Chapter 15
Innovative stormwater management practices

15.1 Introduction

As the stormwater programme continues to mature, alternative technologies will be proposed to meet water quality design goals. These innovative practices may be developed where site or catchment development intensity make it difficult to achieve desired water quality treatment levels with conventional systems, or provide a level of treatment that is not possible with conventional approaches.

The development of innovative, cost-effective stormwater management technologies is encouraged, subject to approval by the ARC through the consent process. Approval will depend on submission of objective, verifiable data that supports the claimed efficiency, although a single pilot site may be approved for purposes of data collection to document performance .

Innovative practices tend to be new technologies that have not been evaluated using approved protocols, but for which preliminary data indicate that they may provide a desirable level of stormwater contaminant control. Some innovative practices have already been installed or are proposed in the Region as parts of treatment trains or as a stand-alone practice for a specific project. In some cases, innovative practices may be necessary to remove metals or hydrocarbons. Innovative practices can also be used for retrofits and where land availability does not permit larger conventional practices.

15.2 Objective

This chapter outlines the information that should be submitted to evaluate the performance of alternative technologies whose operating parameters have not yet been verified to the satisfaction of the ARC.

This chapter deals with stand alone and pretreatment/retrofit practices.

15.2.1 Stand alone practice

An innovative practice should not be used for new development sites unless there are data indicating that its performance is expected to be reasonably equivalent to that provided by conventional practices, or as part of a treatment train. In retrofit situations, the use of any practices that make substantial progress toward the specified environmental objectives is encouraged.

Any alternative stand alone practice must generally comply with the 75% TSS removal goal in the ALW Plan.

Specific contaminant issues may warrant use of an alternative system that may be less effective at TSS reduction while providing enhanced reduction in other contaminants such as hydrocarbons. Performance at specific contaminant reduction will be monitored appropriately.

Water quantity issues may also affect practice acceptance, depending on location in a catchment.

15.2.2 Pretreatment or retrofit

Individual practices that are not capable of providing desired water quality treatment may nevertheless play a useful pretreatment supplementary role together with other approved stand alone practices.

A practice proposed for pretreatment of flows into another practice may, for example:

- remove coarse sediments, in order to reduce the frequency of maintenance of the primary stormwater treatment practice
- provide water quantity control
- reduce stream erosion.

Retrofit of a site or catchment for water quality treatment depends on land availability, specific contaminants of concern and cost. Water quality goals must be tempered by what can realistically be accomplished in a catchment. It is in these situations where innovative practices have a potentially significant role to play.

15.3 General information required from an applicant for approval of innovative systems

Innovative systems are being introduced on a routine basis. Current ones include:

- storm drain inserts
- underground vaults
- hydrodynamic structures
- on-line storage in the storm drain network.

This subsection summarisers the basic information that should be submitted with any request for approval in a specific application in order to promote consistency in the submission of information for approval of an innovative practice. Consistency provides surety for a product manufacturer, a consent applicant and the general public that implementation of an innovative practice is based on the best information available. The ultimate goal is clean water and implementation should be based on an estimation of the best practice being used in a given situation.

It is important to be cautious with using innovative technologies for new development and retrofits. Before selecting an innovative practice for a limited application, available information should be evaluated using an acceptable protocol.

For these reasons, submission of an innovative practice in a given situation or for general compliance should include a description of the innovative technology or product including:

- Whether the operating parameters of the system have been verified.
- Existing or proposed monitoring data (detailed in Section 15.4)
- Documentation of processes by which TSS and other contaminants will be reduced (physical, chemical, biological).
- Documentation and/or discussion of potential causes of poor performance or failure of the practice.
- Key design specifications or considerations
- Specific installation requirements
- Specific maintenance requirements
- Data to support the claimed TSS removal efficiency. If the technology is new or the existing data is not considered reliable, a detailed monitoring programme to assess the TSS removal may be required
- Ownership issues that could influence use of innovative practices on individual sites. Examples of this issue could be refusal of a TA to accept responsibility for operation and maintenance.

15.4 Information needed to judge adequacy of existing or proposed monitoring data

The following summaries the detailed information that is needed to properly judge the adequacy of existing or propsed monitoring data to evaluate performance compliance of an innovative practice, from catchment related information, practice related information and water quality information.

15.4.1 Catchment parameters

The context in which the practice helps define situations where an innovative practice is (or is not) appropriate by assessing collection sites for known or new data. This in turn helps to determine the data's applicability to other locations.

It is also important that monitoring be done in the field, as opposed to the laboratory, as field monitoring better reflects actual practice performance.

Key catchment parameters include:

- catchment area served
- % impervious area
- total impervious area
- hydraulic connectivity
- baseflow or storm generated runoff only
- catchment land use and expected contaminants

15.4.2 Practice design parameters (where applicable)

Detailing specific elements of the innovative practice provides a clear understanding of the water quality treatment processes that occur in the various components of the practice. If the practice has a standard design based on catchment size or maximum flow rate, that information should be clearly stated in the discussion of practice parameters as detailed in the general discussion.

Key practice parameters include:

- basic shape (length/width, volume, importance of local topography)
- any permanent pool elevation and levels of service
- surcharge elevation
- forebay characteristics
- inlet/outlet locations and relative elevations
- water level control options
- 'on-line' or 'off-line'
- age of practice where monitoring has been or will be done
- specifications for practice components (filter media, sieve sizes, geotextile specifications, etc.)

15.4.3 Water quality analysis

Analyses detailed here are primarily for those done in the Auckland Region. Recognising that many innovative practices are being developed overseas, all information may not be available. In those situations a degree of judgement is involved regarding the relative importance of specified criteria. The ARC will consider the submission of overseas data as full or partial fulfilment of the water quality analyses, depending on the applicability of the collected data to the Auckland situation. Compliance assurance may necessitate water quality analysis on a more limited basis only for those parameters where gaps exist.

The following analyses are to be done for practice performance documentation:

- flow weighted composite samples used to determine the TSS concentrations in the influent and effluent of the device
- general water quality constituents for monitoring include TSS, pH, conductivity, DO, enterococci and total hydrocarbons
- total zinc should also be monitored as a 'keystone' contaminant for trace metals
- the performance of the practice or system should be based on the sampling results from at least 10 storms representative of those normally occurring in the Region. Depending on the relative variation in results, additional monitoring may be necessary to better understand expected performance
- at least one storm event must be greater than 20 mm of rainfall
- there must be at least three days of dry weather between storms sampled
- the samples must be collected and handled according to established procedures that are included in the monitoring plan
- the laboratory selected for analysis of the samples is recognised as technically proficient
- the efficiency of the device is calculated for individual events and is also based on the total TSS load removed for all monitored events
- the monitoring must be conducted in the field as opposed to laboratory testing
- depending on the processes involved in treatment, the practice or system may need to be in the ground for at least six months at the time of monitoring

15.5 Discussion

While the level of information requested may seem onerous to someone developing or wanting to use an innovative practice, it is essential that programme implementation and overall success be underpinned by good technology. With millions of dollars being spent on design, implementation and operation, it is important that we get our money's worth and that we are achieving the environmental objectives required.

Ultimate programme success rests on stormwater strategies, approaches and practices achieving a certain level of performance. We must have confidence that a practice will achieve stated goals and a good understanding of practice strength, limitations, and performance if we are to meet our obligations under the RMA and public expectations.