1. INTRODUCTION

1.1 GENERAL

The purpose of TP58 is to provide guidance for the design and maintenance of on-site treatment and disposal systems for domestic wastewater from households and institutions. In this context, the term "institutions" refers to non-dwelling type facilities such as schools, residential accommodation facilities and commercial and public facilities.

The approach taken in the setting of design recommendations for on-site wastewater systems has been based on extensive experience in the region supported by comprehensive literature searches. Wherever practicable, these design guidelines attempt to use a pragmatic approach. However, where any uncertainty exists, ARC is obliged to take a conservative approach and to ensure some safety factor is maintained in final system designs to address uncertainties inherent in the design and operation of on-site systems. This is also to provide confidence that meeting the design recommendations as set out in TP58 gives surety that potential for adverse effects from system design alone will be minor. Maintenance is also recognised as an equally important factor, along with correct system design, installation and operation to ensure optimum performance of the system. These factors are all critical for mitigating potential adverse effects throughout the life of a system.

This document is aimed at providing guidelines applicable to existing sites in situations where there is no existing reticulation system such that on-site disposal is the only option. In the case of new developments, it applies where subdivision is of a scattered nature for example large rural lots, lifestyle blocks or developments on remote sites where reticulation for combined decentralised or centralised treatment systems is not practicable.

In the case of proposed new developments or subdivisions, that could lead to a concentration of settlement, ARC policies promote the need for consideration of all reasonable means of treating and disposing of wastewater, in addition to the immediate option of on-site disposal. There is a requirement for assessments of alternative infrastructure options to be undertaken at the early planning stage. This matter is addressed in the relevant policies in the Auckland Regional Policy Statement, which are outlined in Chapter 2. The need for alternatives to on-site disposal to be considered at the planning stages of a development is specifically discussed in Chapter 4. This outlines matters to be considered in the early *Design Planning* stages of a development, before any decision can be made towards on-site, off-site or a combination of on and off site treatment and disposal options.

1.2 THE CONTEXT OF THIS AND EARLIER EDITIONS/BACKGROUND

The First Edition of this manual titled "On-site Wastewater Disposal from Households and Institutions", commonly referred to as "TP58", was produced by the ARC in 1989. The design standards of that time, NZS 4610:1982 "Household Septic Tank Systems", recommended that in difficult subsoil conditions and/or where institutional facilities were to be served, a manual of engineering practice should be used for specific design purposes. TP58 was developed to fill an information gap identified in the Auckland region.

In 1994, the Second Edition was produced, which incorporated revisions and additions to the previous guidelines, in response to feedback from a user survey. It was noted in the Second Edition that the range of on-site systems outlined in TP58 was by no means conclusive and many local variations on traditional and special types of systems were available and in use. It encouraged designers to apply the design principles and procedures as outlined in the manual, to the technology current at the time, to achieve innovative solutions and effective environmental outcomes for

unsewered wastewater servicing. Industry initiatives in the absence of clear design standards have, in some cases, resulted in a wide range of performance standards in the treatment and disposal systems available.

This, the Third Edition, now addresses the significant advances in on-site wastewater system technology, practices and standards over the past nine years. It has attempted to clarify design standards in areas where clear standards have been lacking. Its preparation has included a complete review of design guidelines in the previous editions, in response to changes in industry practices and to advances in international guidelines and practices. This has also included a consultation process with other regulatory authorities and TP58 user groups and as a result, it attempts to provide increased confidence to areas requiring clarification and detail where it was lacking in the earlier editions.

1.3 The Source of Technical Material and Their Relationship to TP58

Major sources of technical information for the revisions to these guidelines have included the updated version of the USEPA Wastewater Treatment Systems Manual (2002) and recent key research from the USA. New joint Australian and New Zealand Standards have now also been issued in parallel to the drafting of these revised guidelines, specifically:

- AS/NZS 1546.1:1998 On-site domestic wastewater treatment units Part 1: Septic tanks
- AS/NZS 1547:2000 On-site domestic wastewater management
- AS/NZS 1546.3:2001 On-site domestic wastewater treatment units Part 3: Aerated wastewater treatment systems

Further joint Standards in the AS/NZS 1546 series are being issued for "waterless composting toilets" and other systems. AS/NZS 1547 forms an umbrella Standard under which the various treatment unit Standards fit. Material in AS/NZS:1547 has been considered in the preparation of these revised TP58 guidelines and has been included where appropriate.

However, it is important to note that these guidelines are not based on the AS/NZS standards, and in the Auckland region at least, TP58 remains the guidelines against which wastewater system design specifications will be assessed. This requirement is enshrined within legislation through the rules in ARC's Transitional Regional Plan and the Proposed Auckland Regional Plan: Air, Land and Water. (Appendix B includes technical reasons concerning on why TP58 is considered more appropriate and relevant to the Auckland region than the AS/NZS standards. Further details of the relevant objectives and rules for the Auckland region are provided in Section 2.1.2 to 2.1.3 and in 2.6, and also further in Appendix C.)

Where information is lacking in these guidelines, reference should be made to the relevant literature. In particular, where further information is required, consideration should be given to relevant design criteria as specified in AS/NZS standards [Ref 1] and/or USEPA Manual [Ref 5] standards and/or Crites & Tchobanoglous, "Small and Decentralised Wastewater Management Systems" (1998) [Ref 2].

This edition is issued with the recognition that scope remains for further technical details and expansion of some chapters. To address anticipated gaps and changes in the on-site wastewater industry over time and corresponding needs for more detailed guidelines, TP58 will require revision again in forthcoming years and/or new addenda and/or technical sheets will be produced overtime as gaps are identified.

In the interim, where a design detail is outside the recommended specifications in TP58 the appropriate mechanism for approval is via the resource consent process. Once the particular new

design specifications have been proven to meet the objectives of TP58 for effective and sustainable on-site treatment and disposal to the reasonable satisfaction of ARC, then the intent is that it will be incorporated into TP58 via addendum as appropriate, following a notified variation to the Proposed Regional Plan: Air, Land and Water.

ARC is pleased to receive specific comments on the guidelines in this edition for consideration in the preparation of future editions or addenda to this edition, as appropriate.

1.4 USE OF THESE GUIDELINES

These guidelines will assist designers and installers to overcome the complexities that can be involved in selecting and designing the most appropriate wastewater system for a site.

A summary of the structure of the further chapters in these guidelines is as follows:

CHAPTER 2 "Statutory Context and Requirements" outlines the regulatory framework within which application of these guidelines must fall, both within the national context (the Resource Management Act 1991 and other legislation) and more specifically within the Auckland Region (Regional Rules for on-site disposal). Other relevant legislation, such as the Health Act, Building Act and Local Government Act, and how these Acts address sewage disposal, is also introduced. This chapter then further discusses the status of discharges under in terms of the relevant transitional and proposed regional plans, and the relevant status in terms of permitted, controlled and discretionary of a discharge activity.

CHAPTER 3 "Introduction to On-site Wastewater Management" introduces and defines the concept of On-Site Wastewater Management. It provides an overview of some types of wastewater treatment processes systems available, potential effects to be considered from the on-site land disposal of domestic wastewater and introduces key principles associated with achieving effective design, implementation and performance of on-site wastewater systems.

CHAPTER 4 "Design Planning" introduces concerns with respect to a potential for effects from single or a clusters of on-site disposal systems. It outlines key on-site wastewater management issues to be considered early in the subdivision/development planning process, and leads into the need for an assessment to be undertaken of potential cumulative adverse effects on the environment in the case of proposed land use intensification. It covers the need for consideration of decentralised (combined community) wastewater systems at the early planning stage.

CHAPTER 5 "Site Assessment" specifies the key criteria that must be considered when assessing a site for on-site wastewater disposal. This is the first step towards determining the capacity of the site for wastewater disposal. The site constraints must be evaluated before the appropriate maximum design flow, appropriate treatment system and wastewater land disposal methodologies can be determined.

CHAPTER 6 "Design Flow Volumes" provides guidance for determining an appropriate system design flow for the proposed development. It is critical that all wastewater systems are designed to cope well in extreme situations and to achieve this, the design flow must be based on maximum flows. This chapter also provides appropriate conservative flow allowances that must be used for determining the peak flows for design purposes.

CHAPTER 7 "Treatment Systems" is the most comprehensive section and provides design guidelines for primary, secondary and tertiary types of treatment systems. It specifies design criteria for a variety of key systems, many of which need to be used in series to ensure the required final treated wastewater discharge quality is achieved. Additional issues that need to be considered in the selection of appropriate treatment processes are also outlined, such as nutrient removal, disinfection

processes and treated wastewater reuse considerations, in addition to details of alternative treatment options.

CHAPTER 8 "Dosing and Distribution Methods and Fixtures" discusses effective dosing and distribution methods for surface and subsurface land disposal systems.

CHAPTERS 9 and 10 "Land Disposal Systems" outline design criteria for the selection and design of an appropriate system. These chapters include critical design detail for the wide range of land disposal options to provide further land treatment to ensure that any potential impacts on surface and groundwater and any potential health risks are minimised. CHAPTER 9 provides information on surface and shallow irrigation systems, predominantly pressure compensated drip irrigation and low pressure effluent distribution irrigation systems. While CHAPTER 10 focuses on more conventional generally older technology systems, predominantly subsurface trenches and bed disposal systems, as well as other less common forms of disposal systems.

CHAPTER 11 "Environmental Effects From On-Site Wastewater Disposal" discusses the subsurface movement and fate of contaminants in wastewater applied to land and the need to consider options for minimising and assessing the impacts on the receiving environment. It recognises the limited capacity of soils to absorb nutrients and raises the need to not only design systems based on the hydraulic and organic capacity of the soils, but to also consider the potential chemical loadings, cationic salt balance and the nutrient immobilisation and buffering capacity of the receiving soils.

CHAPTER 12 "Installation, Operation and Maintenance Requirements" covers the importance of good system installation practices, including site preparation, building certification and records. It is then followed by the importance of on-going system maintenance. This section outlines the issues to be covered in management plans and those to be considered in relation to maintenance contracts. It also raises options for remedying failed or malfunctioning wastewater treatment or disposal systems. It refers to a number of detailed fact sheets appended, which further specify core system maintenance and operation requirements for optimum long term performance.