BS ISO 16075-2:2015

BSI Standards Publication

# Guidelines for treated wastewater use for irrigation projects

## Part 2: Development of the project

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## National foreword

This British Standard is the UK implementation of ISO 16075-2:2015.

The UK participation in its preparation was entrusted to Technical Committee CB/506, Water reuse.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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# INTERNATIONAL STANDARD

# ISO 16075-2

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# Guidelines for treated wastewater use for irrigation projects —

## Part 2: Development of the project

*Lignes directrices pour l'utilisation des eaux usées traitées en irrigation —*

*Partie 2: Développement du projet*

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# Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 282, *Water reuse*, Subcommittee SC 1, *Treated wastewater use for irrigation*.

ISO 16075 consists of the following parts, under the general title *Guidelines for treated wastewater use for irrigation projects*:

— *Part 1: The basis of a reuse project for irrigation*

— *Part 2: Development of the project*

— *Part 3: Components of a reuse project for irrigation*

The following parts are under preparation:

— *Part 4: Monitoring*


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# Introduction

The increasing water scarcity and water pollution control efforts in many countries have made treated municipal and industrial wastewater a suitable economic means of augmenting the existing water supply especially when compared to expensive alternatives such as desalination or the development of new water sources involving dams and reservoirs. Water reuse makes it possible to close the water cycle at a point closer to cities by producing "new water" from municipal wastewater and reducing wastewater discharge to the environment.

An important new concept in water reuse is the "fit-to-purpose" approach, which entails the production of reclaimed water quality that meets the needs of the intended end-users. In the situation of reclaimed water for irrigation, the reclaimed water quality can induce an adaptation of the type of plant grown. Thus, the intended water reuse applications are to govern the degree of wastewater treatment required and inversely, the reliability of wastewater reclamation processes and operation.

Treated wastewater can be used for various non-potable purposes. The dominant applications for the use of treated wastewater (also referred to as reclaimed water or recycled water) include agricultural irrigation, landscape irrigation, industrial reuse, and groundwater recharge. More recent and rapidly growing applications are for various urban uses, recreational and environmental uses, and indirect and direct potable reuse.

Agricultural irrigation was, is, and will likely remain the largest reuse water consumer with recognized benefits and contribution to food security. Urban water recycling, landscape irrigation in particular, is characterized by fast development and will play a crucial role for the sustainability of cities in the future including energy footprint reduction, human well-being, and environmental restoration.

It is worth noting again that the suitability of treated wastewater for a given type of reuse depends on the compatibility between the wastewater availability (volume) and water irrigation demand throughout the year, as well as on the water quality and the specific use requirements. Water reuse for irrigation can convey some risks for health and environment, depending on the water quality, the irrigation water application method, the soil characteristics, the climate conditions, and the agronomic practices. Consequently, the public health and potential agronomic and environmental adverse impacts are to be considered as priority elements in the successful development of water reuse projects for irrigation. To prevent such potential adverse impacts, the development and application of international guidelines for the reuse of treated wastewater is essential.

The main water quality factors that determine the suitability of treated wastewater for irrigation are pathogen content, salinity, sodicity, specific ion toxicity, other chemical elements, and nutrients. Local health authorities are responsible for establishing water quality threshold values depending on authorized uses and they are also responsible for defining practices to ensure health and environmental protection taking into account local specificities.

From an agronomic point of view, the main limitation in using treated wastewater for irrigation arises from its quality. Treated wastewater, unlike water supplied for domestic and industrial purposes, contains higher concentrations of inorganic suspended and dissolved materials (total soluble salts, sodium, chloride, boron, and heavy metals), which can damage the soil and irrigated crops. Dissolved salts are not removed by conventional wastewater treatment technologies and appropriate good management, agronomic, and irrigation practices should be used to avoid or minimize potential negative impacts.

The presence of nutrients (nitrogen, phosphorus, and potassium) can become an advantage due to possible saving in fertilizers. However, the amount of nutrients provided by treated wastewater along the irrigation period is not necessarily synchronized with crop requirements and the availability of nutrients depends on the chemical forms.

This guideline provides guidance for healthy, hydrological, environmental and good operation, monitoring, and maintenance of water reuse projects for unrestricted and restricted irrigation of agricultural crops, gardens, and landscape areas using treated wastewater. The quality of supplied treated wastewater has to reflect the possible uses according to crop sensitivity (health-wise and

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agronomy-wise), water sources (the hydrologic sensitivity of the project area), the soil, and climate conditions.

This guideline refers to factors involved in water reuse projects for irrigation regardless of size, location, and complexity. It is applicable to intended uses of treated wastewater in a given project even if such uses will change during the project's lifetime as a result of the changes in the project itself or in the applicable legislation.

The key factors in assuring the health, environmental, and safety of water reuse projects in irrigation are the following:

— meticulous monitoring of treated wastewater quality to ensure the system functions as planned and designed;

— design and maintenance instructions of the irrigation systems to ensure their proper long-term operation;

— compatibility between the treated wastewater quality, the distribution method, and the intended soil and crops to ensure a viable use of the soil and undamaged crop growth;

— compatibility between the treated wastewater quality and its use to prevent or minimize possible contamination of groundwater or surface water sources.


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# Guidelines for treated wastewater use for irrigation projects —

# Part 2: Development of the project

## 1 Scope

This part of ISO 16075 covers the following issues:

— criteria for the design of treated wastewater (herinafter: TWW) irrigation projects intended to prevent public health risks within the population that has been in direct or indirect contact with the TWW or with any product that has come in contact with the TWW;

— specifications of the following:

i) the quality of the TWW that can be used for irrigation;

ii) the types of crops that can be irrigated with TWW;

iii) the combination of the qualities of the irrigated TWW and the types of crops that can be irrigated;

iv) the strategy of using barriers that can reduce the risks that arise from TWW irrigation;

v) the correlation between the quality of the TWW, the irrigated crops, and the types of barriers that can be used;

vi) the distance required between the TWW irrigation areas and residential areas.

vii) none of the parts of this part of ISO 16075 are intended to be used for certification purposes.

## 2 Normative references

There are no normative references.

## 3 Terms, definitions, and abbreviated terms

### 3.1 General

**3.1.1**
**aquifer**
underground layer of water-bearing permeable rock or unconsolidated materials (gravel, sand, or silt) from which groundwater can be extracted

**3.1.2**
**background water**
*freshwater* (3.1.10) supplied for domestic, institutional, commercial, and industrial use from which *wastewater* (3.1.22) is created

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**3.1.3**
**barrier**
any means that reduces or prevents the risk of human infection by preventing contact between the TWW and the ingested produce or other means that, for example, reduces the concentration of microorganisms in the TWW or prevents their survival on the ingested produce

**3.1.4**
**environment**
surroundings in which an *organization* (3.1.13) operates including air, water, land, natural resources, flora, fauna, humans, and their interrelation

**3.1.5**
**environmental aspect**
element of an *organization's* (3.1.13) activities, projects, or products that can interact with the *environment* (3.1.4)

**3.1.6**
**environmental impact**
any change to environmental quality whether adverse or beneficial or wholly or partly resulting from an *organization's* (3.1.13) activities, projects, or *products* (3.1.15)

**3.1.7**
**environmental parameter**
quantifiable attribute of an *environmental aspect* (3.1.5)

**3.1.8**
**fodder crops**
crops not for human consumption such as pastures and forage, fiber, ornamental, seed, forest, and turf crops

**3.1.9**
**food crops**
crops which are intended for human consumption often further classified as to whether the food crop is to be cooked, processed, or consumed raw

**3.1.10**
**freshwater**
naturally occurring water on the Earth's surface (in ice, lakes, rivers, and streams) and underground as groundwater in *aquifers* (3.1.1)

Note 1 to entry: Freshwater includes desalinated seawater and desalinated brackish water, but excludes seawater and brackish water.

**3.1.11**
**irrigation project**
design, development, construction, selection of equipment, operation, and monitoring of works to provide suitable TWW irrigation

**3.1.12**
**non-potable water**
NPW
water that is not of drinking water quality

Note 1 to entry: It generally refers to *wastewater* (3.1.22) or TWW, but can also include other waters of non-drinking quality.

**3.1.13**
**organization**
group of people and facilities with an arrangement of responsibilities, authorities, and relationships


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**3.1.14**
**process**
set of interrelated or interacting activities which transform inputs into outputs

Note 1 to entry: Inputs to a process are generally outputs of other processes.

Note 2 to entry: Processes in an *organization* (3.1.13) are generally planned and carried out under controlled conditions to add value.

**3.1.15**
**product**
any goods or services

Note 1 to entry: This includes interconnected and/or interrelated goods or services.

**3.1.16**
**public health aspect**
element of an *organization's* (3.1.13) activities, projects, or *products* (3.1.15) that can interact with the public health

**3.1.17**
**public health impact**
any change to public health, whether adverse or beneficial, wholly or partly resulting from an *organization's* (3.1.13) activities, projects, or *products* (3.1.15)

**3.1.18**
**public health parameter**
quantifiable attribute of a *public health aspect* (3.1.17)

**3.1.19**
**soil**
layer of unconsolidated material consisting of weathered material particles, dead and living organic matter, air space, and the *soil solution* (3.1.20)

**3.1.20**
**soil solution**
liquid phase of the *soil* (3.1.19) and its solutes

**3.1.21**
**stakeholder**
individual, group, or *organization* (3.1.13) that has an interest in an organization or activity

Note 1 to entry: Usually, a stakeholder can affect or is affected by the organization or the activity.

**3.1.22**
**wastewater**
wastewater collected principally by municipalities that can include spent or used water from domestic, institutional, commercial, or industrial sources and can include storm water

**3.1.23**
**water reuse**
use of treated wastewater for beneficial use

Note 1 to entry: Synonymous also to water reclamation and water recycling.

## 3.2 Use of treated wastewater (TWW)

**3.2.1**
**agriculture**
science or practice of farming including cultivation of the *soil* (3.1.19) for the growing of crops and the rearing of animals to provide food or other *products* (3.1.15)

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