

Executive Summary

Introduction

Limited supplies of fresh water are a concern worldwide and especially in South Africa where annual rainfall falls well below the world average. Reuse of greywater offers one means of relieving pressure on fresh water supplies. It is established practice in a significant minority of households, especially in low income settlements where water is difficult to obtain and families are under financial pressure to minimise use of all resources. Use of greywater specifically for irrigation is practised to a lesser extent than for other household uses, but does occur in middle and higher income suburbs in times of drought, and in low income areas to supplement water supplies for food production. Active promotion of greywater use for irrigation in gardens and small-scale agriculture has the potential not only to maximise use of limited water supplies, but also to improve food security in low income settlements. However, before this can be promoted through government structures and local authorities, the legal status of greywater use for irrigation needs to be clarified and guidance needs to be formulated for users so that small-scale irrigation use of greywater is performed in a way that is safe for humans, plants and the environment. The development of such guidance is the purpose of this project.

Aim of this document

To provide guidance for the sustainable use of greywater in small-scale agriculture and gardens in rural villages, peri-urban and urban areas of South Africa.

The aims and objectives of the project as a whole, and the background literature and case studies, are presented in the Technical Report.

Approach adopted for development of the Guidance Report for irrigation use of greywater

Central concepts identified from the literature review and case studies, and deliberations of the project team and the Reference Group, together determined the underlying principles and the structure of the Guidance Report.

Underlying principles

The intended users of the Guidance Report were identified as:

- Municipalities or NGOs who wish to initiate greywater irrigation implementations or wish to support water users in developing and monitoring greywater irrigation implementations.
- Informed members of the public who wish to plan for irrigation use of greywater on their properties or in their settlements, and need guidance in doing so.

The focus of the Guidance Report was defined as:

- Minimisation of risks of *illness* in handlers of greywater and greywater-irrigated produce, or consumers of greywater-irrigated produce.
- Minimisation of risks of *reduction in growth or yield* of plants/crops irrigated with greywater.
- Minimisation of risks of environmental degradation, especially reduction in the *ability of soil irrigated with greywater to support plant growth*.

In addition, the Guidance Report was developed within the following boundary conditions:

- Irrigation use is interpreted as the *beneficial use of greywater to support plant growth within the boundaries of the irrigated property only*. It is important to note that movement of greywater beyond the boundaries of the property is

explicitly *excluded*, since this would amount to uncontrolled disposal of greywater to the environment and all the disadvantages and risks associated with that.

- The guidance provided is intended to address irrigation use of greywater only, not to provide a general solution for disposal of greywater. Thus the focus is not on maximising the volume of greywater which can be applied to land, but on minimising risks and on maximising benefits associated *specifically with irrigation use of greywater*.
- The guidance provided is intended to be used within the context of existing knowledge and best practice relating to irrigation, *e.g.* selection of plants, installation and maintenance of irrigation equipment, and adaptation of irrigation schedules to local agroclimatic conditions. The guidelines focus not on providing a catch-all manual for small-scale irrigation implementations, but on *managing the additional risks and challenges* arising out of the use of greywater in such implementations.

Structure of Guidance Report

The structure of this Guidance Report is as follows:

What is greywater?

Why use greywater for irrigation?

Concerns about the use of greywater for irrigation

Health considerations

Plant growth and yield

Ability of soil to support plant growth

Purpose of the Guidance Report

Intended users of the Guidance Report

Focus of the Guidance Report

Major sources used

Legislative context of greywater use for irrigation

Special considerations

Guidance for greywater use in small-scale irrigation in South Africa

Guide to managing risks and uncertainty

Greywater quality: Guide to greywater constituents

Greywater quality: Mitigation of greywater quality

Greywater quantity: Guide to irrigation volumes

The core of the Guidance Report is provided by the section “Guidance for Greywater Use in Small-Scale Irrigation in South Africa”. In the sub-section on “Managing Risks and Uncertainty in Greywater Irrigation”, three categories of greywater use are identified, based on the extent of characterisation of greywater and, by implication, on compliance with quality limits. Use restrictions are identified for each category. The most stringent restrictions apply to greywater used without characterisation.

Minimum analysis – comprising pH, electrical conductivity, sodium adsorption ratio and *E. coli* –, and compliance with quality limits on these, are associated with less stringent restrictions. The least restrictions are associated with use of greywater undergoing full analysis (minimum analysis plus boron, chemical oxygen demand, oil and grease, suspended solids, total inorganic nitrogen and total phosphorus). The quality limits in each category are specified in the sub-section on “Greywater Quality: Guide to Greywater Constituents”. The section on “Greywater Quality: Mitigation of Greywater Quality” provides means of adjusting to or improving on greywater quality. Two approaches are considered: agricultural practices to mitigate the effect of, predominantly, chemical constituents such as sodium; and treatment to improve,

predominantly, the organic and microbiological quality of greywater. The last subsection, “Greywater Quantity: Guide to Irrigation Volumes” guides users in selecting the volume of greywater to be applied and in adjusting this for site-specific conditions.