Stormwater Group
WATER NEW ZEALAND

Stormwater Education and Training Industry Forum

Water New Zealand Stormwater Education and Training Subgroup

Stormwater Conference 23-25 May 2018 | *Wai Ora – Rising to the Challenge*

Summary of 2018 stormwater training survey

Total responses = 77 as at 12:30 midday on 20 May 2018

Contents

How to stay in touch

You can keep up to date in several ways:

- Join the Stormwater Linked In Group here
- Look for announcements via Water New Zealand's *"Pipeline"* e-newsletter
- Click here to email Vicki McEnaney, Manager, Sector Engagement for Water New Zealand, asking to be put on the mail list for direct updates from the Stormwater Group's Education and Training Subgroup

Find out more about the Stormwater Group on the Water New Zealand website here.

Not taken the Survey yet? We are keeping it open, so click here to tell us your thoughts.

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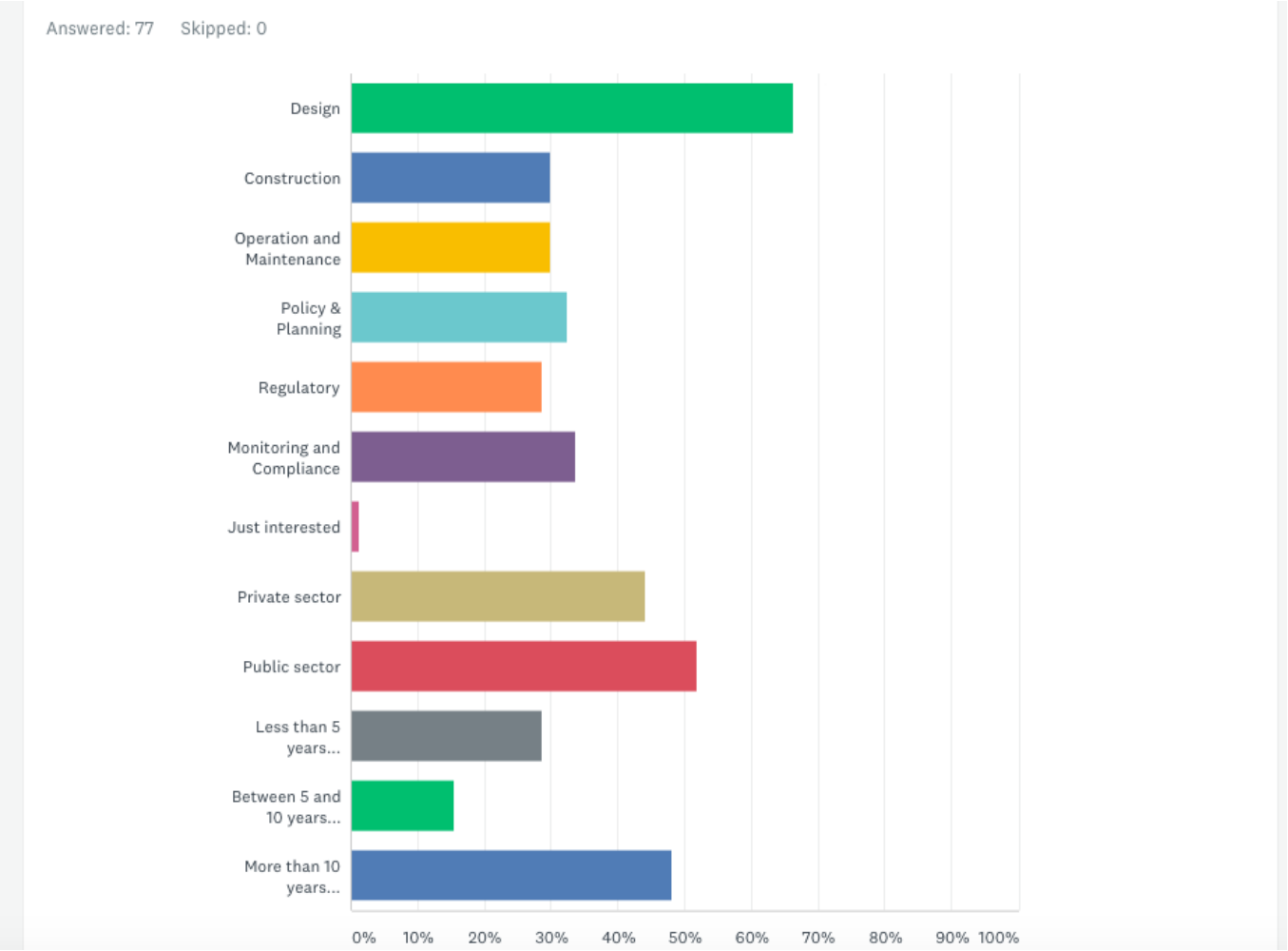
Flip chart notes from the Education and Training Forum on 24 May at the 2018 Stormwater Conference

- Principles and integration: covered as much as can be in part of Allan Leahy's two 1-day training workshops for Engineering New Zealand
- Operation and maintenance training needs to be included in design training
- Auckland Council is looking at training – 1-day workshops at Botanic Gardens
- Reactivating WSUD Aotearoa research project is looking at a central collection of resources for trainers
- Ministry for the Environment is engaging on WSUD principles/guideline
- Every region has its own guidelines
- Ecan website has a 1-stop shop for related guidelines
- Design training needs relate to:
  - Integrated multidisciplinary design
  - Devices
- There's a big gap where doesn't seem to be any training on:
  - Translating design into construction
  - Construction
  - Operation and maintenance
- Hamilton City Council is looking at
  - skilled green infrastructure practitioners who are skilled enough to maintain green infrastructure in parks as well as WSUD and know the difference
  - WSUD training for Building Inspectors
- The skills landscape is rapidly changing
- Trans-disciplinary and multi-disciplinary skill are needed
- There is a New Zealand Standard on sustainable subdivision design
- Need a values-based approach like Christchurch City Council's Waterways and Wetlands Guideline
- Need the rainfall/runoff work
- Need a national database of devices, designers and maintainers
- Partnering with tertiary organisations including user-pays training
- Regional Councils could provide financial support with some cost recovery from trainees
- Need certification of people involved, e.g. through Water New Zealand
- Set up a Centre of Excellence – a "mini-Monash" – where people could go for training and from where training could be delivered across the regions

Qu 1. Which sector/s of the stormwater industry do you work in? Please tick all that apply:

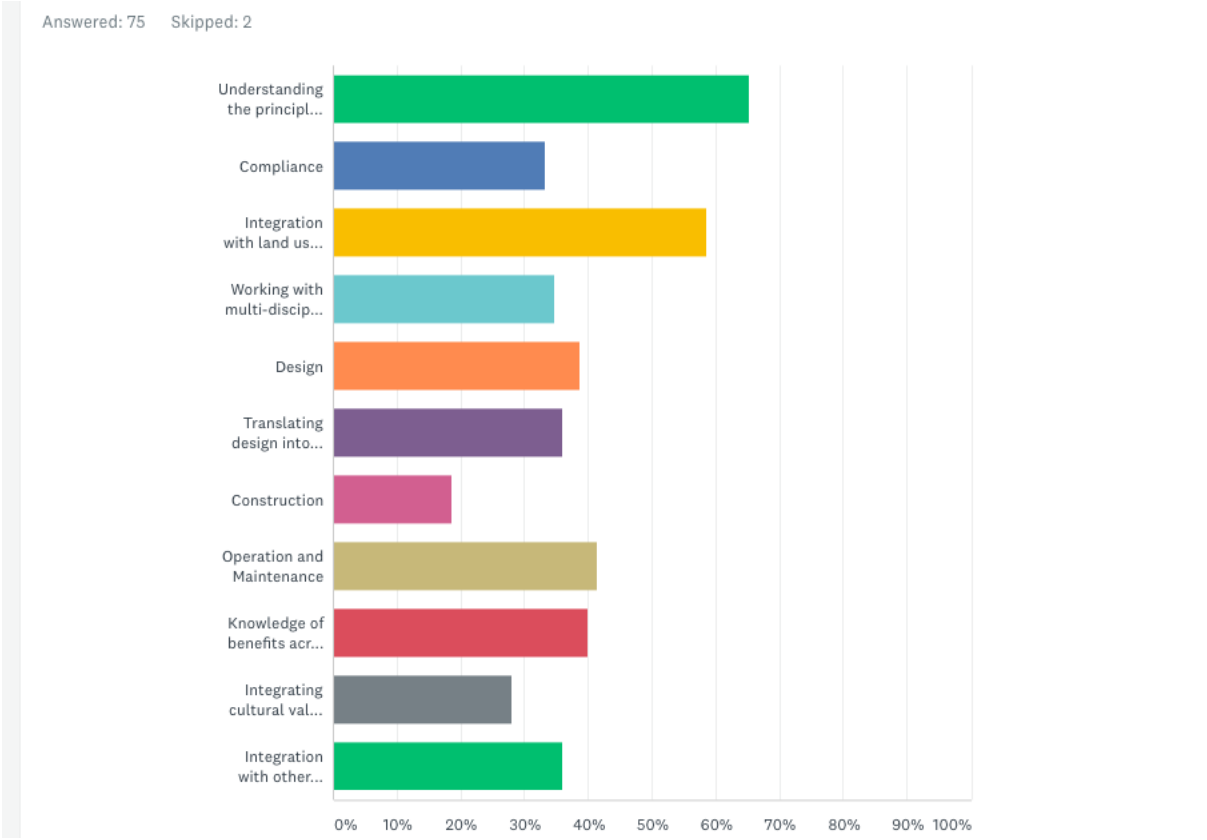


Other (18 responses):

1. Environmental Engineer and Scientist, CEnvP
2. More than 25 years of experience in Water industry (including working on World Ban projects). Interest Design, treatment, and management of stormwater and wastewater
3. PhD (Civil Engineering) Climate-change adaptation Natural hazards
4. Interests surround stormwater quality, and water sensitive urban design
5. Industrial stormwater
6. Qualifications: B.Eng(Hons), Civil & Environmental. Working towards Master Environmental Engineering Studies at Auckland University. Stormwater-related interests: Freshwater Quality & Ecology, Water Sensitive Design, Making Room for the River, Natural Flood Management, Policy & Planning.
7. CMEngNZ
8. I work for a Council but come from a consulting background. I've also worked overseas for the majority of my career. I've worked mostly in the WSD/LID space
9. Māori / indigenous knowledge/matauranga
10. Focused on Sustainability, Water Quality, Erosion
11. Stormwater quality monitoring and improvement
12. Bachelor of Engineering
13. Improving our urban waterways through better technologies
14. Water and wastewater treatment
15. Intermediate engineer, 2.5 years experience. Studied environmental engineering and geography (joint degree). Mainly work on flood modelling and stormwater design with some hydrology
16. CPEng in stormwater treatment & conveyance
17. BE- Civ
18. Interested in sustainable design

Qu 2. What is the most critical issue you have experienced that indicates a need for more stormwater education or training? Please tick all that apply:

Answered: 75 Skipped: 2



ANSWER CHOICES	RESPONSES	
Understanding the principles, purpose and outcomes of stormwater management	65.33%	49
Compliance	33.33%	25
Integration with land use and development planning	58.67%	44
Working with multi-disciplinary teams	34.67%	26
Design	38.67%	29
Translating design into construction	36.00%	27
Construction	18.67%	14
Operation and Maintenance	41.33%	31
Knowledge of benefits across the four wellbeings (social, cultural, environmental, economic)	40.00%	30
Integrating cultural values / mana whenua liaison	28.00%	21
Integration with other industries, e.g. solid waste, wastewater, urban design, pedestrian/cycle access etc	36.00%	27
Total Respondents: 75		

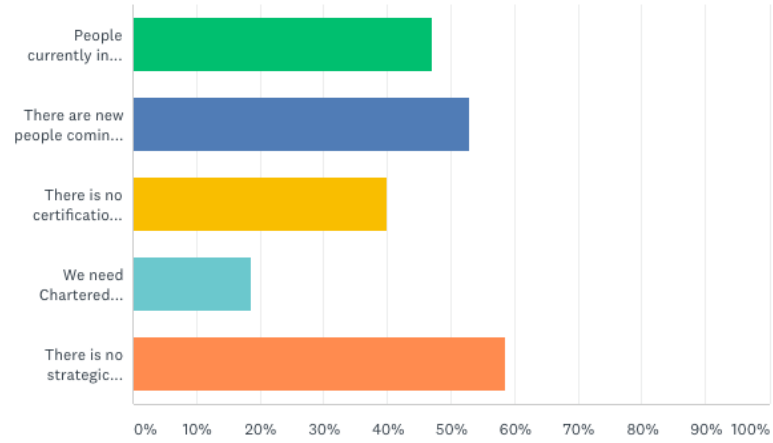
Other (20 responses, some with multiple suggestions):

1. Making clear the responsibilities of the device owners, that it's not a stick it in and forget about it. Rule framework also needs to be clear about this, and the consequences of it
2. Cumulative effects and overland flow paths
3. Effluent irrigated land treatment systems
4. Developers seek least cost solutions that are not best for the community. Such substandard outcomes present future developments that will not satisfy the needs of future generations. Councils need to strengthen the rules that prevent inappropriate designs.
5. Climate-change impacts and implications e.g from more intense rainfall, sea-level rise
6. Definitely how services fit into the overall networks and systems that make up a community
7. Knowledge of extreme events and how systems cope beyond the nominated LOS

8. Understanding of the wider statutory framework e.g CDEMA, NZCPS
9. Better and more consistent approach to developing inventories of system attributes (otherwise risk/benefits difficult to quantify)
10. There is a real need for stormwater to move more into the forefront of thinking for any infrastructure project. This requires a broader appreciation of stormwater management across local authority departments and industry. More needs to be done to integrate cultural values and Tangata whenua's historical understanding of environmental degradation (especially of our freshwater and estuarine environments) in how councils progress towards more water sensitive urban environments.
11. Hydrology/hydraulics/modelling
12. Lack of knowledge by industrial sites regarding good/best management practices for stormwater protection.
13. Educating developers and decision-makers (e.g. Councils) of the importance of getting the above right
14. People still view stormwater management as an isolated (as opposed to integrated) approach and fail to understand cumulative or multi-disciplinary needs
15. Top 3: (1) Integrating cultural values / mana whenua liaison (2) Understanding the principles, purpose and outcomes of stormwater management (3) Knowledge of benefits across the four wellbeings (social, cultural, environmental, economic)
16. Water Sensitive Design
17. Roading engineer /narrow-planning and KPIs blocking water sensitive design integration UP FRONT as the broader benefits aren't considered in narrow upgrade and replacement projects; also local government signoff and vesting assets process that access WSUD as defective assets
18. Lack of understanding of how the design will actually work in practice Lack of understanding on the problems of maintenance of many of the designed systems Lack of understanding on how to actually build the designed systems.
19. Sustainability and future-proofing.
20. Poor understanding of stormwater management by construction contractors.
21. Debunking the myths about stormwater device operation and maintenance. Stormwater BMP asset management. How stormwater BMPs work for non-engineers
22. More and more need to design systems to achieve stormwater neutrality post development
23. understanding whole of life costs and coming up with optimal solutions considering the whole asset lifecycle. Enforcement of developments. Understanding the stormwater network
24. Consistency of outcomes across different authorities. Communication between council planning and Engineering departments. Negative opinions regarding the maintenance of vested low impact design stormwater solutions versus traditional 'hard' engineering solutions, and a specific focus on detention only (lack of focus on landscape/treatment/cultural/heritage values)

Qu 3. What issue, trends or opportunities do you see that support a need for more stormwater education or training? Please tick those statements you agree with:

Answered: 70 Skipped: 7



ANSWER CHOICES	RESPONSES	
People currently in the industry lack adequate baseline knowledge	47.14%	33
There are new people coming into the industry with insufficient experience	52.86%	37
There is no certification process that distinguishes suitably qualified or experienced people from anyone else	40.00%	28
We need Chartered Professionals to sign off on stormwater devices	18.57%	13
There is no strategic pathway for our professional development in stormwater	58.57%	41
Total Respondents: 70		

Other (21 responses):

1. On site systems and the mechanism by which private individuals know that they have an obligation to maintain something and then 'how' (whether contracting someone).
2. All the above are not solutions per say for what is broken or how we move forward. There will always be people with different knowledge as SW is multi disciplined these days. It is the court and individual business that decide who is suitably qualified or experienced; however, having a certification system helps clarifying these levels of expectation and provides client assurance. Yet, mandating will only make getting into the industry harder in a multidisciplined environment.
3. Stormwater is perceived as the softer of the 3 waters infrastructure. But this fails to recognise that it is the most complex.
4. Risk management in a changing climate Public-facing skills in engagement with stakeholders and communities on communicated and negotiating levels of service and factoring in consequences of more extreme events e.g. flooded roads
5. There is a gap between design and operation / maintenance / monitoring of WSUD. Councils are in danger of ending up with green infrastructure that does not actually work as intended, due to a lack of consultation with those on the ground.
6. Needs to be more focus on innovation and research and development of storm water devices and management of existing infrastructure
7. Reliance on specifications and guidelines without having the ability to appropriate challenge them.
8. Asset Management practices around (particularly new and LID) storm water infrastructure
9. climate change will effectively change our methods of building (including the need for a revisit of the "100-year event" theory as more of these events occur in both scale and magnitude.
10. Lack of Social / Cultural exposure to back up Economic / Environmental well beings Hydraulic training Targeting Plastic / Litter / Debris / Gross pollutants as target contaminants of concern
11. Still seeing lots of the "wrong device in the wrong place" at the design end, particularly with placing devices to get Council approval but not following through on how practical the devices are to maintain or operate - Assets sign off is missing.

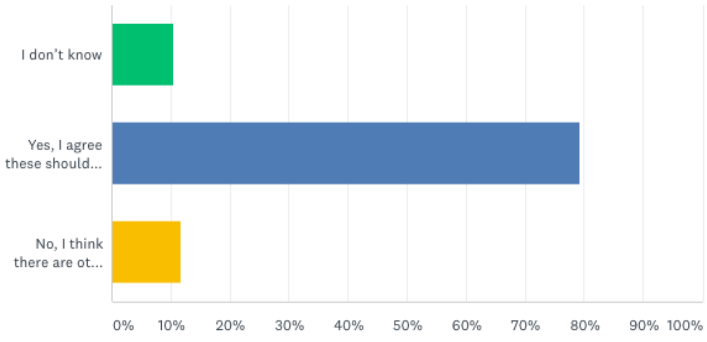
12. Limited flexibility from council regarding alternative methods holding back progression of systems.
13. Some people currently in the stormwater industry lack adequate baseline knowledge. Many people in parallel industries e.g Roading, buildings, lack adequate baseline knowledge
14. Need to better understand how there designs can be built and maintained and how they will perform in the real world
15. There is a need for "holistic" approaches. In former years "Drainage" was the issue. More recently "waterways quality". Now "integrated water management". Iwi perspectives (cultural). I do not think certification is required - simply attending suitable courses will suffice.
16. More training to help people move beyond basic stormwater engineering (e.g. Rational Method, pipes with HGL at pipe grade and E1 Surface Water compliance document) to more complex stormwater management. More national guidance on approach.
17. Difficulty of finding NZ-based resources/training and info on standardised industry processes (much easier to find overseas resources).
18. All of the above. Certified Erosion and Sediment Control Professional goes some of the way.
19. No feedback or accountability for design construction and operation. Bad BMP's being signed off. No maintenance being enforced. if people do not corrected when they make a mistake how can they learn the correct way?
20. Me
21. People do not appreciate the importance of stormwater and the water quality implications and liveability opportunities. You have all sorts of developers and other so called professionals undertaking designs & construction that do not have the right qualifications, experience and understanding to do so.

Qu 4. In the 2017 survey, the key training needs were identified as:

- Water Sensitive Design (integrated design, construction & maintenance)
- Hydraulics
- Modelling (rainfall, flooding, secondary flow paths etc.)
- Policy (AUP interpretation, NPS-FM, consenting)

Do these needs still apply? Please tick what applies

Answered: 77 Skipped: 0



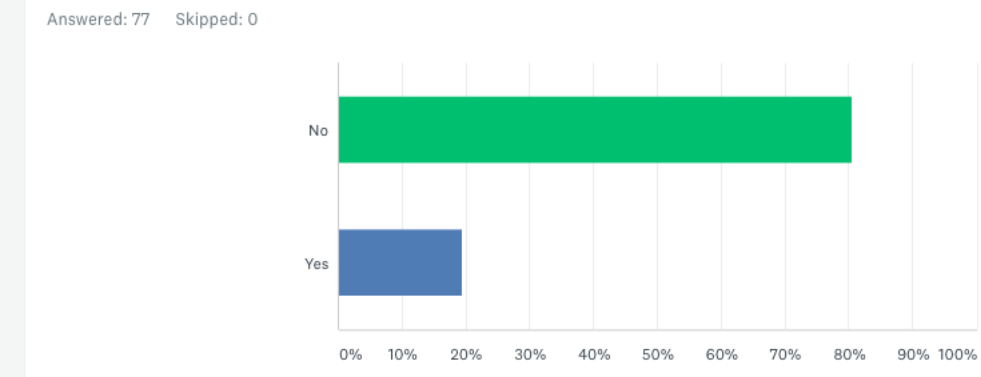
ANSWER CHOICES	RESPONSES	
I don't know	10.39%	8
Yes, I agree these should be the primary focus for training	79.22%	61
No, I think there are other priorities	11.69%	9
Total Respondents: 77		

Other (21 responses):

1. Education and training for industry
2. Building resilient communities that approach stormwater as one of a multiple of natural hazards to be considered in good environmental design. Integrating a strong built environment with the natural environment.

3. How and when to adapt existing (legacy) stormwater systems (urban, peri-urban and OSW's) to a changing climate and ongoing development pressures e.g. transition from gravity to pumped systems (esp. coastal areas), rising groundwater, more intense urban flash flooding
4. Integrated WSUD NPS_FM
5. Integrated planning (land use; housing typology; WSUD etc)
6. Lack of public awareness around GMPs/BMPs
7. Water Sensitive Design is increasingly well understood by land development and urban design practitioners. Hydraulics, modelling, and policy interpretation is an ongoing need. Further to this stormwater practitioners need to have a stronger understanding of freshwater management principles to understand the basis of WSD.
8. Stream and river management
9. Water quality, freshwater and marine ecology, remote sensing, big data,
10. Topic 1 is critical as it is not just a technical discipline but also a planning issue. Strom water infrastructure sits at the intersection of planning and technical design. Storm water design requires a strong bond between urban planning and engineering. This is a team playing exercise which cannot be trained in a course alone.
11. Soakage design is an issue and lots of systems are poorly designed and specified and hence will fail if truly tested
12. Treatment device choice .... outside the recipe cookbook guidelines ie Targeting Plastic / Litter / Debris / Gross pollutants as target contaminants of concern
13. Design for Safety
14. Integrated Design for Social & Cultural values.
15. Who is going to own the asset down the track and is it practical to maintain.
16. Identifying other professions to liaise with in WSD space
17. Design through to construction process, lack of continuum
18. Hydraulics is part of basic training/education. Modelling is very specialised and only suitable for those in that mode; however appreciation of what models can achieve and the associated caveats would be worthwhile. An integrated approach is now required and a real appreciation of what this means is called for. I am not conversant with policy development, but no doubt it is important but varies in each regional council area.
19. Cultural value of water. How Maori see water and how that aligns with WSD, Policy, and how we can incorporate that into Engineering design.
20. Asset management Development of better compliance systems
21. Understanding optimal whole of life asset solutions and costs Benefit realisations
22. Understanding O&M implications
23. Environmental and sustainability in Storm water design
24. Urban development/city planning to lessen imperviousness and promote water sensitive design

Qu 5. Do you know of any existing education or training programmes (in New Zealand or overseas), that could meet these gaps?



Other (16 responses, some with multiple suggestions):

1. Engineering NZ courses (two respondents)
2. NZDE (Civil) BEngTech (CIVIL)
3. The Stormwater Institute at WEF in the USA offer training I think
4. Some of the above topics could be included in BE (Civil/Natural Resources, Env Engineering) degree - but courses would have to be amended.
5. Sector training workshops
6. Need to support a culture that cares about environmental protection (e.g., more community working groups).
7. Changes in policy could also help put more responsibility on dischargers to meet water quality requirements through consents.
8. National SW standards/guidelines.
9. Environmental Science courses at UoA. I'm currently enrolled in the ENVSCI 714 (Water Quality Science) which covers a range of topics not covered in Environmental Engineering or Civil Engineering courses.
10. WSD design: there aren't any training programmes which combine the regulatory needs with the technical design aspects. We need collaboration with regional/local Councils so that training is tailored to regional needs and character.
11. U of Canterbury
12. U of Auckland
13. Clearwater in Melbourne
14. International Water Centre in Brisbane
15. I have not checked. But again short specialised courses would provide great value. I do not see the need for specialised certificates or diplomas. I have taught water engineering papers for the NZDE (civil) for 11 years. And one post graduate diploma paper in Drainage Design.
16. Various overseas organisations seem to provide a variety of resources. More NZ-based options would really help us to continuously improve local professional standards. Examples include: - the CIWEM Constructed Wetlands E-learning course: https://members.ciwem.org/CIWEM_MBR/Events/CIWEMEvent_Display.aspx?EventKey=ONCWET1117&WebsiteKey=7c95955a-2322-4494-9fc7-0858ee2f789d
17. The AWA webinar series: https://awa.asn.au/AWA_MBRR/Events/Webinars/AWA_MBRR/Professional_Development/Webinar_Series.aspx?hkey=923e4e27-3c9e-4081-918e-ffb8499831a0
18. Google stormwater training there is a lot. I suggest waterNZ review options
19. Forester University Programme
20. Developing WSP Opus Programme
21. University planning courses
22. I think the conference covers these at times.

Qu 6. If new training or educational courses are required, how do we make them financially viable in the long term? (For instance: find industry sponsors, support certification through established professional bodies)

Please note that dot points below the headings are included in the total count in the heading.

First Priority (59 responses)

1. Industry sponsors (9)
    - Plus in-kind support eg presenters
2. Certification through established professional bodies (9)
    - Requirement for certified designers/installers through codes and plans would promote training
    - Make it compulsory for qualified people to design, construction and operate
    - [requirement for] experienced professionals
3. User pays (6)
    - Paid course

- self training to lower costs

4. Support through national professional bodies (5)
    - Engineering NZ
    - Professional bodies – needs to be independent
    - Professional bodies working with industry
    - use professional bodies
5. Industry employers pay (3)
    - must pay
    - Fund the training on the job ('team work')
    - Cadets programme for recently graduated with placements of fixed timeframes in design role, construction, regulatory and asset management.
6. Council sponsorship and other approaches (2)
    - Local and regional authorities to drive training
    - Territorial authority rules requiring plans to be prepared or certified by a registered professional. [Registration] Fees pay for the training.
7. Support through educational institutes (2)
    - designed and delivered by industry and educational institutes such as Unitec
    - As part of tertiary training (BE, Post Grad Diploma etc.)

Other comments:

- If general acceptance that the training adds value: then
    - incentives for industry and government to sign up for continuing education programs
    - include in professional development requirement of large public orgs (counted in 4 above)
    - keep each module to a day
- fund their development and then make available online
- How to ensure they are relevant to accreditation bodies.
- Monthly professional events supported by industry sponsors held in Auckland/Wellington/etc, with presentations made available as fee-paying webinars to those in regions/elsewhere.
- Prove the benefits of the training through application and success
- Provide targeted efficient courses in a range of centres that are good value
- Shorter and more targeted (block type courses)
- specify whether its development of training resources

Second Priority (37 responses)

1. Industry/other (unspecified) sponsors (8)
    - Industry Leadership
2. Certification through established professional bodies (5)
    - Certification
    - Professional body CPD accreditation
    - Chartership
3. User pays (4)
    - Self-funded training
4. Support through national professional bodies (6)
    - Course development supported by professional bodies
    - attach to other industry training quals
    - Integrate into institutional learning i.e IPENZ, Worksafe etc
    - through Engineering NZ??
    - IPENZ Stormwater membership fees
    - manage through professional bodies - but be aware not all of us in stormwater are engineers so we don’t neatly fit into existing professional bodies!
5. Industry employers pay (1)
    - Employer subsidy
6. Council sponsorship and other approaches (0)
7. Support through educational institutes (2)
    - Academic scholarships
    - educational grants
8. Collaborative approaches

- Private/Public sponsorship
- Collaboration design, operation, etc. of stormwater devices with suppliers/manufacturers
- Experts work together to donate time where they can
- More partnership-working on chartership/certification schemes to avoid double-ups (e.g. partnerships between WaterNZ/EngineersNZ/etc and overseas bodies such as CIWEM, AWA and Engineers Australia).
- pipe suppliers will help sponsor some elements as long as we accept a bit of a sales pitch as well

Other comments:

- Benefits of the outcome need to be fed back into the projects
- [Development] versus actually delivering the courses
- Make them available for companies/agencies to book for group trainings
- Market through appropriate channels e.g. SOLGM
- Webinar / videos available online
- Webinars

Third Priority (16 responses)

1. Sponsors – unspecified and related ideas (4)
    - Use donated spaces eg. industry premises
2. Certification through established professional bodies (2)
    - tie to registration/chartership
3. User pays (1)
4. Support through national professional bodies (2)
    - WaterNZ and or IPENZ grants
    - Ensure that credits can be earned that can go towards other qualifications
5. Industry employers pay (0)
6. Council sponsorship (0) Other approaches (1)
    - Work on lead projects should be R&D funded (Callaghan)
7. Support through educational institutes ()
    - Collaboration with tertiary institutes

Other comments

- Best information and presenters for the specialist area being taught
- use accepted overseas material
- In-house courses (external trainers if required)
- look at online learning to lower costs
- Make them easily available eg online and remote learning options
- set up a national platform for resources

Fourth Priority (4 responses)

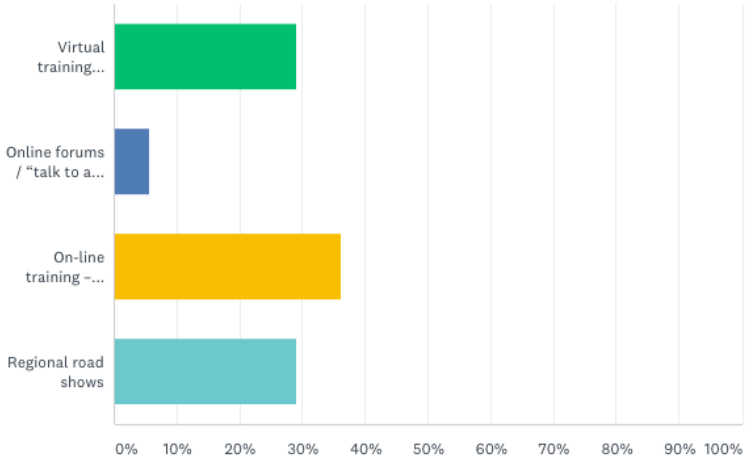
- Certification process across all stages
- Mandatory qualifications
- On the job training.
- multidisciplinary
- Design/Construct/Operate/Maintenance/Regs/Compliance/Monitoring... CWEM??? CEnvP???

Fifth Priority (1 response)

- Employee pays for course, extra pay on completion.

Qu 7. How can we deliver training so that regions, as well as main centres, benefit?

Answered: 72 Skipped: 5



ANSWER CHOICES	RESPONSES	
Virtual training (webinars etc.)	29.17%	21
Online forums / "talk to an expert"	5.56%	4
On-line training – formal modules, tests, certificates	36.11%	26
Regional road shows	29.17%	21
TOTAL		72

Other comments:

- All the above bullets are relevant
- I think it's probably a combination
- Best to mix all of the above for best outcomes
- Partner with IPENZ
- Personally, I believe that a combination of face-2-face and online training could beneficial from learners point of view.
- Develop peer support networks such as those that collaborate together for IPENZ registration
- Central training centre need to be together.
- Webinars are great for us in the main centres as well
- Bring together people out of their work environments and big corporate silos to develop real multidisciplinary skills
- setting up sessions where people can log in from the regions would work and level the playing field. on-line training needs a lot of management and curating information and can become outdated very quickly.
- Followed by regional roadshows targeted audience training, across multidisciplinary professions
- Best to be 'in a place' and 'go into the field' to ensure place-based emphasis
- Most will come from the regions if they know others who think the course is good.
- Supplemented with short courses in strategic centres. Site visits are also very instructive.
- Regional courses. If it's a good course and not too drawn out people will travel.
- Guidance Documents
- Something similar to Lynda.com where they have online videos, transcript, and exercise files, but also in addition to this need some interactive discussion with experts either in person or Skype
- I think people absorb information better and are more likely to ask relevant questions when there is an actual person.
- Ultimately face to face training is best and that means regional hubs/centres are used.

Qu 8. If there was only one thing you could make happen to improve stormwater skills in New Zealand what would it be?

61 responses

- National consistency in design criteria
- Provide on site demonstrations to businesses to create awareness then regulate or incentivise through certification
- Free education
- Knowledge & training
- Conversations early in the project/ development planning stage
- Bring in international experts from places like Canada where water sensitive design is taken more seriously. How can we better balance the need to minimize maintenance while achieving exceptional water treatment.
- Make integrated design mainstream (i.e. SW forms part of the design along with other disciplines such as urban design, roading, planning etc from the outset of the project.
- Industry could fund an introductory course on stormwater management
- Recognised professional development. National awards
- Training at institution
- Greater adoption of an adaptive, systems approach to changing climate, needs and development
- Certification
- Establish centre of excellence associated with a university, or several universities, where training can be undertaken. Initiate cadet programmes overseen by centre of excellence. Centre of excellence develops national guidelines on stormwater management.
- Stormwater specific course (National)
- Make Stormwater treatment a requirement nationwide not regionally.
- Attract young people to pre-apprenticeships or internships with TLAs to get exposure to SW challenges in a practical sense
- Better understanding of local authority requirements
- Better planning
- More training with mentor support.
- More teaching at a tertiary level to bring 1) more people and 2) more skilled people into the field. Contaminated land and other environmental sector fields suffer from this as well.
- integration of multidisciplinary approaches
- understand that the stormwater is different to sewer so do not use the same material specifications
- Support
- Understand the "why"
- create a New Zealand standard for soakage on-site stormwater management - including soakage testing in variable soils retention design principles
- Educate decision makers of the risks of not improving (ala leaky homes)
- teach people how to use the really good resources already available and implement them properly
- Produce a series of training videos or recorded webinars, and make open source on Youtube.... Most impact and spread with littlest cost to trainees.... cost to produce would be an issue though :P
- Get people to pick up gross pollutants around NZ beaches and waterways.
- Design for the 4 well-beings, social, cultural, economic and environment
- education
- Educate compliance engineers at Councils
- recognise that not all stormwater people are engineers when working with Eng NZ for example
- Require WSD as a non-negotiable application to reduce impacts of impervious surfaces

- overall basic understanding of concepts and that design is all theoretical principles
- Field days and case studies to know what works and what does not work in real life application
- easier to access training (at your own pace) materials i.e. online
- Contractor and operator training
- Guidance for moving to water sensitive urban design
- Make sure designers especially new designers understand how their designs will be built and maintained. Designed that are good in theory as still useless if they are difficult/impossible to build or just block up
- Collate many case studies which show both positive and negative and neutral results. These to be available through WaterNZ.
- Inclusion of cultural knowledge to be more mainstream
- More peer review
- Involve other disciplines in the conversation
- Monthly WaterNZ evening-based CPD/networking sessions in Auckland/Wellington/etc, with presentations shared/recorded as webinars for professionals based in the regions.
- WSD
- Specify the requirements to be a certified stormwater professional.
- Accountability for bad work.
- getting the basics right around design/construction interfaces
- The biggest issue is time - time for experienced professional to train others, time to undertake training