Greywater guidelines

For plumbers

A guide to the use of greywater in Queensland

Effective August 2008
Introduction

Queensland’s ClimateSmart 2050 strategy has been developed to help the state address climate change. Through the ClimateSmart adaptation plan, the Queensland Government is working to ensure we have a secured future water supply.

The Plumbing and Drainage Act 2002 (PDA) and the Queensland Plumbing and Wastewater Code (QPW code) complements the government’s commitment to water savings through the implementation of a wide range of measures including sub-meters, expanded use of treated greywater and blackwater re-use trials.

In an aim to help protect and conserve the state’s water resources, the Queensland Government will introduce a new version of the Queensland Development Code (QDC) Part MP 4.2 which addresses water savings targets in class 1 buildings and a new QDC Part MP4.3 to address alternative water sources in commercial buildings. These will commence on 1 January 2008.

The QPW code compliments the QDC by providing for the approval of greywater treatment plants and setting the effluent quality criteria for greywater use.

From 1 January 2008, in both sewered and unsewered areas, appropriately treated greywater may be used for purposes such as:
- toilet flushing
- washing of paths, walls or vehicles
- cold water supply to washing machines
- lawn and garden spray irrigation.

In sewered areas greywater systems can be used with all classes of building generating up to 50 000 litres of greywater per day. However, where the amount generated per day is greater than 3000 litres, a greywater treatment plant must be installed.

The purpose of this guide is to assist plumbers to understand the technical and regulatory requirements for the installation of greywater treatment plants and greywater use facilities. It also contains details on the potential uses of treated and untreated greywater.

The guide aims to protect our high quality of our drinking water supplies and ensure wastewater systems are maintained so that we maintain our high standard of public health.

A full copy of the QPW code is available on the Department of Infrastructure and Planning website at www.dip.qld.gov.au
Important notes

This document should be used as a guide to interpreting the requirements of the PDA and the QPW code.

All terms referred to in this guide have the same meaning as defined in the PDA, *Standard Plumbing and Drainage Regulation 2003* (SPDR) or a relevant Australian/New Zealand Standard. If a definition given in a relevant standard is inconsistent with the Act, Regulation or the QPW code, the legislation prevails.

All relevant Australian and New Zealand Standards are applicable, unless otherwise outlined in the QPW code. Where there is an inconsistency, or the QPW code has additional requirements, the QPW code prevails.

Unsewered areas

The assessment of applications by council for use of greywater in unsewered areas has not changed.

Council can approve the use of greywater in unsewered areas where:

- the facility complies with the SPDR
- it is satisfied that there is enough water available to operate the facility
- either there is enough suitable land or a suitable arrangement has been made for the use of the greywater
- the greywater treatment plant is approved by the Department of Infrastructure and Planning, or the greywater diversion device has watermark approval.

Plumbers should contact council to discuss greywater use in unsewered areas.

Sewered areas

From 1 January 2008 local councils can approve the use of greywater in all classes of buildings. The maximum volume of greywater which can be used has been lifted to 50 000 litres per day. Removal of these restrictions enables commercial premises to re-use greywater.

Changes to the regulation of greywater treatment plants commenced 1 July 2008. Regulation is now based on the capacity of the greywater treatment plant rather than the amount of greywater that is generated on the premises.

- a single greywater treatment plant capable of treating **less than 50 kL greywater per day** will continue to be regulated under the PDA whether or not individual treatment plants are connected in any way.

  For example, installation of two greywater treatment plants with capacities of 30 kL and 25 kL respectively, even though connected, will still be governed by the provisions of the PDA as the individual capacity of each treatment plant does not exceed the 50 kL or more capacity threshold.

- a single greywater treatment plant capable of treating **50 kL or more greywater per day** will be regarded as a ‘large greywater treatment plant’ and installation will be regulated by the chief executive officer of the Department of Natural Resources and Water under the framework set out under the *Water Supply (Safety and Reliability) Act 2008*.

Local governments will still oversee installation of greywater treatment plants under each of the regulatory frameworks.
Kitchen greywater excluded

Kitchen greywater cannot legally be diverted to greywater systems in sewered areas in Queensland.

Kitchen greywater may be heavily polluted with food particles, oils, fats and other wastes, which can promote and support the growth of micro-organisms and solidify, causing blockages in the greywater system. It is often polluted with detergents and cleaning agents, particularly those from dishwashers, which are very alkaline, and over time these contaminants, may damage the soil.

In unsewered areas, kitchen greywater must be discharged to an on-site sewerage facility or greywater treatment plant. In these circumstances the greywater from a kitchen must be connected to a grease arrestor before diverting to the greywater treatment plant.

Associated legislation

The PDA, SPDR and QPW code should not be considered in isolation. Other federal, state and local laws or referenced standards may be relevant.

The following is a list that should be considered, but it is not a comprehensive list.

- Building Act 1975
- Building Regulation 2006
- Integrated Planning Act 1997
- Plumbing and Drainage Act 2002
- Standard Plumbing and Drainage Regulations 2003
- Public Health Act 2005
- Water Act 2000
- Water Regulations 2002
- Building Code of Australia
- Plumbing Code of Australia
- Australian and New Zealand Design Standards
- Australian Technical Specifications

Standards

The following standards are referenced in the QPW code and are applied provisions for the purposes of the SPDR.

- AS/NZS 1546.2 On-site domestic wastewater treatment units Part 2: Waterless composting toilets.
- AS/NZS 1546.3 On-site domestic wastewater treatment units Part 3: Aerated wastewater treatment systems.
- AS/NZS 1547 On-site domestic wastewater management.
1 Types of greywater systems

Greywater systems generally consist of a greywater diversion device or a greywater treatment plant as well as a greywater application area. However, from 1 January 2008 this may include an alternative use, e.g. for flushing the toilet.

Diversion devices divert greywater without storage or treatment. These devices use a coarse screen filter to remove lint, hair and other materials from the greywater before discharging it via subsurface or surface irrigation. Diversion devices are restricted to premises generating up to 3000 litres of greywater per day. A greywater treatment plant must be installed for premises generating more than 3000 litres per day.

A treatment plant treats the greywater and discharges it by subsurface irrigation, surface irrigation or another use. The re-use of treated greywater is determined by the effluent quality specified in Table T1 of the QPW code. For this reason they are more expensive to purchase and install than a diversion device.

Information about approved systems is available from Building Codes Queensland and the Department of Infrastructure and Planning at www.dip.qld.gov.au

2 Diversion of greywater

Greywater can be diverted from laundries and bathrooms by:

- manual bucketing
- connecting a flexible hose to a washing machine outlet
- seeking council approval for the installation of a greywater diversion device or treatment plant.

The simplest greywater systems divert greywater from the laundry or bathroom directly to an irrigation system that uses gravity to disperse the water. In other circumstances, pumps may be necessary to distribute diverted greywater.

Greywater can be diverted by connecting the laundry or bathroom waste pipe to a diversion device. The device must be fitted with a switch to divert greywater from the sewer to a subsurface or surface irrigation system. The system must also automatically divert to the sewer if there is a blockage or if the pump fails.

Plumbing legislation in Queensland requires a licensed plumber or drainer to carry out any work on the water supply, sanitary plumbing or drainage systems.

3. Storage of untreated greywater not recommended

Untreated greywater should not be stored. Greywater stored for more than 24 hours may become septic, give off an offensive odour and provide conditions that breed micro-organisms and mosquitoes.

A pump diversion device incorporates a surge tank to cope with sudden influxes of greywater for distribution by a pump to a subsurface or surface irrigation system. The surge tank must not operate as a storage tank.

If greywater cannot be used immediately—for example, during periods of wet weather, it should be diverted to the sewerage system.
4. Irrigation with greywater

All greywater systems need a permanent connection to the sewerage system so greywater can be discharged during periods of wet weather or when an excessive amount of greywater is produced.

Over watering can cause greywater to pond on the surface of the garden and give off offensive odours. The distribution of greywater must be kept within the boundaries of the premises.

5. Use of treated greywater

Appropriately treated greywater can be used for:
- toilet flushing
- washing of paths, walls or vehicles
- cold water supply to washing machines
- lawn and garden spray irrigation.

Council must assess and approve the installation of treated greywater systems. The greywater treatment plant must be approved by the Department of Infrastructure and Planning for the effluent quality relevant to the desired use—for example, a 10/10/10 standard for toilet flushing. Effluent quality criteria are contained in Table T1 of the QPW code. The plumbing and drainage must be installed to the requirements of AS/NZS 3500.

6. Maintenance of greywater systems

Once a system is installed it becomes the owner’s or occupier’s responsibility to ensure it is maintained. Some greywater systems will require regular maintenance, such as cleaning or replacing of filters, as well as regular servicing in accordance with the manufacturer’s specifications. Homeowners should be advised of the ongoing costs of operating and maintaining the system.

7. Planning a greywater system

The installation and operation of a greywater diversion device or greywater treatment plant and the irrigation system or additional work for other uses (e.g. toilet flushing) requires the approval of the local council. Plumbers can work with homeowners to plan a greywater facility that will work on their land.

Plumbers can work with homeowners to plan a greywater facility and lodge an application with council by:
- calculating whether there is sufficient land area to distribute the greywater
- developing options for greywater systems
- advising on the other potential uses of treated greywater
- drafting plans for council approval.

For more information on calculating the land area available for distributing greywater and an example for calculating a compliant subsurface greywater system, see Appendices 1 and 2.
Lawn or garden surface irrigation must be designed in a manner that complies with AS/NZS 1547.

Appendix 1

Information about subsurface land application areas

Does the homeowner have sufficient area of land to distribute greywater via a subsurface irrigation system?

Homeowners should calculate the area of land they have available for irrigation and see if it is enough to properly distribute all greywater from the home.

Plumbers can assist homeowners to estimate:

1. Area available (A available)—the area of land available for greywater irrigation.
2. Greywater generated (G volume)—the amount of greywater generated by the household.
3. Area needed (A needed)—the area of land needed to soak up all of the greywater generated.

The following calculations are included as a guide to determine if there is sufficient application area to deal with greywater generated on the premises. The calculations are based on the following estimates provided in the QPW code for greywater use in sewered and unsewered areas from a house with three bedrooms and four occupants:

- daily greywater flow from bathroom = 60 litres/person/day
- daily greywater flow from laundry = 35 litres/person/day
- daily greywater from combined bathroom and laundry = 95 litres/person/day

Sample calculation

1. Calculate the area available for irrigation

\[ A_{\text{available}} = \text{area of gardens and lawns not covered by buildings or impermeable surfaces, leaving appropriate setbacks from buildings and boundaries.} \]

Example:
Allotment = 700 m²
Dwelling = 192 m²
Available greywater irrigation area = 130 m²
2. Calculate the volume of greywater that will be generated

*Using estimates from the QPW code:*

Greywater flow from bathroom and laundry combined = 95 litres/person/day

Assume four person household:

\[
G \text{ volume (litres/week)} = \text{four persons} \times 95 \text{ litres/person/day} \times \text{seven days}
\]

\[
= 2,660 \text{ litres/week}
\]

3. Calculate the area needed to soak up this volume of greywater

The ability of the soil to soak up greywater will depend on the type of soil that is present on-site. For this example, let’s assume the soil is a clay loam with average permeability and a design irrigation rate (DIR) of 25 mm/week (AS/NZS 1547:2000 Table 4.2A4).

\[
A \text{ needed (m}^2\text{)} = \frac{G \text{ volume (litres/week)}}{\text{DIR (mm/wk)}}
\]

\[
= \frac{2,660}{25}
\]

\[
= 106 \text{ m}^2
\]

In this case the homeowner does have the area of land (106 m²) needed to distribute all the greywater from the bathroom and laundry.

If the homeowner has plenty of land, then a greywater facility can be planned to use all of the greywater from the home for irrigation.

For many Queensland homes in closely settled sewered areas, there will not be sufficient area of land available to soak up all the greywater generated within the home. Homeowners should talk to their local council for advice and should consider the following options:

(i) limit the volume diverted. Plan a facility that only uses part of the greywater generated—for example, only divert greywater from the laundry, or the bathroom

(ii) diversion times. Only divert greywater for limited times during the week.

**Options for smaller blocks (1)—limit sources of greywater**

1. Calculate the area available for irrigation

\[
A \text{ available (m}^2\text{)} = \text{area of gardens and lawns not covered by buildings or impermeable surfaces, leaving appropriate setbacks from buildings and boundaries. See the QPW code for setback distances.}
\]

*Example for small allotment:*

- Allotment = 450 m²
- Dwelling = 192 m²

Available greywater irrigation area = 60 m²
2. Calculate the volume of greywater that will be generated

Using estimates from the QPW code:

Greywater flow from laundry alone = 35 litres/person/day

**Assume four person household:**

\[
G \text{ volume from laundry (litres/week)} = \text{four persons x 35 litres/person/day x seven days}
\]

\[
= 980 \text{ litres/week}
\]

3. Calculate the area needed to soak up this volume of greywater

The ability of the soil to soak up greywater will depend on the type of soil that is present on-site. For this example, let’s assume the soil is a clay loam with average permeability and a design irrigation rate (DIR) of 25 mm/week (AS/NZS 1547:2000 Table 4.2A4).

\[
A \text{ needed (m}^2\text{)} = \frac{G \text{ volume from laundry (litres/week)}}{\text{DIR (mm/wk)}}
\]

\[
= \frac{980}{25}
\]

\[
= 39 \text{ m}^2
\]

4. Look at all the possible options

a) Application area needed 2660 litres/wk for bathroom & laundry 25 (mm/wk) = 106 m²

b) Application area needed 1680 (litres/wk) for bathroom 25 (mm/wk) = 67 m²

c) Application area needed 980 (litres/wk) for laundry 25 (mm/wk) = 39 m²

Option (c) indicates that the homeowner has sufficient land to plan a system that only irrigates with greywater from the laundry.

**Options for smaller blocks (2)—limit diversion and irrigation times**

1. Calculate the area available for irrigation

\[A \text{ available (m}^2\text{)} = \text{area of gardens and lawns not covered by buildings or impermeable surfaces, leaving appropriate setbacks from buildings and boundaries. See the QPW code for setback distances.}\]

**Example for small allotment:**

Allotment = 450 m²

Dwelling = 192 m²

Available greywater irrigation area = 60 m²
2. Calculate the volume of greywater that will be generated

Using estimates from QPW code:

Greywater flow from bathroom and laundry combined = 95 litres/person/day

Assume four person household:

\[
G \text{ volume if only irrigating} = \text{four persons} \times 95 \text{ litres/person/day} \times \text{two days} = 760 \text{ litres/week}
\]

3. Calculate the area needed to soak up this volume of greywater

The ability of the soil to soak up greywater will depend on the type of soil that is present on-site. For this example, let’s assume the soil is a clay loam with average permeability and a design irrigation rate (DIR) of 25 mm/week (AS/NZS 1547:2000 Table 4.2A4).

\[
A \text{ needed (m}^2) = \frac{G \text{ volume from 2 days irrigating (litres/week)}}{\text{DIR (mm/wk)}}
\]

Under section 85(7) of the PDA, a council may impose reasonable and relevant conditions on a compliance permit. Councils may decide to issue a compliance permit or certificate with operating conditions that will restrict irrigation days.

**Options for smaller blocks (3)—limit sources and irrigation times**

1. Calculate the area available for irrigation

\[
A \text{ available (m}^2) = \text{area of gardens and lawns not covered by buildings or impermeable surfaces, leaving appropriate setbacks from buildings and boundaries. See the QPW code for setback distances.}
\]

Example for small allotment:

- Allotment = 400 m^2
- Dwelling = 192 m^2
- Significant paved areas
- Available greywater irrigation area = 25 m^2

2. Calculate the volume of greywater that will be generated

Using estimates from QPW code:

Greywater flow from laundry alone = 35 litres/person/day

Assume four person household:

\[
G \text{ volume — laundry only} = \text{four persons} \times 35 \text{ litres/person/day} \times \text{three days} = 420 \text{ litres/week}
\]

3. Calculate the area needed to soak up this volume of greywater

The ability of the soil to soak up greywater will depend on the type of soil that is present on-site. For this example, let’s assume the soil is a clay loam with average permeability and a design irrigation rate (DIR) of 25 mm/week (AS/NZS 1547:2000 Table 4.2A4).
\[
A_{\text{needed}} \text{ (m}^2\text{)} = \frac{G\text{ volume—laundry only, three days a week (litres/wk)}}{\text{DIR (mm/wk)}}
\]
\[
= \frac{420}{25}
\]
\[
= 17 \text{ m}^2
\]

Councils may issue a compliance permit or certificate for this sort of system with approval limiting irrigation to three days per week.

Future developments such as swimming pools, driveways, sheds and paved entertainment areas will affect the application area available for subsurface irrigation.

The calculations provided in these guidelines are examples of how plumbers may wish to consider greywater applications in sewered and unsewered areas. However, the method of assessment used for deciding greywater applications remains the responsibility of councils to determine.
Appendix 2

Planning a greywater use facility

When providing advice to a homeowner planning to install a greywater use facility, plumbers need to consider the following:

- The types of greywater diversion devices and treatment plants available. Visit the Department of Infrastructure and Planning's website www.dip.qld.gov.au for details on diversion devices and approved treatment plants.
- The selection of the most appropriate greywater use system.
- An application to install a greywater use facility must be lodged with council and must include a site plan showing:
  - details of proposed or existing buildings or structures on the premises
  - the uses of treated greywater—for example, toilet flushing
  - the location of the greywater application area
  - distances from the area to the boundary of the premises
  - location of any swimming pool, shed or impervious surfaces (paths or paved areas)
  - the connection from the greywater diversion device or greywater treatment plant to sanitary drainage
  - any other relevant plumbing and drainage details.

Other information or documents should be provided to indicate:

- the facility's greywater diversion device has Plumbing Code authorisation and certification
- the quality of effluent produced by the treatment plant for the potential end use
- the facility’s greywater treatment plant has chief executive approval
- the system is designed to ensure that there is no ponding, run-off of greywater or odour problems.

- A licensed plumber is required to install the plumbing pipework to the greywater diversion and/or treatment or holding vessel for all plumbing systems delivering greywater.
- A licensed plumber must arrange for all greywater plumbing pipework to be inspected by a plumbing inspector. This includes pipework to supply treated greywater for other uses.
- Installing, maintaining or replacing all or part of a greywater application area for a greywater use facility is unlicensed work.
Appendix 3

Technical matters about greywater use facilities

All the requirements of the PDA, the SPDR, the QPW code and the Australian and New Zealand Standards 3500 and 1547 must be met when building, installing, or operating a greywater use facility.

Some of the technical issues that should be considered include:

- Rainwater, storm water or surface water must not be discharged to the sewer through the greywater return or overflow.
- Any greywater to be returned to the sewer system is to be conveyed via a sewer disconnector gully. This gully cannot replace a complying overflow relief gully for the building.
- Any vessel for operational storage and pumping of greywater must be vented to the atmosphere via an open air vent at a high level. All access openings to the vessel must be sealed and be vermin proof.
- Open air venting on vessels for operational storage and pumping of greywater cannot be replaced by an air admittance valve.
- Sanitary plumbing and drainage piping from sanitary fixtures (baths, showers, basins and laundries) must comply with AS/NZS3500 Part 2 Sections 3 through to 9.
- Greywater sanitary plumbing and drainage must be installed directly to treatment or distribution systems and independently of other systems.
- Below ground vessels for operational storage and pumping of greywater should be protected from sewage surcharge by the installation of a reflux valve.
- There must be no interconnection or cross connection between any drinking water services (domestic water supply or rainwater supply) and a greywater service.
- All distribution pipes for the greywater system—gravity feed irrigation or pressurised irrigation systems—must be coloured purple and clearly and permanently marked ‘WARNING: RECYCLED OR RECLAIMED WATER—DO NOT DRINK’.
- All pipes, pipe sleeves, identification tapes and outlets must be coloured purple in accordance with AS2700.
- All pipes, pipe sleeves and identification tapes must be marked with the following in accordance with AS1345: ‘WARNING: RECYCLED OR RECLAIMED WATER—DO NOT DRINK’
- Greywater diversion components should be labelled: ‘WARNING: RECYCLED OR RECLAIMED WATER—DO NOT DRINK’.