- 20% were in non-mapped (S-map Online) zones and therefore classed as outside the STSA.

About 80% (based on area) of the Canterbury region is outside the STSA. It would be of more relevance to analyse the proportion of total OWMS that are located outside the STSA, excluding non-mapped areas. ecoEng did not have the data to carry out this analysis. What is significant to note from this preliminary analysis is that at least 37% of the problems associated with OWMS are within the so called low risk STSA zone. This is significant.

ecoEng has attempted to correlate high risk (outside the STSA) areas within Canterbury regions (using CRC reports) with mapping of:

- Nitrate levels in shallow ground water resources;
- Drinking water status ;
- Lowland stream ecosystem health.

No strong correlation was found.

A recent (2012) report to CRC by Barry Loe informs that there are:

- 37,600 OWMS within the Canterbury Region
- 74% pre-date 2006

Using these data, 86 registered complaints since 2006 relating to a system failure is 0.05%/year of all OWMS in the Canterbury region; a relatively low level of “failure”.

It is acknowledged that not all failing or sub-standard OWMS will be the subject of a complaint to CRC.

The ecoEng submission, 243, provided evidence that the pLWRP will increase the number of OWMS resource consent applications. The critical question is whether this additional cost to the Canterbury homeowners will result in reduced risk from OWMS and fairly and consistently targets high risk sites. I submit that the pLWRP, and particularly the STSA mapping, will be inefficient in achieving accurate and fair targeting the high risk OWMS and is unlikely to result in a net reduction in risk relative to the current NRRP regime.

The pLWRP will eliminate the CRC permitted activity (PA) workload. It is unclear who will be taking responsibility for ensuring that those OWMS deemed PA do meet PA criteria as defined in the pLWRP and in particular will meet the standards set in AS/NZS1547:2012. My experience is

that there is a very low level of awareness of the technical detail of AS/NZS1547:2012, particularly in district councils. It is likely that district councils and Christchurch City Council will find it necessary to perform this duty; this cost being transferred rather than eliminated. I am concerned that District Councils will not have the capacity or, in some cases the desire, to implement this role effectively and efficiently. **This is likely to increase the risks and failures within the STSA.**

With many years experience working at the “front line” of providing OWMS for Canterbury citizens, it is my experience and observation that the causal factors of ineffective, poorly functioning, unsustainable and failed OWMS will be one or more of the following:

- Inadequate or incompetent;
 - Site assessment and design;
 - Installation;
 - Servicing;
- Neglect by dwelling occupier;
- Substandard technologies.

I submit that the pLWRP will not directly or effectively address these key causal factors. Consequently, it is my view that the pLWRP is a sub optimal means of reducing risk and failure and of achieving **effective and sustainable** OWMS.

I am unconvinced that the costs and the benefits of the pLWRP have been adequately assessed. I believe there is a more cost effective strategy and consequent rules that CRC should adopt and implement to achieve **sustainable and effective** OWMS within the Canterbury region. Alternatives are discussed in **Section 5** of this submission.

7 STSA MAP AND AS/NZS1547:2012

Two key resources that are critical to the current pLWRP are the STSA map and AS/NZS1547:2012.

I submit that the STSA is an unsuitable tool for determination of consent status (permitted and restricted discretionary).

As noted in the original ecoEng submission (243), the STSA map boundaries were set by Landcare Research CRI. I have been informed by Landcare (Trevor Webb, personal communication) that the key criteria for map boundaries are:

- Digitised soil type mapping provided on S-Map Online;
- Slopes greater than 15 degrees;
- Areas with persistent high water table (mainly regulated by nearby water bodies) ;
- Areas with very slowly-to-impermeable substrates within 1 m depth.

In recent discussions with Landcare (16 January 2013) we were informed that the mapping was intended as a **guideline** tool. The soil maps, used as one of three criteria for defining STSA

mapping boundaries, are based on in-field soil assessments that are about 1km apart. Mapping is completed by interpolation of data gathered from this broad scale field work. While this may be accurate enough for aiding management decisions for macro-scale activities, such as agricultural, forestry, land development and soil conservation, I am very clear that the soil maps are not necessarily suitable for decisions relating to micro-scale land activities such as OWMS. The maps will not facilitate definitive and reliable assessments of which OWMS sites could fairly and justifiably qualify as low risk (and therefore permitted activity) and which OWMS sites could fairly and justifiably qualify as high risk (and therefore restricted discretionary activity). Since the 11 October 2012 a number of site assessors and designers have been implementing the pLWRP along with the NRRP. We are able to provide case studies demonstrating:

- Inconsistencies in soil descriptions between what the STSA map determines and what is observed on site;
- Sites within the STSA with high risk to ground water;
- Sites that are outside the STSA simply because the mapping had not been completed for that particular area.
- Sites outside the STSA for which AS/NZS1547:2012 provides sufficient specific details to enable design of a low risk OWMS.

Other concerns with respect to the validity STSA as a consent determining tool include:

- I don't accept that the slope criteria (less than 15 degrees) which is based on macro scale methodology (*digitising from topographic and air photo interpretation*) is an appropriate criteria. My field experience is that slope must be assessed site by site as there are often sufficient and suitable flat fields in areas designated as too steep by *digitising from topographic and air photo interpretation*.
- It is noted that areas with soils types described as "poorly drained" are included within the STSA. (see discussions below).

I have been informed that some areas with soils described as "poorly drained" have been included within the STSA because AS/NZS 1547:2012 provides for the acceptable design of OWMS on soils designated "poorly drained". In fact AS/NZS1547 defines six soil categories for which it provides acceptable design standards. These six soil categories are:

- Category 1: Rapidly draining
- Category 2: Well drained
- Category 3: Moderately drained
- Category 4: Imperfectly drained
- Category 5: Poorly drained
- Category 6: Very poorly drained

These 6 soils categories cover most of the soil textures that are encountered within the Canterbury region. **It is clear that acceptable design standards are provided in AS/NZS1547 for the vast majority of soil categories in Canterbury region, including many soils outside the STSA.**

According to Landcare Research, high ground water risk was determined mainly from presence/absence of *nearby water bodies*. The common practice, strongly supported by CRC,

and under the NRRP, is that ground water level determination is by one or both of interpretation of bore log data and installation of on site observation pits and/or auger holes. Additionally mottling observations are noted by the site assessor as an indication of seasonal soil saturation. Our field experience is that there are areas **within** the STSA where risk to ground water is high.

What is clearly not well explained in the S32 report is the detail of what type and level of risk is acceptable, provided AS/NZS1547 is applied, and what type and level of risk would deem it necessary for CRC to apply their oversight of the proposed OWMS design.

I submit that the STSA map layers (soil types, slope, groundwater table levels and drainage capacity) are an inadequate tool at the micro scale (which is the level of reality for OWMS risks, successes and failures) and render this map as an unsuitable and unfair (to Canterbury citizens) tool for determining consent status.

8 RECOMMENDATION: ALTERNATIVE TO PLWRP AND NRRP

It is my expectation that the Canterbury Regional rules relating to OWMS will integrate with other stakeholders' initiatives and drivers aiming to achieve **sustainable and effective** OWMS.

As previously noted the desired outcomes are:

- Reduction of OWMS risks to:
 - Public and private health.
 - Ecosystems health.
 - Cultural values.
- Provision of a convenient and affordable amenity service to the end user and purchaser of the service.

I further submit that the most cost effective means of achieving the above outcomes is, in the context of sound, fair and sensible regulations, to build the capacity and capability of the key practitioners instrumental in the **doing** of sustainable and effective OWM; and these practitioners include:

- Site assessors and designers;
- Technology providers;
- Installers;
- Servicing agents;
- End users;

Effective and sustainable OWMS not only includes quality treatment components (e.g. septic tank, aerated package units, constructed wetlands....) but perhaps more importantly, well designed, installed and serviced land applications systems (trenches, beds, mounds, sub-irrigation fields, ecoTrench.....) and in many cases the 'failure' of the system is associated with failure of the land application system.

8.1 Recommendation 1

The essential recommendation of this submission is that the STSA map be removed as tool for determining the consent status of a particular site.

It is recognized that the STSA has the potential to be excellent aid for site assessors, designers and regulators to highlight **possible** risks areas. This, along with other site data available on the Ecan GIS website (e.g. well card data, surface water data, Ngai Tahu issues.....), will assist the site assessor to pre-determine what to expect and what to plan for in the actual site assessment procedure. Equally, in the case of a resource consent application, it will alert the CRC investigating officers what issues may need special attention.

As it is currently presented the STSA map is of limited assistance as it is not made explicit what the determining criteria for the map boundary is; soil type, slope water table level or unmapped or a combination of the former three. It should be possible and would be very desirable to provide these layer details.

The removal of the STSA will significantly undermine the integrity of pLWRP as it currently stands.

8.2 Recommendation 2

My strong preference is that the Rules relating to OWMS be designed in accordance with the following principles:

- A strategy that builds trust between key stakeholders;
- Build the capacity and capability of the key practitioners within the Canterbury Region;
- Provide supporting technical resources and tools to OWMS practitioners.

An approach that has now been taken up by a number of Regional and Unitary Councils in NZ is the registration key practitioners. The registration process requires a specified standard of performance. I have given consideration to the detail of how this could be implemented, and received feedback from some of those councils who have adopted this approach, and there are clear fish-hooks, but, in my view it is entirely feasible. In my view it is critical that the criteria for registration and retention of registration should be developed collaboratively by the key stakeholders.

This recommendation was not presented in the ecoEng original submission, 243. The indecently hasty timeline given to the LWRP process is likely to mean this recommendation is not admissible at this late stage. It would take about 6 months of due process to work through this proposal.

More details for this presumably “inadmissible” recommendation can be found in **Appendix A**

If the recommendation for registration of practitioners is not admissible then I must defer to the sub-optimal **Recommendation 3**.

8.3 Recommendation 3

1. pLWRP rules 5.7, 5.8, 5.9 be deleted and replaced with NRRP Rules WQL9 with the following changes (partly supported by S42 Report):
 - a. Amend NRRP rule 9a to read 1m for the set-back between the point of discharge and the highest groundwater level for treated wastewater application rates of less than 10mm/day and 3m for the set-back between the point of discharge and the highest groundwater level for application rates greater than 10mm/day.
 - b. Update reference to AS/NZS 1547:2000 to AS/NZS 1547:2012

9 APPENDIX A: RECOMMENDATION 2 DETAIL.

We see the role of the CRC as establishing an accreditation programme, in conjunction with OWMS site assessors and designers, technology providers, installers and servicing agents. This group would set the performance standards for registration, auditing and deregistration.

- CRC would administer these standards.
- Those practitioners not meeting the standards would be deregistered.
- CRC would support the national independent certification of package treatment plants provided by OSET NTP, Rotorua.

Example conditions for proposed Rule 5.9.

The installation of a new OWMS is a permitted activity given that:

1. The system is to be for domestic wastewater flows up to 2000 L/day, from a population equivalent of up to 10 persons.
2. The OWMS has been designed and installed by an individual or company that holds a current accreditation under the CRC OWMS accreditation programme.
3. The discharge is not onto or into land:
 - (a) where there is an available sewerage network;
 - (b) that is potentially contaminated;
 - (c) listed as an archaeological site;
 - (d) where the discharge would enter any surface water body;
 - (e) within 20 m of any surface water body or the Coastal Marine Area;
 - (f) – *Retain NRRP WQL9 rules for setbacks from wells and boundaries*
 - (g) within a group or community drinking water supply protection area as set out in Schedule 1.
 - (h) With less than 1m set-back between the point of discharge and the highest groundwater level for treated wastewater application rates of less than 10mm/day and 3m set-back between the point of discharge and the highest groundwater level for application rates greater than 10mm/day.
4. The treatment and disposal system is designed and installed in accordance with New Zealand Standard AS/NZS 1547:2012 – On-site domestic wastewater management; and
5. All primary treatment units are either designed by a qualified wastewater engineer or have been certified in accordance with AS/NZS 1546 Pt 1 2008 or an equivalent standard.
6. All secondary and advanced treatment units are to be either certified by OSET NTP (Rotorua) or an equivalent independent certifying body or be designed and certified by a qualified wastewater engineer.

