

## **On-site Wastewater Training – Where at we at?**

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### **ABSTRACT**

NZWETA have been delivering a training course for onsite wastewater design. Prompted by Bay of Plenty Regional Council and assisted by Auckland Council, the course has evolved from when it initially started in 2013. The Unit Standard based course is being delivered by Lowe Environmental Impact and Opus, with both companies committing in-kind contributions equal to the two initial funding partners to develop the course and material.

What was three modules has now been replaced with two modules; the first module is an introduction to wastewater and the application of this to onsite wastewater. Module two starts with a hydraulic design component followed by an overview of an understanding the receiving environment with a focus on design and system selection as well as practical work on soil texture and structure.

A total of 5 sets of courses have been delivered so far with three in Tauranga and two in Auckland. The course has had support from Auckland Council and also BOPRC with representatives from council participating within the course. Just less than 100 participants have been through the programme and come from a range of industry sectors, including installers, designers, council staff and consulting engineers.

The wide range of participant's abilities and experiences has meant it has been challenging to meet everyone's needs, especially as content has been determined by the current Unit Standards. Despite the technical content all participants have agreed that the course has been a worthwhile addition to increasing their knowledge and awareness in the onsite industry.

The question that exists now is 'Where are the participants going to come from outside Bay of Plenty and Auckland?' and 'If we think training is a good idea, where is the support to prove it?'

This paper provides an overview of the course content and the people that have attended so far. It looks at possible options for modifications to the Unit Standards and seeks input to options to enable the course to continue.

### **KEY WORDS**

On-site, national wastewater training, unit standards

### **INTRODUCTION**

The Opus lead New Zealand Water and Environment Training Academy (NZWETA) (<http://www.nzweta.org.nz/water-wastes-industry.html>) and Lowe Environmental Impact have been delivering a training programme for onsite wastewater design in the regions of

Tauranga and Auckland. The course has been based around six NZQA Unit Standards (US) which were formed in 2008. A description of the US is as follows:

- 25124: Demonstrate knowledge of domestic wastewater treatment processes
- 25125: Describe domestic wastewater land application systems, and their selection
- 25126: Demonstrate knowledge of hydraulics and pump types and fittings for OSW systems
- 25127: Carry out a site and soil evaluation for an OSW system
- 25128: Design an OSW system, and describe regulatory requirements
- 25129: Describe package treatment, and wastewater land application systems

Based on the US and also the approach that the trainers wanted to take, course material was produced. The course attendees were required to be assessed against the US and course material; and assessments have been developed based on these but also includes what is currently relevant information for the design of onsite wastewater systems in NZ.

## **COURSE MATERIAL**

The first course was conducted in Tauranga and consisted of three modules in 2014. The first module (M1) included an introduction to wastewater and included a historical overview of wastewater treatment in NZ. It looked at wastewater constituents, and the different processes of the wastewater treatment on a microbial level including processes such as activated sludge and the effects that wastewater can have on the Receiving Environment (RE) once it is discharged. The second module (M2) consisted of a hydraulics component, the content of this part of the course consisted of teaching course attendees about fluid dynamics which included some initial detail on pressure changes in pipes, and then got into the detail about the types of pumps and the application of these and looking at pump curves for pump selection and also calculations of head losses in pipes and fittings. The last module (M3) had a practical component and looked at soil characteristics and the RE. This included how to determine soil categories and also selection of treatment and discharge systems as well as sizing and design.

After this initial course, the delivery team decided that the hydraulic component could be shortened and condensed into a two module programme. This was mainly based upon the uses of today's off-the-shelf treatment systems and the participant's technical ability to go into detailed engineering aspects. Time availability, costs and the relevance of the initial content were also factors in deciding to create two three day modules.

Emphasis is now placed on identification of the RE and linking this to options for treatment and discharge. The following lists details the current content of Modules 1 and 2.

### **Module 1- Session Details**

- Definitions and history
- Characterisation of Wastewater
- Details of each system
- Secondary Treatment processes
- Disinfection, Advanced Treatment
- Nutrient Reduction
- Soil Treatment Selection
- Alternative Treatment Systems,
- Soil Treatment Processes
- Solids disposal sampling
- Risks Maintenance for each system type
- Management of land application systems

- Toxic substances and excessive water flow
- Legal requirements
- Land application system types
- Distribution methods
- Design, construction and commissioning
- Understanding the Receiving Environment and Soils
- Site and Soil
- Evaluation Exercise
- OSET Trials and Resource Information
- Legislation
- Introduction to Design
- Discharge Options
- System Selection
- System Selection Exercise
- Evaluation and Design Reporting - Risk Management

### **Module 2 – Session Details**

- Physical properties of Wastewater,
- Fluid statics
- Fluids in Motion
- Flows in pipes
- Pipework design and Installation
- Pumps and Pumping
  
- Local Regulations and Problems
- Receiving Environment
- Soil Properties
- Soil Texture
- Soil Texture Analysis
- Local Features
- Site and Soil Evaluation
- Treatment and Discharge Options
- System Design and Reporting
- Design Calculations and Variations

An ability to provide for recognition of prior learning is provided where Module 1 can be bypassed with entry into Module 2. This is possible by undertaking one of the following two options:

*Option 1: The Assessment Pathway*

*On-site wastewater practitioners who are interested in getting a certificate of completion for Module 1 training may elect to receive a copy of the notes and assessments from Module 1 and complete the assessments, which are returned to the Opus ETC for marking. The assessments are unit standard based and cover US25124, US25125 and US25129.*

*Option 2: Recognition of Current Competency (RCC) Pathway*

*Practitioners should submit ONE design report detailing an on-site wastewater treatment and dispersal system which has been completed by the practitioner within the last two years.*

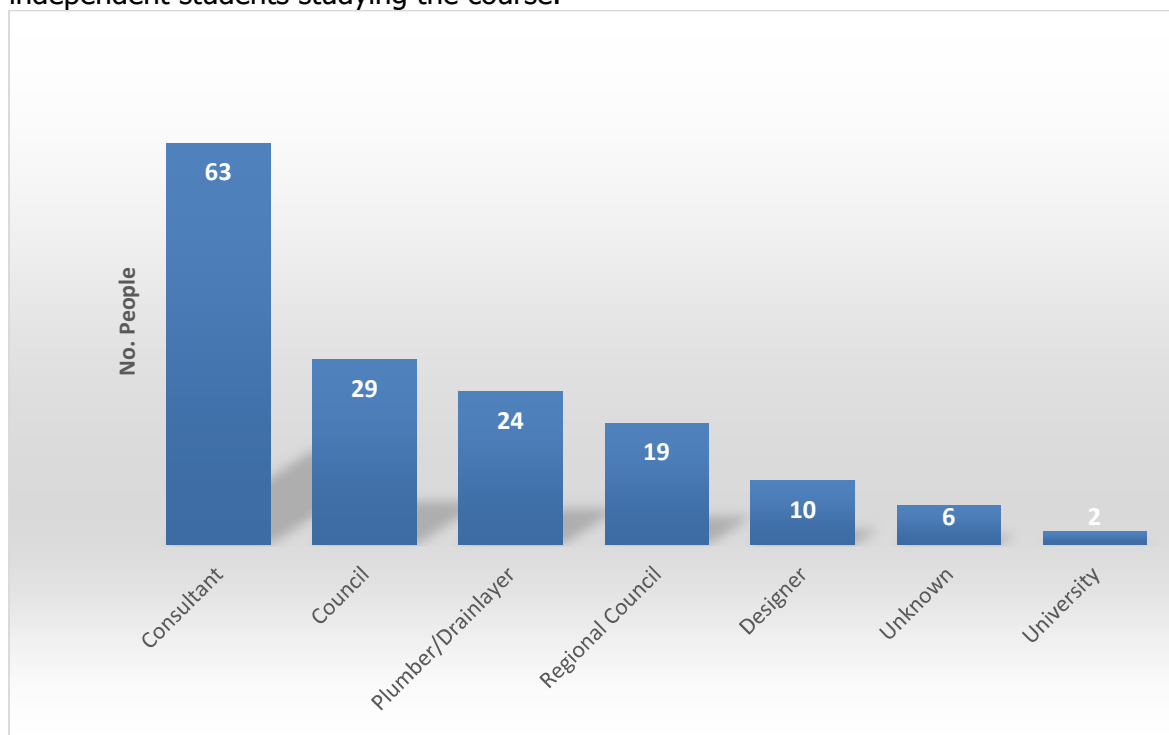
*As well as completion of the design report, candidates are required to get an attestation letter from the regional council in the area in which the practitioner works recognizing that the practitioner works in the on-site wastewater sphere in that particular area. The report and*

attestation will be submitted to Opus ETC and the design report reviewed with reference to a checklist that lists critical attributes of the report

## ATTENDANCE

### Attendee Background

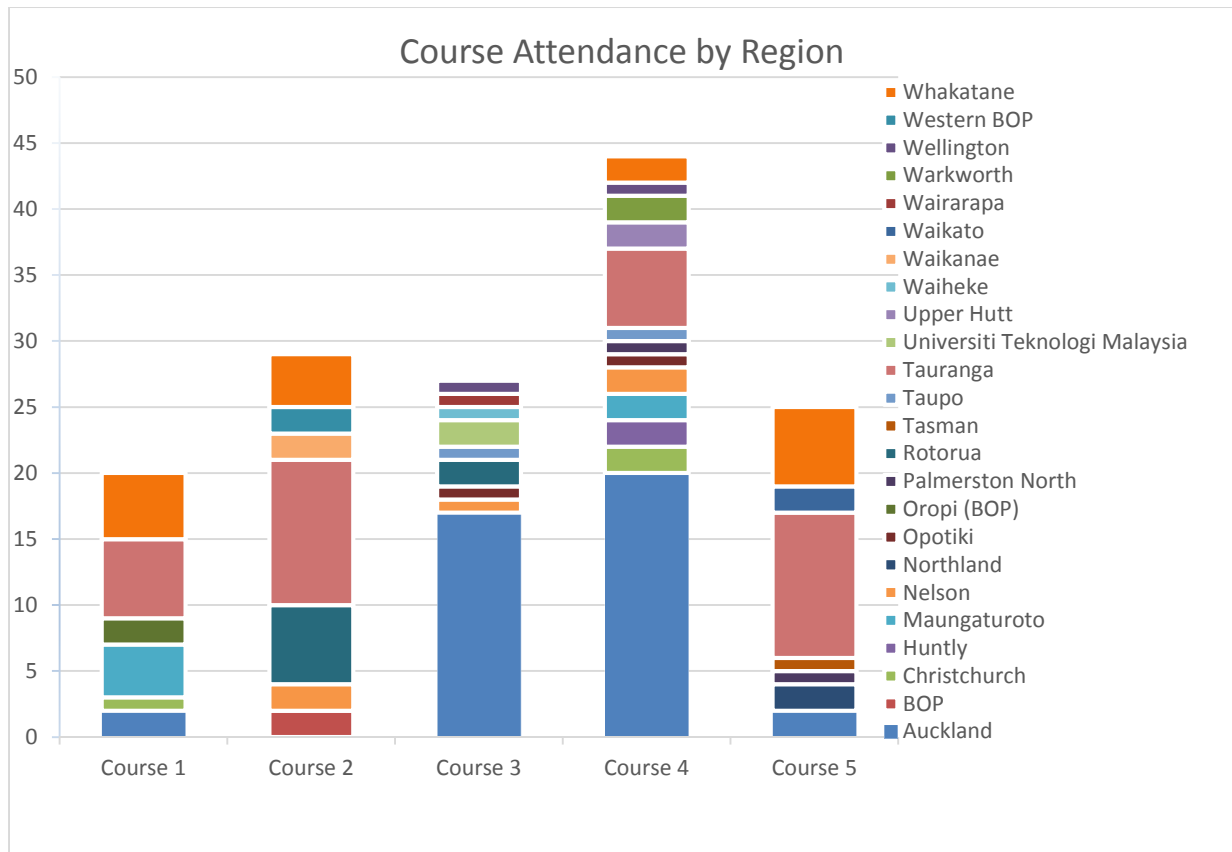
Figure 1 shows the attendance at the course from various types of organisations. The majority of attendees were from consultant organisations. These people were either independent consultants or worked for larger companies. There is a mix of civil, environmental and geotechnical engineering backgrounds. The next group were from councils and were generally building/drainage inspectors and environmental health officers. The third largest group attending were drainlayers and plumbers who were generally installers and servicing agents. A smaller group of regional council staff attended, which included mainly consent and compliance staff. There were also some designers of treatment system and then some independent students studying the course.



**Figure 1: Attendees on the Onsite Wastewater Course from each type of organisation**

### Location of Course Vs Attendees Location

Figure 2 shows the total attendance on the courses from different locations around NZ. It shows that for both the Tauranga and Auckland courses, these had the majority of attendees and attendees were from those locations respectively. Other attendees were generally from neighbouring towns, cities or from the same region, for example, Bay of Plenty attendees from Tauranga, Whakatane and Rotorua and Oropi. Course 3 and 4 in Auckland seemed to include more of attendees from a broader range of areas, however 63% of the course attendees were from Auckland on Course 3 and 45% on course 4. All courses were attended by people from many areas of NZ with some international students also in attendance. Generally, both Auckland and BOP regions were well represented.



**Figure 2: Total Attendance by Region**

**Course Numbers Vs Course Location**

Generally, it is expected that most attendees would attend both modules. Figure 3 shows course attendance per module. The highest numbers were Course 4 which was held in Auckland and was run during June and July 2015. The second most attended course was the second Tauranga course (Course 2) held in November 2014 and February 2015 followed by the first Auckland course (Course 3) in April 15 and May 15.



**Figure 3: Course Attendance for each Module and Course**

## LOOKING FORWARD

### Limitations When Applying the US

- The US were developed in 2008. The standards referred to AS/NZS:1547:2000, which has been superseded with AS/NZS:1547:2012. Over this period a number of other standards have also been updated.
- Many of the elements described in the US are difficult to assess; for example, element 1.2 in 25127 refers to consultation with the client on-site. This is not easily achieved and able to be assessed during a course, especially for attendees who do not deal with a property owner. Another example is getting course attendees to demonstrate their knowledge of the extensive range of items given in each of the elements. This is difficult to achieve given the limited time and costs with undertaking such assessments.
- Attendees are expected to complete a reports for the following:
  - Site and Soil Evaluation reports, design, installation and commissioning and operation and maintenance monitoring plans (this is detailed in US 25127 and 25128). These are difficult to assess during the course, and to complete all of these reports would become very time consuming and would really be beyond the work that should be required for this course. This aspect has been managed by the trainer providing examples during the course and within the course notes. Assessment of the attendees' knowledge is done by testing the attendee of what they would need to include in these reports.
- Currently, assessments are expected to be completed and assessed solely in accordance with AS/NZS1547:2000. However, many of the Auckland region attendees would normally use the Auckland Regional Council guideline Technical Publication 58 for on-site wastewater design (ARC TP58). A change to the US which details that course attendees can use the appropriate standard/guideline for the location of the onsite wastewater system they are designing could be included.
- There could be more emphasis on identification of the RE. Element 2 from US25125 and US25127 covers details on environmental constraints, site clearances and also site features on-site and off-site; but there is limited detail provided in terms of the RE sensitivity; for example, types of water ways and climatic details. Some more information on linking the RE to the treatment and discharge options could be provided in US2128 for this. However the trainers have identified the need for the main focus to be on the RE and have incorporated this into the course.

While the US's were only developed some 8 years ago, the content they require to be addressed is somewhat out of date with the current state of the industry and onsite wastewater management. Four key areas are:

- Technical complexity – there is a requirement to address technical engineering solutions and methodology. The reality is that while of some relevance, many designers do not need to thoroughly understand this level of detail. In many cases, especially for regulatory participants, they will never need to consider the detail of calculations and high level engineering solutions. While they should be aware of the background and processes, it is questionable if they need to fully understand and be able to use complex mathematical equations.
- Regulations and receiving environment – the US are heavily systems and engineering focused. There is limited coverage of regulatory and receiving environment considerations. This is a large gap in the US, and while covered in detail in the course, it is not a significant requirement of the US.
- Demonstrating competence – assessing competence against the US can be difficult, especially given the current array of information and its technical complexity. There

is limited time available and fees to fully scrutinise the attendees understanding of all aspects of the US.

- Starting point – the US are complex in places and akin to what is covered in 2<sup>nd</sup> and 3<sup>rd</sup> year tertiary engineering degrees. The content at university is covered in a series of lectures, labs and assignments over a period of weeks. While some course attendees have tertiary qualification and can understand the technical aspects, a number of very capable course attendees would not have reach Year 13 at secondary school. This creates a huge challenge for delivering the course material as there is a wide range of experiences and technical levels that need to be catered for.

## **Cost of Development and Change to Course Material**

The development of the training programme incurs costs in four areas.

- Resource material preparation;
- Presentation material preparation;
- Delivery of the courses;
- Assessments; and
- Administration.

Initial 'seed' funding of \$20,000 each was provided by BoPRC and AC. In addition to this, both Opus and LEI have contributed in-kind. LEI have effectively written off \$35,300 to date and many additional hours discussing the programme with other industry practitioners and councils to try and generate interest.

Given the limitations of delivering to the US's and the varying knowledge of the course participants, LEI and Opus have made changes from course-to-course. This allows the individual courses to use up-to-date material, course material region-specific, and helps to improve the understanding of the attendees.

Current course fees of \$1,500 per attendee per module cover the delivery and assessment of the courses, but depending on numbers attending there can be a shortfall. Typically LEI would write off about \$1,000 per module on top of reduced hourly rates.

The ongoing viability of the current delivery of the onsite training courses needs to be addressed. Changes to the US's and the course content may help this. Further, ensuring reasonable attendance at each course will also allow costs to be covered.

## **Future Course Numbers**

Currently the course is detailed on the WETA Water and Waste NZ website. Also BoPRC have stipulated the following:

*Practitioners who intend designing on site wastewater systems in the Bay of Plenty Region will need to complete the training to "On Site Wastewater System Designer" level to meet the Suitably Qualified and Experienced Person requirements in the operative on site effluent treatment regional plan.*

BoPRC recognised that practitioners in their region required training, this is particularly because of the following factors:

- Population,
- Sensitivity of the receiving environments in many locations in the region, and



- Failed systems.

This drive from BoPRC can be seen by the number of attendees on the course from the BoP region. It is unclear how many more will attend from the region.

At this stage despite discussions with regional councils around the country, there has not been sufficient enquiry to have the confidence of obtaining numbers to schedule a further training course.

### **Ways to Get More Numbers on the Course**

For the course to continue viably there needs to be enough people in attendance. The most obvious way would be to convince other Regional Councils around the country to become involved and also take a similar line to BOPRC where practitioners are expected to attend the courses, particularly in areas where there are sensitive receiving environments within a region or they have identified an issue with onsite wastewater discharges. This, like BoPRC have done, be made a requirement of submitting a design.

There could also be opportunities to provide a roadshow training programme, with the course being offered at key locations around the country. Again, this would ideally require the commitment of regional councils to assist with ensuring adequate numbers attended.

### **CONCLUSION**

Many people from a range of backgrounds have attended the course, with the majority being consulting engineers and council staff to drainlayers and designers.

The majority of course attendees have been from the BOP and Auckland regions. This has been instigated with the need to have suitably qualified practitioners designing onsite wastewater systems in these regions.

It is very encouraging to see a high number of council staff attend, especially building control officers.

Some changes should be made to the NZQA unit standards for onsite wastewater training. They need updating to reflect current standards and also the variation in standards/guides used around the country. Further, changes whereby there is the ability to assess the students more easily against the unit standards should be considered. Greater emphasis should be placed on regulatory requirements and the identification of the receiving environment and matching this to discharge and treatment options.

High costs are incurred to the trainers' organisations with the presentation of the course, where costs are beyond the budgeted expenses.

To deliver more courses and keep the training programme going, there needs to be additional support from Regional Councils around NZ where they have identified a need to have suitably trained practitioners in their area for onsite wastewater.