
DEPARTMENT OF LOCAL GOVERNMENT, PLANNING, SPORT & RECREATION

QUEENSLAND PLUMBING AND WASTEWATER CODE

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NOTE

The Queensland Plumbing and Wastewater (QPW) Code replaces the “On-site Sewerage Code”. QPW Code has been restructured into four (4) Parts of which Part 2.0 Use of Greywater for Garden and Lawn Irrigation in Sewered Areas is new. No changes have been made to the performance requirements or technical aspects of the On-site Sewerage Code, which are now contained in Parts 1.0, 3.0 and 4.0 of the QPW Code.

INTRODUCTION

Purpose of Queensland Plumbing and Wastewater Code

The Queensland Plumbing and Wastewater (QPW) Code provides a framework within which Queensland specific plumbing and drainage standards are consolidated into a single document. The standards cover matters outside the scope of and in addition to the Plumbing Code of Australia (PCA) such as requirements for on-site sewerage facilities and the beneficial use of greywater in seweraged areas.

Satisfying the Performance Requirements

The standards are all performance based. An application will comply with a standard if it satisfies the performance criteria. Compliance with the performance criteria can be achieved by;

- a) complying with the acceptable solutions; or
- b) formulating an alternative solution that satisfies the performance criteria or is shown to be at least equivalent to the acceptable solutions; or
- c) a combination of (a) and (b).

Where an alternative solution is proposed, a report from a competent person¹, that demonstrates how the relevant performance criteria will be met is usually required as part of the application.

Associated Requirements

Compliance with a standard may not be the only requirement. Other legislation such as State Acts, IDAS codes, council planning schemes and local laws may impose additional requirements. Site and soil evaluators, designers, installers, manufacturers, service agents and owners should satisfy themselves that they would achieve compliance with all legislative requirements.

Table of Parts

Part	Title of Standard	Status of Standard	Referral Agency
1	On-site Sewerage Facilities	Mandatory	Nil
2	Use of Greywater in Seweraged Areas	Mandatory	Nil
3	Use and Disposal of Greywater in Unsewered Areas	Mandatory	Nil
4	Chief Executive Approval	Mandatory	Nil

¹ For the definition of a competent person refer to the *Standard Plumbing and Drainage Regulation 2003*, Part 3, Division 2, Section 14(4)(b).

PART 1.0 – ON-SITE SEWERAGE FACILITIES

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1.1 Scope

Part 1.0 of the QPW Code² sets out the technical requirements for the sustainable management, site and soil evaluation, design, installation and operation of on-site sewerage facilities in areas not served by a sewerage system³.

1.2 Application

Part 1.0 of the Code applies to on-site sewerage facilities serving premises where the sewage is predominantly of domestic origin and where the facility includes a sewage treatment works having a peak design capacity to treat sewage of 20 or less equivalent persons.

Part 1.0 of the Code applies to any part of an on-site sewerage facility of the above peak design capacity, installed at each premises as part of a common effluent drainage (CED) scheme. This part of the Code does not apply to the sanitary drains and other components of the sewage collection system that forms part of the CED scheme.

Part 1.0 of this code does not cover the design and installation of waterless composting toilets, chemical toilets and incinerating toilets⁴.

This Code permits the segregation of wastewater at the source into two separate streams i.e. blackwater and greywater. Part 2 provides the technical requirements for the use of greywater for garden and lawn irrigation in sewered areas. Refer to Part 3.0 of the QPW Code for the technical requirements for a greywater use facility in an unsewered area, which is part of an on-site sewerage facility.

1.3 Australian/New Zealand Standards

Australian/New Zealand Standards are taken to apply to all on-site sewage treatment plants and land application areas of the peak design capacity in Clause 1.2 and not merely to on-site sewage treatment plants and land application areas of a size mentioned in Australian/New Zealand Standards.

1.4 Associated Requirements

- The *Environmental Protection Act 1994* places a general environmental duty upon all persons to take all reasonable and practicable measures to prevent or minimise harm to the environment. For the purposes of this Act and this Code the discharge of sewage and or effluent without local government approval or an appropriate Environmental Authority granted under the *Environmental Protection Act* is an offence. Generally for on-site sewerage facilities, effluent must have no unsustainable impacts on land, groundwater and surface water.
- The *Environmental Protection Regulation 1998* defines environmentally relevant activities. On-site sewerage facilities having a peak design capacity to treat sewage of 20 or less equivalent persons are **not** environmentally relevant activities under the Regulations.

² *Standard Plumbing and Drainage Regulation 2003*, Section 8B, and Section 8C.

³ Defined in *Plumbing and Drainage Act 2002*, Schedule Dictionary

⁴ Refer to *Plumbing and Drainage Act 2002*, Schedule Dictionary, "Environmentally relevant on-site sewerage facility"

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- The *Environmental Protection (Water) Policy 1997* requires local governments to consider the cumulative impacts of on-site land application of effluent on the environment when assessing and approving development applications under the *Integrated Planning Act, 1997*. The policy further requires that the environmental values of Queensland waters be enhanced or protected. Under Section 31 of the Policy, it is an offence to deposit or release solid or liquid waste from an on-site sewerage facility:
 - (a) into a roadside gutter, stormwater drain or a water; or
 - (b) in a place where it could reasonably be expected to move or be washed into a roadside gutter, stormwater drain or a water.
 - The *Health Act 1937* (Part3, Division 7) contains provisions relating to situations considered to be a nuisance or injurious or prejudicial to health or a breeding-ground for mosquitoes. Such situations include accumulation of water and waste and run off of water and waste from a premises. The Act places obligations on local government and provides them with powers to inspect premises and deal with nuisance situations.

1.5 Alternative and/or New Materials

This Code must not be interpreted to prevent the use of materials or products not specifically referred herein. If it is desired to use alternative and/or new materials and products not covered by this Code or the *Standard Plumbing and Drainage Regulation 2003*, they shall be submitted to a JAS-ANZ accredited agency for certification or approval.

1.6 Referenced Standards

AS/NZS

- 1546.1 On-site domestic wastewater treatment units Part 1:Septic tanks
- 1546.2 On-site domestic wastewater treatment units Part 2:Waterless composting toilets
- 1546.3 On-site domestic wastewater treatment units Part 3:Aerated wastewater treatment systems
- 1547 On-site domestic wastewater management

1.7 Definitions

Unless noted otherwise all terms have the same meaning as given in the Dictionary of the *Plumbing and Drainage Act 2002* and *Standard Plumbing and Drainage Regulation 2003*.

Unless noted otherwise all terms have the same meaning as given in the relevant Australian/New Zealand or Australian Standard.

If a definition given in the relevant Australian/New Zealand Standard or Australian Standard is inconsistent with the Act or Regulation, the Act or Regulation prevails to the extent of the inconsistency.

1.8 Performance

1.8.1 Function and Context of Use

The function and context of use of an on-site wastewater system as specified in Clause 2.1.2 of AS/NZS 1547:2000 shall apply as appropriate to an on-site sewerage facility.

1.8.2 Performance Objectives

The key performance objectives for any on-site domestic wastewater system specified in Clause 2.2.1 of AS/NZS 1547:2000, shall apply as appropriate to any on-site sewerage facility.

1.8.3 Performance Requirements

Public Health, Community Amenity and Resource Utilisation

The performance requirements for public health, community amenity and resource utilisation specified in Clause 2.2.2 AS/NZS 1547:2000, shall apply as appropriate to an on-site sewerage facility.

On-site Sewerage Facility

The performance requirements for wastewater systems as specified in Section 2.4 of AS/NZS 1547:2000 with the exception of serviceable life shall apply as appropriate to an on-site sewerage facility.

Serviceable Life

The serviceable life criteria for an on-site sewerage facility in lieu of Clause 2.4.1.4.2 of AS/NZS 1547:2000 shall be in accordance with the following clauses.

Serviceable life of an on-site sewerage facility means the period for which the facility is designed, installed and maintained using the components specified and built in accordance with the approved specification.

Provided the soil assessment is appropriate, the loading rate does not exceed the recommended design, and all other aspects of construction, installation, operation and maintenance are in accordance with the QPW Code a service life of 15 years is considered achievable.

Mechanical and electrical components are exempt from this requirement provided they are readily accessible for maintenance and replacement.

The anticipated life of any elements of an on-site sewerage facility that have a serviceable life of less than 15 years shall be nominated. A soil based element of an on-site sewerage facility is one to which a reduced life might apply.

Construction and Installation

The performance requirements for construction and installation of a wastewater system specified in Section 2.5 of AS/NZS 1547:2000 shall apply as appropriate to an on-site sewerage facility.

1.8.4 Performance Criteria

On-site sewerage Facilities

The performance criteria for wastewater systems as specified in Section 2.4.2 of AS/NZS 1547:2000 with the exception of Clause 2.4.2.1(b) and Clause 2.4.2.4 Effluent Quality shall apply as appropriate to on-site sewerage facilities.

The flow of wastewater from a range of population equivalents up to 20 persons in lieu of Clause 2.4.2.1(b) shall be 28 000 L/week for all-waste wastewater flow.

Effluent Quality

The effluent quality criteria for land application of effluent in lieu of Clause 2.4.2.4 of AS/NZS 1547:2000 shall be in accordance with the following clauses.

Three levels of effluent quality are defined based on the level of treatment i.e. primary, secondary and advanced secondary.

Table 1.1
Effluent quality based on level of treatment¹

Parameter	Primary Effluent mg/L	Secondary Effluent mg/L	Advanced Secondary Effluent mg/L
Biochemical oxygen demand (BOD)	120-240	20	10
Total suspended solids (TSS)	65-180	30	10
Thermotolerant organisms (org/100ml)	Not applicable	200	10

¹Effluent quality criteria for nutrients, nitrogen and phosphorus, have not been included. Refer to Comment on Nutrients.

Typical primary or clarified effluent concentrations of BOD₅ and TSS are given in Table 1.1. The addition of an effluent filter to the outlet of the septic tank or primary treatment chamber will improve effluent quality by reducing the BOD₅ and TSS in the range of 15-30%. Where an effluent filter is installed, the effluent is still regarded as primary treated.

Primary treated effluent may be discharged to either a subsurface land application system eg soil absorption trench, evapotranspiration area, mound or to a secondary treatment process.

The expected secondary effluent concentrations of BOD₅ and TSS are given in Table 1.1.

A secondary treated effluent may be discharged to sub-surface irrigation systems, soil absorption trench, evapotranspiration area, and mound. A secondary treated effluent that is disinfected and meets the effluent quality given in Table 1.1 is suitable for above ground spray irrigation if permitted by the local authority.

Where effluent of higher quality, such as 10/10 BOD/TSS is required, further treatment is usually necessary. This may involve physical, chemical or biological processes or various combinations of them depending on the impurities to be removed and is termed "advanced secondary effluent". The reduction of nutrients, such as nitrogen and phosphorus, may or may not be included in "advanced secondary effluent".

Comment *Nutrients such as nitrogen and phosphorus can cause significant pollution of receiving waters. Nutrients in the effluent can also encourage growth of biofilms (slimes) inside the irrigation pipework. On the positive side nutrients in the effluent can make a positive contribution to crop growth in the land application area.*

Nitrogen can occur in the effluent as organic nitrogen, ammonia, nitrate or nitrite. Wastewater that has been specifically treated to reduce nitrogen will generally have a total nitrogen concentration between 5-10 mg/L provided the treatment plant is operated and maintained in

accordance with the manufacturer's instructions. A secondary effluent could have a total nitrogen concentration between 25-50 mg/L.

Phosphorus that is added to the soil in the effluent can be either taken up by plant growth, stored within the soil (if the soil contains a significant amount of cation exchange sites. As with clay soils) or it may be lost through leaching. Phosphorus concentrations in secondary effluent range between 7-16 mg/L and for plants specifically designed to reduce phosphorus the effluent concentration can range from 1-5 mg/L.

1.9 Site and Soil Evaluation

1.9.1 Purpose

A site-and-soil evaluation⁵ is carried out in order to obtain detailed site-specific information relating to the allotment. This enables the on-site sewerage facility design to meet the performance outcomes required by this Code in conjunction with the requirements of the *Environmental Protection Act 1994* and the *Environmental Protection (Water) Policy, 1997*.

The site and soil evaluation will assist in resolving the following questions:

- Which site and soil factors relevant to the site must be taken into account when selecting and designing the on-site sewerage facility?
- Is the site environmentally suitable for an on-site sewerage facility?
- If so, what type of on-site sewerage facility is appropriate?
- What capacity and/or size should the facility be?

1.9.2 Performance Objectives

The performance objectives for a site and soil evaluation specified in Section 2.3 of AS/NZS 1547:2000 shall apply as appropriate for this Code

1.9.3 Means of Compliance

The means of compliance for site and soil evaluation procedures for individual lots specified in Section 4.1 of AS/NZS 1547:2000 shall apply as appropriate for this Code.

1.9.4 Acceptable Solutions

AS/NZS 1547:2000, Appendices 4.1A, 4.1B, 4.1C, 4.1D, 4.1E and 4.1F provide acceptable solutions for the various aspects of a site and soil evaluation.

When site evaluation experience, research results or performance practice can demonstrate that less conservative or less rigorous procedures than those covered in the Acceptable Solutions provide an equal or superior result in achieving the performance objectives of this Code, they can be adopted. However, justification for their adoption must be lodged with and accepted by the local authority.

1.10 Means of Compliance

1.10.1 Land Application Areas

Function

The function of the land application facility is to further treat and absorb the effluent from the sewage treatment unit and to distribute the effluent to the natural environment in a manner that achieves the performance requirements set in this Code.

⁵ Refer to note accompanying AS/NZS 1547:2000, Clause 4.1.1.

Means of Compliance

The means of compliance with the performance objectives and performance requirements for land application areas specified in Section 4.2 of AS/NZS 1547:2000 with the exception of siting conditions shall apply as appropriate for this Code.

Acceptable Solutions

AS/NZS 1547:2000, Appendices 4.2A, 4.2B, 4.2C and 4.2D provide acceptable solutions for the most commonly used land application areas.

The acceptable solutions presented in Appendices 4.2A, 4.2B, 4.2C and 4.2D adopt a conservative approach to design criteria and to design-loading or design-irrigation rates. Where design experience, and/or research results, and/or performance practice can demonstrate that less conservative approaches provide an equal or superior result in achieving performance objectives they can be adopted. Justification for their adoption shall form part of the final design report.

Siting Conditions

The siting conditions for land application areas in lieu of Clause 4.2.3.3 of AS/NZS 1547:2000 shall be in accordance with this section.

Performance Objectives

There are two performance objectives for any on-site sewerage facility stated in AS/NZS 1547:2000 that relate to separation distances and are given as follows:

1. *to protect public health by ensuring that risks associated with the discharge of human waste and domestic-wastewater to the environment are minimised (AS/NZS 1547:2000 Clause 2.2.1(a)).*
2. *to maintain and enhance the quality of the environment by ensuring that surface and groundwater are not polluted (AS/NZS 1547:2000 Clause 2.2.1(b)).*

Performance Requirement – Protection of Public Health

The on-site sewerage facility shall incorporate *measures to ensure that the effects of the wastewater systems are contained within the property boundaries including, if necessary, the use of set-backs (AS/NZS 1547:2000 Clause 2.2.2.1(d)).*

Means of Compliance	Acceptable Solution
M1 Where practical, land application areas are exposed to prevailing winds and not shaded from the sunlight, or are placed where nearby plants can help evapotranspire the effluent (AS/NZS 1547:2000 Clause 4.2.3.3(a)).	A1.1 Achieved by locating land application areas so that buildings for a minimum time during the day do not shelter them. A1.2 Achieved by selecting plant species that can be utilised to provide evapo-transpiration assistance. A1.3 Achieving the performance, site evaluation, design, construction, installation requirements of AS/NZS 1547:2000.

M2	Land application areas are to be sited so that they do not affect, or are not affected by and comply with requirements for setback distances from buildings, property boundaries, retaining walls, embankments swimming pools etc. (AS/NZS 1547:2000 Clause 4.2.3.3(b)).	A2.1	Achieving the recommended separation distances of Table 1.2 between buildings, property boundaries, retaining walls, embankments, swimming pools and the subsurface land application area.
		A2.2	Achieving the recommended separation distances of Table 1.3 between property boundaries, pedestrian paths, water edge of swimming pool, dwellings and recreation areas and surface irrigation areas.

Table 1.2
Recommended horizontal separation distances for subsurface land application areas

Feature	Recommended Horizontal Separation Distance
Footings of buildings	Edge of trench/bed excavation or subsurface irrigation distribution pipework is positioned at least 2.0 metres down slope, or 4.0 metres upslope from the footing or where the site is flat, 2.0 metres from any point of the building footing.
Property boundaries, pedestrian paths and walkways, recreation areas	Edge of trench/bed excavation or subsurface irrigation distribution pipework is positioned at least 2.0 metres down slope, or 4.0 metres upslope from the feature in column one or where the site is flat, 2.0 metres from any point of the feature. (Refer to Figures 1.1 and 1.2 for examples)
Retaining wall footing	Edge of trench/bed excavation or subsurface irrigation distribution pipework is positioned at least 2.0 metres down slope, or 4.0 metres upslope from the retaining wall footing or where the site is flat, 2.0 metres from any point of the retaining wall footing.
In ground swimming pools.	Edge of trench/bed excavation or subsurface irrigation distribution pipework is positioned at least 6.0 metres down slope, or 6.0 metres upslope from the footing or where the site is flat, 6.0 metres from any point of the building footing. (Refer to Figures 1.1 and 1.2 for examples)
In ground potable water tank	Primary effluent – 15 metres from the boundary of the land application area. Secondary effluent – 6 metres from the boundary of the land application area.
Notes:	
1. The separation distances are recommended only. The local government may upon considering the public health and environmental risks reduce or increase the distances given in Table 1.2	

The recommended separation distances in Table 1.2 apply to primary effluent, secondary effluent and advanced secondary effluent.

Table 1.3
Recommended horizontal separation distances for surface irrigated land application areas

Feature	Recommended Horizontal Separation Distance^φ
Property boundaries, pedestrian paths and walkways	<p>Secondary Effluent: 2 metres from the edge of the irrigated wetted area to any point of the feature. (Refer to Figure 1.3 for example)</p> <p>Advanced Secondary Effluent: 2 metres from the edge of the irrigated wetted area to any point of the feature</p>
Water edge of a swimming pool	<p>Secondary Effluent: 6 metres from the edge of the irrigated wetted area to the water edge.</p> <p>Advanced Secondary Effluent: 6 metres from the edge of the irrigated wetted area to water edge.</p>
Dwellings, recreation areas.	<p>Secondary effluent: 15 metres from the edge of the irrigated wetted area to the dwelling or designated edge of recreation area. (Refer to Figure 1.3 for example)</p> <p>Advanced Secondary Effluent: 10 metres from the edge of the irrigated wetted area to the dwelling or designated edge of recreation area.</p>
<p>Notes:</p> <p>1. The separation distances are based on a spray plume with a diameter not exceeding 1.0 m or a plume height not exceeding 0.3 m above the finished surface level.</p> <p>2. The separation distances are recommended only. The local government may upon considering the public health and environmental risks reduce or increase the distances given in Table 1.3.</p>	

^φ Spray irrigation of primary treated effluent is not permitted.

Performance Requirement – Protection of Surface and Groundwater Quality

The on-site sewerage facility shall incorporate *measures to control the effects of an on-site domestic-wastewater system on surface water and groundwater flows and the quality of natural waters such that subsequent use of those waters is not impaired or compounded (AS/NZS 1547:2000 Clause 2.2.2.1(a)).*

Means of Compliance	Acceptable Solutions
<p>M1 The design process shall determine or identify the location of wells and drinking water supplies, location and variation of groundwater level.</p>	<p>A1.1 Achieving the site and soil evaluation procedures given in AS/NZS 1547:2000</p>
<p>M2 Comply with performance requirements set by AS/NZS 1547:2000 and/or the relevant regulatory authority with respect to clearance from groundwater and avoiding pollution of any watercourse, canal, dam, or waterbody (AS/NZS 1547:2000</p>	<p>A2.1 Achieving the separation distances calculated by means of the viral die-off method⁶.</p> <p>or</p> <p>A2.2 Achieving recommended separation distances of Table 1.4.</p> <p>or</p> <p>A2.3 Facilitate the uptake of nutrients by</p>

⁶ Beavers, P.D and Gardner E.A., (2005) "Viral Die-off Method for Estimating Setback Distances". <http://www.lgp.qld.gov.au>.

Clause 4.2.3.3(e).	vegetation or A2.4 Use of design or construction techniques that act as a barrier or prevent entry.
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Table 1.4
Recommended separation distances for protection of water quality

Feature	Recommended Separation Distance
Top of bank of permanent water course; or Top of bank of Intermittent water course; or Top of bank of a lake or, Top water level of a surface water source used for agriculture, aquaculture or stock purposes or; Easement boundary of unlined open stormwater drainage channel or drain.	Primary effluent: 50 metres (horizontal). Secondary effluent: 30 metres (horizontal). Advanced secondary effluent: 10 metres (horizontal).
Bore or a dam used or likely to used for human and or domestic consumption	Primary effluent: 50 metres (horizontal). Secondary effluent: 30 metres (horizontal). Advanced secondary effluent: 10 metres (horizontal).
Unsaturated soil depth to a permanent water table	Primary effluent: 1.2 metres (vertical). Secondary effluent: 0.6 metres (vertical). Advanced secondary effluent: 0.3 metres (vertical).
Note: The separation distances are recommended and the local government may upon considering the public health and environmental risks reduce or increase the distances given in Table 1.4.	

Performance Requirement – Control of Odours

The on-site sewerage facility shall incorporate *measures for control of odours generated by decomposition and stabilisation processes within an on-site domestic-wastewater system during normal operation and routine maintenance (AS/NZS 1547:2000 Clause 2.2.2.1(f)).*

Means of Compliance	Acceptable Solution
M1 The on-site sewerage facility is designed, constructed and located so as to minimise odour nuisance to the occupants of neighbouring properties	A1.1 The on-site sewerage facility is not located adjacent to bedrooms, living rooms or recreational areas of neighbouring properties. A1.2 Site evaluation procedures for new premises should determine where

	<p>existing on-site sewerage facilities on neighbouring properties are located.</p> <p>A1.3 Primary treated effluent and untreated greywater is discharged to a subsurface system.</p>
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Performance Requirement – Control of Noise

The siting, installation and operation of an on-site domestic-wastewater system shall be controlled so that nuisance is avoided (AS/NZS 1547:2000 Clause 2.2.2.2(a)).

Means of Compliance		Acceptable Solutions	
M1	The on-site sewerage facility is designed, constructed and located so as to minimise nuisance eg noise to the occupants of neighbouring properties	A1.1	Pumps and motors are not located adjacent to bedrooms, living rooms or recreational areas of neighbouring properties.
		A1.2	Pumps and motors are contained in an acoustic enclosure so as to reduce the emission of noise
		A1.3	The noise level with all equipment (except any alarm system) operating does not exceed 40 dB measured on fast response at a distance of 1 m from the nearest item of noise emitting equipment.

Declared Catchment Areas

Declared catchment areas are areas of land set aside to control land use activities on those areas that may have an adverse impact on water quality in a water storage, lake or groundwater area. The Department of Natural Resources & Mines has established separation distances for declared catchment areas. Before commencing design of an on-site sewerage facility in or adjacent to a declared catchment area, the designer should contact the regional office, Department of Natural Resources & Mines for the appropriate separation distances.

1.10.2 Design – On-site Sewage Treatment Plants

Function

The function of an on-site sewage treatment plant is to receive and treat domestic sewage so as to produce an effluent appropriate to the land application area to be installed within the boundaries of the property. In doing so the on-site sewage treatment plant must:

- protect public health by minimising the risks associated with the treatment of sewage and its ultimate discharge to the environment;
- provide treatment capacity to meet expected hydraulic and organic loadings from a premises discharging domestic sewage;
- provide a reliable treatment process that will achieve the effluent quality criteria nominated in Clause 1.8.4 when operated and maintained in accordance with the manufacturer’s instructions; and

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- provide easy access for authorised persons to all parts of the plant for inspection, maintenance and repairs.

Context of Use

On-site sewage treatment plants may be installed freestanding, partially in-ground or buried. In these situations, they are exposed to the effects of the weather, internal loads/pressures, external loads/pressures and any ground movement. In addition, corrosion of the tank material and fittings is possible internally from the sewage and externally from the surrounding environment.

When installed in the ground, the top surface of the tank or tanks is normally placed at or just above the ground surface so that inspection and access covers are readily accessed and ingress of surface water is prevented. When a tank is installed below ground level, provision must be made for a watertight vertical extension to be installed above the access and inspection openings to bring the access and inspection covers to or just above finished ground level. The surrounding ground levels must slope away from the tanks installed at ground level.

Means of Compliance

The means of compliance with the performance objectives and performance requirements for wastewater treatment units specified in Section 4.3 of AS/NZS 1547:2000 shall apply as appropriate to on-site sewage treatment plants.

Siting Conditions

On-site sewage treatment plants, including septic tanks, shall be positioned so that:

- there is 6.0 m of compacted soil between the treatment plant and a water tank used or likely to be used for human or domestic activities;
- there is access to the treatment plant for desludging and maintenance activities;
- there will be no affect on any structural elements of buildings installed partially or fully in the ground.

Disinfection

Disinfection is often the final step after secondary or tertiary treatment and helps to reduce the remaining viruses and bacteria. Disinfection methods include chlorination, ultra violet radiation and ozonation.

When is disinfection not required?

A secondary treated effluent discharged to a land application area by sub-surface irrigation does not require disinfection. An acceptable solution for subsurface irrigation deemed to comply with this Code can be found in AS/NZS 1547:2000, Appendix 4.5C, Figure 4.5C1.

When the effluent distribution system is placed on the natural surface and the cover material⁷ is a soil e.g. loam, clay loam, disinfection is not compulsory.

When is disinfection required?

⁷ An example being Figure 4.5D1, Appendix 4.5D, AS/NZS 1547:2000.

Effluent discharged to a land application area by surface irrigation must be of secondary quality and have a thermotolerant coliform count of less than or equal to 200 organisms per 100 millilitres. In order to meet the thermotolerant coliform requirements the effluent needs to be disinfected.

Surface irrigation is considered to be:

- a) spray irrigation where sprinklers disperse the effluent over the land application area, or
- b) surface drip irrigation where the effluent is distributed from a perforated small diameter pipe installed on the natural surface.

Where a layer of mulch e.g. pine bark covers the distribution system, the effluent is to be disinfected before discharge to the land application area.

There may be subsurface discharge situations, e.g. shallow groundwater table, where the local government may consider disinfection as being appropriate to minimize the potential for pathogenic organisms entering the groundwater. In such cases, the compliance permit for the on-site sewerage facility may include a condition that requires the effluent to be disinfected. The condition must be complied with.

1.10.3 Construction and Installation

Function and context of Use

Correct construction of an on-site sewerage facility, including correct installation of any manufactured components will lead to a sustainable system that gives satisfactory service that meets the objectives of this Code.

Means of Compliance

The means of compliance with the performance requirements for construction and installation of wastewater systems specified in Section 4.5 of AS/NZS 1547:2000, shall apply as appropriate to an on-site sewerage facility.

Acceptable Solutions

AS/NZS 1547:2000 Appendices 4.5A, 4.5B, 4.5C, and 4.5D provide acceptable solution for the construction and installation of the most commonly used land application areas.

Construction and installation of land application areas not covered by the above acceptable solutions may be accepted provided they meet the general performance requirements of this Code.

Street Frontage

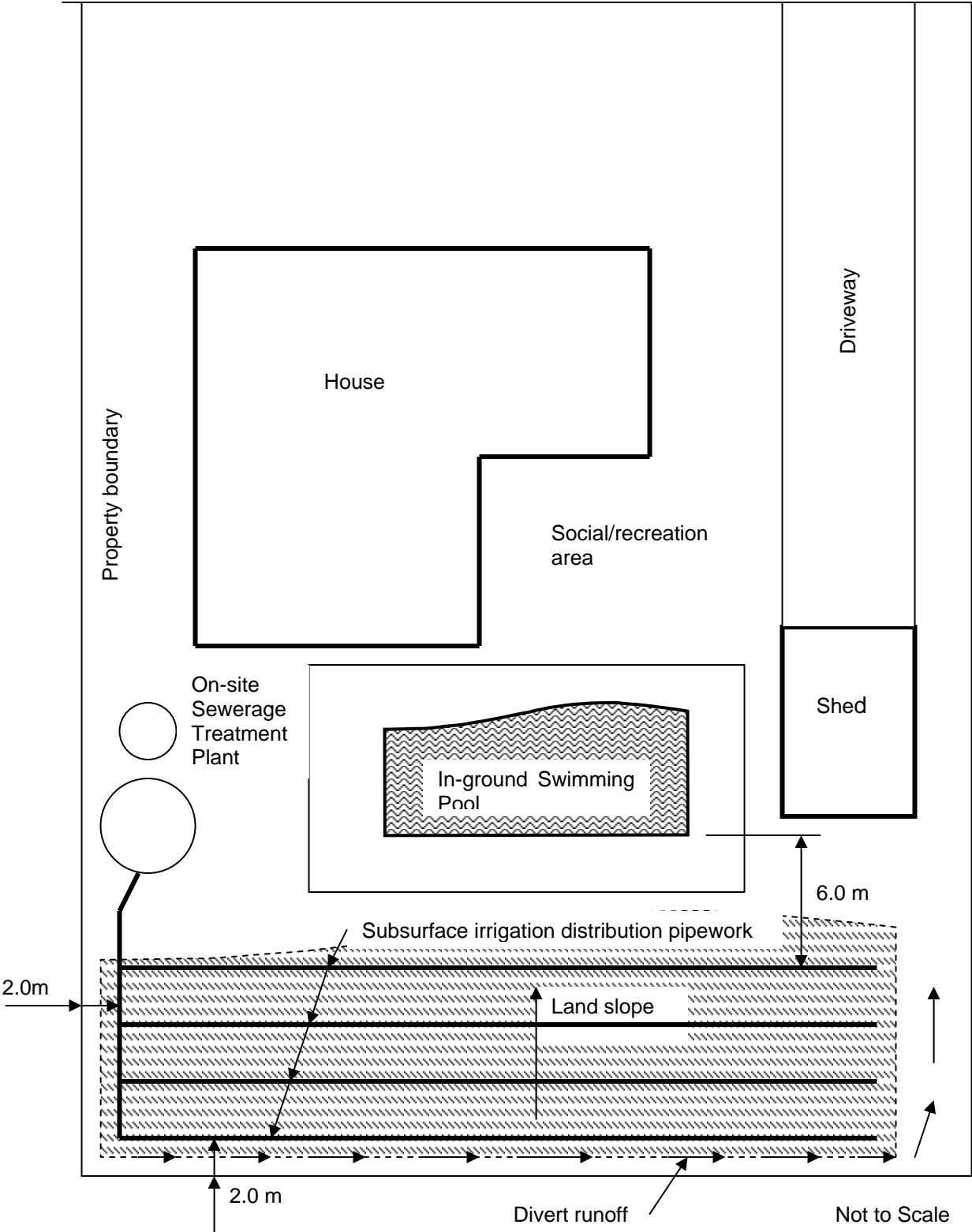
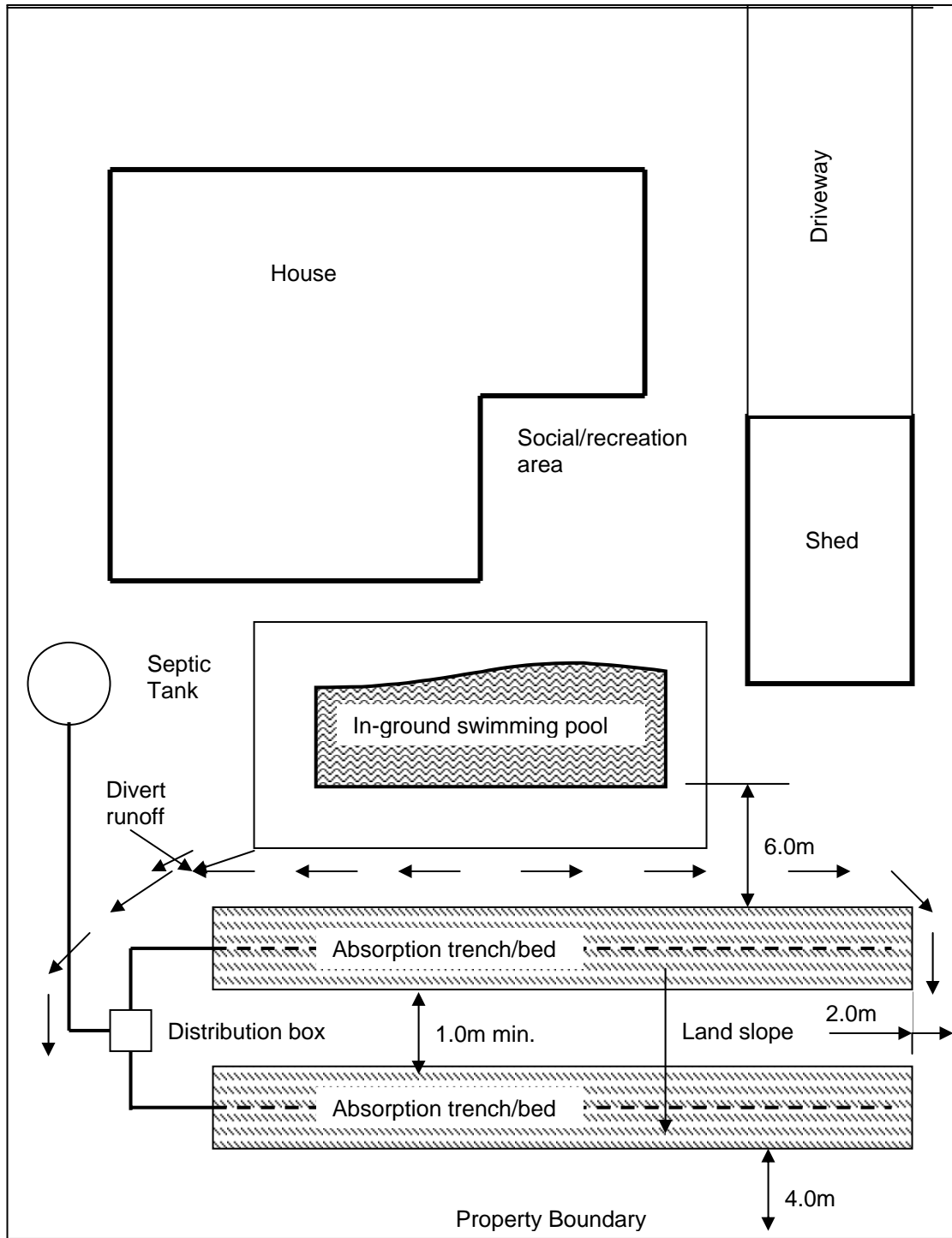


Figure 1.1 – Setback distances shallow subsurface irrigation area where landfall is to the front of the block

Street Frontage



Not to Scale

Figure 1.2 – Setback distances soil absorption trench where landfall is to the rear of the allotment.

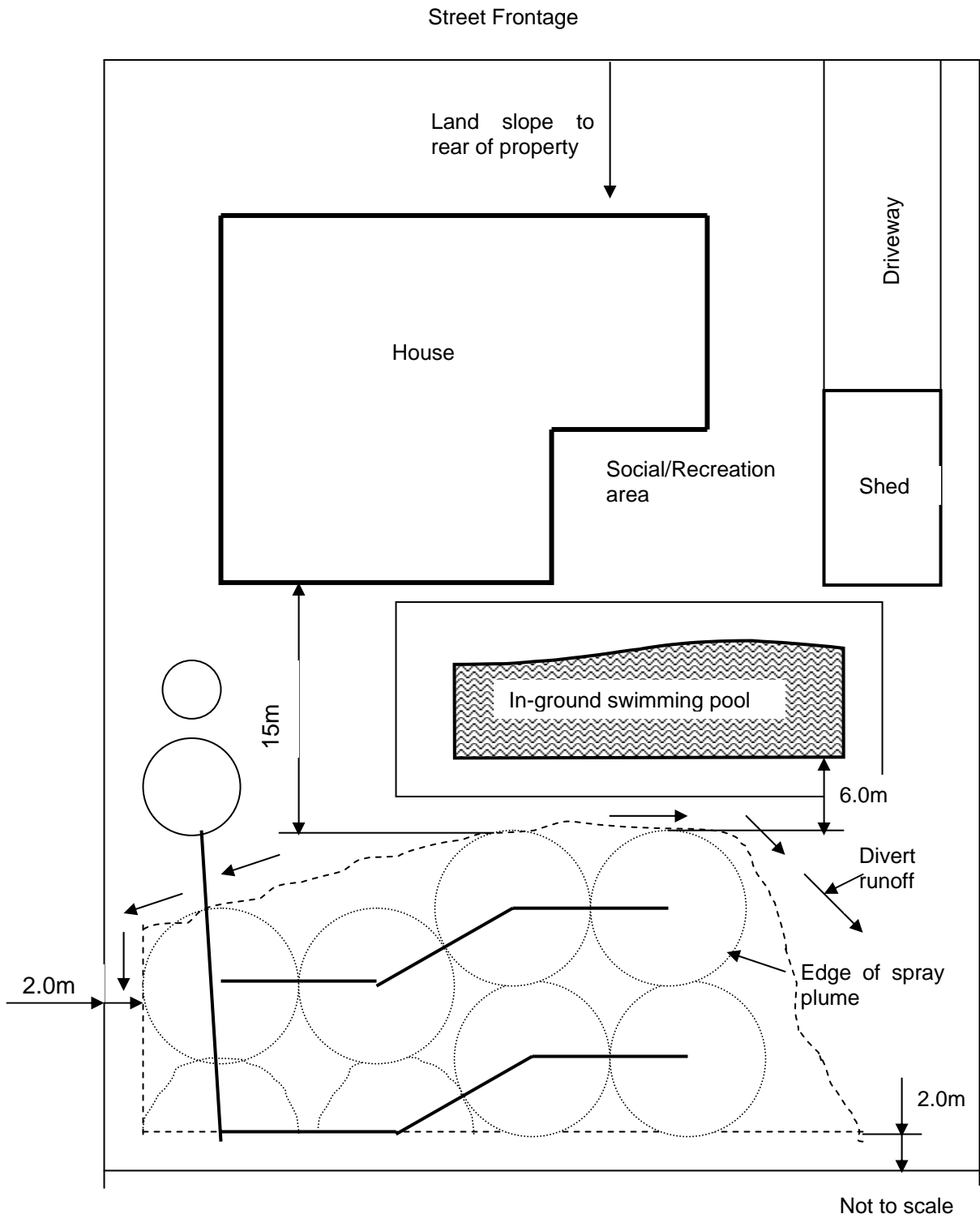


Figure 1.3 – Horizontal separation distances for surface irrigated land application areas

PART 2.0 – USE OF GREYWATER FOR GARDEN AND LAWN IRRIGATION IN SEWERED AREAS

Contents

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 - 2.10.3 Greywater Treatment Plants
 - 2.10.4 Greywater Application Area
- 2.11 Construction and Installation
- 2.12 Marking, Labelling and Signage

2.1 Purpose

The purpose of this Part of the QPW Code is to ensure that greywater use facilities in sewered areas are designed and constructed in a manner that protects public health and maintains and enhances the environment.

2.2 Application

This Part of the QPW Code applies to greywater use facilities⁸ serving premises defined in Section 85B, *Plumbing and Drainage Act 2002*.

2.3 Associated Requirements

Plumbing and Drainage Act 2002 and *Standard Plumbing and Drainage Regulation 2003*.
Health Act 1937 (Part 3), Division 7)

2.4 Referenced Standards

AS/NZS 1546.1:1998 On-site domestic Wastewater Treatment Units Part 1:Septic Tanks
AS 2698.2 Plastic pipes and fittings for irrigation and rural applications.
AS 1345: Identification of the contents of pipes, conduits and ducts.

2.5 Definitions

Unless noted otherwise all terms have the same meaning as given in the Dictionary of the *Plumbing and Drainage Act 2002* and *Standard Plumbing and Drainage Regulation 2003*.

2.6 Function

Greywater use facilities are designed to process greywater sourced from components such as laundry, bath, shower and hand basins and disperse the effluent to the greywater application area⁹ in an even and constant manner that will best promote plant growth.

2.7 Context of Use

Greywater may contain faecal indicator bacteria in concentrations high enough to indicate a health risk from the potential presence of pathogenic microorganisms. A level of caution is to be exercised with greywater use due to associated health risks.

Greywater use facilities in sewered areas are to be sited within the property boundaries of the premises producing the greywater and come within the daily “control” of the occupier of the premises.

The factors that need to be assessed and managed that affect the final types of facility to be installed are:

- a) The land availability for installing a facility may be flat or hilly. It may have a good depth of natural soil or rock or a mixture of both. The soil itself may have chemical characteristics that make it unsuitable for long-term application of greywater.
- b) The beneficial use of greywater avoids human contact, poses no environmental concerns and promotes efficient application of greywater to plants.
- c) Greywater diversion devices and greywater treatment plants may be installed in the ground, near the surface or be free-standing in the open air. In these situations

⁸ Defined in *Plumbing and Drainage Act 2002*, Schedule, Dictionary

⁹ Defined in *Plumbing and Drainage Act 2002*, Schedule, Dictionary.

greywater use facilities may be exposed to the effects of the weather, internal loads/pressures, external loads/pressures and any ground movement. In addition corrosion of materials is possible internally from the greywater and externally from the surrounding environment.

2.8 Performance Objectives

The key performance objectives for the beneficial use of greywater in sewered areas are:

- a) To protect public health by ensuring that risks associated with the dispersal of greywater to the greywater application area are minimised;
- b) To maintain and enhance the quality of the environment by ensuring that the soil productivity is maintained, surface water and groundwater are not polluted, the water requirements of the vegetation are recognised and cumulative and adverse environmental effects are avoided;
- c) To maintain community amenity by ensuring that the greywater use facility has no adverse impact on the built environment.

2.9 Performance Requirements

2.9.1 Design and Structure

Greywater use facilities shall be constructed of durable materials. The components comprising the greywater use facility shall be watertight, where applicable, and be capable of withstanding vertical, lateral and uplift loads imposed by any situation for which they are designed.

All treatment tanks and pump wells must comply with the structural and access requirements of AS/NZS 1546.1:1998.

Greywater Diversion Devices

A greywater diversion device¹⁰ shall be designed:

- a) to incorporate a means of removing gross solid material such as hair, lint etc;
- b) to incorporate means of diverting the greywater to a subsurface irrigation system;
- c) to avoid storage of greywater in a holding tank after passing through the greywater diversion device;
- d) so that devices have readily accessible maintenance points with security against unauthorised access;
- e) to incorporate means of preventing foul air and gases creating an odour nuisance and entering buildings.

Greywater Treatment Plants

Greywater treatment plants¹¹ shall be designed:

¹⁰ *Plumbing and Drainage Act 2002*, Section 85B (2) (c), (d) and (e).

¹¹ Defined in *Plumbing and Drainage Act 2002*, Schedule, Dictionary.

-
- a) to prevent the direct flow of greywater between inlet and outlet;
 - b) to avoid the likelihood of blockage, leakage or overflow;
 - c) so that storage of greywater in a holding tank after treatment is avoided;
 - d) from materials that are resistant or impervious both to the waste contained in the treatment unit and to the external environment such as groundwater or sunlight for the serviceable life of the unit;
 - e) to avoid the likelihood of foul air and gases creating an odour nuisance and entering buildings;
 - f) so that the entire structure of the unit and its associated inspection and access covers are integrally sound, and avoids the penetration by roots, entry of overland runoff, insects and groundwater;
 - g) with access for removal of greywater treatment plant contents;
 - h) with readily accessible maintenance points and security against unauthorised access;
 - i) so that systems incorporating an irrigation pump are fitted with a high water level warning device to warn of pump failure or system blockage;
 - j) to prevent the likelihood of damage from superimposed loads or normal ground movement;
 - k) to be able to perform adequately with normal maintenance over their serviceable life;
 - l) to ensure no rainwater/infiltration can back flow to the sanitary drainage during periods of heavy rainfall.

Greywater Application Areas

The greywater application area shall be designed:

- a) to incorporate shallow subsurface dispersal of greywater from a diversion device or effluent from a greywater treatment plant;
- b) so that shallow subsurface drip irrigation lines and emitters are suitable for long term operation having regard for the likely quality of effluent from the greywater diversion device or treatment plant;
- c) so that there is sufficient greywater irrigation area to ensure long term performance, taking soil types and likely greywater volumes into consideration;
- d) so that the drip irrigation line and emitters are buried at a minimum depth of 100 mm below ground level;

-
- e) to avoid above ground ponding of greywater after its application to the soil;
 - f) to avoid the likelihood of blockage and leakage;
 - g) to provide reasonable access for maintenance, cleaning and clearing of blockages;
 - h) from materials which are impervious both to the greywater and to water in the soil.

2.9.2 Mechanical and Electrical Equipment

All mechanical and electrical equipment shall be readily accessible for maintenance or replacement.

2.9.3 Serviceable Life

Serviceable life of a greywater use facility means the period for which the facility is designed installed and maintained using the components specified and built in accordance with the approved specification.

Serviceable life of components means that period for which they are designed and rated to perform reliably to specification.

All metal fittings, fasteners and components of the greywater use facility other than pumps and motors shall be of non-corroding material and shall have a service life of at least 15 years.

2.9.4 Construction and Installation

General

Any on-site assembly or construction of greywater use facilities shall be done so that the joints and junctions are watertight and prevent the ingress of tree roots. Subsequent installation shall be done in a manner, which preserves the integrity of the greywater use facility and the installation design in stable soil conditions.

Site Work

Site work shall be carried out:

- a) to provide stability for any construction on the site and on adjoining sites;
- b) so as not to affect the stability of nearby structures;
- c) to prevent flotation;

and to take account of the effects of:

- d) changes in groundwater level;
- e) water, weather and vegetation;
- f) ground loss and slumping.

Distribution System

The distribution system shall:

-
- a) convey greywater from the diversion device or effluent from the treatment plant to the appropriate part of the system;
 - b) be constructed to avoid the likelihood of blockage or leakage
 - c) be supported, jointed and protected in a way that will avoid the likelihood of penetration of roots or the entry of groundwater;
 - d) be constructed to avoid the likelihood of damage from superimposed loads or normal ground movement;
 - e) where necessary be ventilated to avoid the likelihood of foul air and gases accumulating in the system.

2.10 Means of Compliance

2.10.1 Sustainable Use of Greywater

Use of greywater on-site is only acceptable as an alternative to discharging to sewer if the use is sustainable. Sustainable use occurs when the greywater is applied to meet plant needs during periods when there is insufficient rainfall and there is negligible discharge to the environment.

For safe and sustainable operation, the inputs i.e. rainfall and irrigation water (greywater) must not exceed the outputs i.e. evapotranspiration, infiltration, and seepage. All surface runoff from the area should be rainfall alone. Thus greywater is applied to the area to meet the water needs of the plant when rainfall is not sufficient. Under these circumstances lateral subsurface seepage should be negligible. However it is important that there is a net, although possibly small, deep infiltration component to remove added salts from the area. For this to happen, shallow water tables are not acceptable.

2.10.2 Greywater Diversion Device

This section identifies the capacity and structural requirements for gravity diversion devices and pump diversion devices.

- a) Greywater diversion devices use coarse screen filters or sedimentation to remove oils/greases and solids prior to discharge to the greywater application area.
- b) The capacity of the device is based on the household fixtures that are contributing greywater to the device.
- c) Pump diversion devices generally incorporate a surge tank to temporarily hold large drain flows from washing machines and bathtubs before distribution by a pump to a subsurface land application area.
- d) The surge tank shall be vented in accordance with the requirements of AS/NZS 3500.
- e) Access openings to the surge tank shall be fitted with locking gasket covers, or approved equivalent, to allow inspection and cleaning and to prevent entry of mosquitoes, flies and vermin.

-
- f) The pump diversion device shall be fitted with a high water level warning device to warn of pump failure or system blockage.
 - g) Systems that physically capture/filter out solids prior to irrigation and require owner input for cleaning must have the filter readily accessible and include health and safety advice for the owner.

2.10.3 Greywater Treatment Plants

Greywater treatment plants are subject to specific design and sizing appropriate to their intended application. They shall be installed/constructed, operated and maintained in accordance with the designer's or manufacturer's instructions.

Greywater treatment plants must have a Chief Executive Approval granted by the Chief Executive of Department of Local Government, Planning, Sport and Recreation. Part 4.0 of this Code sets out the minimum requirements for Chief Executive Approval of a greywater treatment plant.

Effluent quality compliance criteria can be found in this Code in Part 4.0, Clause 4.10.2 Performance Requirements

2.10.4 Greywater Application Area

This section establishes requirements for greywater application area design and siting to meet the performance requirements of this Code.

A shallow subsurface drip system is installed at least 100 mm below ground into the soil in grassed or other suitably vegetated areas. It utilises a system of dosed distribution of effluent from perforated small-diameter pipes or dripper lines.

The design process shall use the results of the investigations required under the Standard Plumbing and Drainage Regulation 2003, Part 1A, Section 6A and the subsequent determination of soil categories along with any environmental constraints and the design loading rate to select, size and position the greywater application area.

The irrigation system shall be designed to ensure that greywater is not applied at rates, which exceed the absorption capacity of the soil and the plant needs during times of insufficient rainfall. Care shall be taken to ensure that the application rate is:

- a) sufficient to prevent excess salt accumulation in the root zone; but
- b) not enough to cause harmful long-term environmental effects to the soil of the greywater application area or the groundwater and any adjacent surface water.

The inappropriate use of domestic greywater has the potential to harm the environment by:

- Overloading the garden with nutrients;
- Exceeding a site's hydraulic loading, causing runoff of polluted water into stormwater drains, rivers, streams and other people's property;

- Causing the soil to become permanently saturated, preventing plants from growing and causing offensive odours;
- Overloading the garden with salt, causing degradation of the soil structure, decreased permeability and changes to soil pH; and
- Degrading the soil with chemical impurities, which affect the soil's ability to assimilate nutrients or water.

Soil and plants can process many of the contaminants found in greywater if the system is not overloaded. These include organic material, nutrients and sediments. Some nutrients can even be beneficial in moderate concentrations.

Calculating the daily volume of greywater generated and the required application area

The volumes of greywater available at a particular house vary depending on the number of occupants, number and age of children, personal habits and lifestyles.

In determining an appropriate land area for greywater it will be necessary to consider the volume of greywater likely to be generated under normal circumstances at the premises. Estimates of greywater generated are included in Australian Standard AS 1547.

Recommended estimates for greywater generated from average homes are given in Table 2.1.

Table 2.1
Recommended estimates for greywater generated by an average house
(3 bedroom home and four occupants)¹

Greywater flow	Litres/person/day ²
Daily greywater flow from bathroom	60
Daily greywater flow from laundry	35
Total for bathroom and laundry	95

¹ These volume estimates are recommended average figures. Local governments may upon considering the public health and environmental conditions for the particular site vary these estimates to reflect local conditions.

² The above estimates assume a top loading washing machine and no water saving devices in the bathroom and laundry.

Siting a Greywater Application Area

Once the greywater irrigation system has been correctly sized, identification of a suitable location for siting the system in the garden or lawn needs to be considered. It must be located to ensure the protection of buildings, structures and adjoining properties. Recommended setback distances are given in Table 2.2.

Note: On smaller blocks, it may be necessary to consider using greywater generated from one source only, that is, either the laundry or the bathroom in order to meet the siting requirements for a greywater application area.

Table 2.2
Recommended Minimum Setback Distances

Feature	Setback Distance ¹ (metres)
Property boundaries, pedestrian paths, and driveways	1.0
Footings of buildings	1.5
Retaining wall footing	1.0
In ground swimming pool surrounds	1.0
In ground potable water tank	6.0
Bores intended for human consumption	30.0

¹ The setback distances are recommended minimum distances. The local government may upon considering the public health and environmental conditions for the particular site increase the distances given in Table 2.2

Any pumps or other motors associated with the greywater use facility should not be located adjacent to bedrooms, living rooms or recreational areas of neighbouring properties. The pumps and/or motors should be contained in an acoustic enclosure so as to reduce the emission of noise.

The noise level with all equipment (except any alarm system) operating should not exceed 40 dB measured on fast response at a distance of 1 m from the nearest item of noise emitting equipment.

Comment: *The minimum setback distances in Table 2.2 differ from those given in Part 1.0 and Part 3.0 of this Code. The recommended setback distances in Table 2.2 take into consideration that greywater is being used to beneficially irrigate the garden or lawn. Therefore greywater should not be applied during wet weather or at times when there is adequate moisture in the soil to meet the needs of the plants. This differs from applying greywater to a land application area in unsewered areas where the greywater must be applied regardless of weather conditions and soil moisture. In an unsewered area the option to divert the greywater to a sewer does not exist.*

Groundwater Clearance

A minimum clearance of 1.2 m of unsaturated soil between the dripper lines and highest known water table shall be maintained at all times

2.11 Construction and Installation

General

This section sets out the requirements for construction and installation of greywater use facilities to meet the performance requirements of Section 2.9.4.

Type of System

The greywater application area shall be a shallow subsurface dripper system where the pipework is buried a minimum of 100 mm below the ground surface.

Irrigation Area

The irrigation area shall have an adequate depth of natural topsoil (or imported topsoil if necessary) to store the applied greywater and to support the growth of evergreen plants/vegetation to maximise evapo-transpiration.

Separation Distances

The system shall be installed with appropriate separation distances required by this Code.

Sloping Sites

The ingress of surface and seepage water into the greywater application area shall be controlled where appropriate.

Pipework

The greywater distribution pipes and fittings shall:

- a) be polyethylene complying with AS 2698.2.
- b) have the dripper system designed to evenly distribute the effluent and to avoid clogging by soil or root intrusion.
- c) be permanently buried and fixed.
- d) have the dripper system spaced to provide an effective distribution of effluent over the whole of the design area.

Solids, Soil and Water

Measures shall be taken to prevent malfunction:

- a) the system shall have a means of removing larger suspended particles and filters that require maintenance by the owner must be readily accessible and include information about health and safety matters.
- b) Vacuum breakers with surface boxes shall be provided to prevent ingress of soil into the irrigation lines under the effects of negative pipeline pressures.
- c) Scour valves in surface boxes shall be provided where applicable to allow periodic cleaning of the system. Their positions shall be marked.

2.12 Marking, Labelling and Signage

Greywater diversion components shall be labelled "Recycled/Reclaimed Water - Do not drink".

All pipes, pipe sleeves and identification tapes shall be marked with the following in accordance with AS 1345,

"WARNING RECYCLED/RECLAIMED WATER – DO NOT DRINK"

PART 3.0 – USE AND DISPOSAL OF GREYWATER IN UNSEWERED AREAS

Contents

- 3.1 Purpose
- 3.2 Application
- 3.3 Associated Requirements
- 3.4 Referenced Standards
- 3.5 Definitions
- 3.6 Function
- 3.7 Context of Use
- 3.8 Performance Objectives
- 3.9 Performance Requirements
- 3.10 Performance Criteria
- 3.11 Site and Soil Evaluation
- 3.12 Means of Compliance
- 3.13 Further Information

3.1 Purpose

This part of the QPW Code sets out the technical requirements for site and soil evaluation, design, installation and operation of a greywater use facility in an unsewered area.

3.2 Application

This Part of the QPW Code applies to greywater use facilities serving premises where the greywater generated from sources such as kitchen sink, dishwasher, laundry, bath shower or hand-basin and where the facility may include a greywater treatment plant having a peak design capacity to treat greywater of 20 or less equivalent persons.

A greywater use facility will be required where a waterless composting toilet, incinerating toilet or chemical toilet is used for collection and treatment of toilet wastes. A greywater use facility may be used where the owner of the premises wishes separately to collect and treat the blackwater in a septic tank or other approved treatment facility. Wastewater from the kitchen and dishwasher may also be included as part of the waste stream to the septic tank.

This Part of the QPW Code does not cover the design and installation of waterless composting toilets, chemical toilets and incinerating toilets. Further information on waterless composting toilets may be obtained from AS/NZS 1546.2:2001.

3.3 Associated Requirements

Environmental Protection (Waste Management) Regulation 2000, Schedule 8, Part 2, Chemical, Composting and Incinerating Toilets.

3.4 Referenced Standards

AS/NZS 1546.1:1998 On-site domestic Wastewater Treatment Units Part 1: Septic Tanks

AS/NZS 1546.2:2001 On-site domestic Wastewater Treatment Units Part 2: Waterless Composting Toilets

AS/NZS 1547:2000 On-site domestic wastewater management

3.5 Definitions

Unless noted otherwise all terms have the same meaning as given in the Dictionary of the *Plumbing and Drainage Act 2002* and *Standard Plumbing and Drainage Regulation 2003*.

Unless noted otherwise all terms have the same meaning as given in the relevant Australian/New Zealand or Australian Standard.

If a definition given in the relevant Australian/New Zealand Standard or Australian Standard is inconsistent with the Act or Regulation, the Act or Regulation prevails to the extent of the inconsistency.

3.6 Function

Greywater use facilities serving premises in unsewered areas are designed to process greywater sourced from components such as kitchen sink, dishwasher, laundry, bath, shower and hand basins and disperse the effluent to an appropriate land application area.

3.7 Context of Use

Greywater may contain faecal indicator bacteria in concentrations high enough to indicate a health risk from the potential presence of pathogenic microorganisms. A level of caution is to be exercised with greywater use due to associated health risks.

For the safe use of greywater the following requirements must be met:

- (a) greywater when discharged above ground by surface irrigation methods must be treated to remove or destroy pathogenic microorganisms;
- (b) human contact with greywater that has not been treated to remove pathogenic microorganisms must be avoided;
- (c) the greywater treatment system and land application area must be sited within the property boundaries of the premises producing the greywater; and
- (d) the proposed use of the greywater must be appropriate for the site.

The greywater treatment plant may be required to treat greywater from a variety of sources. The designer shall ascertain the sources and size the system appropriately. It is important to ensure that on change of ownership or occupation of the premises that the new owner or occupier is aware of the waste streams flowing to the greywater treatment plant and the wastewater treatment plant.

3.8 Performance Objectives

The performance objectives for the management of an on-site sewerage facility specified in Clause 2.2.1 AS/NZS 1547:2000 shall apply as appropriate for the management of a greywater use facility for unsewered areas.

3.9 Performance Requirements

The performance requirements for the management of an on-site sewerage facility specified in Clause 2.2.2 AS/NZS 1547:2000 shall apply as appropriate for the management of a greywater use facility for unsewered areas.

Greywater Use Facility

The performance requirements for wastewater systems specified in Clause 2.4.1 AS/NZS 1547:2000 except for serviceable life criteria shall apply as appropriate to a greywater use facility for unsewered areas.

Serviceable Life

Serviceable life of a greywater use facility means the period for which the facility is designed, installed and maintained using the components specified and built in accordance with the approved specification.

Serviceable life of components means that period for which they are designed and rated to perform reliably to specification.

All metal fittings, fasteners and components of the greywater use facility other than pumps and motors shall be of non-corroding material and shall have a service life of at least 15 years.

Construction and Installation

The performance requirements for the construction and installation of an on-site sewerage facility specified in Clause 2.5.1 AS/NZS 1547:2000 shall apply as appropriate to a greywater use facility for unsewered areas.

3.10 Performance Criteria

The performance criteria for wastewater systems specified in Clause 2.4.2 AS/NZS 1547:2000 except for capacity and effluent quality criteria shall apply as appropriate to a greywater use facility for unsewered areas.

Capacity

- (a) A daily allowance of 136 L/person comprising greywater sourced from kitchen, laundry and bathroom.

Comment. The above figure represents 68% of the daily allowance of 200 L/person and is representative of current information available on greywater discharge from a domestic dwelling.

- (b) A flow of greywater from a range of population equivalents up to 20 persons – being 19,000 L/week for greywater sourced from kitchen, laundry and bathroom.
- (c) Sludge and scum accumulation as specified in Clause 2.4.2.1 (c) AS/NZS 1547:2000 shall apply as appropriate to greywater use in unsewered areas.

Effluent Quality

Three levels of effluent quality are defined based on the level of treatment i.e. primary, secondary and advanced secondary. The effluent quality criteria for each level are given in Table 3.1.

Table 3.1
Effluent quality based on level of treatment

Parameter	Primary Effluent mg/L	Secondary Effluent mg/L	Advanced Secondary Effluent mg/L
Biochemical oxygen demand	120-240	20	10
Total suspended solids	65-180	30	10
Thermotolerant organisms (org/100ml)	Not applicable	200	10

Greywater that has received coarse filtration to remove solids such as hair, lint, food scraps etc is a primary effluent and must be discharged to a subsurface land application area.

Greywater that has been treated to a secondary effluent standard and disinfected may be dispersed to a land application are by surface irrigation methods.

3.11 Site and Soil Evaluation

Performance Objectives

The performance objectives for a site and soil evaluation as specified in Clause 2.3.1 AS/NZS 1547:2000 shall apply as appropriate to a greywater use facility for unsewered areas.

Means of Compliance

The means of compliance for a site and soil evaluation procedure as specified in Section 4.1 of AS/NZS 1547:2000 to meet the performance objectives given above shall apply as appropriate to a greywater use facility for unsewered areas.

3.12 Means of Compliance

Land Application Systems

The means of compliance for land application system design and sizing as specified in Section 4.2 of AS/NZS 1547:2000 except for siting considerations shall apply to land application systems for greywater use facilities in unsewered areas.

Siting Consideration for Greywater Use Facilities

The siting considerations for land application areas specified in Clause 1.10.1 of QPW Code: 2005 shall apply to land application areas for greywater use facilities in unsewered areas.

Greywater Treatment Plants

Greywater treatment plants are subject to specific design and sizing appropriate to their intended application. They shall be installed/constructed, operated and maintained in accordance with the designer's or manufacturer's instructions.

Greywater treatment plants must have a Chief Executive approval granted by the Chief Executive of Department of Local Government, Planning, Sport and Recreation. Part 4.0 of this code sets out the minimum requirements for Chief Executive approval of a greywater treatment plant.

Construction and Installation

The requirements for construction and installation of wastewater systems as specified in Section 4.5 of AS/NZS 1547:2000 with the exception of commissioning and inspections shall apply to greywater use facilities in unsewered areas.

3.13 Further Information

Further information on the use and disposal of greywater in unsewered areas can be found in *Guidelines for the use and Disposal of Greywater in Unsewered Areas* at the website www.lgp.qld.gov.au

PART 4.0 CHIEF EXECUTIVE APPROVAL FOR AN ON-SITE SEWAGE TREATMENT PLANT

Contents

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- 4.5 Procedure
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 - 4.16.3 Installation Manual
 - 4.16.4 Operation and Maintenance Manual

- Annexure 1 Chief Executive Approval Procedure
- Annexure 2 Procedure for Approval of Modification or Variation to Approved Design

4.1 Purpose

The purpose of Part 4.0 of this Code is to establish the minimum requirements for a Chief Executive Approval¹¹ of an on-site sewage treatment plant granted by the Chief Executive of the Department of Local Government, Planning, Sport and Recreation and to:

- (a) provide a process to obtain Chief Executive approval;
- (b) ensure that the product is fit for purpose.

4.2 Application

Chief executive approval applies to on-site sewage treatment plants that:

- are generally available for purchase by retail;
- treat sewage of predominantly domestic origin;
- uses more than primary treatment (solids settlement); and
- where the treated sewage is used primarily for the purposes of recycling water for
 - above ground spray irrigation,
 - covered surface drip irrigation,
 - shallow subsurface irrigation, or
 - by other means such as evapotranspiration beds, absorption trench/bed or mound.

An on-site sewage treatment plant for water recycling may include many types of devices. The devices included in this Code are output defined and produce a discrete category of risk where members of, and visitors to, the household may come into direct contact with the treated effluent. These devices may include but are not limited to:

- an aerated wastewater treatment system;
- a single pass or recirculating sand filter;
- a reverse osmosis or microfiltration filter;
- a biological filter; or
- any treatment system or device or combination of treatment hardware to form a treatment unit which satisfies the accreditation, performance and design requirements of this Code.

Chief executive approval applies to on-site sewage treatment plants where the sewage generated on the property is less than that of 20 equivalent persons.

Chief executive approval does **not** apply to an on-site sewage treatment plant:

- (a) that is designed and constructed in accordance with Section 4.2A9 of AS/NZS 1547:2000, and
- (b) that is specifically designed and constructed in-situ by the owner or occupier of the premises or a person other than the owner or occupier and effluent is discharged to a subsurface land application system, e.g. constructed surface or subsurface flow wetland and associated land application area.
- (c) That is a chemical, composting or incinerating toilet.

Chief executive approval does **not** include the method of land application of the treated effluent.

¹¹ *Plumbing and Drainage Act 2002*, Part 5, Divisions 1 and 2.

4.3 Referenced Standards

AS/NZS 1546.3:2001 On-site domestic wastewater treatment units, Part 3: Aerated wastewater treatment systems.

AS/NZS 1547:2000 On-site domestic–wastewater management

4.4 Definitions

Unless noted otherwise all terms have the same meaning as given in the Dictionary of the *Plumbing and Drainage Act 2002* and *Standard Plumbing and Drainage Regulation 2003*.

Unless noted otherwise all terms have the same meaning as given in the relevant Australian/New Zealand or Australian Standard.

If a definition given in the relevant Australian/New Zealand Standard or Australian Standard is inconsistent with the Act or Regulation, the Act or Regulation prevails to the extent of the inconsistency.

4.5 Procedure

The procedure for obtaining Chief Executive Approval for an on-site sewage treatment plant is shown in the form of a flow chart in Annexure 1 to this part.

4.6 Testing Agency

All compliance checking, monitoring, testing, and sampling is to be performed by an agency accredited as a third party quality management certification body certified by the Joint Accreditation System of Australia and New Zealand (JAS-ANZ) or by another accreditation body with which JAS-ANZ has a memorandum of understanding, and at the cost of the applicant.

The samples for BOD, suspended solids, total nitrogen, total phosphorus and thermotolerant coliforms, taken by the testing agency, must be directly transported and delivered to a laboratory, registered by the National Association of Testing Authorities (NATA) to carry out analyses for the parameters specified. Where applicable residual disinfectant and dissolved oxygen samples must be analysed on site.

4.7 Application Criteria

This section states the information or documents required for assessment of an application for Chief Executive Approval

An application to commence performance evaluation testing shall be submitted to the Chief Executive. Following review of this application, the applicant will be advised on the performance evaluation procedure, i.e. either in accordance with Section 4.10 or Section 4.11.

When performance evaluation testing of the on-site sewage treatment plant is completed an Application for Approval shall be submitted in hard copy or electronic format. The application must include:

- An application form signed and dated either by the applicant or a person authorised to act on the applicant's behalf (written confirmation of such authorisation should be provided with the application). A signed application form must be submitted in hard copy;
- Where applicable, a certificate of incorporation and business name certificate; and

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- Supporting technical information as required by the application form.

4.8 Existing Interstate or Overseas Approval

If interstate or overseas approval has already been obtained, then application can be made to have the on-site sewage treatment plant approved in Queensland.

Such Chief Executive approval will only be given where it can be shown that the performance evaluation testing program carried out is of an equivalent standard to that required under this Code. If the Chief Executive believes that the performance evaluation testing is not to an equivalent standard then the Chief Executive may require performance evaluation testing in accordance with this Code to be undertaken.

The responsibility rests with the applicant to provide all necessary information to allow a decision to be made in these matters. However, this does not prevent the Department making any independent investigation it considers appropriate.

4.9 Performance Requirements and Design Requirements

4.9.1 General

This section is intended to outline the performance and design requirements for an on-site sewage treatment plant.

The function of an on-site sewage treatment plant is to treat sewage of predominantly domestic origin by means of aerobic and/or anaerobic processes and where required disinfection so as to produce an effluent appropriate to the land application facility.

On-site sewage treatment plants may be installed freestanding, partially in-ground, or buried. In these situations they are exposed to the effects of the weather, internal loads/pressures, external loads/pressures and any ground movement. In addition, corrosion of material of tanks used to contain treatment processes and fittings is possible internally from the wastewater and externally from the surrounding environment.

When installed in the ground, the top surface of the tank(s) is placed at or above the ground surface, so that inspection and access covers are accessed and ingress of surface water is minimised. When the tank(s) is installed below ground level, inspection and access covers must be extended to ground level. Unauthorised or accidental access must be prevented.

4.9.2 Performance Requirements

The performance requirements specified in Section 2.4 of AS/NZS 1546.3 2001, except for the effluent compliance criteria and serviceable life criteria shall apply as appropriate to an on-site sewage treatment plant.

Effluent Quality

For effluent that is to be of secondary quality it shall meet the following effluent compliance characteristics:

- (a) 90% of the samples taken over the test period shall have a BOD₅ less than or equal to 20 g/m³ with no sample greater than 30 g/m³.

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- (b) 90% of the samples taken over the test period shall have total suspended solids less than or equal to 30 g/m³ with no sample greater than 45 g/m³.
 - (c) Where disinfection is provided, 90% of the samples taken over the test period shall have a thermotolerant coliform count (determined by either the most probable number or membrane filter technique) not exceeding 200 organisms per 100 mL with no sample exceeding 1000 organisms per 100 mL.
 - (d) Where chlorination is the disinfection process, the total chlorine concentration shall be greater than or equal to 0.5 g/m³ and less than 2.0 g/m³ in four out of five samples taken.

Effluent Quality – Advanced Secondary

For effluent that is to be of advanced secondary quality it shall meet the following effluent compliance characteristics:

- (a) 90% of the samples taken over the test period shall have a BOD₅ less than or equal to 10 g/m³ with no sample greater than 20 g/m³.
- (b) 90% of the samples taken over the test period shall have total suspended solids less than or equal to 10 g/m³ with no sample greater than 20 g/m³.
- (c) Where disinfection is provided, 90% of the samples taken over the test period shall have a thermotolerant coliform count (determined by either the most probable number or membrane filter technique) not exceeding 10 organisms per 100 mL with no sample exceeding 200 organisms per 100 mL.
- (d) Where chlorination is the disinfection process, the total chlorine concentration shall be greater than or equal to 0.5 g/m³ and less than 2.0 g/m³ in four out of five samples taken.

Where the manufacturer has included nitrogen and/or phosphorus reduction in the treatment process, the effluent compliance criteria shall be able to meet in addition to the above the following nutrient criteria.

- (e) 90% of the samples, with 95% confidence limits taken over the test period shall have a total nitrogen concentration less than or equal to 10 mg/L.
- (f) 90% of the samples, with 95% confidence limits taken over the test period shall have a total phosphorus concentration less than or equal to 5 mg/L.

Comment: *If the nitrogen and phosphorus concentrations do not meet the criteria nominated in (e) and (f) above, the manufacturer can request that recognition be given to the actual nitrogen and/or phosphorus concentration determined in the above evaluation by the Department of Local Government and Planning, Sport and Recreation.*

4.9.3 Serviceable Life

Service life of a system means the period for which that system is designed and rated to comply with the test criteria reliably – using the components specified.

Service life of components means that period for which they are designed and rated to perform reliably to specification.

All metal fittings, fasteners and components of the on-site sewage treatment plant other than the pumps and motors shall be of non-corroding material and shall have a service life of at least 15 years.

All mechanical and electrical parts shall have a minimum service life of 5 years and minimum warranty period of 12 months.

4.9.4 Design Requirements

The design requirements specified in Section 2.5 of AS/NZS 1546:2001 shall apply as appropriate to a prefabricated on-site sewage treatment plant. Specific details of any design requirement mentioned in this Code shall prevail over the Standard. The following design requirements shall also apply.

An on-site sewage treatment plant shall be designed to treat sewage generated by a minimum of 8 persons or up to a maximum of 20 persons and the design loading shall be stated. A built item designed and tested for a specific maximum number of people will be accredited for that loading.

All plastic and perishable components in the on-site sewage treatment plant subject to exposure to ultra-violet radiation, or an adverse chemical or biological environment shall be able to retain their integrity under normal operating conditions to satisfy the service life of the component.

All components shall be capable of being securely fixed to withstand all loads encountered during transportation, installation and normal operation.

Disinfection

Disinfection in accordance with Clause 2.5.12 of AS/NZS 1546.3:2000 shall be provided where applicable.

4.10 Performance Evaluation Testing – AS/NZS 1546.3:2001

The test criteria and test period procedures specified in Appendix A of AS/NZS 1546.3 2001 shall apply to an on-site sewage treatment plant placed under test.

Note: A manufacturer wishing to obtain approval outside Queensland should check the requirements of the relevant regulatory authority before proceeding with performance evaluation testing.

4.11 Performance Evaluation Testing – Other than AS/NZS 1546.3:2001

Where it is difficult or not possible to construct the on-site sewage treatment plant such as in the case of a sand filter or greywater treatment plant, then with the consent of the Chief Executive the performance evaluation testing may be carried out in accordance with the following clauses.

- (a) The test on-site sewage treatment plant or greywater treatment plant (including alarm system) shall be installed on a premises that will produce either a flow of sewage or greywater representative of the operational loading. For a greywater

treatment plant the source components shall include all components e.g. bath, shower, basin, laundry and kitchen where applicable.

(b) Aspects to consider when selecting and setting up a test site include:

- Minimum flow requirements continually received over at least the 26 week monitoring program.
- Premises is occupied full time and on a continual basis over the 26 week monitoring program.
- Greywater influent to the greywater treatment plant is not to be absent for more than three consecutive days.
- Appropriate diversion plumbing to either the sewer or other appropriate system line is made available in the case of greywater treatment plant failure.
- Approval for installation and operation of the test site shall be obtained from the local government.

(c) Raw sewage to the test on-site sewage treatment plant must not be pre-treated by chemical addition and should have characteristics within the following ranges

Parameter	Characteristic
BOD ₅	150-300 mg/L
SS	150-300 mg/L
Total Nitrogen	20-100 mg/L
Total Phosphorus	6-25 mg/L

(d) The test on-site sewage treatment plant or greywater treatment plant shall be installed, commissioned, operated and maintained according to the manufacturer's instructions. The manufacturer is responsible for ensuring the on-site sewage treatment plant or greywater treatment plant is free of defects and is operable.

(e) The on-site sewage treatment plant or greywater treatment plant shall be placed under test over a period of twenty-six (26) weeks. The on-site sewage treatment plant or greywater treatment plant shall be commissioned in accordance with the manufacturer's recommended procedure.

(f) The following data shall be obtained at the described intervals from grab samples collected over the 26-week monitoring period.

Parameter	On-site Sewage Treatment Plant		Greywater Treatment Plant	
	Influent	Effluent	Influent	Effluent
Prescribed (must be analysed)				
BOD ₅	Every 12 days	Every 6 days	Every 12 days	Every 6 days
TSS	Every 12 days	Every 6 days	Every 12 days	Every 6 days
Thermotolerant coliforms	Every 12 days	Every 6 days	Every 12 days	Every 6 days
Free Chlorine (where used)		Every 6 days		Every 6 days
Optional (Manufacturer to nominate)				

Total nitrogen	Every 12 days	Every 6 days	Every 12 days	Every 6 days
Total phosphorus	Every 12 days	Every 6 days	Every 12 days	Every 6 days

If the on-site sewage treatment plant or greywater treatment plant do not include disinfection then thermotolerant coliforms can be excluded from the monitoring program.

- (g) Other data to be recorded at a minimum of every 6 days includes:
- On-site sewage treatment plant or greywater treatment plant inflow reading
 - Site notes and comments
- (h) The final effluent grab samples shall be taken from the outlet chamber or a point prior to land application. The influent samples shall be taken upstream of all process units associated with the built item or greywater treatment plant.
- (i) The samples for BOD₅, total suspended solids, total nitrogen, total phosphorus and thermotolerant coliforms taken by the testing agency shall be directly transported and delivered to a laboratory, registered by NATA to carry out analyses for the parameters specified. Analyses for disinfectant concentration shall be tested onsite immediately after sampling.

The manufacturer shall ensure that the premises are returned to their original condition, or to the satisfaction of the owner of the premises and the local government once testing has been completed.

4.12 Variations to Performance Evaluation Test

The performance evaluation test procedures set out in Clause 4.10 and 11 may not be appropriate for certain on-site sewage treatment plant or greywater treatment plant configurations. The Chief Executive may vary the performance evaluation testing to ensure the plant is tested under the appropriate operational conditions.

4.13 Modifications or Variations to Approved Design

Any modifications or variations to the approved design of the on-site sewage treatment plant or greywater treatment plant shall be submitted to the product certification body that issued the license. Once the product certification body has considered the application, completed additional testing if required and re-issued the certification documentation, the manufacturer shall seek separate consideration and variation of approval of the on-site sewage treatment plant by the Chief Executive.

The procedure for obtaining an approval of a modification or variation to an approved design of an on-site sewage treatment plant is shown in the form of a flow chart in Annexure 2 to this Part.

Applications to the Chief Executive for approval of a modification or variation to the approved design may be submitted in hard copy or electronic format. The application must include:

- An application form signed and dated either by the applicant or a person authorised to act on the applicant's behalf (written confirmation of such authorisation should be provided with the application). A signed application form must be submitted in hard copy.
- Supporting technical information as detailed on the application form.

4.14 Marking

The minimum marking requirements for a prefabricated on-site sewage treatment plant specified in Section 3 of AS/NZS 1456.3 2001 shall apply.

4.15 Warranty and Guaranteed Service Life

By applying for and accepting an approval pursuant to the procedures in this Code, the manufacturer of a prefabricated on-site sewage treatment plant guarantees that the product is:

- manufactured and supplied as approved;
- built in accordance with an approved specification; and
- fit for use, and has a service life as indicated in this section.

4.16 Drawings and Manuals

The following drawings and manuals shall be produced and submitted:

4.16.1 Drawings

Three copies of drawings must be provided in A3 format. They must be full engineering drawings to scale and dimensioned and contain a full listing of all components with name, model, size, description, function, material of manufacture and location in the plant and include any wiring diagrams.

The components to be shown must include the electric motor(s), gearbox, compressor, pump(s), valves, diffusers, media, pipework, scum collection and sludge pumping equipment, brackets, electrodes, float switches, control panel and the arrangement of the alarm.

4.16.2 Owner's Manual

Each on-site sewage treatment plant must be accompanied by an owner's manual prepared by the manufacturer. The authorised representative must provide the manual to the owner at the time of system installation or on occupation of the premises. The manual must be written so as to be easily understood by the intended reader and must include, at a minimum:

- The treatment plant's model designation;
- A statement confirming that the treatment plant meets the requirements of this Code;
- A clear statement of examples of the types of waste that can be effectively treated by the treatment plant;
- A list of household substances that, if discharged to the treatment plant, may adversely affect the treatment plant, the process, or the environment;
- Comprehensive operating instructions that clearly delineate proper function of the treatment plant, operating and maintenance responsibilities of the owner and authorised service personnel, and service-related obligations of the manufacturer or facility builder;
- Requirements for the periodic removal of sludge¹² from the treatment plant;
- A course of action to be taken if the treatment plant is to be used intermittently or if extended periods of non-use are anticipated;
- Detailed methods and criteria to be used to identify treatment plant malfunction or problems;
- A statement instructing the owner to reference the label in the event that a problem arises or service is required; and
- The name and telephone number of an appropriate service representative to be contacted in the event that a problem with the treatment plant occurs.

¹² Sludge is the unstabilised concentrated solids produced during the sewage treatment process.

4.16.3 Installation Manual

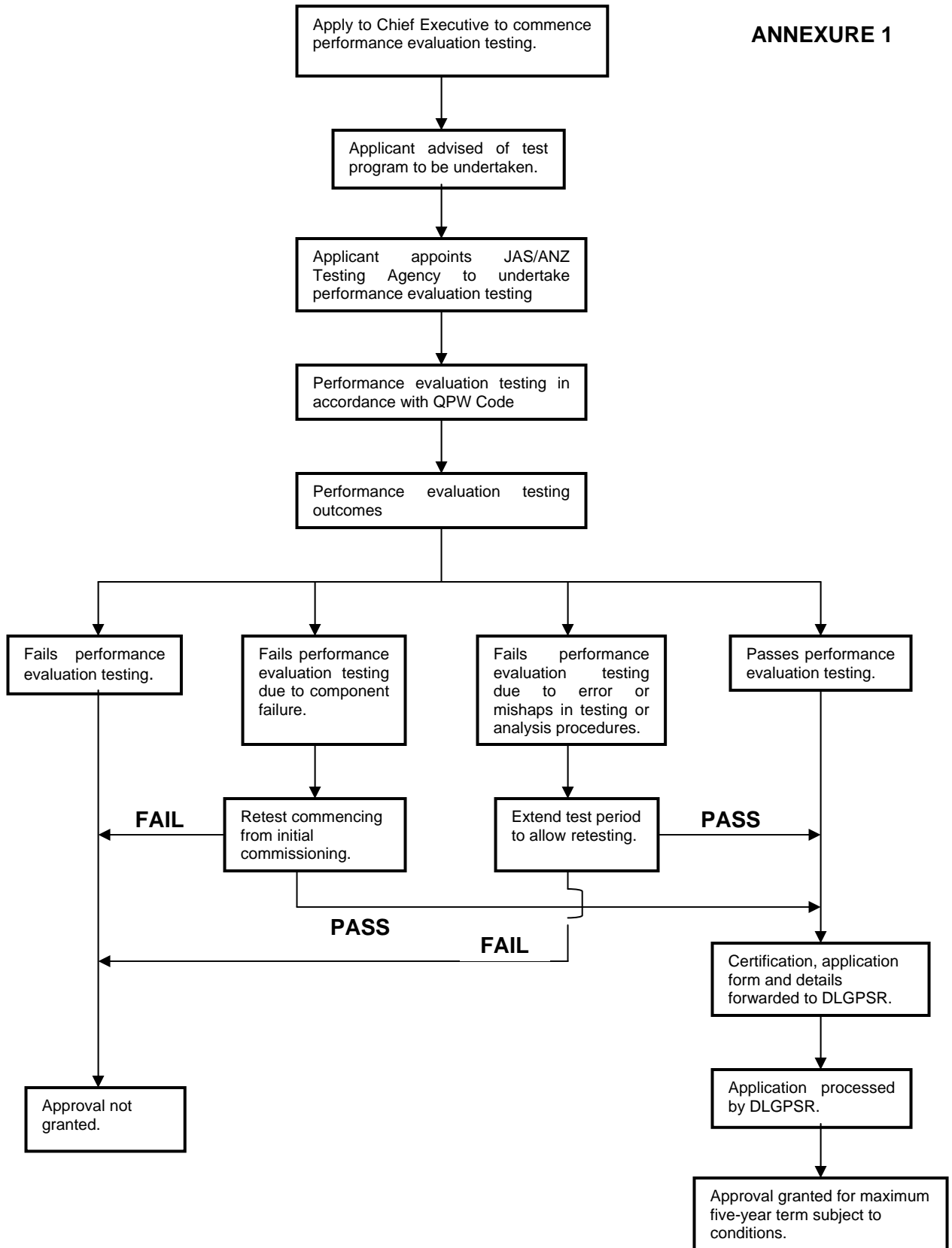
Manufacturers must provide comprehensive and detailed installation instructions to authorised representatives. The manual must be written so as to be easily understood by the intended reader and must include, as a minimum:

- A numbered list of treatment plant components and an accompanying illustration, photograph, or print in which the components are respectively identified;
- Design, construction, and material specifications for the treatment plant's components;
- Wiring schematics for the treatment plant's electrical components;
- Off-loading and unpacking instructions including safety considerations, identification of fragile components and measures to be taken to avoid damage to the treatment plant;
- A process overview of the function of each component and the expected function of the entire treatment plant when all components are properly assembled and connected;
- A clear definition of treatment plant installation requirements including plumbing and electrical power requirements, ventilation, air intake protection, bedding, hydrostatic displacement protection, water tightness, slope and miscellaneous fittings and appurtenances;
- Repair or replacement instructions in the event that a treatment plant possesses flaws that would inhibit proper functioning and a list of sources where replacement components can be obtained; and
- A detailed start-up procedure.

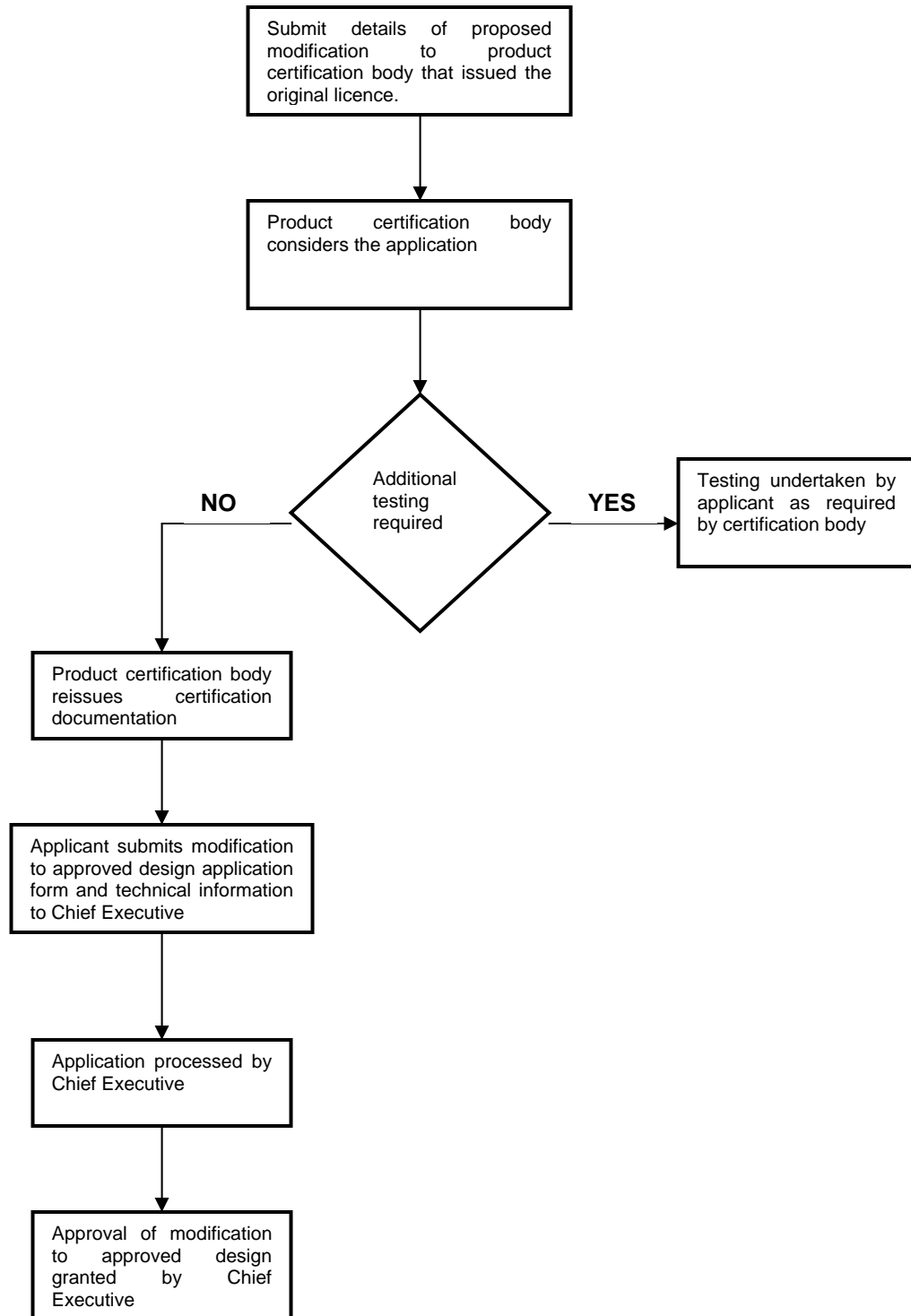
4.16.4 Operation and Maintenance Manual

Manufacturers must provide comprehensive and detailed operation and maintenance instructions to authorised service personnel. The manual must be written so as to be easily understood by the intended reader and shall include, at a minimum:

- A maintenance schedule for all components;
- Requirements and recommended procedures for the periodic removal of sludge from the treatment plant;
- Recommended methods for collecting effluent samples; and
- The expected effluent produced by the operational system.



CHIEF EXECUTIVE APPROVAL PROCEDURE



PROCEDURE FOR APPROVAL OF MODIFICATION OR VARIATION TO APPROVED DESIGN