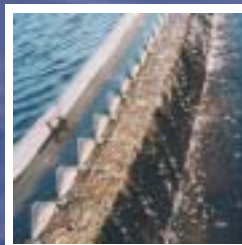




Ministry for the
Environment
Manatū Mō Te Taiao



Sustainable Wastewater Management

A handbook for smaller communities

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Steering Group

The Steering Group was responsible for the tenor, framework and scope of the Handbook, and also contributed content. Members came from a wide range of backgrounds, including local councillors, the farming community, Greenpeace, an engineering consultancy, local government officers, the Ministry of Health, and the Ministry for the Environment. Members were not expected to act as representatives of organisations with which they were associated, but were asked to draw on their own personal views and experience. The group consisted of April Bennett, Jim Bradley, Dr Joel Cayford, Andrew Dakers, Dr Gael Fergusson, Ian Gunn, Dr Gordon Hodson, Penny Hulse, Gordon Jackman, Dr Peter Maddison, Liz Mellish, Paul Prendergast, Tim Rochford, Trish Taylor, and Charles Willmot.

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FOREWORD AND HE MIHI

The New Zealand Waste Strategy, launched jointly with Local Government New Zealand last year, identified the need to complete and publish a Sewage Treatment Handbook for small communities.

Coastal settlements, small towns, and low-density rural settlements will all face wastewater management decisions at some time. The issues are complex and challenging, and finding solutions will involve thinking about how big the community will grow, what kind of community it will be, how clean the local stream or estuary will be, even the layout and form of the settlement.

Sustainable Wastewater Management: A handbook for smaller communities, provides a framework to assist small communities identify and evaluate alternatives for improving sewage treatment and disposal. The aim of the handbook is to help communities understand and navigate the issues, plans, legislation, and technical advice provided by consultants.

The government's Sanitary Works Subsidy Scheme will assist small communities to upgrade substandard wastewater treatment facilities and provide a healthier environment. This handbook has been designed to help everyone get involved in the process.



Hon Marian L Hobbs
Minister for the Environment

Ka hoki ki te tīmatanga, ko te pū, ko te weu, ko te more, ko te aka. E takoto mai ngā atua nei ko Ranginui ko Papatūānuku, kei waenganui tonu ā rāua tamariki e noho ana, e whakaora tonu ana. Tēnei te hono hei tūhono i a tātou, kia tūhono, kia tūtaki, kia whiti te noho tahi e, Tihei mauri ora!

Ō tātou mate tuatini, i takoto mai ai i roto i te kōpū o te whenua, e tika ana hei poroporoaki i a rātou. Āpiti hono, tātai hono, te hunga mate ki te whenua; āpiti hono, tātai hono ko te whenua ki te hunga ora.

E ngā iwi, e ngā mana, ka huri ngā mihi ki a koutou. Ahakoa te kaupapa taiao, te kaha ki te kōrero tahi me te mahi tahi, kāore he hua i tua atu. Te tiaki i ngā āhuetanga katoa o te tangata me te taiao kia āhei ai te tokorua te puāwai tahi mo ake tonu atu.

Tēnā koutou, tēnā koutou, tēnā tātou katoa.

We return to the beginning, where life itself began, and, like the development cycle of a plant, earth transformed itself into various stages of evolution. Papatūānuku and Ranginui lay together with their children, and today continue to dwell and sustain all people. This relationship joins people and the land, it binds us and it joins us so that our co-existence will flourish. Long live this life force!

Our many deceased who lie in the belly of the land, it is right that they be appropriately eulogised. Let the deceased then be united with the earth below. So, too, let us, the living, be united with the land above.

All peoples, all authorities, our acknowledgement goes out to you. There are many environmental issues to be balanced, there is therefore no greater asset and benefit to the environment than being able to talk and work together. Through looking after the needs of the environment and people, the two will continue to flourish and sustain each other.

Greetings to you, greetings to us all.

Introduction

This handbook was developed for smaller New Zealand communities that face choices about the kind of wastewater system they will use, and how it will be managed. Coastal settlements, small towns, scattered low-density rural settlements – all will face wastewater management decisions at some time. The issues are complex and challenging, but finding solutions can be exciting and immensely satisfying.

Exciting? Satisfying? This may seem hard to imagine given the topic. But in the end, wastewater management is about issues such as how big your community will grow, what kind of community it will be, how clean your local stream or estuary will be, even the layout and form of your settlement.

Finding answers to these questions means understanding wastewater and its effects; understanding your local environment and the best way of choosing a solution, the technical systems, the effects they can manage, and their costs. It also means understanding the relationship between the technical solution and the shape and form of your community.

An awful lot has been written about wastewater over the years. So why write more about it, why write it now, and why as a handbook for smaller communities?

Why focus on smaller communities?

For a start, smaller New Zealand communities face unique pressures and choices. The most obvious is: do you stay with on-site systems like septic tanks, or move to a community-based system? Is the problem really the technical system, or the way it is managed? People in smaller communities are required to think about and confront wastewater management issues in a way that people in larger communities are not. If your septic tank overflows it is right there, impossible to ignore. The local treatment plant is not hidden away – it is just down the road. If the local estuary becomes polluted, everyone notices it. As awareness about environmental effects has grown, the need to deal with seemingly small-scale wastewater problems of smaller communities has become more pressing.

Smaller New Zealand communities also face growth pressures that large communities do not feel in the same way. Beach settlements or tourist areas must deal with the wastewater problems of seasonal changes in growth. Rural marae can experience huge short-term increases in population. Some smaller communities near larger towns can experience growth that slowly changes their character and seems to turn them into suburbs. Should that growth happen? What happens if that wastewater plant is made bigger – does that increase the growth pressures? In recent years the impacts of growth (and in some cases population decline) have become more pronounced as smaller communities forge their own future in the context of wider economic changes.

For a smaller community, facing up to wastewater management issues can cause tensions and splits. The tasks are not easy and can put a great deal of stress on community vitality and feeling. The quality and nature of the decision-making processes can have a huge effect on people's long-term sense of wellbeing. Getting access to information can be hard for a small, isolated community. More and more, the need for everyone to have access to information is recognised as vital to good wastewater investment decisions.

Finally, there is now an increasing focus on the quality of drinking-water for smaller communities, and associated public health problems. Wastewater can have a huge effect on the quality of the groundwater and streams from which communities may take their drinking-water supplies. It is likely that there will be greater national pressure for smaller communities to improve their water supplies. This will mean greater attention paid to wastewater management, and smaller communities with a limited ability to pay will face increasing financial pressures.

Fortunately, central government has re-introduced a *subsidy* (see *Section 11*) for the construction of wastewater schemes, which will be available to small communities. This subsidy will focus attention on the key issue of whether a community should move to community-based collection and treatment systems. Communities will need information that will help them to balance the choice of the best overall solution with the availability of this subsidy. Making this solution happen involves consideration of public health, environmental, social, cultural and economic factors to determine the appropriate level of wastewater services.

What ideas have influenced the handbook's approach?

This handbook offers a new approach to thinking about wastewater that reflects many of the changes over the last 10 or so years. In the past, wastewater management was very much focused on specific public health effects, but there is now increased consideration of a wider range of effects on people and the environment. The handbook therefore reflects a *sustainable development* framework. Sustainable development is all about linking environmental, social and economic concerns, and developing human communities in a way that melds these together.

This shift in focus from individual effects to interconnected systems means that 'systems thinking' has helped to shape the handbook. This includes looking at natural systems and processes, and how wastewater fits in with and affects those systems. It includes looking at how human communities and systems fit into this natural framework, and the effects wastewater management has on people and their activities.

This system thinking is relatively new to wastewater management (and much public decision-making). The fact that small communities are so much 'closer' to their surrounding natural environment means that it is likely to be relatively easy to introduce this concept into decisions about wastewater.

Ecosystem services are also an important concept in this document. The idea that the natural system provides 'services' to humans (eg, cleansing of water) that need to be protected is a major impetus for the increasing standards that are being applied to the discharge of wastes into the environment. All communities – but particularly smaller communities, which depend on the local environment more directly for their livelihood – must now think about this relationship. The loss of clean water can mean the loss of a marine farming industry, say, a loss of recreational waters, or the decline of tourism.

Linked to this is a greater scientific understanding of the whole nature of wastewater and its effect on these ecosystem services. It is not just a matter of managing the discharge of human wastes. Heavy metals and the impact of other organic material and chemicals must also be managed. This handbook tries to explain how different technical solutions will deal with particular adverse effects, and what this might mean when choosing technical options.



The 2002 *New Zealand Waste Strategy*, central government's plan for solid and liquid waste management (including wastewater), brings together much of this thinking and sets targets at the national level. This includes bringing all wastewater treatment systems up to standard by 2020. This might seem a long way off, but there are many examples of schemes taking 20 years to come to fruition, so you need to start planning now. Cutting down the amount of waste generated and discarded by the country is the long-term challenge that the Strategy is designed to meet, in an attempt to separate – or decouple – environmental pressures from economic growth.

Other targets in the Strategy deal with *tradewastes*, as well as sludges and the treatment and disposal of organic wastes. Obviously these targets have implications for smaller communities. This changing official context is another reason for the 'here and now' of the handbook.

But the emphasis is not just on physical systems and risks to ecosystem services, or hard economic effects. Perhaps one of the most profound changes in the last decade or so has been the greater legal and community recognition of the significance of the Treaty of Waitangi. This has forced communities to recognise and give a place to the cultural values of Māori, including the belief in a spiritual dimension to the world. This has a direct and immediate impact on wastewater management thinking. For New Zealanders this means a greater exploration and scrutiny of land-based wastewater treatment and re-entry systems (where the wastewater ends up), and a greater willingness to take a creative and innovative approach.

Any community will have to take account of these Treaty of Waitangi-based issues, emerging case law around principles of the Treaty, and associated wastewater management issues. Helping people come to grips with this new responsibility in relation to wastewater is a major focus for this handbook. But the focus is also on the personal side of this developing area. Many small communities have a strong Māori, iwi and hapū presence. Protecting and building this wider relationship with the various groups must also be a concern as wastewater issues are confronted.

The increased recognition of Māori perspectives on the environment has also made it easier for the wider community to speak about and include other cultural perspectives on water and the environment. Increasingly, wastewater management must fit and accommodate people's desire to live within natural systems and to protect the beauty and wonder of the natural world. This means the design of systems must take account of impacts on the landscape, for example, and not just the need to solve public health issues.

There has also been a shift in thinking around formal decision-making processes used by local authorities. The Local Government Act (2002) requires local authorities to take a sustainable development approach. *Section 125* requires a territorial authority to assess the provision of wastewater services within its district from time to time. An assessment may be included in the territorial authority's long-term council community plan, but if it is not, the territorial authority must adopt the assessment using the special consultative procedure.

This is important, because most communities will need to work with their local council on wastewater issues. There is increasing pressure on local authorities to work directly with communities and to encourage grass-roots involvement. This handbook reflects this by exploring possible community planning processes and looking at some case histories. It is important that people have the tools to help them negotiate and run community-based processes, since wastewater is one of the most important development issues a community will face.

All these changes have led to a greater range and choice of wastewater management systems, and this handbook aims to show the range now available.

This is not just an issue for smaller communities, though. In the end, the handbook can be used by any community – for 'greenfields' sites on the edge of towns, say, or for 'eco-villages', or perhaps even for older urban areas. We hope that it will be used as widely as possible. But in the end, the focus is on smaller communities, and on helping those communities drive their own wastewater decision-making.

The structure of the handbook

The handbook does have a story to tell, starting at section 1 and working through to the end. But you can also dip in at various points, and we hope you will find it a useful ongoing resource. To facilitate this it has been structured into four parts, each divided into a number of sections.

Part One provides an overview of wastewater and its relationship with human and natural systems. *Section 1* discusses these natural and human systems, and introduces the idea of ecosystems services, while *Section 2* looks at the nature of wastewater and its effects on the environment. *Section 3* introduces the reader to wastewater management systems, a topic that is returned to in much more detail in *Part Three*.

Part Two elaborates on the human system that must be negotiated when deciding on a wastewater management system. *Section 4* looks at the formal regulatory processes and the important players you will encounter on the way, while *Section 5* sets out some ideas for running and managing a community-driven process.

Part Three is where the nuts and bolts of wastewater management systems and technologies are discussed. There is a lot of technical detail here, so to try and make the material more accessible, it has been divided according to which part of the wastewater management process you are concerned with. Thus *Section 6* looks at managing wastewater at its source, since how well you do this will influence the technical solutions (and costs) you need to consider. *Section 7* then addresses collection and treatment systems and technologies, while *Section 8* looks at options for dealing with the treated wastewater and other products (residuals). *Sections 9 and 10* look at options for how all of these aspects (source management, treatment, collection and re-entry) can be configured together, and at system performance and failure.

Part Four examines the prevention of system failure, and introduces the idea of management and responsibility of wastewater systems. This is covered in *Section 11*, along with various funding options. Along the way an important message of the handbook is reiterated and explored: how the technical systems are managed ultimately decides the success of any technical solution. Finally, *Section 12* provides several brief guides and checklists for making wastewater management decisions.

It may seem as you work your way through the handbook that discussion of technical solutions comes late in the piece. This reflects another major message of the handbook: that a community can no longer develop technical wastewater solutions independently of natural systems or wider community concerns. The legislative framework makes it harder and harder to take the old path of simply finding engineering solutions at the least cost. Nor will communities accept this kind of approach any more. More and more, wastewater experts are advising that community-driven solutions are essential.

Finally, the handbook comes with a CD-Rom, which provides more detailed technical information, references and links to further information. It is hoped that these layers of information will help your community negotiate its way through the process.

So, have fun and good luck for your wastewater and community future.