1 OVERVIEW

This section will briefly outline the need for these guidelines, their use, and how they were developed

1.1 The Need – Why are these Guidelines Needed?

Waste stabilisation ponds are extensively used both throughout New Zealand and internationally for the treatment of urban, agricultural and industrial wastewaters. This treatment technology is well known for its simplicity of construction and operation. The efficiency of pond systems is, however, often compromised by hydraulic problems.

Pond hydraulics are strongly influenced by shape (including the use of baffles) and by the inlet/outlet configuration. It has been noted, "it is currently impossible to reliably predict how various modifications of pond design, such as placement and number of inlets, use of baffles, etc, might affect pond performance" (Wood, *et al*., 1995, p 112).

At the moment design engineers have no published guidelines in the area of pond hydraulics only rough 'rules of thumb'! While this document cannot provide a simple answer for all situations, it will certainly provide valuable insight and guidance compared to the knowledge gap that currently exists.

1.2 Use of this Manual

These guidelines relate to the hydraulic behaviour of pond systems. They are not intended as a means of sizing ponds. A brief guide to sizing ponds has been added as an appendix to this document (Appendix 3). Comprehensive design guidelines are also available at: http://www.leeds.ac.uk/civil/ceri/water/tphe/publicat/pdm/pdm.html

It must also be noted that the means to achieving an improvement in pond hydraulic performance will be site specific. Each pond has its own individual characteristics with regard to influent flows and loads; shape; and environmental conditions. Therefore, the addition of features such as modified inlets or baffles, will have differing effects on different ponds. Engineering judgement is still required!

1.3 The Development of this Manual

These guidelines build on previous research, but also incorporate findings from new research that has involved the use of computer simulation, laboratory research and field-testing.

Computer simulation using the PHOENICS Computational Fluid Dynamics (CFD) software has been used extensively to investigate potential hydraulic improvements due to different inlet, outlet and baffling configurations.

Laboratory and field-testing were used to produce data on the flow patterns (using drogue tracking techniques) and tracer responses. In both situations these was undertaken for a range of different pond modifications.