

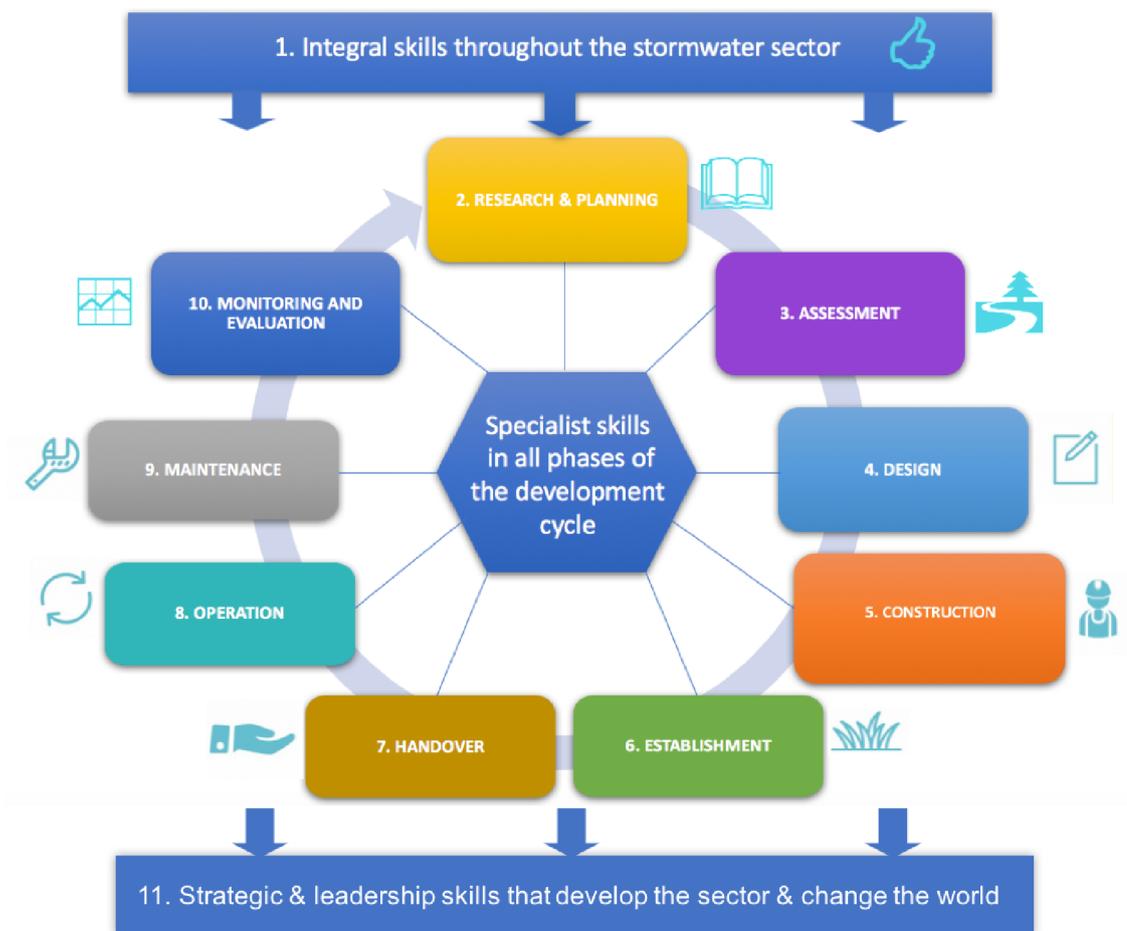
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# water NEW ZEALAND

Stormwater Education, Training & Sector Development

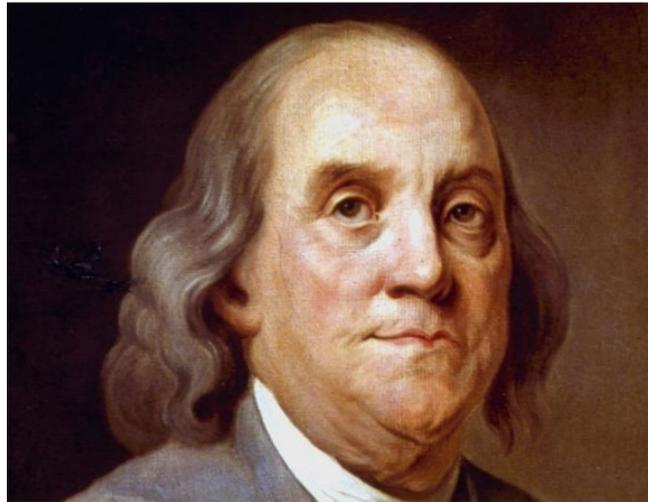
## PART 1: 3-YEAR EXECUTABLE PLAN

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DRAFT report for industry comment



If you think education is expensive, try ignorance.

— Benjamin Franklin

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DRAFT



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## Acknowledgement

The author gratefully acknowledges the prior work, expertise and generosity of Water New Zealand staff and the members of the Water New Zealand Stormwater Group Committee, as well as the excellent input from the wider industry during this three-year process before and during her involvement. Members of the Committee and Education and Training Subgroup are named in Appendix A.

### How to use this Plan

This Plan is based on a lot of work carried out over several years. It proposes a lot more work for the sector – work the sector wants, much of which it is itself best placed to deliver.

To keep core information ready to hand for those who will step up to this work, the Plan is in three parts:

- The **Plan** itself (this document)
- a set of **Toolkits** with practical detail for working groups implementing the Plan
- a short set of **Appendices** for other information collected as part of this process.

A great deal of other work is going on, so working groups will be supported with several key documents referenced in the Plan, especially the 2018 and 2019 WSUD research team reports, ongoing work by the Ministry for the Environment and the Auditor-General's December 2018 report on Managing stormwater systems to reduce the risk of flooding.

This Plan can only be implemented by the kind of ongoing communication and collaboration that characterises the stormwater sector. An exciting time lies ahead.

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**Toolkits:** Information to support working groups is in a second supporting document.

**Appendices:** remaining detail from the Tasks 1-4 reports is in a third supporting document.

## Executive Summary

### The context

Water New Zealand has been engaging with the stormwater sector over the last three years on the need for industry training. In late July 2018, Water New Zealand identified the need to develop a framework for a stormwater education and training programme and commissioned this Plan.

### The drivers

**Table A** broadly indicates the very real costs to communities across New Zealand of inadequate education and training of stormwater professionals and low public awareness of stormwater-related issues. Most if not all of them are externalised: they are borne by public and private agencies in the infrastructure and development areas and in the end, by the people in every community across New Zealand. Documenting these builds the **business case** for industry training.

### The brief

The brief is to deliver a **three-year executable Education and Training Plan** which provides:

- an adaptive framework adjustable to both the regional and national context, with a focus on training needs and delivery and how to fund the training
- tangible outcomes towards stormwater sector goals defined in industry feedback
- quantitative and qualitative methods to evaluate the effectiveness of the Plan.

This Plan is based on extensive engagement with the stormwater sector, which is made up of people who both want and can deliver identified training needs. It forms the basis for further engagement with the sector as a way of filling in the gaps in this first full draft and starting to implement its actions. It also will enable wider engagement with key players at a time of rapid change for the water sector.

### The barriers

Work over the last 2-3 years shows the two biggest barriers to effective stormwater training are<sup>1</sup>:

- a lack of **structure** to the training
- lack of **funding** to develop and deliver training: volunteers can only do so much.

The Plan addresses these barriers.

### Training structure

This Plan is fundamentally different from other environmental training plans because it:

- is based on a unique classification of training needs into the **water sensitive development cycle**. This allows a strategic overview of the entire stormwater and related sectors and their very different but interdependent skills, and provides a much-needed structure to help people search for the training they want. As new topics emerge, they can be readily fitted into the cycle
- draws on the skills in both the **stormwater** profession and the **professional training** sector
- integrates **evaluation** of the effectiveness of stormwater training into how catchment and asset managers monitor and evaluate the effectiveness of stormwater management generally, should they desire to do so.

Table A Indicative costs of inadequate stormwater education and training

Broad area	Examples of costs
Costs of rework and repair	Lack of training leads to the need for rework of inappropriate, poorly installed or maintained WSUD and other infrastructure. Lack of erosion and sediment control training leads to sedimentation of WSUD devices post-s224 sign-off.
Cost of delays	Consenting, tendering, funding, construction lead to avoidable price increases as a results of skills shortage and recruitment and retention issues.
Low productivity	Low productivity affects New Zealand's wider economy and the civil construction sector in particular, with lack of capacity and capability in the stormwater and wider horizontal construction sector an issue <sup>2</sup> . The skills shortage is now acute and is reflected in housing and infrastructure shortages and other issues.
Costs of poor outcomes of stormwater infrastructure	Without a core level of understanding at all stages of implementation, there are significant risks of poor outcomes in terms of environmental performance, CAPEX/OPEX costs, landscape amenity and public safety. Across New Zealand it is evident that a lack of information and technical capacity by decision makers, designers, contractors and operations staff is contributing to poor outcomes at all levels of WSUD implementation <sup>3</sup> .
Cost of unintended consequences	More and more privately-owned and operated WSD systems will potentially fall back on the public sector to remedy. We need to think through the cost implications of directing (narrowing) policy to this end-future outcome without identifying possible consequences of far-future impacts.
Lack of investment in green assets	Poor outcomes with WSUD projects and practice ultimately leads to poor perception of the efficacy of such investment at both a political and public level. This in turn is resulting in inefficient investment of substantial public/private funds and a failure to realise the benefits associated with well executed WSUD <sup>ibid</sup> . Conversely, many studies show that where elected representatives and their communities understand the benefits they are willing to pay for them <sup>4</sup> .
Costs of lack of national oversight and co-ordination	Gaps and duplication in information, effort and outcome monitoring with respect to stormwater management and training are avoidable costs to the country.
Unknown ROI of training	Across New Zealand it is evident that a lack of information and technical capacity by decision makers, designers, contractors and operations staff is contributing to poor outcomes at all levels of WSUD implementation <sup>5</sup> . Moreover, the costs and benefits of training in the sector are not tracked so we don't know how much of a problem the training is solving or the value of the solutions it delivers.
Cost of staff turnover	Staffing (subcontractor shortages / staff shortages / finding skilled staff / retaining staff / skill shortage / competition) was the top challenge/concern for respondents to a New Zealand survey of the construction sector <sup>6</sup> . Staff turnover is very expensive and is contributes to low productivity. Recruitment and retention is also an issue for Engineering New Zealand <sup>7</sup> .
Costs of lack of alignment with wellbeing outcomes	There is an opportunity cost to the sector, especially to councils, in being unable to clearly align beneficial stormwater outcomes with the wellbeing indicators being developed by Treasury and Statistics New Zealand <sup>8</sup> .
Lack of monitoring of wellbeing outcomes	Without robust assessment pf the costs and benefits of good (and bad) stormwater management it is difficult to measure attribution and contribution aspects of stormwater management to wider social, cultural, environmental and economic outcomes.
Risks of poor stormwater outcomes	Without a core level of understanding at all stages of implementation, there are significant risks of poor outcomes in terms of environmental performance, CAPEX/OPEX costs, landscape amenity and public safety <sup>8</sup> . Poor outcomes with WSUD projects and practice ultimately leads to poor perception of the efficacy of such investment at both a political and public level. This in turn is resulting in inefficient investment of substantial public/private funds and a failure to realise the benefits associated with well executed WSUD <sup>8</sup> .

## The water sensitive development cycle

**Figure A** depicts the water sensitive development cycle as a framework for categorising stormwater training needs across eleven areas of training on integral, specialist, sector and leadership skills.

Figure A The water sensitive development cycle as a stormwater sector development tool



## Training priorities

The Plan suggests targeting high priority capability and capacity needs by:

- synergising with a **pilot training** programme funded by the Auckland Council that targets design, construction, inspection and maintenance of water sensitive stormwater infrastructure, which address some of the top training needs listed by the industry
- proposing a method to **prioritise other training** to meet other urgent and expensive needs
- providing a **self-help model** that enables the sector to deliver on its own training needs.

Given the current rapid developments in water sector governance, this plan also recommends the future preparation of a **funding plan** backed up by a robust **business case** for **future professional development** needs to help the sector meet future challenges and opportunities.

## Getting started

A **pilot** training initiative is under way via an MOU between Water New Zealand, Auckland Council Healthy Waters and the WSP Opus Environmental Training Centre to introduce the US-based Water Environment Federation's National Green Infrastructure Certification Program (NGICP). The program delivers **certificate-level training** for people who construct, inspect and maintain green infrastructure (Steps 5 to 9 in **Figure A**). If the pilot results are favourable, this training could be rolled out to other parts of the country.

Other training needs identified require existing **tertiary courses** to be adapted or created. This is treated as a longer term need, though any early initiatives by other parties would be supported.

Many other urgent training needs identified by the industry relate to highly specialised post-graduate training that is best met through **continuing professional development** (CPD). Experts from within the industry itself, including research institutes and tertiary providers, are best placed to meet those needs.

### A self-help model

The Plan proposes a “self-help” model to developing and delivering stormwater training, with stormwater subject matter experts invited to prepare and deliver training with the support of professional trainers. This will ensure the training meets the outcomes demanded by best practice adult vocational training as well as identified performance gaps in best practice stormwater management.

### A supportive model

Several supporting elements need to be in place to sustain the program for the long term, as shown in **Figure B**. Training is seldom the only solution to a problem, and sometimes it is not the right solution at all. This plan highlights the needs for such other success elements to sustain the program.

Figure B Elements of successful environmental training programs (After Clare Feeney, 2013<sup>9</sup>)



### An aspirational model

Industry engagement has revealed an ardent and aspirational streak amongst stormwater professionals. Over half of the 2018 survey respondents agreed that there is ‘no strategic pathway for our professional development in stormwater’.

This finding points to the potential for stormwater professionals to make a difference within and beyond the stormwater sector by developing:

- **integral** skills that pervade the stormwater sector
- **expert** skills in the specialist phases of the water sensitive development cycle
- **strategic** skills that develop the stormwater and related sectors
- **leadership** skills that transform the rest of the world.

Opportunities for stormwater professionals to bring their environmental expertise to the top tables need to be highlighted as a way of bringing sustainability into business and government activities.

### Monitoring and evaluation

Evaluating the effectiveness of this training plan is based on two models:

- five levels of evaluation of the effectiveness of training that are used by professional trainers all around the world, culminating in measuring the full financial return on investment in training
- a logic model that helps environmental managers assess the impact of their interventions on complex natural ecosystems, should they desire to do so because of this training initiative.

### A lead agency

Water New Zealand is best placed to lead the stormwater training process, including quality assurance of the training and tracking its delivery and outcomes. As the wider three-waters context starts to emerge, things will change, but Water New Zealand has the capability to build strategic partnerships to support the survival of industry education and training into this fast-approaching future.

### Key partners

Predominantly engineering-based but increasingly less so, the multi-disciplinary stormwater sector has connections into many professional associations, from aquatic ecology and landscape architecture to planning and surveying. Professional associations and government agencies have much to offer as training partners and some of these relationships are already well-established.

Some potential partners are already well-equipped with systems and skills for the development and delivery of training, such as Engineering New Zealand, the Environmental Institute of Australia and New Zealand, Local Government New Zealand, the New Zealand Planning Institute and the Society of Local Government Managers, as well as some of their international equivalents.

Other partners are at a strategic and policy level, such as Ministry for the Environment and any new urban water and infrastructure bodies.

### A funding model

The sector has endorsed a comprehensive need for stormwater education and training and can back this up with a powerful business case, as shown in **Table A**. Realistically, however, at least in the next 2-3 years, funding will need to come from:

- Water New Zealand itself
- members who have the most to gain from good training – mostly the larger councils
- members who can donate their time to help develop high priority training
- a commercial model of training where development costs are progressively recovered over time from training fees (some support for smaller councils and firms may be needed).

### 2019-2020 budget

Immediate funding needs relate to:

- asking the industry to:
  - identify training priorities on topics other than the Auckland Council's pilot training
  - select 2-3 urgent training needs that can be funded from 1 July 2019 to 30 June 2020
- providing experts on the selected topics with the necessary support to develop, deliver and evaluate CPD training in line with best adult vocational training principles and practice
- seeking funding from other interested parties as part of a longer term funding plan.

Industry engagement on stormwater education and training is ongoing and this phase of consultation will be concluded after the 2019 Stormwater Conference when an updated plan will be released.

In order to ensure this initiative maintains momentum, a budget of \$50,000 is recommended to be made available to the Stormwater Group for the purposes of industry education and training.

The funding will be used as set out in **Table B** to:

- reimburse unpaid volunteers for travel and other expenses
- enable a Phillips-certified professional trainer# (see **Figure D**) and a stormwater consultant to support the stormwater experts to develop, deliver and evaluate CPD training
- progress other longer-term recommendations in the Plan as appropriate and practicable.

Table B Key actions, funding and timeframes

No.	For action by the Stormwater Group	Funding	Timeframe
1.	Support the Auckland Council Healthy Waters pilot of the WEF NGICP (National Green Infrastructure Certification Program) and other non-NGICP training (water sensitive design)	Auckland Council	To December 2019
2.	Report to the Water New Zealand Board seeking endorsement of the Stormwater Education, Training and Development Plan and \$50,000 in funding for the 2019-2020 financial year	Water New Zealand	July 2019 meeting
3.	Travel and other expenses to enable members of the stormwater committee to work with water New Zealand to enlist support from councils and other key influencers and other decision makers for funding in the 2020/21 financial year and beyond	\$20,000	1 July 2019 to 30 June 2020
4.	1-day workshop with a Phillips-certified trainer# to help stormwater subject matter experts develop robust indicators of the effectiveness of their training (see Figure D)	\$6,000	1 July 2019 to 30 June 2020
5.	1-day train-the-trainer workshop for stormwater experts on how to deliver great training that optimises adult learning outcomes, including pre- and post-workshop activities and support	\$6,000	1 July 2019 to 30 June 2020
6.	Supporting subject matter experts to use the Toolkits to develop best practice adult learning materials and processes e.g. by live webinars and where practicable, face-to-face workshops	\$10,000	1 July 2019 to 30 June 2020
7.	Other supporting work such as preparing supervisor coaching packages for trainees to take back to work, evaluating training outcomes, liaising with and reporting to Water New Zealand and progressing other recommendations in the full Plan as indicated by the outcomes of the training priorities process.	\$7,000	1 July 2019 to 30 June 2020
<b>TOTAL</b>		<b>\$50,000.00</b>	

# A Phillips-certified trainer is one who is accredited by the US-based [ROI Institute](#) to assess the effectiveness of training up to and including its full financial return on investment (ROI).

### Executive Summary Recommendation

That the Stormwater Group present this Executive Summary and supporting materials to the Board of Water New Zealand and request:

- endorsement of the Stormwater Education, Training and Development Plan
- \$50,000 in funding for the 2019-2020 financial year to progress its implementation as summarised above and, as appropriate, in the full Plan.

## Glossary

For the purposes of this report, the terms below are defined for practical application.

Term	Working definition
Capacity	The headcount of people available to carry out a given piece of work or sector-wide work. Capacity also describes the ceiling that caps their level of activity as defined by their headcount and also by their funding and access to other resources.
Capability	The knowledge, skills and experience of individuals or a sector carrying out a given piece of work or sector-wide work. Also refers to aptitudes which can be developed.
Course	An integrated set of sequential and associated training activities on a given topic or set of topics.
Water sensitive development cycle	The stages of urban development from greenfields to established development, including redevelopment (brownfields), construction, inspection, operation and maintenance of green infrastructure to monitoring and evaluation of outcomes across the four wellbeings. Includes management of erosion and sediment control on large and small sites and point and diffuse source pollution control.
Education	The process of receiving or giving systematic instruction, especially at a school, polytechnic or university.
Formative evaluation	These evaluations answer questions about how to improve and refine a developing programme. Formative evaluation is usually undertaken during the initial or establishment phase of a project, though it can also be helpful for assessing the ongoing activities of an established programme. Formative evaluation may include process and impact studies. <sup>10</sup>
Green & grey infrastructure	Shorthand terms for water sensitive (mostly plants) and conventional (mostly concrete) stormwater infrastructure.
Green jobs	Green jobs are a vital part of the 'transformation of economies, enterprises, workplaces and labour markets into a sustainable, low-carbon economy providing decent work'. They are a significant pathway espoused by the New Zealand <a href="#">government</a> . The ILO defines <sup>11</sup> green jobs as decent jobs that: <ul style="list-style-type: none"> <li>• reduce consumption of energy and raw materials</li> <li>• limit greenhouse gas emissions</li> <li>• minimize waste and pollution</li> <li>• protect and restore ecosystems.</li> </ul>
Influencers	Influencers are those people, groups or organisations with interests in a policy, programme or project, whose support or lack of it might significantly influence a project's success.
Learning (or training) objectives	Defined from the learner's or <u>trainee's point of view</u> , these reflect the findings of the Training needs assessment and objectively describe what knowledge the trainee will master and what specific practices the trainee will be able to carry out.
Productivity	"How well people combine resources to produce goods and services. For countries, it is about creating more from available resources – such as raw materials, labour, skills, capital equipment, land, intellectual property, managerial capability and financial capital. With the right choices, higher production, higher value and higher incomes can be achieved for every hour worked" (NZ Productivity Commission) [and from reduced inputs of natural & other resources].
Summative evaluation	Summative evaluations answer questions about programme quality and impact for the purposes of accountability and decision making. They are conducted at a project's or programme's end and usually include a synthesis of process and impact or outcome evaluation components.
Training	The acquisition of work-related knowledge, skills and practices that will improve an accepted and specified aspect of on-the-job performance that can be defined

	and objectively assessed in observable and/or objectively measurable ways. Trainers, trainees & assessors all need to know exactly what is expected of them.
Training needs assessment (TNA)	Training needs assessment, or TNA, is the method of determining if a training need exists and, if it does, what training is required to fill the gap. A TNA is essentially an assessment of “what is” and “what ought to be” that defines the training and/or other needs. Now usually just called “needs assessment” because training may not be the solution to the problem.
Workshop	A training delivery method usually involving classroom-style interactive activities of a given duration (half-day, 1-day, 2-day etc). A workshop may be a standalone training method or comprise part of a course (as defined above) that also involves other delivery methods including e-training, field trips, webinars and the like.

## Abbreviations

ADDIE	The model that describes the five traditional phases of developing training; Assessment, Design, Development, Implementation and Evaluation.
CPD	Continuing Professional Development
CRI	Crown Research Institute
ISCA	Infrastructure Sustainability Council of Australia
ITO	Industry Training Organisation
ITP	ITP means Institutes of Technology and Polytechnics, which are tertiary education organisations owned by the New Zealand government
LID	Low impact design (see also WSUD)
LMS	Learning management system
MfE	Ministry for the Environment
NGICP	The US-based National Green Infrastructure Certification Program
NZQA	New Zealand Qualification Authority
NZQF	New Zealand Qualification Framework
PTE	Private Training Establishment
RCC	Recognition of Current Competence
ROI	Return on investment
SUDS	Sustainable urban drainage systems (see also WSUD)
TTT	Train-the-Trainer Training, where subject matter experts are trained by professional training experts on best practice adult learning principles and practices
WEF	Water Environment Foundation, the US-based membership organisation that developed the NGICP training
WSUD	Water sensitive urban design. Also referred to as low impact design (LID) and sustainable urban drainage systems (SUDS).

## 1. CONTEXT: why we need this Plan

“ If you don't know where you're going, any road will take you there. ANON

### Purpose of this section

To background the emergence of the need for a plan for education, training and sector development for the stormwater sector in New Zealand.

The issue of capability and capacity in the three-waters sector is a long-standing one, and in early 2018 Water New Zealand set up a [Workforce capability strategy](#).

Through consultation with the industry, the Water New Zealand Stormwater Group, working on behalf of Water New Zealand, has identified a series of critical gaps in the stormwater sector that if not addressed will have significant adverse effects on the effectiveness of stormwater management.

Water New Zealand's stormwater objectives and mandate are to:

- assist in the definition and promotion of best practice for the management of stormwater within New Zealand
- disseminate information related to stormwater issues
- promote education and public understanding of stormwater issues.

In order to get a better grasp of the issues and opportunities for stormwater education and training, Water New Zealand has produced the following pieces of work:

- 2017 survey of stormwater professionals
- 2018 survey of stormwater professionals
- results of the 2018 Stormwater Conference Industry Training Forum
- an informal list of local and international stormwater education and training practices
- Annual Workplan July 2017-June 2018
- Stormwater Group draft Training Plan, Version 0.3 Draft November 2017.

In late July 2018, Water New Zealand identified the need to develop a framework for a stormwater education and training programme and commissioned this piece of work. The brief is to deliver a **three-year executable Education and Training Plan** which provides:

- an adaptive framework adjustable to both the regional and national context, with a focus on:
  - **needs:** what training is needed in identified areas
  - **delivery:** how the training might be delivered
  - **funding:** how the training might be funded
- tangible outcomes towards industry goals defined in feedback received over the past two years
- quantitative and qualitative methods to evaluate the effectiveness of the Plan.

There is more detail on the project methodology in **Appendix B**.

## 2. DRIVERS: rapid change and the high costs of inadequate training

“ Our infrastructure and housing backlogs are creating ever-increasing economic, social and environmental risks and costs.  
CHAPMAN TRIPP, 2018<sup>12</sup>

### Purpose of this section

To provide the framework for a business case for stormwater education and training that addresses the many different ways stormwater affects the four wellbeings for good or ill and to forge links with related work being done by other agencies.

### 2.1 What inadequate education and training are costing us

Skills shortages are adversely affecting New Zealand's productivity<sup>13</sup> and wellbeing. The water sector is no exception. It is however, a sector that has widespread flow-on effects on national wellbeing because of its leading role in human and environmental health and the economic value and value-add of its built and natural infrastructure.

**Table 2.1** summarises the costs to communities across New Zealand of inadequate education and training of stormwater professionals and low public awareness of stormwater-related issues. It is not a comprehensive or quantitative estimate of these costs or of the financial return on investment of avoiding them. It is simply intended as a broad indication of the areas where costs will be incurred by not delivering adequate education, training and public awareness.

It is important to document these, because we can't make a **business case for good training** on the basis that “of course it's just a Good Thing” or that “people are requesting it”.

Most if not all of the costs in **Table 2.1** are externalised: they are borne by public and private agencies in the infrastructure and development areas and in the end, by the people in every community across New Zealand.

It is clear that:

- lack of stormwater-related training is a problem
- the problem has far-reaching and very expensive consequences
- the cause of the training problem reflects several factors including the current construction boom and the associated capacity and capability gaps, low recruitment and retention of staff and the difficulty and associated time and costs of addressing training issues in a way that is sufficiently comprehensive to make a real difference
- reframing the problem, its costs and its causes allows us to identify the key areas where significant value can be added from good training, thus supporting the business case for the three-waters sector to fund good training.

Table 2.1 Indicative costs of inadequate stormwater education and training

Broad area	Examples of costs
Costs of rework and repair	Lack of training leads to the need for rework of inappropriate, poorly installed or maintained WSUD and other infrastructure. Lack of erosion and sediment control training leads to sedimentation of WSUD devices post-s224 sign-off.
Cost of delays	Consenting, tendering, funding, construction lead to avoidable price increases as a results of skills shortage and recruitment and retention issues.
Low productivity	Low productivity affects New Zealand's wider economy and the civil construction sector in particular, with lack of capacity and capability in the stormwater and wider horizontal construction sector an issue <sup>14</sup> . The skills shortage is now acute and is reflected in housing and infrastructure shortages and other issues.
Costs of poor outcomes of stormwater infrastructure	Without a core level of understanding at all stages of implementation, there are significant risks of poor outcomes in terms of environmental performance, CAPEX/OPEX costs, landscape amenity and public safety. Across New Zealand it is evident that a lack of information and technical capacity by decision makers, designers, contractors and operations staff is contributing to poor outcomes at all levels of WSUD implementation <sup>15</sup> .
Cost of unintended consequences	More and more privately-owned and operated WSD systems will potentially fall back on the public sector to remedy. We need to think through the cost implications of directing (narrowing) policy to this end-future outcome without identifying possible consequences of far-future impacts.
Lack of investment in green assets	Poor outcomes with WSUD projects and practice ultimately leads to poor perception of the efficacy of such investment at both a political and public level. This in turn is resulting in inefficient investment of substantial public/private funds and a failure to realise the benefits associated with well executed WSUD <sup>bid</sup> . Conversely, many studies show that where elected representatives and their communities understand the benefits they are willing to pay for them <sup>16</sup> .
Costs of lack of national oversight and co-ordination	Gaps and duplication in information, effort and outcome monitoring with respect to stormwater management and training are avoidable costs to the country.
Unknown ROI of training	Across New Zealand it is evident that a lack of information and technical capacity by decision makers, designers, contractors and operations staff is contributing to poor outcomes at all levels of WSUD implementation <sup>17</sup> . Moreover, the costs and benefits of training in the sector are not tracked so we don't know how much of a problem the training is solving or the value of the solutions it delivers.
Cost of staff turnover	Staffing (subcontractor shortages / staff shortages / finding skilled staff / retaining staff / skill shortage / competition) was the top challenge/concern for respondents to a New Zealand survey of the construction sector <sup>18</sup> . Staff turnover is very expensive and is contributes to low productivity. Recruitment and retention is also an issue for Engineering New Zealand <sup>19</sup> .
Costs of lack of alignment with wellbeing outcomes	There is an opportunity cost to the sector, especially to councils, in being unable to clearly align beneficial stormwater outcomes with the wellbeing indicators being developed by Treasury and Statistics New Zealand <sup>20</sup> .
Lack of monitoring of wellbeing outcomes	Without robust assessment of the costs and benefits of good (and bad) stormwater management it is difficult to measure attribution and contribution aspects of stormwater management to wider social, cultural, environmental and economic outcomes.
Risks of poor stormwater outcomes	Without a core level of understanding at all stages of implementation, there are significant risks of poor outcomes in terms of environmental performance, CAPEX/OPEX costs, landscape amenity and public safety <sup>8</sup> . Poor outcomes with WSUD projects and practice ultimately leads to poor perception of the efficacy of such investment at both a political and public level. This in turn is resulting in inefficient investment of substantial public/private funds and a failure to realise the benefits associated with well executed WSUD <sup>8</sup> .

The Water New Zealand Stormwater Group has tried in the past to put dollar values on the costs of poor training, for example as part of the New Zealand Rainfall Runoff Guidelines, where the

team found a lot of anecdotal evidence but difficulty in monetising the costs<sup>21</sup>. Problems like those in **Table 2.1** make a strong business case for stormwater training.

Two solutions can help with providing more data:

- information from the Water Sensitive Urban Design [Activating WSUD](#) Research Project
- methods used by professional trainers to assess the full financial return on investment of training, which is overviewed in **Section 5.1**.

**Appendix C** contains a short history of water-related training in New Zealand showing there has always been a focus on ongoing professional training as well as certificate and degree education. But currently, the availability of industry training to keep up with technical, ecological, social, cultural and policy innovations is clearly an issue. Of the 2016 Stormwater Water New Zealand education and training survey's 137 respondents:

- 63% said their employer didn't provide stormwater training
- 80% had not attended any other stormwater training in the previous year
- 75% would be interested in attending training as part of the stormwater conference.

These responses clearly indicate an unmet need for training. The causes are less clear, but could include lack of availability and/or affordability of relevant training.

## 2.2 Drivers for change in the New Zealand water sector

Other influences on stormwater training demand, content and possibly providers, may also become available in the near to medium future through new agencies that will become operational in 2019 and recent reports that will affect stormwater, including the:

- National Infrastructure Unit recently announced by the New Zealand [Treasury](#)
- National Urban Development Authority ([UDA](#))
- Just Transitions Unit at [MBIE](#)
- Independent Climate Change [Commission](#) (more information [here](#))
- Ministry for the Environment's Urban Water Principles [Project](#)
- Ministerial Group on the [Construction Workforce](#)'s Construction Skills Action Plan
- [Three Waters Review](#) by the Department of Internal Affairs, proposing changes to drinking water, wastewater and stormwater management
- the Auditor-General's December 2018 [report](#) on Managing stormwater systems to reduce the risk of flooding
- New Zealand Treasury, which in 2015 released a [Thirty Year New Zealand Infrastructure Plan](#) which contains three-waters provisions.

### Recommendation 2

That Water New Zealand support the collection and dissemination of examples where lack of knowledge and skills is costing our communities money, including quantitative and qualitative technical and financial information about the costs of poor stormwater management and the benefits of better management.

### 3. STRATEGY: how to make sense of many different specialised skills

“ It’s not enough to be busy; so are the ants. The question is: what are we busy about? HENRY DAVID THOREAU

#### Purpose of this section

To group stormwater training needs into a conceptual overview that enables assessment of risks and priorities; supports a proactive approach to identifying opportunities, training partners and audiences; and supports and directs the personal and professional development of people in the stormwater sector.

#### 3.1 What the stormwater sector wants

Water New Zealand’s 2016 and 2018 surveys of the stormwater sector’s training wants are listed in **Table 3.1**. There is a very detailed list of all responses under these headings in **Toolkit 1**.

Table 3.1 High level overview of stormwater-related training wants

Source 2016 & 2018 surveys; 2018 Conference Industry Forum; input from Stormwater Subgroup

Training needs		
Rank	Topic	No. responses
1.	Water sensitive (low impact) design (WSD)	52
2.	Policy, planning, standards, consenting, compliance, monitoring	51
3.	GIS analysis, hydraulic modelling and software training	40
4.	Design	36
5.	Water quality, stormwater treatment, habitat and amenity	34
6.	Costs and benefits	27
7.	Principles/overview/basics/case studies	22
8.	Construction	18
9.	Flooding	16
10.	Risk and resilience	16
11.	Catchment and asset management	14
12.	Hydrology	12
13.	Operation and maintenance	10
14.	Hydraulics	9
15.	Iwi and community engagement	8
16.	Other (ten topics each suggested by one person)	10

However to help identify training priorities, we need more than a list: we need a conceptual overview of the stormwater sector to avoid knock-on or compounding effects of early errors.

Work over the last 2-3 years shows the two biggest barriers to effective stormwater training are<sup>22</sup>:

- a lack of structure to the training – the conceptual overview
- the knock-on effect of no funding for much-needed training.

Structure is discussed next and funding in **Section 11**.

### 3.2 The water sensitive development cycle: making sense of sector needs

A common misstep by subject matter experts is to focus on the delivery of the training they want. With the partial exception of Clearwater in Melbourne, all the many training providers identified for this report list their training options under **delivery** headings such as workshops, webinars, online courses, field trips and so on, and then in lists with subheadings but little overall structure to follow. This is no help to someone with a subject-specific personal or professional development need.

The results:

- training offers are set out in long lists of bare headings in alphabetical order or in order of their chronological addition to the list:
  - ⇒ there's no structure to the training on offer
  - ⇒ it's difficult for people to find the training they want
  - ⇒ training is done to comply with CPD and annual certification needs rather than for reasons of personal and professional satisfaction and challenge
- there is no synoptic overview of the profession's disciplines as an integrated whole:
  - ⇒ lack of collegiality, communication, cross-fertilisation and innovation between the different specialisations within the discipline and across it as an integrated whole
  - ⇒ it's difficult to create a strategic overview of sector training needs that will develop individual professionals as well as the entire sector and its value to society
- while training in the so-called 'soft skills' including leadership and the like is sometimes offered, there is there is no explicit and institutionally endorsed pathway to meet professional and sectoral (as opposed to technical) development needs:
  - ⇒ there is no career development pathway within the profession
  - ⇒ missed opportunities to lift the profession overall and open up career possibilities for environmental experts to move into wider sustainability leadership roles in society.

This plan is fundamentally different from other environmental training plans because it:

- is based on a unique classification of training needs into the **water sensitive development cycle** shown in **Figure 3.1**. This allows a strategic overview of the entire stormwater and related sectors and their very different but interdependent skills, and provides a much-needed structure to help people search for the training they want
- draws on skills in both the stormwater profession and the professional training sector
  - integrates evaluation of the effectiveness of stormwater training with monitoring and evaluation of the effectiveness of stormwater management generally, should catchment and asset managers desire to do so.

The development cycle provides a conceptual framework to classify specialist stormwater-related training needs, because it applies equally to greenfields and brownfields developments and describes a sequence of events and concurrent ongoing activities that need different skills.

It also allows:

- stormwater training topics to be classified, grouping like with like topics within a coherent and logical framework. Within these development cycle stages, some modules will be vitally important to a small number of people and others will need to be addressed at a range of levels from overview/novice through to specialised/expert
- more modules to be added to different aspects of the development cycle
- more stages to be added to the cycle itself as our understanding broadens and deepens
- easier identification of where the most serious knock-on and compounding effects of lack of training occur
- people to take in at a glance the bigger picture they are working in and towards
- specialised professionals to appreciate and transcend the silos they work in.

The choice of delivery method is then made to reflect the strategic and operational industry training needs across the development cycle and career progression and the specific technical needs and learning preferences of the various target audiences in those groups.

Figure 3.1 The water sensitive development cycle as a stormwater sector development tool

N.B. At the time of writing, some icons are borrowed from Clearwater and will need to be redrawn.



One respondent to the 2018 survey said:

*“We can't pick and choose. A thorough understanding of all the whole stormwater system (and wider socio-economic/ political processes) is essential to ensuring the correct solutions are identified and implemented in the right way, at the right time. In this sense, the most critical issue is the risk of industry professionals operating in silos, without appreciating the drivers/challenges associated with the rest.”*

The development cycle phases also provide a training navigation tool, allowing people who must or want to undergo training can see exactly where their skills will contribute to their own professional development and to wider sustainable outcomes

### 3.3 Grouping training needs into the phases of the development cycle

Accompanying the diverse range of **specialist skills** at all stages of the development cycle are **integral skills** that pervade the stormwater sector, all of which were suggested by survey respondents. These are listed at the top of **Table 3.2**.

Training needs and providers can then be summarised for each of the skills listed in **Table 3.2**, revealing where there are gaps due to lack of information about available training or an actual lack of training. **Table 3.3** is an example of this and the full set of tables is in **Toolkit 2**. The tables in **Toolkit 2** detail the training needs listed in **Table 3.2** along with:

- an assessment of the underlying causes of the training need, to help identify if training is the solution to the problem; it may not be the only solution and may be the wrong one
- flow-on effects of the need, to help with prioritising training in order of delivery timing
- other non-training supports that need to be in place to address the performance problem.

Training needs and providers are then listed below that assessment.

The numbering convention allows courses to be listed in a logical order at the beginning while enabling other courses to be added while maintaining the integrity of the development cycle approach. The use of icons and numbers also allows clear navigation of:

- any future website
- where a given workshop fits within the development cycle.

Table 3.2 Integral and specialist stormwater training needs across the water sensitive development cycle

1. Integral skills	
See Toolkit 2 Tables 1.1-1.7	
1.1	Te Ao Māori and iwi engagement
1.2	Principles of sustainability and water sensitive design across the four wellbeings
1.3	Wellbeings Part 1: Introduction to cost sensitivity/life cycle costings, cost & benefit analysis of sustainability/WSD across the four wellbeings, including multidisciplinary engagement
1.4	Community engagement methods including positive communication & conflict resolution
1.5	Creativity and innovation
1.6	Train the Trainer training for environmental experts delivering non-NGICP training
1.7	Responsible procurement: how to prepare, respond to and deliver on tenders requiring outcomes across the four wellbeings/six capitals

<b>Specialist skills</b>	
<b>2. Research, planning and governance (Toolkit 2 Tables 2.1-2.5)</b>	
2.1	Research, planning and governance: from research & policy to consenting & compliance; statutory & other methods, catchment governance – beyond the three waters
2.2	Monitoring and evaluation Part 1: how to define desired outcomes and indicators across the four wellbeings
2.3	WSD Part 1: Water sensitive/green/low impact design overview and principles
2.4	Risk and resilience, including climate change effects, mitigation and adaptation
2.5	Wellbeings Part 2: Costs and benefits of WSD and its alternatives
<b>3. Catchment assessment and planning (Toolkit 2 Tables 3.1-3.5)</b>	
3.1	Catchment management planning
3.2	Ecology Part 1: ecological, cultural, archaeological and social analyses
3.3	Asset planning and management, including mixed green and grey infrastructure
3.4	Hydrology including flooding, and hydrological modelling
3.5	Hydraulics and hydraulic modelling
<b>4. Design (Toolkit 2 Tables 4.1-4.2)</b>	
4.1	WSUD Part 2: detailed design, from site characterisation to device design and sizing
4.2	Wellbeings Part 3: BPO/MCA: best practicable option/multi-criteria analysis of all wellbeings
<b>5. Construction (Toolkit 2 Tables 5.1-5.3)</b>	
5.1	WSUD Part 3: How WSUD infrastructure and devices operate; fit-for-purpose construction; inspection (checklists, what to look for)
5.2	Ecology Part 2: Protection, capture and/or relocation of sensitive terrestrial and aquatic species
5.3	Sensitive construction methodologies including subdivision-scale erosion and sediment control and small site erosion and sediment control + pollution prevention
<b>6. Establishment: ecological and amenity aspects (Toolkit 2 Tables 6.1-6.2)</b>	
6.1	Establishment and care of stormwater and other plantings, including weeding and replacement
6.2	Ecological re-establishment, including introduction/reintroduction of terrestrial & aquatic fauna
<b>7. Handover (Toolkit 2 Tables 7.1-7.3)</b>	
7.1	Legal aspects Part 1: subdivision-scale decommissioning of temporary environmental controls
7.2	Legal aspects Part 2: handover hold points, verification and rectification of asset condition
7.3	Legal aspects Part 3: small site-scale – environmental controls
<b>8. Green and grey asset operation (Toolkit 2 Tables 8.1-8.3)</b>	
8.1	Green and grey asset operation with respect to desired levels of service
8.2	Ongoing point source contaminant control from industrial and other source premises
8.3	Ongoing diffuse source contaminant identification and control
<b>9. Maintenance (Toolkit 2 Tables 9.1-9.3)</b>	
9.1	Inspection: the art and science of inspecting green and grey assets on public and private land
9.2	Proactive maintenance: planning, budgeting, implementing, documenting, learning
9.3	Reactive maintenance: budgeting, implementing, documenting, learning
<b>10. Monitoring and evaluation (Toolkit 2 Tables 10.10.5)</b>	
10.1	How to measure and monetise the effectiveness of environmental training
10.2	The art and science of compliance monitoring
10.3	Wellbeings Part 4: How to measure the effectiveness of catchment and asset management plans across the four wellbeings as per the statutory analysis in 2.1 and 2.2
10.4	Wellbeings Part 5: how to capture costs and benefits at all stages of the development cycle to contribute to cost/benefit assessments & case studies
10.5	The learning organisation, evaluation and learning for adaptive and creative management

## Strategic and leadership skills

(To be added to the table in Toolkit 2 when fully assessed)

11.1	Career pathing
11.2	Leadership training
11.3	Sustainability leadership training
11.4	MBA's (Masters of Business Administration)
11.5	Masters of Public Policy
11.6	Director training

Here we see the potential for the whole sector to become a learning community. In time this would include engaging with audiences like developers both directly and through their influencers: their consultants and contractors, so they are informed about the water sensitive development cycle.

There is more about the strategic sector development and wider leadership skills in **Section 12**.

## Recommendations

- 3.1 That Water New Zealand seek feedback on the concept, content and application of the water sensitive development cycle. What needs to be added? Removed? Amended? What other purposes can it usefully serve? Is there a better idea?
- 3.2 That Water New Zealand ask for industry feedback on the training topics listed under the 11 headings (or other suggested headings), for example:
  - Do they accurately reflect your survey responses and other ideas?
  - Are the sub-headings under the right heading?
  - What other training topics can you suggest?
  - At the moment the Development Cycle goes from construction to handover to operation to maintenance. Have we adequately have captured "Service and Delivery of stormwater assets"? Is this best suited under "Operation" or does it need a separate individual section?
- 3.3 That Water New Zealand call for experts in each of the integral and specialist skill areas to work in small groups to review and update each detailed table in Toolkit 2.

Table 3.3 Example assessment of training needs and availability for specialist water sensitive maintenance skills

TOOLKIT 2, TABLE 9.1 Inspection: The art and science of inspecting green and grey assets on public and private land							
Needs		Underlying causes of performance gap		Flow-on results of the performance gap	Target audiences		
<ul style="list-style-type: none"> <li>inspection: what to look for and what to do about it for green infrastructure (including natural water bodies) and the interfaces between green and grey infrastructure</li> <li>the importance of keeping good records</li> <li>building an interactive GIS-based asset register</li> <li>review for learnings/continual improvement/adaptive management</li> </ul>		<ul style="list-style-type: none"> <li>lack of consistent approach and training for asset inspectors</li> <li>lack of understanding of the synergies and gaps between green and grey infrastructure</li> <li>lack of training in stormwater BMP asset management generally</li> <li>communities don't understand green and grey asset life cycles</li> </ul>		<ul style="list-style-type: none"> <li>inspectors don't know what to look for</li> <li>under-performance of the green assets</li> <li>investment in assets doesn't deliver the anticipated ROI across the four wellbeings</li> <li>communities are less likely to find what they misunderstand</li> </ul>	<ul style="list-style-type: none"> <li>stormwater professionals</li> <li>developers</li> <li>consultants</li> <li>contractors</li> <li>utilities/built asset managers</li> <li>council consenting and compliance staff</li> </ul>		
Solutions							
Needs	Education: Polytech/ITO <ul style="list-style-type: none"> <li>inspection of WSUD and green/grey stormwater infrastructure</li> </ul>	Education: University	<ul style="list-style-type: none"> <li>lecture topic</li> </ul>	Professional training	<ul style="list-style-type: none"> <li>inspection of WSUD and mixed green/grey stormwater infrastructure</li> </ul>	Other support	<ul style="list-style-type: none"> <li>Infrastructure New Zealand <a href="https://infrastructure.org.nz/">https://infrastructure.org.nz/</a></li> <li><a href="#">ZAM WSUD Handbook</a>: Zero Additional Maintenance Water Sensitive Urban Design without ongoing maintenance requirements for asset owners, CRC et al, 2018</li> <li>ISCA</li> <li>NGICP</li> </ul>
Providers	<ul style="list-style-type: none"> <li><a href="#">BCITO</a> (Building and Construction ITO)</li> <li>Connexis, the infrastructure ITO</li> <li>NZIHT, the New Zealand Institute of Highway Technology</li> <li>Unitec (landscape architecture)</li> </ul>	<ul style="list-style-type: none"> <li>Unitec</li> <li>schools of engineering, biological sciences at Auckland and Canterbury</li> </ul>	<ul style="list-style-type: none"> <li>Peter Mitchell, Stormwater Asset Manager, <a href="#">Auckland Motorways Alliance</a></li> <li>NAMS <a href="#">Infrastructure Management Manual</a> and others <a href="#">here</a></li> <li>NGICP</li> <li>Clearwater <a href="#">asset management training</a></li> <li>WSUD research team</li> <li>Peter Christensen and other councils</li> </ul>				

NOTE: Please refer to **Toolkit 2** for similar tables for all the other workshops listed in **Table 3.2**.

## 4. RIGOUR: how professional trainers approach training

“ Defining the problem is 98% of the solution. ALBERT EINSTEIN

### Purpose of this section

To place Water New Zealand’s stormwater training within the context of globally recognised professional training practice.

Workforce development is a global profession, with linked professional associations in countries all around the world, including New Zealand. The members are ‘professionals who help others achieve their full potential by improving their knowledge, skills, and abilities in the workplace. They go by many titles: talent development managers, trainers, instructional designers, performance consultants, frontline managers, workplace learning professionals, and more<sup>23</sup>.’

This section overviews the most common instructional design model that is used all around the world: the ADDIE model. The ADDIE model is shown in **Figure 4**. Each phase generates an outcome that feeds into the next step in the sequence, as follows<sup>24</sup>:

- **Assessment:** here the designer analyses the learning problem, the goals and objectives, the audience’s needs, existing knowledge and other relevant characteristics, including the learning environment, any constraints, delivery options, and timeline for the project
- **Design:** the design phase is a systematic process of specifying learning objectives and the look and feel, graphic design, user-interface and content
- **Development:** this phase involves the actual creation (production) of the content and learning materials based on the design phase
- **Implementation:** the plan is put into action and a procedure for training the trainer and trainees and supporting the trainees’ managers is developed and the training is delivered
- **Evaluation:** formative evaluation happens at all stages of the ADDIE process and should be carried out by stormwater subject matter experts working closely with a professional trainer with recognised credentials (more on how to evaluate the effectiveness of training in **Section 5**). This Stormwater Education, Training and Sector Development Plan is a three-year plan, and the same people should conduct a summative evaluation at the end of that time.

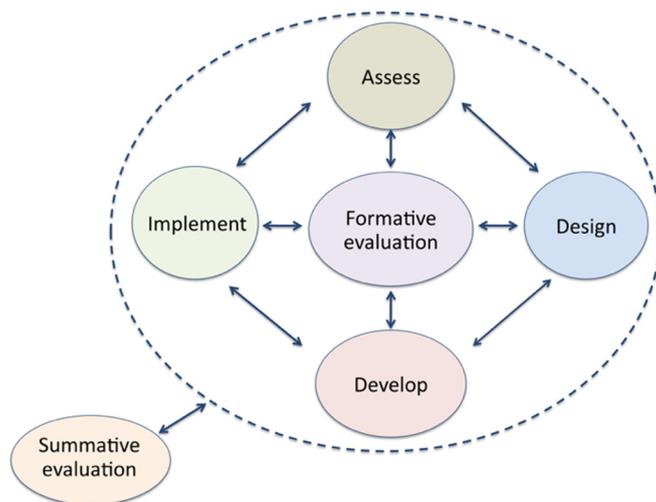
At the core of any effective training program is the accurate identification of what or who needs to be trained. Poorly conducted needs analyses or worse still, training based not on research but on assumptions about what training is needed, can result in programs that train:

- the wrong people
- in the wrong competencies
- with the wrong learning methods<sup>25</sup>.

A thorough needs assessment may find that training is indeed the solution to a given problem; or that training may not be the solution; or that training may not be only part of the solution.

This plan sets up a process that accommodates these other non-training needs.

Figure 4 The ADDIE model for instructional design



**Toolkit 3** contains information about a rapid prototyping model that could also prove useful for some stormwater training topics, particularly ones with a high priority.

From its 2016 and 2018 surveys, Water New Zealand has obtained detailed training needs information from experienced practitioners, giving Water New Zealand a good overview of the topics on which they consider training is needed and the numbers of people interested in each topic.

However for a good needs assessment, other filters are also required to ensure the training is accurately targeted and fit for purpose. These are set out in **Toolkit 4** and include:

- performance gap analysis
- competency / objectives analysis
- target group analysis
- outcomes analysis / business impact
- feasibility analysis.

**Toolkit 5** outlines the many levels of stormwater-related training in New Zealand across many public, private and nonprofit agencies. It provides a useful framework for targeting training to meet the various needs of stormwater practitioners needing different types and levels of expertise within each topic.

**Toolkit 6** is a matrix that could be used to help build an overall gap analysis of stormwater courses from stormwater-related professional bodies if this is desired.

#### **Recommendation 4**

That Water New Zealand ask its stormwater subject matter experts to work closely with a professional trainer with recognised credentials when developing training in line with the ADDIE model.

## 5. EVALUATION: how to measure how effective our training is

“ However beautiful the strategy, you should occasionally look at the results. WINSTON CHURCHILL

### Purpose of this section

- to summarise the evaluation tools that are globally used by professional trainers
- to integrated these with good practice planning, implementation, monitoring, documentation and evaluation of asset, catchment and environmental management across all four wellbeings
- to encourage their uptake for the strategic development of the stormwater sector.

Good management needs good data. Traditionally, however, monitoring and evaluation of both management and training programs are weaker than planning and implementation of them. This deprives us of the information we need for adaptive management and continual improvement.

For stormwater sector training, we need to plan, manage, monitor and evaluate across all four wellbeings across several core areas:

- asset management (green and grey)
- catchment management
- sector education, training (including informal workplace learning) and development.

We also need to be able to “join the dots” amongst these four core areas and do our best to tease out the contributions they respectively and collectively make to the desired outcomes across the four wellbeings.

Defining and encouraging good practice in this way aids the strategic development of the stormwater sector.

Given the high level of investment by the stormwater sector in this Plan, I recommend that all its associated evaluations take a participatory approach. Excellent guidance is available<sup>9</sup>.

We need to measure two broad aspects to tell us if our stormwater training and management are making a difference:

- The effectiveness of the training we do.
- The outcomes of training and other changes in stormwater management practice across the social, cultural, environmental and economic wellbeings.

### 5.1 How professional trainers evaluate the effectiveness of their training

Learning and development professionals all around the world recognise five levels of evaluation of the effectiveness of training. Levels 1-4 were developed by Donald Kirkpatrick and Level 5 by Drs Jack and Patti Phillips of the ROI Institute<sup>26</sup>.

These five levels are summarised in **Figure 5.1**. and there is more information in **Toolkit 7**.

Understanding the value that training delivers is part of preparing the **business case** for funding its delivery. Given the size of the investments at stake, the stormwater sector needs to take a highly systematic and rigorous approach to measuring the effectiveness of industry training.

Figure 5.1 How professional trainers evaluate the effectiveness of their training: a globally accepted model. Kirkpatrick<sup>19</sup> and Phillips<sup>20</sup>



## 5.2 What outcomes are we managing stormwater for?

“ We need clear definitions and goals – if you aim at nothing you will hit it every time. ZIG ZIGLAR

Stormwater training must demonstrably contribute to recognised sustainable development outcomes. This is not easy: stormwater is at a complex nexus of land and water management with terrestrial and aquatic ecosystems and built and social infrastructure. It is intimately interconnected with the other piped waters and all forms of natural water. It is multidisciplinary and transboundary. It is a matter of national strategic importance and a cause of bitter community disputes.

It is therefore no surprise that stormwater is affected by a plethora of regulatory and advisory documents: for one small urban ICMP over 120 national, regional and local laws, policies, plans and strategies were identified<sup>27</sup>. This complexity is reflected in the survey feedback, with 50 people (65% of respondents) referring to a need for training in the planning aspects of stormwater management.

**Figure 5.2** gives an overview of these guiding and requiring documents at a generic level<sup>28</sup>. This is often referred to as the statutory analysis that supports integrated catchment management plans and other plans. The diagram also shows where more detailed non-statutory plans and reports flesh out the local picture for sustainable stormwater management.

Of particular importance is the need to formally account for the four wellbeings in the Resource Management Act (RMA); social, cultural, environmental and economic. Monitoring across these four wellbeings is a commitment of the current government, and is also vital for building the business case, including the economic benefits, of genuinely sustainable stormwater management.

Figure 5.2 Overview of stormwater-related guiding and requiring documents



### 5.3 How stormwater managers can evaluate their outcomes and effectiveness

Below is a description of the “orders of outcomes” framework, which lines up the sequence of indicators needed to ensure management plans of all kinds are prepared in a way that allows their implementation and outcomes to be monitored and evaluated across the four wellbeings.

A framework for monitoring plan outcomes and evaluating plan effectiveness must be devised as **part of** (not after) preparing any plan in order to allow an ex ante evaluation; that is, an evaluation that can answer the key evaluation questions that indicate the plan’s effectiveness:

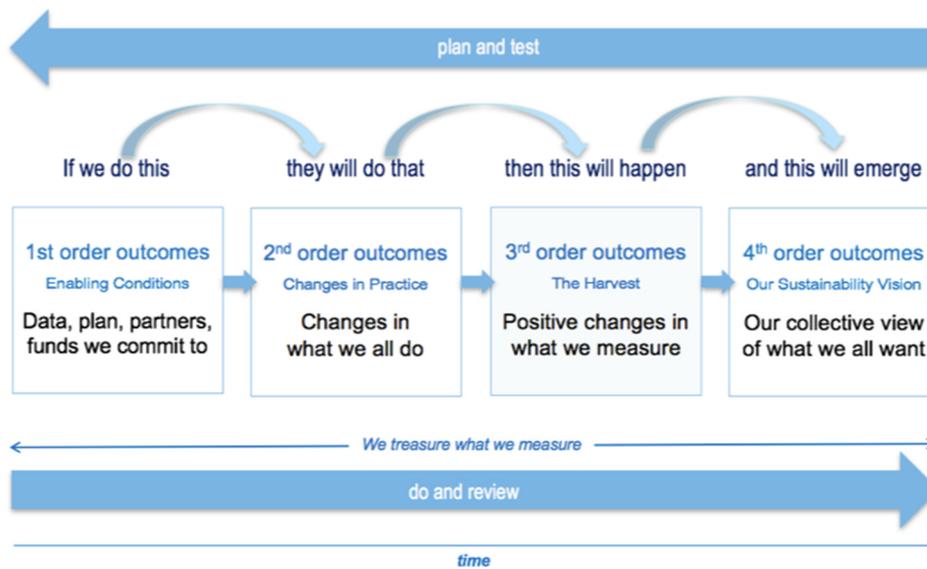
- where are we now?
- where do we want to be?
- how do we get to where we want to be?
- did we do what we said we’d do to get there? If not, why not?
- are we getting there/did we get there?
- what else happened that contributed to where we are now (synergistic and confounding factors)? That is, how well do we understand the system?

The orders of outcomes framework<sup>29</sup> was developed in the USA to help answer such questions, and was specifically devised to help people managing catchments that drain into complex estuarine ecosystems.

The four orders of outcomes are shown in **Figure 5.3** and discussed in more detail in **Toolkit 8**.

Figure 5.3 The orders of outcomes framework

Source: Adapted from UNEP/GPA, 2006<sup>18</sup>



The way to use the framework is to plan backwards and implement and monitor forwards – that is, to start with the end in mind and then plan and align actions and indicators towards it.

Education and training fit into the orders of outcomes framework as one of the many stormwater management tools with its own specialised monitoring toolkit – just as for flooding or MCI. (the macroinvertebrate community index). Use of the orders of outcomes framework is therefore recommended as a training topic in line 2.2 of **Table 3.2** and is used as the framework to evaluate the effectiveness of this Plan.

#### 5.4 What this means for developing and delivering our training

How will evaluation actually be set up and undertaken in practice, for training and for outcomes across the four wellbeings?

Evaluating the effectiveness of training starts with assessment of the training need, or performance gap. This ensures evaluation is built into the training from the start. Who will do this? The people managing the implementation of this Stormwater Education, Training and Development Plan. Practical steps to achieve this are listed in **Toolkit 9.1**.

To assess the impact on environmental and other **wellbeing outcomes**, the results of the training effectiveness analysis are inserted into the orders of outcomes framework (or the monitoring and evaluation provisions of an existing network or catchment management plan) as one of the management interventions. Who will do this? The government agencies, councils, network operators and other bodies responsible for managing the environments in which stormwater and related professionals work. This Plan can only recommend such monitoring.

#### Recommendation

That the stormwater sector utilise the training evaluation methods used by professional trainers worldwide by taking a strategic and systematic approach to cost-effective monitoring

## 6. PRIORITIES: how to work out what to do first

“ We don't have much money to do this so we're going to have to THINK. ERNEST RUTHERFORD

### Purpose of this section

To provide a set of criteria to help the stormwater sector determine its training priorities.

In a typical training context, setting training priorities is based on different training needs for the same small audience, requiring a sequential approach.

However, **Figure 3.1** and **Table 3.2** reveal some very diverse and specialised audiences whose training may be able to proceed in parallel.

Also, for some audiences, like hydrological and hydraulic modelers and the people who use their outputs, their involvement very early in the development cycle may mean their training needs to be delivered as soon as practicably possible to avoid adverse knock-on and compounding effects further down the track.

Other candidates for early training delivery would be:

- existing courses with existing providers
- known problems with known solutions, such as fish passage, or erosion and sediment control to protect WSUD devices.

Auckland Council Healthy Waters is currently introducing a pilot training programme for people in Auckland involved in construction, inspection and maintenance of water sensitive stormwater devices. This is a fast and encouraging initiative related to this Plan, and shows that development and delivery of training on different topics can proceed simultaneously if we can find the capacity to give the right support to the stormwater experts involved.

**Table 6.1** is a proposed matrix for setting training priorities that will deliver a simplified traffic light system based on the availability and urgency of training, to help us decide where to start on stormwater training.

There are two red lights in the matrix:

- **WAIT**: training is an appropriate solution but is low priority and can be delivered further down the track in the longer term.
- **STOP**: training is not the solution in the medium term unless some other external factors change in the longer term.

Every training delivery decision is made as part of a planned and holistic approach to a given training topic in the context of its place and fellow-topics in the development cycle.

Updating these criteria and applying them to the sector's training wants will need to be a collective process that includes sector views on priorities. An example attempt is in **Toolkit 10**.

Table 6.1 Training priority matrix

Availability of stormwater education or training			
<b>LOW</b>	Little or no education and/or training available at the time of writing		
<b>MEDIUM</b>	Some education and/or training available at the time of writing, or existing materials need to be adapted for the purpose		
<b>HIGH</b>	Good availability and suitability (with some updates) of education and/or training at the time of writing		
Urgency of stormwater education or training need			
<b>LOW</b>	Low identified need for training in the short-medium term		
<b>MEDIUM</b>	Training is needed in the short-medium term		
<b>HIGH</b>	There is a high priority for training in the short and medium term		
Priority of stormwater education or training <b>STOP OR WAIT   SLOW   GO</b>			
Availability of training	Need for training		
	<b>LOW</b>	<b>MEDIUM</b>	<b>HIGH</b>
<b>HIGH</b>	<b>SLOW</b>	<b>GO</b>	<b>GO</b>
<b>MEDIUM</b>	<b>WAIT</b>	<b>SLOW</b>	<b>GO</b>
<b>LOW or N/A</b>	<b>STOP</b>	<b>WAIT</b>	<b>SLOW</b>

For all training solutions, especially where there are no courses or providers available, a strong **business case** is needed. Decision-making criteria would include:

- the risk/cost of not doing the training
- urgency of the training need (including knock-on effects along the development cycle)
- market size for a given audience on a given topic at a given level
- the risk of and time to reach market exhaustion, another component of assessing the financial ROI of training
- time and money to develop and deliver training:
  - from within the stormwater sector
  - from other sources as new agencies and initiatives get under way
- fundability and funding availability (see **Section 10**)
- trainer capability
- trainer and trainee capacity.

Learning from the past is also vital: past experience recorded in the 2017 Stormwater Group Training Plan<sup>30</sup> is summarised in **Table 6.2**.

For example, we could start updating existing high priority training that can be readily adapted, and developing high priority and “quick win” training that is not currently available.

Table 6.2 Scope, constraints and limitations of stormwater training in New Zealand

Source 2017 Stormwater Group Training Plan

Course	Outline content	Frequency and location	Constraints / limitations	Actions
Jamie Comley from Clearwater in Melbourne: WSD Course	Introduction to WSD devices	Held once to date at 2017 Stormwater Conference in Auckland. Could be run again	Ran at a loss when last held – may need further funding, cost reduction, or better attendance.	Financial review to determine if it can be run again. Course consent review. Discuss with IPENZ whether CPD credits can be assigned.
Stormwater Management and Design – An Introduction (IPENZ)	Flow and volume calcs Treatment methods Intro to WSD Practical Exercises	Held multiple times per year around New Zealand		Liaise with IPENZ on course content and stormwater training gaps identified.
Auckland Council Stormwater Unitary Plan	Understanding and application of AUP Stormwater Rules	Held once to date at 2017 SW Conference in Auckland. Could be run again	Ran at a loss when last held – may need further funding, cost reduction, or better attendance. Next course may focus more on practical application, rather than what the rules say.	Financial review to determine whether it can be run again. Discuss with IPENZ whether CPD credits can be assigned.
Regional Meetings	Technical Presentations by Guest Speakers Networking	Refer SW Group Work Plan	Travel for attendees. Undertaken in 'free time' Awareness of events. Limited number of attendees.	Ongoing, regular promotion of events.
WATER Magazine	Industry-wide	5 Magazines per year	Reach is limited to subscribers.	Promote training
LinkedIn	Ad hoc, generally relevant to stormwater	Ad hoc	Reach is limited to subscribers/users. Reliant on volunteers to post. Limited number of people viewing.	Ongoing, regular promotion of platform by Comms SubGroup
Hydraulic Modelling Software Courses	Guidance on how to use software	Regular around the country. Software providers organise.	Applicable to software practitioners only. Software costs are generally high. Generally only covers the software operator, rather than hydraulics/ hydrology first principles.	Promote training

### Recommendation

6.1 That industry feedback be sought on the prioritisation criteria proposed.

6.2 That a working group or groups be set up to report back to the Stormwater Committee for subsequent ratification by the Water New Zealand Board to provide an overview and decision on stormwater training priorities, noting where some training can be done concurrently.

## 7. DEVELOPMENT: how to develop our training

“ For training to be effective, it must relate to the day-to-day situation in which the person operates ... Training is most effective when it is realistic, practical, relevant and enjoyable.

PETER MITCHELL, CORPORATE TRAINER

### Purpose of this section: to

1. highlight some of the key tenets of adult vocational training
2. clarify the difference between training design & development and training delivery
3. harness the stormwater sector's expertise into a process of best practice training design and development.

### 7.1 What makes for “good” training?

The ever-widening choice of electronic training delivery methods can dazzle us with technical possibilities, so we have to go back to the basics of what makes for good training for adult learners. **Toolkit 9.3** contains a list of good practice educational principles<sup>31</sup>. Devised for schools, they are equally relevant to adult vocational training and should be used when developing stormwater training.

In line with the above findings, the key to effective teaching is the quality of the feedback students get and their interaction with teachers. A meta-analysis by New Zealander John Hattie<sup>32</sup> of 50,000 previous studies and research into 83 million students from around the world ranked 138 aspects of schooling. The study found that overwhelmingly, student-teacher interactions at schools came out on top as an indicator of teaching effectiveness.

Number one among these is “self-reporting” on learning, when the student knows exactly how well they are doing and can explain this, as well as any gaps in their understanding, to their teacher. The ability of the teacher to give useful feedback then becomes crucial. Students thus need to constantly ask themselves what feedback have they got from their teachers, while teachers, Hattie says, should ask themselves how many of their students are prepared to say, in front of the class, “we need help”, “we don't know what's going on” or “we need to have this re-taught”. We need to build this process into our training as we develop it.

### 7.2 Supporting stormwater experts to develop their training

Once the gap analysis for all the training topics in **Table 3.2** has been completed and training priorities have been identified as suggested in **Section 10**, the task of adapting and developing the training begins. Several steps can be taken by different teams, some simultaneously, e.g.:

- a pilot introduction of the US NGICP training and accreditation is already under way with Auckland Council Healthy Waters
- hydraulic modelers will be a mostly different population of experts from, for example, asset managers, so these groups could proceed with their work as indicated by agreed priorities or, if it doesn't conflict with these, simultaneously with it.

**Section 5** sets a benchmark for the level of rigour we need to apply to the development of our training – that is, by starting with the issues it needs to address and the measurable learning and wellbeing outcomes it needs to deliver.

Once the gap analysis in **Toolkit 2** has been completed and training priorities have been identified, the task of developing new training and adapting existing training begins. The stormwater sector, including the academic sector, has the expertise it needs to develop the technical content of the training to meet the needs in **Figure 3.1**, **Table 3.2** and **Toolkit 2**.

There are many technical guidelines around New Zealand (e.g. as identified by Peter Christensen et al<sup>93</sup>) that define the performance benchmarks that a well-trained workforce must reach, and there are already numbers of people delivering training around New Zealand on how to apply these guidelines.

As set out in **Toolkit 9.3 and 9.4**, a possible training development process is convening such teams of technical experts working on agreed topics with the support of a professional trainer and good technical and target audience peer reviewers. Some first steps could be to:

1. convene a working group of people implementing local, regional and national guidelines
2. run a half- or 1-day workshop based on the report by Christensen et al in order to:
  - a. share knowledge and avoid reinventing the wheel
  - b. identify technical gaps where guidelines are needed but not available
  - c. work out what it would take to plug these gaps
  - d. identify a training model based on the approach taken by [NGICP](#), where core generic training is developed on each of the key topics and then additional locally-specific training is delivered in regions that have their own guideline or use a national guideline or that of an adjacent council
3. report their findings and recommendations at the Stormwater Conference.

Distance engagement could be facilitated by the use of tools such as Google docs, Microsoft tools, dropbox and collaborative discussion tools like [Loomio](#).

#### **Recommendation 7**

That Water New Zealand engage with and support the stormwater sector in developing and delivering the necessary training, for example by:

- **working teams:** convening specialist teams of technical experts on prioritised training topics to develop the training and recommend suitable trainers
- **technical support:** peer reviewers and target audiences reviewing the technical content of the training
- **professional training support:** a professional trainer and target audiences supporting the detailed training needs assessments, design, delivery and criteria for evaluating the effectiveness of the training

## 8. DELIVERY: how to deliver our education and training

“ Bad training is a monologue delivered in the presence of hostages.  
SARDEK LOVE

### Purpose of this section

To understand the sector's ideas and preferences for stormwater training delivery and incorporate them into good training practice for identified training needs in the most cost-effective way.

### 8.1 Surveyed preferences and other possibilities for training delivery

Training delivery preferences of 77 respondents to the 2018 survey are in **Toolkit 11**. Of the 20 specific suggestions:

- 13 involved face to face engagement, whether singly, such as peer review or mentoring, or in groups by way of work experience, conferences or local meetings and field days
- four were online suggestions for videos, webinars and online training or presentations
- three related to training or education, including case studies, certificate or diploma courses and more teaching at tertiary institutions to bring 1) more people and 2) more skilled people into the field.

Other suggestions included:

- graduate programmes, with one respondent asking, “For the next stage, do we also need to think bigger and contact the bigger consulting and contracting companies in our sector to explore stormwater-focused graduate programmes?”
- outreach: expanding out to related industries and professions.

Many firms already have well established graduate and cadet programmes. While a separate stormwater-focussed graduate programme may not be needed, existing programmes could be amended to ensure stormwater is given sufficient weight.

Another option is inter-organisation transfer programmes, where people can move between councils, consultancies and contractors, or even tertiary training and research institutions. The sector has talked about this for a long time, and it has happened in some cases in the past, but there would be real benefits from an established national programme that allowed graduates to have short term placements in other types of organisations.

Such transfers are an important indicator of a mature sector. It took 5-10 years to emerge after the introduction of the then Auckland Regional Council's TP90 erosion and sediment control training programme, and delivered noticeable benefits for industry collegiality and expertise.

There is more information in **Toolkit 11** about some other popular training delivery methods such as Coursera and other [MOOCs](#), or massive open online courses. Many of these are [available](#) for free from prestigious institutions.

**Toolkit 12** has a set of criteria to help assess and compare cost-effective methods of delivering training.

## 8.2 Selecting and training trainers

We need to identify our subject matter experts (SMEs) for every topic, find out which of them are interested in and have an aptitude for training and provide a platform to support their work.

The discussion below is predicated on the availability of funding as set out in the **Executive Summary** and **Section 10**.

**Toolkits 13 and 14** list potential New Zealand and overseas training providers, in addition to those listed in **Toolkits 2 and 5**.

Suggestions for working with our stormwater SMEs to grow a pool of good trainers are in **Toolkit 15** (funding is discussed in **Section 10**).

The need for environmental experts to undergo what's known as 'train the trainer' training (TTT) has been explicitly acknowledged by WEF's NGICP training program. Its green infrastructure trainers are required to be or become green infrastructure experts and must also undergo the NGICP's TTT training. This is a 2.5-day face-to-face workshop that focuses on adult learning and vocational training skills, rather than the technical content of the GI training manual and exam. The trainers are not coached specifically on how to apply the TTT learnings to their delivery of the 5-day green infrastructure course content.

However, the NGICP program focuses on the maintenance of green infrastructure, while the Water New Zealand Stormwater Education, Training and Development Plan also covers other aspects of the development cycle. This plan must therefore address TTT opportunities for stormwater and related experts delivering non-NGICP training, on other phases of the water sensitive development cycle.

There is no requirement in New Zealand, similar to the NGICP's, for environmental subject matter experts to undergo TTT training. However, to ensure credibility with target audiences and funders, stormwater trainers really must get up to speed with the principles and practices of adult vocational training. This demonstrates the need for each trainer to commit to his or her ongoing professional development both as a trainer and as a subject matter expert.

There is more information on TTT training in **Toolkit 16**.

## 8.3 Criteria to assess and compare cost-effective methods of delivering training

For many specialist stormwater topics, a mix of online, face-to-face and on-site training, known as blended learning, would be ideal. Each delivery method has its own set of costs, and the question of whether a given topic of training is "worth it" depends on the cost of the problem the training is aiming to fix, as well as the upfront budget and lead time available.

Many professional trainers in New Zealand can quote prices for developing the online component of training courses (these usually exclude the cost of input from the subject matter expert/s). Their experience in adult vocational training brings considerable value.

That said, the cost-effectiveness of simple and inexpensive online solutions like a webinar "lecture to camera" should not be underestimated. For example, the flipped classroom model in **Toolkit 17** could enhance face-to-face training by making good use of time on task, reflection and enquiry before, after and during the training session.

Cost-saving tips from technical trainers [Job Training Systems Inc](#) include:

- the use of self-study training materials on fundamentals prior to on site classes or outside seminars is a low cost way to help insure a successful outcome
- utilize purchased training programs to teach fundamentals so resources can be conserved for the development of plant-specific equipment and procedure training.

In the absence of a simple set of decision-making criteria other than those in **Section 9**, a useful guide for estimating the level of time, money and resourcing needed for different kinds of engagement is in the [CRC Citizen Science Toolbox](#). The criteria are overviewed in **Toolkit 12**. The CRC document is a 100-page file and will be made available as needed.

### Recommendations

- 8.1 That experts or teams of experts on the different training topics listed in **Figure 2.4** and **Table 2.2** be asked to assess and compare training delivery methods using the following sets of criteria:
  - the needs and priorities defined in **Section 9**, Training priorities
  - the considerations in **Toolkit 4**, Types of Needs Assessment
  - surveyed preferences and other possibilities for training delivery above and in **Toolkit 11**
  - the adapted CRC Coastal toolbox assessment criteria separately provided
- 8.2 That subject matter experts delivering stormwater training be encouraged, supported and acknowledged for undergoing train-the-trainer training
- 8.3 That longer term, the formation of a specialist environmental wing of or sister-organisation status with the New Zealand Association of Training and Development be explored.

## 9. SUPPORT: the elements of success that will support our programme

“ In the absence of follow-up coaching, 87% of the skill change brought about by the programme was lost within two months.  
CLEMMER AND MCNEIL, 1990, LEADERSHIP SKILLS FOR MANAGERS<sup>34</sup>

### Purpose of this section

To explain a proven success framework that supports effective environmental training programmes and supports sector professionals and existing and new training providers to adapt and create fit-for purpose stormwater training.

#### 9.1 The seven elements of successful environmental training programs

Even when the needs assessment indicates that training is the most cost-effective solution to a given environmental problem, it is only part of the solution, as shown in **Figure 9.1**, which is based in an analysis of the common elements that contributed to the success of several environmental training programs.

To quote one of our survey respondents:

*“[We need] better accountability enforced through stronger compliance processes/systems.”*

The training needs to be justified by robust research and supported by simple and robust guidelines that define the performance needs. A coherent management system needs effective partnership at its core, and must include policy and compliance arrangements that capture the identified activities, support the training program and monitor its outcomes. This plan addresses each of these elements.

Figure 9.1 Elements of successful environmental training programs

Source: After Clare Feeney, 2013<sup>35</sup>



A durable and sufficient level of resourcing is essential for the long-term effectiveness of any training program, but is very often overlooked.

## 9.2 When training is not the solution: identifying non-training needs

Below is a summary<sup>36</sup> of some of the indicators of when training is not the solution to the problem – or not until other matters have been addressed:

- standards: no definable performance benchmarks or guidelines; or badly written or poorly thought-out standards that lead to poor outcomes
- systems: how things are done in the organisations concerned doesn't support good practice
- services don't support good practice
  - infrastructure e.g. plant/site layout
  - availability of recycling bins, spill kits etc
- staff support doesn't support good practice
  - availability of staff time, responsibility or money to take action
  - availability of supervisors for on-job follow up
  - culture of fear or criticism doesn't allow failure and analysis as part of learning
- set attitudes – poor company culture – block good practice
  - “That's not how we do things around here.”
  - often unspoken and rapidly infects new people
- sourpusses don't support good practice
  - people in positions of power prevent positive steps
  - attitude and motivation make it a management not a training issue.

Often these things reflect wider/higher organisational issues, and for stormwater, complex and disjointed policy, management and regulation and siloed disciplines.

The subject matter experts developing training need to consider the “Other support” cell of the tables in **Toolkit 2** that show which training activities may need particular forms of support, and which needs in **Toolkit 2** cannot be met by education or training.

## 9.2 Ongoing sector communication

One respondent to the 2018 survey said:

*“Many respondents want to know what is going on elsewhere, including industry developments. Water NZ is already playing a lead role in facilitating sharing knowledge through Magazine, LinkedIn and the website. Regular promotion of these platforms to the wider industry is needed.”*

These and other follow-up activities are summarised in **Table 9.1**.

One respondent said:

*“Not sure who we should be targeting with information/initiatives. Owners/managers or prospective attendees? But it does need to be cross-sector.”*

Additional options suggested by the industry include:

- sharing this survey information with Universities and other agencies
- working with existing and potential providers to develop recognised qualifications
- more regularly providing feedback on what the industry needs
- bringing in international experts from places where water sensitive design is taken more seriously.

Table 9.1 Other activities that support uptake of stormwater-related training in New Zealand

Source: Water New Zealand Stormwater Education and Training Subgroup (2017)<sup>37</sup>

Activity	Content	Frequency and location	Constraints and limitations	Actions
Regional Meetings	Technical Presentations by Guest Speakers Networking	Refer Stormwater Group Work Plan	Travel for attendees Undertaken in 'free time' Awareness of events Limited number of attendees	Ongoing, regular promotion of events.
WATER Magazine	Industry-wide	5 Magazines per year	Reach is limited to subscribers	Promote training opportunities in the magazine
LinkedIn	Ad hoc, generally relevant to stormwater	Ad hoc	Reach is limited to subscribers/users Reliant on volunteers to post Limited number of people viewing	Ongoing, regular promotion of platform by WaterNZ Communications SubGroup

Respondents to the 2018 stormwater education and training survey also suggested several ways of keeping updated on new developments. Such activities are not training as such, but can be strategically planned for to reinforce recent and proposed training, as well as to take advantage of other opportunities that arise, such as visiting speakers and release of relevant reports, publications or government and other initiatives, and include:

- construction, technology and general industry updates
- keeping up-to-date with emerging information
- WaterNZ conferences
- updates on approaches taken elsewhere in New Zealand and internationally
- updating knowledge on water sensitive design and good practice from overseas
- regular sessions giving updates on new products, techniques, regulatory requirements
- latest industry trends, particularly related to evolving best practice, but with robust scientific background
- updates on WSUD/SUDS.

### 9.3 The level of support needed for an ongoing education and training program

The three golden rules of program support? Commitment, commitment and... commitment. It can be better not to start a multi-stakeholder training program at all than to have it fail. Even successful training programs can fall by the wayside as a result of changes in organisational structure, senior staff or elected representation. Moreover, agencies sometimes withdraw or reduce support because a program is thriving, only for it to starve a short time later<sup>38</sup>.

As well as these existential risks, it is easy to underestimate the administrative commitment that a successful training program demands, including:

- funding (see **Section 10**)
- a comprehensive and segmented stakeholder database
- plans for stakeholder engagement, communication and marketing
- a learning management system (LMS)

- a workshop logistics system (venues, bookings, fees etc)
- documentation of procedures
- a system for reporting outcomes to stakeholders.

There is more information in **Toolkit 18**.

#### 9.4 What’s needed to embed training into workplace practice

“ We need to get away from the ‘bulimic’ model of education where you stuff your students full of facts then get them to puke it all up in an exam and go away empty. STUART FIRESTEIN

Support for trainees and their managers also provides for rehearsal of new practices in a supportive work environment, to ensure the desired practices are regularly rehearsed and until they are embedded not only into the trainee’s routine practice but into the organisation’s culture.

Moreover a growing body of knowledge indicates that training itself contributes much less to learning than we usually think, as shown in **Table 9.2**<sup>39</sup>.

Table 9.2 The effectiveness of training – debunking the myths<sup>40</sup>

Phase	How much learning we <u>think</u> happens ...	How much learning <u>actually</u> happens ...
<b>Before</b> the training	10%	26%
<b>During</b> the training	85%	24%
<b>After</b> the training	5%	50%

For every piece of training, we need to consider what needs to happen before the training, to maximise the effectiveness of training contact time, and, even more importantly, what support is provided after the training for good application and positive reinforcement of new practices , such as:

- the flipped classroom model<sup>41</sup> (**Toolkit 17**)
- helping supervisors and managers to support trainees and report on how good the training was at achieving the desired workplace performance (Level 3 evaluation)
- formal mentoring and coaching
- buddying that maximises opportunities for beneficial informal learning<sup>42</sup>
- structured [work experiences](#)
- follow up refreshers e.g. webinars, field trips, networking sessions or [question of the day](#).

#### Recommendation

That the Subject matter experts developing training consider the “Other support” cell of the tables in Toolkit 2 that show which training activities may need particular forms of support, for example from software suppliers for modelling training, and also consider which needs in Toolkit 2 cannot be met by education or training.

## 10. FUNDING: how to pay for our education and training programme

“ Don’t tell me what you value, show me your budget and I’ll tell you what you value. FORMER US VICE-PRESIDENT JOE BIDEN

### Purpose of this section

To make a credible business case to government and other bodies for funding stormwater training, including demonstrable benefits across the four wellbeings and to collate industry suggestions to inform the development of a strategic funding plan.

The sector has endorsed a comprehensive need for stormwater education and training and can back this up with a powerful business case, as shown in **Table 2.1**.

Stormwater-related initiatives are a large part of many government reforms as shown in **Section 2.2**. Attracting sufficient funding is crucially important to the success of this plan and our vision, mission and purpose for stormwater outcomes Aotearoa in New Zealand. To quote three survey respondents and a peer reviewer:

*“One of the big issues we have is that most of the work is already being done by volunteers which drags things out and things tend to stall. I would suggest that Water New Zealand seek funding to pay people for their services.”*

*“There is a serious lack of resourcing, and investment in the sector as a whole in terms of knowledge transfer/management.”*

*“What about [training for] the little guys, with only a handful of employees?”*

*“The biggest issue is time – time for experienced professional to train others, time for trainees to undergo training.”*

Realistically, however, at least in the next 2-3 years, funding will need to come from:

- Water New Zealand itself
- members who have the most to gain from good training – mostly the larger councils
- members who can donate their time to help develop high priority training
- a commercial model of training where development costs are progressively recovered over time from training fees (some support for smaller councils and firms may be needed).

Immediate funding needs relate to:

- asking the industry to:
  - identify training priorities on topics other than the Auckland Council’s pilot training
  - select 2-3 urgent training needs that can be funded from 1 July 2019 to 30 June 2020
- providing experts on the selected topics with the necessary support to develop, deliver and evaluate CPD training in line with best adult vocational training principles and practice
- seeking funding from other interested parties as part of a longer term funding plan.

Industry engagement on stormwater education and training is ongoing and this phase of consultation will be concluded after the 2019 Stormwater Conference when an updated plan will be released.

**Table 10.1** summarises the industry’s funding suggestions and the full list is in **Toolkit 19**.



Table 10.2 Summary of options for funding stormwater education and training

Source: 2018 Water New Zealand Stormwater Education and Training Water New Zealand survey

First priority (60 responses incl. comments)	No.	2nd priority (37 responses incl. comments)	No.	Third priority (16 responses incl. comments)	No.
1. Industry sponsors	10	1. Industry/other (unspecified) sponsors	8	1. Sponsors – unspecified	4
2. Certification thru existing professional bodies	9	2. Support through national professional bodies	6	2. Certification thru existing professional bodies	2
3. User pays	6	3. Certification thru existing professional bodies	5	3. Support through national professional bodies	2
4. Support through national professional bodies	5	4. User pays	4	4. User pays	1
5. Industry employers pay	3	4. Support through educational institutes	2	5. Other approaches	1
6. Council sponsorship	2	6. Industry employers pay	1	6. Support through educational institutes	1
7. Support through educational institutes	2	7. Collaborative approaches	1	7. Partnering with tertiary organisations including user-pays training	1

Other funding suggestions<sup>43</sup> include:

- Councils could provide financial support with some cost recovery from trainees (territorial councils could also do this)
- free education, presumably referring to tertiary (polytech and university education)
- working with training providers to identify funding streams for tier 3 (short) courses (see Table 9.2 in **Toolkit 11**).



In order to ensure the initiative maintains momentum, a budget of \$50,000 is recommended to be made available to the Stormwater Group for the purposes of industry education and training.

The funding will be used as set out in **Table 10.2** to:

- reimburse unpaid volunteers for travel and other expenses
- enable a Phillips-certified professional trainer# (see **Figure 5.1**) and a stormwater consultant to support the stormwater experts to develop, deliver and evaluate CPD training
- progress other longer-term recommendations in the Plan as appropriate and practicable.

It is also important to encourage and track in-kind contributions that reduce the costs of training.

In-kind contributions could include donation or sponsorship of things like:

- training venues
- printing
- catering
- transport to and from construction and other sites
- hosting of live and pre-recorded webinars and other virtual training.

Table 10.2 Key actions, funding and timeframes

No.	For action by the Stormwater Group	Funding	Timeframe
4.	Support the Auckland Council Healthy Waters pilot of the WEF NGICP (National Green Infrastructure Certification Program) and other non-NGICP training (water sensitive design)	Auckland Council	To December 2019
5.	Report to the Water New Zealand Board seeking endorsement of the Stormwater Education, Training and Development Plan and \$50,000 in funding for the 2019-2020 financial year	Water New Zealand	July 2019 meeting
6.	Work with the industry to finalise training priorities	\$1,000	Jul-Aug 2019
7.	Travel and other expenses to help stormwater subject matter experts attend workshops and apply their learnings	\$20,000	1 July 2019 to 30 June 2020
8.	1-day workshop with a Phillips-certified trainer# to help stormwater subject matter experts develop robust indicators of the effectiveness of their training (see Figure D)	\$6,000	1 July 2019 to 30 June 2020
9.	1-day train-the-trainer workshop for stormwater experts on how to deliver great training that optimises adult learning outcomes, including pre- and post-workshop activities and support	\$6,000	1 July 2019 to 30 June 2020
10.	Supporting subject matter experts to use the Toolkits to develop best practice adult learning materials and processes e.g. by live webinars and where practicable, face-to-face workshops	\$10,000	1 July 2019 to 30 June 2020
11.	Other supporting work such as preparing supervisor coaching packages for trainees to take back to work, evaluating training outcomes, liaising with and reporting to Water New Zealand and progressing other recommendations in the full Plan as indicated by the outcomes of the training priorities process.	\$7,000	1 July 2019 to 30 June 2020
<b>TOTAL</b>		<b>\$50,000.00</b>	

# A Phillips-certified trainer is one who is accredited by the US-based [ROI Institute](#) to assess the effectiveness of training up to and including its full financial return on investment (ROI).

Further work on funding could include identifying different sources of funding for different training needs in order to achieve the most cost-effective / optimised financial ROI on the different training topics.

The raft of new government initiatives listed in **Section 3.2**, will make big demands of a sector already suffering from both capacity and capability constraints.

Central government definitely has a role to play, including funding the development of the training necessary for the stormwater sector to meet new government requirements. However this will take time and it is not known if there will be funding available for growing industry capacity and capability.

The training need is urgent and we have to make a start using our own internal resources.

### **Recommendations**

10.1 That the Stormwater Group present a report on this Plan to the Board of Water New Zealand and request:

- endorsement of the Stormwater Education, Training and Development Plan
- \$50,000 in funding for the 2019-2020 financial year to progress its implementation as summarised above and, as appropriate, in the full Plan.

10.2 That learnings from the Auckland Council Healthy Waters pilot of a fully commercial finding model be applied to this Stormwater Education, Training and Sector Development Plan.

10.3 That the suggestions in Toolkit 19 be further examined.

10.4 That the need for developing a comprehensive medium-long term funding plan be investigated, past the 2019-2020 financial year.

## 11. MANAGING: holding the programme together – issues and models

“ Coming together is a beginning. Keeping together is progress.  
Working together is success. HENRY FORD

### Purpose of this section

To highlight other matters that will need to be considered as the sector develops, implements and evaluates the effectiveness of the Stormwater Education, Training and Development Plan.

The Stormwater Education, Training and Development Plan is an opportunity to collate, share and expand the whole sector’s knowledge and skills.

However this raises several issues for consideration, including:

- quality assurance and support of the training and trainers
- tracking training delivery and effectiveness: a learning management system
- options for accreditation and certification of industry training and more
- partners and partnerships
- program management models: do we need a lead agency?

### 11.1 Quality assurance and support of the training and trainers

In the long term the Stormwater Education, Training and Development Plan will need a moderation plan for quality assurance / consistency for trainers delivering this material around New Zealand. Some of this work is under way by the Auckland Council. Questions to be addressed include<sup>44</sup>:

- Who will deliver the training? What measures do we need to put in place to manage the selection, quality, moderation and evaluation of trainers? It is important to understand that I see moderation as a stimulating and enjoyable process of collaborative learning and sector development.
- Who will own the intellectual property? Where people are paid to develop training, this is straightforward: the funder owns the material. Where volunteers prepare new material or where people are already providing valuable paid training, agreements will be needed that also consider legacy aspects when people move on from the training
- How do we recruit and select trainers? What selection criteria do we use?
- Who will train the trainers and how do we ensure that all trainers have undergone TTT training and ongoing training refreshers?
- How can we afford to fund training pilots to ensure that sector trainees receive the best possible version of new training?
- How do we ensure that trainers and training materials are keeping up-to-date?
- How do we manage training that has both for free or for fee elements?
- What are the pros and cons of sponsorship of training?
- How do we fund the development and implementation of a communications and marketing plan? It is very labour-intensive to effectively market training opportunities.
- The skills landscape and training methods and preferences are all rapidly changing. How can we ensure that our needs assessment and training design and delivery keep up?

## 11.2 Tracking training delivery and effectiveness: a learning management system

“ You can’t manage what you don’t measure. DR DONALD HUISINGH

A learning management system (LMS) is a software application for the administration, documentation, tracking, reporting and delivery of educational courses, training programs and learning and development programs.

WSP Opus’ Environmental Training Centre (ETC) has an LMS that is currently being upgraded, and it tracks multiple courses run by multiple trainers for multiple trainees from multiple organisations. The ETC’s LMS and other existing training support systems are being used to manage the Auckland Council Healthy Waters NGICP pilot, and this provides an excellent way to test a training management model for this Plan.

There is more information on this important matter in **Toolkit 20**.

## 11.3 Accreditation and certification of training and other things

Water New Zealand is supporting the work of the Auckland Council’s Healthy Waters Team to investigate and, if indicated, pilot the introduction of the US-based Water Environment Federation’s National Green Infrastructure Certification Program (NGICP) into Auckland. At the time of writing, the NGICP appears to have all the necessary elements for a robust and transparent process for certifying practitioners at the construction, establishment and maintenance phases of the development cycle.

Depending on the outcome of the Auckland Council’s pilot, Water New Zealand could look at applying the NGICP to training of people working in:

- stormwater construction and establishment, especially for WSUD, across New Zealand
- other phases of the development cycle, based on sector needs and priorities over time.

This work includes assessing how any certification (and hence the training) can be required in order to progress the development of more sustainable stormwater management in New Zealand, as shown in the “policy and compliance” phase of **Figure 7.3**, Elements of successful environmental training programs. At this stage, there are two interim solutions, both of which can form part of a longer term strategy:

- requiring tender documents and proposals as well as project KPIs to specify the need for and evidence of suitably qualified, experienced and trained personnel for the specified work as well as the supervision and auditing of the work.
- providing evidence of training, for example in the form of [electronic badges](#) issued by the Auckland Council and/or Water New Zealand. These badges are portable and secure, and also provide an incentive for people to report their training and help to keep any stormwater-specific and other LMSs up-to-date.

It also would be desirable to align stormwater training and certification needs with a proposed comprehensive certification scheme for operators, supervisors and managers of water supply and wastewater treatment plants. This has emerged from the Havelock North Inquiry, which recommended new industry qualifications. Water New Zealand is closely involved in this work and in the development of training material to deliver these qualifications<sup>45</sup>.

Certification can apply to many things other than trainees<sup>46</sup>. Some of the words bandied about include (more or less in order of increasing rigour) assessment, approval, certification, accreditation, qualification, licensing and registration. Some of these can be done in-house while others involve working with external parties.

With respect to certification, some of the things that can be certified include trainees, trainers, courses, products (as envisaged by GD03, the Auckland Councils' draft Proprietary Device Evaluation Protocol for Stormwater Devices) and infrastructure, e.g. the Australasian [Infrastructure Sustainability Rating Scheme \(ISCA\)](#).

Certification programs are very demanding of administrative resources. **Toolkit 21** lists several programs run by reputable bodies with a New Zealand presence, and some of these will be suitable for those phases of the development cycle to which the NGICP doesn't apply. As with the NGICP, it will be much more cost-effective to subscribe to them than to replicate them.

#### 11.4 Partners and partnerships

The large number of government, business and non-profit bodies involved with stormwater necessitates a strategic approach to partnerships. Whether they are formal or informal, aligning our efforts with those of others with similar aims will deliver shared outcomes much more cost-effectively and will build a strong and well-coordinated constituency with which government can more readily engage.

There is a list of potential partners in **Toolkit 22**. These will need to be assessed in terms of the levels of influence and interest Water New Zealand shares with them.

#### 11.5 Program management models: do we need a lead agency?

There was a powerful call for national co-ordination of stormwater management and training from many respondents to the 2018 survey and those attending the May 2018 Stormwater Education and Training Forum. Comments are listed in detail in **Toolkit 23**, and many important issues are raised which implementers of this plan need to consider.

One of the more acclaimed calls for national coordination was to 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. The centre of excellence could:

- deliver stormwater training
- initiate and oversee cadet programmes
- attract young people to pre-apprenticeships or internships with councils, consultancies and contractors to get exposure to stormwater challenges in a practical sense
- develop the national guidelines on stormwater management suggested above.

Suggestions for responsible agencies included:

- a centre of excellence associated with a university or several universities
- Water New Zealand, which has guidance documents covering many of the training needs raised and could act as a repository or knowledge sharing platform
- Ministry for the Environment
- the WSUD group.

Two current government reviews have also suggested centres of excellence:

- [Treasury's 30-year Infrastructure Action Plan](#) suggests establishing centres of excellence to collate and analyse data and support local decision-making (**Appendix C**)
- the [reform of the vocational training sector](#) has proposed setting up a CoVe – a Centre of Vocational Excellence – for particular skills.

For the purposes of informing the discussion, **Toolkit 24** examines the case for Water New Zealand to be the coordinating agency. The broad findings are:

- it will take time for new water sector arrangements to emerge. The more work that Water New Zealand can do right now, the better placed the stormwater sector will be to continue this important education and training work into whatever emerges in the future, be it an independent national water or other infrastructure agency
- Water New Zealand is well-placed to be or to partner with a lead agency for stormwater training because it already has:
  - taken a strong and inclusive lead
  - an existing body of relevant expertise
  - an existing strategic program for the strategic development of the water sector, including sector workforce capability and training needed for the water supply, wastewater treatment and stormwater sectors<sup>47</sup>
  - a track record of interagency partnerships, which will be vital regardless of what options the government puts in place
  - experience with responding to both government and industry calls for action
- continuity is vital: central government arrangements may change and agencies be set up, disestablished or given new mandates, but Water New Zealand as the independent professional body will remain, providing much-needed continuity over a period of significant change.

However, this could all change as government plans for the three waters sector crystallise.

### Recommendations

- 11.1 That Water New Zealand continue to take the lead on stormwater and related education and training in the short, medium and long term (Step 5).
- 11.2 That Water New Zealand develop a moderation plan for quality assurance / consistency for trainers delivering stormwater training around New Zealand.
- 11.3 That the WSP Opus Environmental Training Centre be approached about use of its recently upgraded Learning Management System to track training delivery and outcomes.
- 11.4 That Water New Zealand continue to support the work of the Auckland Council's Healthy Waters Team to investigate and, if indicated, pilot the introduction of the NGICP for the construction phase of the development cycle into Auckland and, if also indicated, the rest of New Zealand.
- 11.5 That Water New Zealand carry out a strategic assessment of short, medium and longer term partnership priorities for stormwater education and training, including those alluded to in the Treasury's 30-year Infrastructure Plan.

## 12. BEYOND STORMWATER: how to change the world

“ Most people overestimate what they can do in one year and underestimate what they can do in ten years. BILL GATES

### Purpose of this section

To encourage stormwater professionals to more fully appreciate the serious sustainability skills they have developed and challenge those among them who wish to do so to take these skills out there into leading roles in business, government and society.

The objective of this training plan is to develop the stormwater sector so its professionals can deliver the level of services across the four wellbeings that they dream of and know they are capable of delivering.

The skills we want to develop in the stormwater sector are:

- **integral** skills that pervade the stormwater sector
- **expert** skills in the specialist phases of the water sensitive development cycle
- **strategic** skills that develop the stormwater and related sectors
- **leadership** skills that transform the rest of the world.

This section therefore addresses the latter two.

### 12.1 Developing the stormwater and related sectors

Productivity statistics show that within the construction sector in New Zealand<sup>48</sup>:

- heavy and civil construction (horizontal construction) is the worst performer
- building (vertical) construction is the second worst performer
- the construction services sector as a whole has relatively low productivity within the New Zealand economy.

Good training increases staff productivity and the avoidance of expensive infrastructure mistakes will do so to an even greater degree. This strengthens the business case for industry training.

**Table 12.1** lists some of the responses of the 2018 industry survey to a multi-choice question about the issues, trends or opportunities they see that support a need for more stormwater education or training.

A high proportion of respondents to the first four statements were concerned about the skills and qualifications of professionals that this Plan aims to address.

Also interesting is that over half of the respondents agreed with the first statement, that there is 'no strategic pathway for our professional development in stormwater'. This Plan aims to fix that.

Table 12.1 Issues, trends or opportunities indicating stormwater education or training needs

Source: 74 respondents to the 2018 stormwater industry survey

Statement	Percentage agreeing	Number agreeing
1. There is no strategic pathway for our professional development in stormwater	58.11	43
2. There are new people coming into the industry with insufficient experience	52.70	39
3. People currently in the industry lack adequate baseline knowledge	45.95	34
4. There is no certification process that distinguishes suitably qualified or experienced people from anyone else	37.84	28
5. We need Chartered Professionals to sign off on stormwater devices	17.57	13

**Figure 3.1** and **Table 4.1** list stormwater training needs and skills under two main headings; integral skills that pervade the industry and specialist skills that inform the wider sector. In both spheres, there are several pathways to ongoing learning and development, such as:

- educational (technical and academic) qualifications
- professional qualifications and accreditations
- personal and interpersonal development and qualifications
- management qualifications
- career development opportunities
- leadership qualifications.

Many agencies referred to in this Plan offer such personal and professional development over and above the educational qualifications that allow entry into a given field, as with examples included in **Toolkits 13 and 14**.

Other comments about staff development from the industry include:

- use of the Engineering NZ Mentor Me Program: an Auckland trial is working well and the Stormwater Education, Training and Development Plan could build this in as part of the picture, using in-house and/or external mentoring: "Mentoring on the job is the best way to learn – people used to get training in councils and software companies. This could be linked to the company HR departments."<sup>49</sup>
- we need some recognised professional development, including national awards
- there is a serious lack of resourcing, and investment in the sector as a whole in terms of knowledge transfer/management. The industry we operate within needs to better transfer/accumulate/value knowledge
- we need more strategic stormwater training: I don't do operational work any more
- most core stormwater skills are technical items that should be 'learnt' at a university. However industry experience, and the ability to join the complex network of dots that exist within our industry, necessary to deliver sustainable and resilient solutions, can't be learnt without decades of experience working within a range of sectors including design and delivery, construction and/or regulatory/compliance. There are very few people in our industry today (and as a result even less being produced for the future) who have the ability to connect these dots. Often, these

people are treated as either eccentric or too expensive. There is a real risk that knowledge is actually a negative within the industry we operate in today.

The last two comments above indicate that much value lies within the industry and could be tapped given the right opportunities. Good training is thus likely to deliver wider sector benefits.

Comments were also made about the recruitment and retention problems facing the civil construction sector. One respondent noted that:

*“The industry needs More teaching at a tertiary institutions 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.”*

Many firms are investing a great deal of effort on this area, for apprentices, women, Māori and Pasifika as well as other groups. Examples include:

- CCNZ’s apprentice recruitment program, [EPIC](#)
- the NZ Marine and Composites ITO marine [apprenticeship scheme](#), which in November 2018 was named the best in the world
- [scholarships](#) for women’s leadership development
- the [Diversity Agenda](#), which Water New Zealand joined in late 2018. Launched as a partnership between Engineering New Zealand, the New Zealand Institute of Architects and ACENZ, the agenda now has nearly 50 organisations signed up.

Such developments have the potential to be highly significant for stormwater and related professionals and the quality of their work towards a more sustainable Aotearoa New Zealand. This is part of Water New Zealand’s wider capability and capacity workstream, and offers great scope for assisting entry-level employees into “green jobs” which they may not have considered for themselves.

The International Water Centre in [Brisbane](#) offers custom-designed training where you can [design](#) your own training and a Masters of Integrated Water Management ([MIWM](#)) through Griffith University. It also runs some more far-reaching courses that include water leadership, water governance and a capacity development partnerships [programme](#).

To quote one of the survey respondents:

*“The industry we operate within needs to better transfer/accumulate/value knowledge”.*

The concept of legacy is implicit in the work we all do. However we can and must take this further by directing our personal, professional and sector development strategies towards, for example<sup>50</sup>:

- succession planning
- passing on of expert knowledge and skills
- long term visions of Intergenerational wealth, as we measure outcomes across the four wellbeings and the six capitals
- mana whenua engagement and visions for water and Māori involvement with it.

## 12.2 Leadership skills that transform the rest of the world

Business commentators are increasingly concerned about the lack of diversity at the highest professional levels, including boards of private and public sector bodies. These comments mainly apply to gender and cultural diversity, and also to age and neuro diversity.

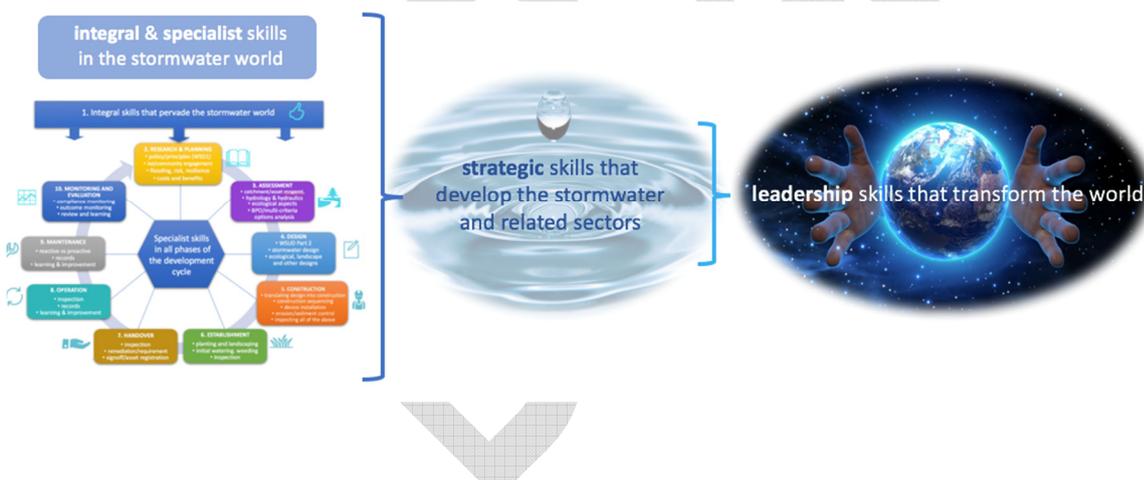
Given that 80-odd stock exchanges now require their listed companies to report against the six capitals and that the NZX is heading the same way<sup>51</sup>, it seems that a wider range of skills is needed at the most senior levels of management and governance. But when even a company like Fletcher's has no sustainability expertise at board level<sup>52</sup>, the ability of our big firms to address the major threats posed to the environment to the world's economic stability<sup>53</sup> has to be a source of some concern. Opportunities for stormwater professionals to bring their environmental expertise to the top tables need to be highlighted as a way of bringing sustainability into core business and government activities.

Leadership skills that transform the rest of the world can be developed by encouraging stormwater professionals to become CSOs (corporate sustainability officers), CEOs and directors in the public, private and nonprofit sectors by pathways including career pathing, leadership training, MBAs, sustainability leadership, such as the Sustainable Business Network's 5-day '[Leadership in Sustainable Business](#)' course, and director training.

A similar [model](#) that of education and training for both technical specialists and water leaders is at the International Water Centre at Griffith University in Queensland, covering infrastructure, technology, governance & policy, social and natural sciences, ethics and engineering.

Implementation of this plan could encourage people to consider such options, for example by hosting a website questionnaire that applies all around – and beyond – the development cycle. Stormwater professionals can have a career trajectory that can take them well beyond our current vision. **Figure 12** sums it up.

Figure 12 From integral and specialist skills to strategic and transformative skills



**Recommendations**

- 12.1 That more professional and career development training options be added to **Table 3.2** as they are identified.
- 12.2 That in due course, Water New Zealand conduct a further survey of the stormwater sector to discover more about stormwater professionals' career development needs and strategic pathways; and about their aspirations for making a difference for environment and sustainability in the wider community.

## 13. ACTION: A Three-Year Executable Action Plan

“ A goal properly set is halfway reached. ZIG ZIGLAR

### Purpose of this section

To define a vision, purpose and mission for this Plan and support them by defining:

- roles and responsibilities
- tasks, objectives and tangible milestone targets
- provisions for plan evaluation, review and reporting.

### 13.1 Vision, purpose and mission for stormwater education and training

The following are posed to generate discussion that generates an agreed direction for stormwater education, training and sector development in New Zealand.

**Vision:** Stormwater is a holistic, diverse and highly skilled discipline that integrates management of whenua and wai for beneficial outcomes across all four wellbeings.

**Purpose:** To enhance the capability and capacity of all levels of practitioners in the stormwater and related professions so as to provide cost-effective management of the natural, built, human and cultural assets that deliver and benefit from excellent stormwater services.

**Mission:** We provide training to support stormwater and related professionals working to protect, enhance and restore the integrity of the natural and built elements of New Zealand's stormwater systems with and for the communities we serve, for their environments and for future generations.

These three act as a compass against which each proposed action can be calibrated: is what we propose in line with our mission? Will it give effect to our purpose? Will it move us closer towards our vision or deviate us away from it?

### 13.2 Objectives of this Plan

This Plan needs long-term sector and government support if it is to be fully implemented, but events are moving very rapidly for the water sector, with several far-reaching reforms simultaneously under way. This plan therefore focuses on things that Water New Zealand and its members can do in the three years from 1 July 2019 to 30 June 2022.

The proposed measurable objectives listed below are tailored for this three-year working life:

1. The Plan is reviewed and endorsed by industry, including training priorities (May-June 2019)
2. The Plan is endorsed by Water New Zealand and funding is allocated for one year (June 2019)
3. Auckland Council delivers and evaluates the effectiveness of NGICP training (July-Dec 2019)
4. Industry members form Working Groups to develop other prioritised training (from June 2019)
5. Funds are sought from external parties to support these efforts (July-Dec 2019, ongoing)
6. Data is collected to track progress towards objectives and evaluate the effectiveness of training.

### 13.3 Roles, responsibilities and actions

Water New Zealand required this Plan to put in place actions towards industry goals defined in feedback received over the past two years. **Figure 13.2** is the integrated water management cycle. The numbers show that this plan represents the culmination of an **internal** Water New Zealand process from Steps 1-4. Steps 5-7 will take place over the next three years and will involve a mix of actions by Water New Zealand and **external** parties towards:

- building commitment to the proposed actions
- clarifying governance and management provisions
- implementation
- monitoring and evaluation.

Influencers are crucial to the success of Steps 5-7. Influencers are people, groups or organisations with interests in the Plan whose support or lack of it might significantly influence its success<sup>54</sup>.

The success of this Plan will depend on early, comprehensive and effective engagement with influencers and other stakeholders. The development of a **communications and engagement plan** and a **partnership plan** is recommended in order to enlist the support of leading influencers who are likely to play an active role in supporting the Plan and enlisting the support of funders.

**Tables 13.1 and 13.2** list these and other actions over the three-year period requested by Water New Zealand. However, given the many fast-moving initiatives affecting the water sector, projecting actions out to a three-year timeframe is too long.

The next section addresses this.

### 13.4 Timeframes

The budget sought from Water New Zealand will support work for one year.

Over that time, the sector needs to engage and deliver sufficiently well to secure enough funding to carry on for the following two years at least.

By then, new water and related agencies may be in place and Water New Zealand should be able to demonstrate a highly credible track record of performance improvement from its training development and delivery across all three waters. This should put it in a good position to attract:

- new funding that the new agencies are hopefully able to provide
- ongoing funding from other key partners and stakeholders, including trainees.

This Plan can then be reviewed and adapted to fit the new landscape.

Three timeframes are this proposed for this Plan:

- Year 1 to 30 June 2020: deliver on the six objectives set out in **Section 13.2**
- Year 2 to 30 June 2021: obtain further funding from existing partners and stakeholders for delivery of ongoing training and development of new training to meet industry priorities and address such needs in **Table 13.1** as are deemed helpful for supporting this. Develop a funding plan to attract investment from appropriate new water agencies
- Year 3 to 30 June 2022: consolidate, evaluate, communicate and update the Plan.

Public education was also part of the original brief, but given current work by the Ministry for the Environment on this, Water New Zealand agreed to defer that work. However water-related

community activism is alive and well across the country and is also on the industry’s mind. One respondent to the 2018 survey said:

*“Start an evidence based conversation with the 'general public' on relevant matters – better educate the voters, so they will demand more of our decision makers, which is critical to ensuring the correct systems (and prioritisations) happen.”*

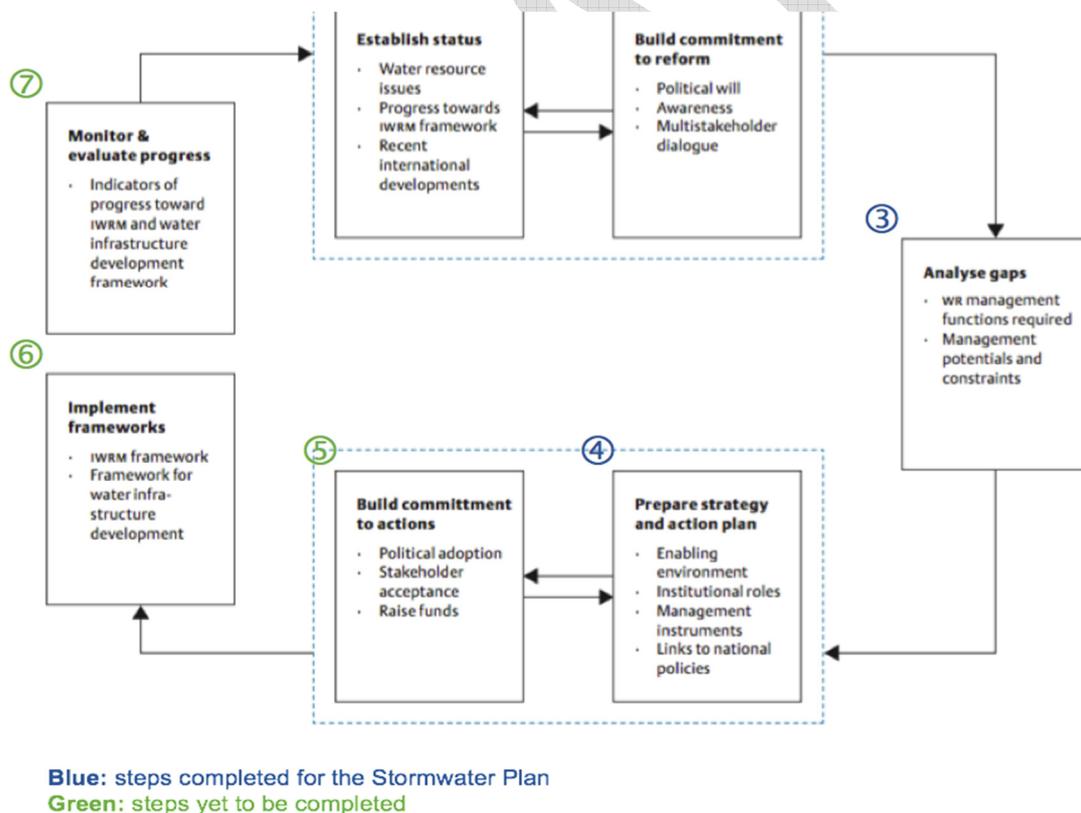
Such engagement is also a great opportunity to weave Te Ao Māori into the work, and Water New Zealand has already supported such initiatives. Such work could be considered for Year 3.

The numbering of the steps refers to the United Nations Environment Program’s integrated water management cycle shown in **Figure 13.2**. Water New Zealand has already completed steps 1-4 for this Plan, and required this Plan to deliver on Steps 5, 6 and 7 as follows:

1. Establish status: identify issues
2. Build commitment to reform
3. Analyse gaps
4. Prepare strategy and action plan
5. Build commitment to actions
6. Implement plan
7. Monitor and evaluate progress.

Figure 13.2 Steps in the integrated water management cycle as a guide to the status of this plan

Source: Adapted by adding coloured numbers to the diagram in UNEP/GPA 2006<sup>18</sup>



**Table 13.1** sets out roles, responsible parties and actions for the steps in **Figure 14.2**. As shown in **Figure 13.3**, actions across the steps can be simultaneous: for example, progress can be made

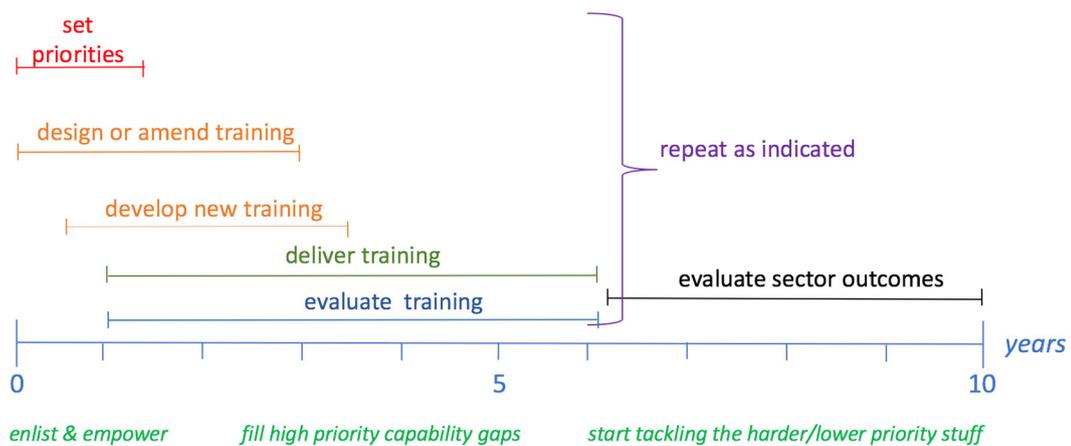
and is already under way on Step 6 (Implementation) by developing and delivering training before all of the Step 5 enabling conditions are in place.

### 13.5 Tangible milestone targets

Year 1 achievement of the six objectives in **Section 13.2** is mostly a Yes/No assessment.

Years 2-3 actions in **Table 13.2** should be considered an 'optional extra' for now, and reviewed at the start of Year 2, at which point, the names of groups and people can then be assigned to the detailed tasks in **Table 13.1** and other tasks as they emerge.

Figure 13.3 Example of concurrent tasks in designing, delivering and evaluating training



### 13.6 Plan evaluation, reporting and review

Water New Zealand required this Plan to put in place quantitative and qualitative methods to evaluate the effectiveness of the Plan. Some of the actions in **Table 13.1** are already under way or can be taken in the short term by the sector itself. Others depend on actions taken by influencers and other third parties and although we can't control these, their level of engagement and action will be a measure of the success of this plan's content and implementation.

Here we see the potential for the whole sector to become a learning community. In time this would include engaging with audiences like developers both directly and through their influencers: their consultants and contractors, so they are informed from the beginning about the water sensitive development cycle.

#### Recommendations

- 13.1 That Water New Zealand seek industry feedback on the framework, vision, purpose, mission, objectives, steps and timeframes of this Action Plan.
- 13.2 That once the Plan has been updated in light of industry feedback, it be reported to the Water New Zealand Board for endorsement and funding.



Table 13.1 Roles, responsible parties and actions for Steps 5-7 of Figure 1.2, Steps in the integrated water management cycle, to progress this Plan

NOTE: The actions below need to be read together with the Summary of all recommendations in Section 14 and each of the relevant Toolkits. Many can be done concurrently.

Role	Responsibility	Actions
<p><b>Step 5:</b> Build commitment to the Stormwater Plan (first order outcomes; the enabling conditions)</p>	<p>Water New Zealand and its Special Interest Groups and Subgroups</p> <p>Internal influencers from within the stormwater sector</p> <p><i>All actions in parallel with and supporting Auckland Council Healthy Waters NGICP and GD04 training</i></p>	<p><b>Step 5.1 Endorsement of this Stormwater Education, Training and Sector Development Plan</b></p> <p>5.1.1 Seek formal endorsement of the draft Plan from Water New Zealand to sanction release to members &amp; others</p> <p>5.1.2 Seek input &amp; endorsement from the members &amp; a “green light” to proceed (e.g. at the Stormwater conference)</p> <p>5.1.3 Update this Plan in light of industry and stakeholder feedback</p> <p>5.1.4 Plan reported to Water New Zealand Board and adopted.</p> <p>5.1.5 Develop institutional capacity for managing &amp; implementing the Plan (within WaterNZ &amp; its members)</p> <p><b>Step 5.2 Funding plan</b></p> <p>5.2.1 Prepare a programme management budget estimate</p> <p>5.2.2 Identify potential funders, including central government sources (MfE, Minister for Local Government, Ministry of Education, as part of the vocational training reforms)</p> <p>5.2.3 Prepare a funding plan to secure the money needed to implement the Plan</p> <p>5.2.4 Appoint a project management and implementation team to carry out the work on Water New Zealand’s behalf</p> <p><b>Step 5.3 Governance and management plan</b></p> <p>5.3.1 Adopt a governance and management model for the 3-year period of this plan</p> <p>5.3.2 Scope future models that reflect the outcomes of proposed changes to the water sector as these emerge</p> <p>5.3.3 Consider IP and other issues raised in Section 9</p> <p><b>Step 5.4 Partnership plan</b></p> <p>5.4.1 Identify potential partnerships formal and informal, that will progress achievement of this Plan’s objectives</p> <p><b>Step 5.5 Engagement and communication plan</b></p> <p>5.5.1 Carry out a stakeholder identification and analysis</p> <p>5.5.2 Prepare an engagement and communications plan to ensure that everyone is on the same page regarding training, with methods and outcomes for the following groups and others:</p> <ul style="list-style-type: none"> <li>• internal (to Water New Zealand and its members) and external influencers</li> <li>• potential trainers including experts within the sector as well as existing tertiary and other providers</li> <li>• potential trainees: who are they, where are they and how can we access them?</li> </ul> <p><b>Step 5.6 Evaluation plan</b></p> <p>5.6.1 Develop a more detailed list of indicators of success for plan implementation, uptake and outcomes</p> <p>5.6.2 Develop a formative &amp; summative evaluation plan, including who will measure what &amp; when, review, reporting</p>
<p><b>Step 6:</b> Implement the Stormwater Plan (second order outcomes; observable changes in practice made by (1) those implementing the Plan and (2) those targeted by it)</p>	<p>Water New Zealand</p> <p>Internal influencers</p> <p>External influencers</p> <p>Trainers &amp; Educators</p> <p>Trainees</p> <p>Other stakeholders</p>	<p><b>Step 6.1 Engage with influencers and partners</b></p> <p>6.1.1 Water New Zealand and internal influencers engage with external influencers</p> <p>6.1.2 Water New Zealand and internal influencers engage with existing and potential partners</p> <p>6.1.3 External influencers begin to take the actions sought by Water New Zealand</p> <p>6.1.4 Water New Zealand establishes formal and informal partnerships</p> <p>6.1.5 Partners begin to take the actions sought by Water New Zealand</p> <p><b>Step 6.2 Identify training priorities and engage with potential trainers</b></p> <p>6.2.1 Engage with current and potential trainers</p> <p>6.2.2 Collaboratively identify training priorities as per Section 10 and Table 10, especially high priority &amp; “quick win”</p>

Role	Responsibility	Actions
	<p><i>All actions in parallel with and supporting Auckland Council Healthy Waters NGICP and GD04 training</i></p>	<p>training not currently available and existing high priority training that can be readily adapted</p> <p><b>Step 6.3 Engage with funders</b>                      6.3.1 Funders approached and requests and/or applications made                      6.3.2 Funds come in for training via Water New Zealand; different stakeholders/influencers may take an interest in different parts of the action plan and fund it separately</p> <p><b>Step 6.4 Engage with existing tertiary and other providers as per priorities in updated plan</b>                      6.4.1 Identify and engage with existing university and technical education &amp; training providers                      6.4.2 Discuss development of new courses and amendment of existing ones as needed</p> <p><b>Step 6.5 Develop training not currently available and adapt existing training as needed as per priorities</b>                      6.5.1 Develop the training with stormwater subject matter experts/trainers supported by professional training input to optimise training delivery and evaluation                      6.5.2 Train the trainers on adult vocational training</p> <p><b>Step 6.6 Deliver adapted and new training</b>                      6.6.1 Identify and engage with trainees                      6.6.2 Deliver the training                      6.6.3 Provide support for trainees via a Supervisor Tool Kit                      6.6.4 Evaluate the effectiveness of the training                      6.6.5 Develop and deliver a trainer/training moderation plan</p> <p><b>Step 6.7 Track plan implementation</b>                      6.7.1 Document actions taken by the project team to implement the Plan and record reasons for any deviations                      6.7.2 Document actions taken by influencers and other stakeholders as a result of the project team's actions</p> <p><b>Step 6.8 Track external synergistic or confounding factors</b>                      6.8.1 Monitor and interpret 3-waters governance developments and any relevant societal and ecosystem trends</p> <p><b>Step 6.9 Assess and adapt the Plan</b>                      6.9.1 Conduct a formative evaluation against objectives and milestones using participatory methods                      6.9.2 Consider the need for any of the certification options listed in Toolkit 21                      6.9.3 Adjust the Plan and its implementation as indicated                      6.9.4 Consider the needs and opportunities around public awareness of stormwater-related issues and recommend any appropriate action.</p>
<p><b>Step 7:</b> Monitor and evaluate the outcomes of the Plan (third order outcomes; the harvest, in the short, medium and long term)</p>	<p>Water New Zealand                      External influencers                      Trainers                      Other stakeholders</p>	<p><b>Step 7.1 Track implementation outcomes</b>                      7.1.1 Document progress with reaching the Plan's objectives and milestones                      7.1.2 Document the results of actions taken in accordance with the plan &amp; consequences of external factors                      7.1.3 Conduct formative evaluation e.g. management, priorities, actions, changing social/environmental conditions                      7.1.4 Conduct a summative evaluation using participatory methods</p> <p><b>Step 7.2 Adaptive management</b>                      7.2.1 Document learnings and Plan adaptations                      7.2.2 Start planning for the next phases once there is more clarity around arrangements for the water sector</p>

Table 13.2 Using the orders of outcomes framework to track plan implementation against objectives and milestone target dates

MILESTONE DATES											
Q3 2019	Q4 2019	Q1 2020	Q2 2020	Q3 2020	Q4 2020	Q1 2021	Q2 2021	Q3 2021	Q4 2021	Q1 2022	Q2 2022
5.1	5.2	5.3-6	5.5 >>								
6.1	6.2, 6.4>>	6.3>>	6.5>>		6.8						
6.1-6.4>>	1, 2 6.5 NGICP	5.2-6; 3		6.2 \$\$\$	6.5						7.1 & 7.2

1 <sup>st</sup> Order: Enabling conditions	2 <sup>nd</sup> Order: Changes in practice	3 <sup>rd</sup> Order: The harvest	4 <sup>th</sup> Order: Sustainable development
<p><b>What we need in place to get it done</b></p> <p>Step 5.1 Endorsement of this Plan, especially priorities for training</p> <p>Step 5.2 Budget estimate and funding plan</p> <p>Step 5.2.4 Appoint project management &amp; implementation team</p> <p>Step 5.3 Governance and management</p> <p>Step 5.4 Partnership plan</p> <p>Step 5.5 Engagement &amp; communication</p> <p>Step 5.6 Evaluation plan</p>	<p><b>Actions by us and others</b></p> <p>Step 6.1 Engage with influencers and partners</p> <p>Step 6.2 Identify training priorities and engage with potential trainers</p> <p>Step 6.3 Engage with funders</p> <p>Step 6.4 Engage with existing tertiary and other providers (&gt; = ongoing)</p> <p>Step 6.5 Develop adapted &amp; new training</p> <p>Step 6.6 Deliver adapted &amp; new training</p> <p>Step 6.7 Track plan implementation (ongoing)</p> <p>Step 6.8 Track external synergistic or confounding factors (ongoing)</p> <p>Step 6.9 Assess and adapt the Plan (formative)</p>	<p><b>Short term objectives</b></p> <p><b>1<sup>st</sup> order enabling conditions largely in place by 20 June:</b></p> <p>1. Plan endorsed for release: <b>April 2019</b></p> <p>2. Plan updated and active: <b>June 2019</b></p> <p>3. Plans 5.2-5.6 in place by <b>March 2020</b></p> <p><b>2<sup>nd</sup> order changes in practice:</b></p> <p>Steps 6.1-6.4: ongoing from <b>Q3 2019</b></p> <p>Step 6.1 Influencers on board and active; <b>Q4 2019</b></p> <p>Step 6.1 partners on board: <b>Q2 2020</b></p> <p>Step 6.5: Auckland Council NGICP training by <b>Q4 2019</b></p> <p>Steps 6.4 &amp; 6.7: ongoing from <b>Q3 2019</b></p> <p><b>Medium term 3<sup>rd</sup> order outcomes:</b></p> <p>Step 6.2 More funding secured <b>Q3 2020</b></p> <p>Step 6.5 More training done <b>Q4 2020</b></p> <p>Step 7.1 Track implementation outcomes</p> <p>Step 7.2 Plan evaluation and update</p> <p><b>Long term 3<sup>rd</sup> order outcomes:</b></p> <p>Major stakeholders sustain participation</p> <p>Trainers, trainees and clients are happy</p> <p>Funding sustained and growing</p> <p>Plan able to be updated to reflect emerging 3-waters context</p>	<p><b>Are we getting there?</b></p> <p>What do we use as our compass as we progressively deepen our understanding of what sustainability really looks like?</p> <p>Vision: Stormwater is a holistic, diverse and highly skilled discipline that integrates management of whenua and wai for beneficial outcomes across the four wellbeings.</p> <p>Purpose: To enhance the capability and capacity of all levels of practitioners in the stormwater and related professions so as to provide cost-effective management of the natural, built and human assets that both deliver and benefit from excellent stormwater services.</p> <p>Mission: We protect, enhance and restore the integrity of the natural and built elements of New Zealand's stormwater systems with and for the communities we serve.</p>

## 14. RECOMMENDATIONS: Summary of all recommendations

The steps listed below for each recommendation relate to the steps in **Figure 13.1.** and **Table 13.1.**

### EXECUTIVE SUMMARY OVERARCHING RECOMMENDATION

That the Stormwater Group present this Executive Summary and supporting materials to the Board of Water New Zealand and request:

- endorsement of the Stormwater Education, Training and Development Plan
- \$50,000 in funding for the 2019-2020 financial year to progress its implementation.

### OTHER RECOMMENDATIONS TO BE CONSIDERED AS AND WHEN RESOURCES PERMIT

SECTION 2 DRIVERS: rapid change and the high costs of inadequate training

2. That Water New Zealand ask the sector to provide real world examples of where a lack of knowledge and skills is costing our communities money, with quantitative and qualitative technical and financial information about the costs of poor stormwater management and the benefits of more sustainable stormwater management (Step 5.1.2).

SECTION 3 STRATEGY: how to make sense of many different specialised skills

- 3.1 That Water New Zealand seek industry feedback on the concept, content and application of the Development Cycle. What needs to be added? Removed? Amended? What other purposes can it usefully serve? Is there a better idea? (Step 5.1.2)
- 3.2 That Water New Zealand ask for industry feedback on the training topics listed under the ten headings (or other headings suggested by the industry), for example (Step 5.1.2):
  - Do they accurately reflect your survey responses and other ideas?
  - Are the sub-headings under the right heading?
  - What other training topics can you suggest?
  - At the moment the Development Cycle goes from construction to handover to operation to maintenance. Have we adequately have captured "Service and Delivery of stormwater assets"? Is this best suited under "Operation" or does it need a separate individual section?
- 3.3 That Water New Zealand call for the appropriate experts in each of the integral and specialist skill areas to work in small groups to review and update each detailed table in **Toolkit 2** (Step 5.1.2 and 5.1.3).

SECTION 4 RIGOUR: how professional trainers approach training

4. That Water New Zealand ask its stormwater subject matter experts to work closely with a professional trainer with recognised credentials when developing training in line with the ADDIE model (Step 6.5).

SECTION 5 EVALUATION: how to measure how effective our training is

5. That the stormwater sector utilise the training evaluation methods used by professional trainers worldwide by taking a strategic and systematic approach to cost-effective monitoring (Steps 5.6 and 6.5).

SECTION 6 PRIORITIES: how to work out what to do first

- 6.1 That industry feedback be sought on the prioritisation criteria proposed (Step 5.1.2).
- 6.2 That a working group be set up to report back to the Stormwater Committee for subsequent ratification by the Water New Zealand Board to provide an overview and decision on stormwater training priorities, noting where some training can be done concurrently (Step 6.2.2).

SECTION 7 DEVELOPMENT: how to develop our training

7. That Water New Zealand engage with and support the stormwater sector in developing and delivering the necessary training (Steps 6.1-6.6), for example by:
  - **working teams:** convening specialist teams of technical experts on prioritised training topics to develop the training and recommend suitable trainers
  - **technical support:** peer reviewers and target audiences reviewing the technical content of the training
  - **professional training support:** a professional trainer and target audiences reviewing the detailed training needs assessments, design, delivery and criteria for evaluating the effectiveness of the training

SECTION 8 DELIVERY: how to deliver our education and training

- 8.1 That experts or teams of experts on the different training topics listed in **Figure 2.4** and **Table 2.2** be asked to assess and compare training delivery methods using the following sets of criteria (Step 6.5):
  - the needs and priorities defined in **Section 6**, Training priorities
  - the considerations in **Toolkit 2**, Types of Needs Assessment
  - surveyed preferences and other training delivery possibilities above and in **Toolkit 11**
  - the adapted CRC Coastal toolbox assessment criteria separately provided
- 8.2 That subject matter experts delivering stormwater training be encouraged, supported and acknowledged for undergoing train-the-trainer training (Steps 5.2 and 6.5.2).
- 8.3 That longer term, the formation of a specialist environmental wing of or sister organisation status with the New Zealand Association of Training and Development be explored (Step 6.2).

SECTION 9 SUPPORT: the elements of success that will support our training

- 9.2 That the Subject matter experts developing training consider the “Other support” cell of the tables in Toolkit 2 that show which training activities may need particular forms of support, for example from software suppliers for modelling training, and also consider which needs in Toolkit 2 cannot be met by education or training.

SECTION 10 FUNDING: how to pay for our education and training programme

10.1 That the Stormwater Group present a report on this Plan to the Board of Water New Zealand and request:

- endorsement of the Stormwater Education, Training and Development Plan
- \$50,000 in funding for the 2019-2020 financial year to progress its implementation as summarised above and, as appropriate, in the full Plan.

10.2 That learnings from the Auckland Council Healthy Waters pilot of a fully commercial finding model be applied to this Stormwater Education, Training and Sector Development Plan.

10.3 That the suggestions in Toolkit 19 be further examined.

10.4 That the need for developing a comprehensive medium-long term funding plan be investigated, past the 2019-2020 financial year.

SECTION 11 MANAGING: holding the programme together – issues and models

11.1 That Water New Zealand continue to take the lead on stormwater and related education and training in the short, medium and long term (Step 5).

11.2 That Water New Zealand develop a moderation plan for quality assurance / consistency for trainers delivering stormwater training around New Zealand (Step 6.6.5).

11.3 That the WSP Opus Environmental Training Centre be approached about use of its recently upgraded Learning Management System to track training delivery and outcomes

11.4 That Water New Zealand continue to support the work of the Auckland Council's Healthy Waters Team to investigate and, if indicated, pilot the introduction of the NGICP for the construction phase of the development cycle into Auckland and, if also indicated, the rest of New Zealand

11.5 That Water New Zealand carry out a strategic assessment of short, medium and longer term partnership priorities for stormwater education and training, including those alluded to in the Treasure's 30-year Infrastructure Plan.

SECTION 12 BEYOND STORMWATER: how to change the world

12.1 That more professional and career development training options be added to **Table 3.2** as they are identified.

12.2 That in due course, Water New Zealand conduct a further survey of the stormwater sector to discover more about stormwater professionals' career development needs and strategic pathways; and about their aspirations for making a difference for environment and sustainability in the wider community (Step 6.9).

SECTION 13 ACTION: Three-year Executable Action Plan

1.1 That Water New Zealand seek industry feedback on the framework, vision, purpose, mission, objectives, steps and timeframes of this Action Plan (Step 5.1.2).

1.2 That once the Plan has been updated in light of industry feedback, it be reported to the Water New Zealand Board for endorsement and funding (Step 5.1.4).

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