

CITY & COUNTY OF DENVER COMMUNITY PLANNING & DEVELOPMENT BUILDING PERMIT POLICY		
Subject: Graywater Treatment Works Systems		
Approved: Scott Prisco, AIA, Building Official		
Number: IPC Chapters 13 & 14	Issued Date: March 20, 2018	Page: 1 of 10

Reference: International Plumbing Code (IPC) Sections 1301 & 1302 and Chapter 14

SCOPE

IPC Section 1301.1 states that the use and application of nonpotable water shall comply with laws, rules, and ordinances applicable in the City and County of Denver; and IPC Section 1401.1 states that the provision of IPC Chapter 14 shall govern the materials, design, construction, and installation of subsurface landscape irrigation systems connected to nonpotable water from on-site water reuse systems. This policy identifies the Denver Community Planning and Development agency requirements for graywater treatment works systems, a type of nonpotable water system, and for reference the applicability of other laws, rules, and ordinances applicable to graywater treatment works systems within the City and County of Denver.

REFERENCED AGENCIES

City and County of Denver (CCD)
 CCD Community Planning and Development (CPD)
 CCD Department of Public Health and Environment (DDPHE)
 State of Colorado Water Quality Control Commission (WQCC)

REFERENCED STANDARDS

CCD Board of Environmental Health Rules and Regulations Governing Graywater Treatment Works
 CCD Board of Environmental Health Graywater Design Criteria Document (published with the Rules and Regulations Governing Graywater Treatment Works)
 Colorado Water Quality Control Act Section 25-8-205(1)(g), C.R.S
 WQCC Regulation 86, Graywater Control Regulation (5 CCR 1002-86)
 Denver Water's Engineering Standard Section 5.05

DEFINITIONS

Graywater – Waste discharged from lavatories, bathtubs, showers, clothes washers, and laundry trays (as identified in the 2015 IPC). Waste discharged from water closets (toilets) and urinals are not considered graywater.

Graywater treatment works system – An arrangement of devices and structures used to: (a) collect graywater from within a building or facility; and (b) treat, neutralize, or stabilize graywater within the same building or facility to the level necessary for its authorized uses (as defined in CCD Board of Environmental Health Rules and Regulations Governing Graywater Treatment Works)

ALLOWABLE USES OF GRAYWATER

Graywater can only be used for subsurface irrigation or indoor toilet and urinal flushing.

CITY & COUNTY OF DENVER COMMUNITY PLANNING & DEVELOPMENT BUILDING PERMIT POLICY		
Subject: Graywater Treatment Works Systems		
Approved: Scott Prisco, AIA, Building Official		
Number: IPC Chapters 13 & 14	Issued Date: March 20, 2018	Page: 2 of 10

ALLOWABLE SOURCES OF GRAYWATER

Only waste discharged from lavatories, bathtubs, showers, clothes washers, and laundry sinks can be used in graywater treatment works systems. The use of graywater for graywater treatment works systems is limited to the confines of the facility generating the graywater. Waste discharged from water closets (toilets) and urinals is NOT graywater and cannot be used as such.

ADMINISTRATIVE MODIFICATION REQUIREMENTS

At this time, variances are not allowed per WQCC Regulation 86; therefore, an Administrative Modification will not be accepted.

If WQCC Regulation 86 is updated to allow a variance, then CPD will review an Administrative Modification request to any provision of IPC Chapters 13 or 14 that deals with graywater treatment works system if all of the following conditions have been met:

1. The request meets the general requirements found in Denver Building and Fire Code Administrative Section 104.9;
2. A variance to the design criteria included in the WQCC Regulation 86 Graywater Control Regulation has been granted by the WQCC;
3. A variance to the current version of the IPC has been granted by the State of Colorado Plumbing Board;
4. A variance to the CCD Board of Environmental Health Rules and Regulations Governing Graywater Treatment Works has been granted by the CCD Board of Environmental Health;
5. The application has adequately demonstrated that the system design will prevent human exposure to graywater; and
6. The Administrative Modification application (available at http://www.denvergov.org/content/dam/denvergov/Portals/696/documents/Other_forms_and_guides/Administrative_Modification_Guide.pdf) has been submitted to CPD with all required fees paid.

PERMITS REQUIRED

A plumbing permit from CPD is required for all graywater treatment works systems to be installed, including both commercial and residential projects with either subsurface irrigation or indoor toilet and urinal flushing uses. If the subsurface irrigation system will not be installed by the time of the plumbing permit's final inspection, then a separate plumbing permit will be required for the irrigation system installation. Installing the plumbing piping to the vacuum breaker of the irrigation system will require a licensed plumbing contractor. The plumbing permit for the subsurface irrigation piping can be issued to licensed plumbing contractor, the home owner (for single family dwelling units only), or to a licensed sprinkler contractor. Prior to receiving a plumbing permit for the graywater treatment works system, the applicant must also have an approval from DDPHE.

CITY & COUNTY OF DENVER COMMUNITY PLANNING & DEVELOPMENT BUILDING PERMIT POLICY		
Subject: Graywater Treatment Works Systems		
Approved: Scott Prisco, AIA, Building Official		
Number: IPC Chapters 13 & 14	Issued Date: March 20, 2018	Page: 3 of 10

SUBMITTAL REQUIREMENTS

All projects containing graywater treatment works systems must be submitted for review to both DDPHE and CPD.

1. **DDPHE** – DDPHE’s requirements for graywater treatment works systems are listed in the Board of Environmental Health Rules and Regulations Governing Graywater Treatment Works.
2. **CPD** – CPD’s requirements are listed in the Denver Building and Fire Code Sections 130 through 138 and in the 2015 IPC. In addition, the submittal to CPD must also include the following:
 - a. The seal and signature (original signatures required) of the State of Colorado licensed design professional legally responsible for the design;
 - b. An indication on the project’s code analysis that graywater will be used;
 - c. The location shown on the plumbing floor plans of all graywater treatment works system components and all plumbing fixtures to be used as the source of the graywater;
 - d. Design flow calculations for the graywater treatment works system;
 - e. The uses of the graywater system;
 - f. A description of all products and components (including manufacturer’s information) of the graywater treatment works system;
 - g. If graywater is used for subsurface irrigation, a site evaluation report and area calculations, including all soil analysis reports; and
 - h. The contact information (name, address, email, and phone number) for the party who is legally responsible for the graywater treatment works system once it is installed and operating. Note that the application must be signed (original signatures required) by the legally responsible party.

INSPECTIONS

All projects containing a graywater treatment works system must be inspected by DDPHE and CPD. After all inspections are completed and approved, the building’s graywater treatment works system will be approved for use.

The DDPHE inspection can be requested by calling (720) 865-5478.

CPD inspections can be scheduled online at www.denvergov.org/buildinginspections.

MODIFICATIONS TO PREVIOUSLY APPROVED GRAYWATER TREATMENT WORKS SYSTEMS

All modifications to previously approved graywater treatment works systems are required to follow the same procedures and requirements as that of a new system installation.

CITY & COUNTY OF DENVER COMMUNITY PLANNING & DEVELOPMENT BUILDING PERMIT POLICY		
Subject: Graywater Treatment Works Systems		
Approved: Scott Prisco, AIA, Building Official		
Number: IPC Chapters 13 & 14	Issued Date: March 20, 2018	Page: 4 of 10

**THE REMAINING ITEMS IN THIS POLICY LIST CERTAIN REQUIREMENTS FOUND
IN OTHER LAWS, RULES AND ORDINANCES.**

THEY ARE LISTED HERE FOR EASE OF REFERENCE.

**OVER TIME THESE REQUIREMENTS MAY CHANGE SO IT IS THE PERMIT
APPLICANTS RESPONSIBILITY TO CONSULT THE REFERENCED STANDARDS
LISTED ON PAGE 1 TO ENSURE COMPLIANCE WITH THOSE STANDARDS.**

SYSTEM REQUIREMENTS

GRAYWATER USE CATEGORIES

1. Category A: Single Family, Subsurface Irrigation
 - a. The design flow is limited to 400 gallons per day or less combined flow for all uses.
2. Category B: Non-Single Family, Subsurface Irrigation
 - a. The design flow is limited to 2000 gallons per day or less combined flow for all uses for the entire facility.
3. Category C: Single Family, Subsurface Irrigation and Indoor Toilet and Urinal Flushing
 - a. The design flow is limited to 400 gallons per day or less combined flow for all uses.
4. Category D: Non-Single Family, Subsurface Irrigation and Indoor Toilet and Urinal Flushing
 - a. There is no maximum design flow for indoor toilet and urinal flushing. There is no maximum design flow for the amount of wastewater from the facility that can go to a closed sewage system. The design flow is limited to 2000 gallons per day or less combined flow for all subsurface irrigation for the entire facility.

CONTROL MEASURES

All graywater treatment works systems must be operated in accordance with the following control measures:

1. Graywater must be collected in a manner that minimizes the presence or introduction of any of the following:
 - a. Hazardous or toxic chemicals in the graywater to the greatest extent possible.
 - b. Human excreta in the graywater to the greatest extent possible.
 - c. Household wastes.
 - d. Animal or vegetable matter.
2. Use of graywater is limited to the confines of the facility that generates the graywater.
3. The owner or operator of the graywater treatment works system must minimize the exposure of graywater to humans and domestic pets.

CITY & COUNTY OF DENVER COMMUNITY PLANNING & DEVELOPMENT BUILDING PERMIT POLICY		
Subject: Graywater Treatment Works Systems		
Approved: Scott Prisco, AIA, Building Official		
Number: IPC Chapters 13 & 14	Issued Date: March 20, 2018	Page: 5 of 10

4. Graywater use and graywater treatment works systems must not create a public nuisance.
5. Graywater must not be stored for more than 24 hours unless the graywater has been treated by a graywater treatment works that meets the design requirements of the CCD Board of Environmental Health Graywater Design Criteria Documents. All graywater must be stored inside tank(s) that meet the design requirements of the CCD Board of Environmental Health Graywater Design Criteria Documents.
6. Temporary or semi-temporary connections from the potable water system or public water system to the graywater treatment works system are prohibited. Permanent connections from the potable water system or public water system to the graywater treatment works system are allowed but must meet the requirements of Denver Water’s Engineering Standard Section 5.05.

Graywater used for subsurface irrigation must also comply with the following additional control measures:

1. Agricultural irrigation with graywater is prohibited.
2. Irrigation is prohibited when the ground is frozen, when plants are dormant, during rainfall events, or if the ground is saturated.
3. Irrigation scheduling must be adjusted so that application rates are closely matched with soil and weather conditions.
4. Graywater must be applied in a manner that does not result in ponding, runoff, or unauthorized discharge to state waters. For dispersed subsurface irrigation systems, the graywater must be applied at an agronomic rate. For mulch basin systems, the graywater must not be applied in excess of the soil absorption rate.
5. For mulch basin systems, mulch must be replenished and undergo periodic maintenance as needed to reshape or remove materials to maintain surge capacity and to prevent ponding and runoff.

Graywater used for indoor toilet and urinal flushing must also comply with the following additional control measures:

1. Graywater for indoor toilet and urinal flushing must be disinfected.
 - a. Graywater treatment works systems that utilize chlorine for disinfection must have a minimum of 0.2 mg/L and a maximum of 4.0 mg/L of free chlorine residual throughout the indoor graywater plumbing system, including fixtures.
 - b. Single family graywater treatment works systems that utilize non-chemical methods, such as UV, for disinfection must have a chlorine puck present in each toilet or urinal tank.
2. Graywater for indoor toilet and urinal flushing must be dyed with either blue or green food grade vegetable dye and be visibly distinct from potable water.

DESIGN CRITERIA

All graywater treatment works systems must meet the requirements of the CCD Board of Environmental Health Graywater Design Criteria Document in effect at the time of the installation of the system. The design criteria is included in the CCD Board of Environmental Health Rules and Regulations Governing Graywater Treatment Works.

CITY & COUNTY OF DENVER COMMUNITY PLANNING & DEVELOPMENT BUILDING PERMIT POLICY		
Subject: Graywater Treatment Works Systems		
Approved: Scott Prisco, AIA, Building Official		
Number: IPC Chapters 13 & 14	Issued Date: March 20, 2018	Page: 6 of 10

Sizing Criteria:

1. Graywater treatment works systems must be sized appropriately using the flow projection methods described in the CCD Board of Environmental Health Graywater Design Criteria Document in effect at the time of the installation of the system.
2. The size of irrigation areas must be determined using the sizing protocols described in the CCD Board of Environmental Health Graywater Design Criteria Document in effect at the time of the installation of the system.

Subsurface irrigation systems:

1. Subsurface irrigation components of the system must be installed a minimum of four (4) inches and a maximum of twelve (12) inches below the finish grade.
2. The irrigation field may only be located on slopes of less than thirty (30) percent from horizontal.
3. All irrigation supply piping shall be polyethylene tubing or PVC Class 200 pipe, or better, with Schedule 40 fittings. All joints shall be pressure tested at 40 psi (276 kPa), and shown to be drip tight for five (5) minutes prior to burial.

Mulch basin irrigation systems:

1. Mulch basin must be installed a minimum of twelve (12) inches and maximum of twenty-four (24) inches below the finish grade.
2. Mulch basins may only be located on slopes of less than thirty (30) percent from horizontal.
3. All mulch basin supply piping shall be polyethylene tubing or PVC Class 200 pipe, or better, with Schedule 40 fittings. All joints shall be pressure tested at 40 psi (276 kPa), and shown to be drip tight for five (5) minutes prior to burial.
4. Mulch basin supply piping must discharge a minimum of four (4) inches below the grade into a container for dispersal of graywater into the mulch basin. The container must be designed to have four (4) inches of freefall between the invert of the discharge pipe and the mulch. The container must have an access lid for observation of flow and to check the mulch levels.

Indoor toilet and urinal flushing:

1. Indoor toilets and urinals utilizing nonpotable water from the graywater treatment works system must have a backup potable water system connection.

System Modifications:

1. If the graywater treatment works system requires modifications, the system must be upgraded to the requirements of the CCD Board of Environmental Health Graywater Design Criteria Document in effect at the time of the modification of the system. All system modifications are required to be approved by both DDPHE and CPD. All system modifications shall be required to follow the same procedures and requirements as for a new system installation.

CITY & COUNTY OF DENVER COMMUNITY PLANNING & DEVELOPMENT BUILDING PERMIT POLICY		
Subject: Graywater Treatment Works Systems		
Approved: Scott Prisco, AIA, Building Official		
Number: IPC Chapters 13 & 14	Issued Date: March 20, 2018	Page: 7 of 10

LABELING OF NONPOTABLE WATER PIPING

Where nonpotable water systems are installed, the piping conveying the nonpotable water must be identified either by piping that is purple in color or by piping that has a purple identification tape/wrap installed the entire length of the piping that is embossed or integrally stamped with the words “CAUTION: NONPOTABLE WATER – DO NOT DRINK” in accordance with the CCD Board of Environmental Health Graywater Design Criteria Document in effect at the time of the installation of the system.

BACKFLOW ASSEMBLY PROTECTION

All buildings containing a graywater treatment works system must have an approved backflow assembly at the connection to the public water system (water entry). The backflow assembly for all commercial projects must be a reduced pressure backflow assembly. The backflow assembly for all residential projects can be either a reduced pressure or a double check backflow assembly.

SIGNAGE REQUIREMENTS

Sign wording must be legibly and indelibly printed on a tag or sign constructed of corrosion-resistant waterproof material, or indelibly printed on the fixture. The letters must be 0.5 inches (12.7 mm) or greater in height and in colors that contrast with the background on which they are applied.

1. Category A: Single Family, Subsurface Irrigation
 - a. There are no signage requirements.
2. Category B: Non-Single Family, Subsurface Irrigation
 - a. Plumbing fixtures used as the source for the graywater treatment works system shall be identified with permanent signage that reads as follows: “WATER FROM THIS FIXTURE IS REUSED. CHEMICALS, EXCRETA, PETROLEUM OILS, AND HAZARDOUS MATERIALS MUST NOT BE DISPOSED DOWN THE DRAIN.”
 - b. Each room that contains graywater treatment works system components shall contain permanent signage that reads as follows: “CAUTION GRAYWATER TREATMENT WORKS. DO NOT DRINK. DO NOT CONNECT TO THE POTABLE DRINKING WATER SYSTEM. NOTICE: CONTACT BUILDING MANGEMENT BEFORE PERFORMING ANY WORK ON THIS WATER SYSTEM.”
 - c. Each area being irrigated shall be identified with permanent signage that reads as follows: CAUTION GRAYWATER BEING USED FOR IRRIGATION. DO NOT DRINK. DO NOT CONNECT TO THE POTABLE DRINKING WATER SYSTEM.”
3. Category C: Single Family, Subsurface Irrigation and Indoor Toilet and Urinal Flushing
 - a. Plumbing fixtures flushed with nonpotable water shall be identified with permanent signage that reads as follows: “Nonpotable water is utilized to flush this fixture. CAUTION NONPOTABLE WATER – DO NOT DRINK.” In addition to the required wording, the pictograph as shown in the IPC Figure 1301.3 shall be provided shall be provided.

CITY & COUNTY OF DENVER COMMUNITY PLANNING & DEVELOPMENT BUILDING PERMIT POLICY		
Subject: Graywater Treatment Works Systems		
Approved: Scott Prisco, AIA, Building Official		
Number: IPC Chapters 13 & 14	Issued Date: March 20, 2018	Page: 8 of 10

4. Category D: Non-Single Family, Subsurface Irrigation and Indoor Toilet and Urinal Flushing
- a. Plumbing fixtures used as the source for the graywater treatment works system shall be identified with permanent signage that reads as follows: “WATER FROM THIS FIXTURE IS REUSED. CHEMICALS, EXCRETA, PETROLEUM OILS, AND HAZARDOUS MATERIALS MUST NOT BE DISPOSED DOWN THE DRAIN.”
 - b. Each room that contains graywater treatment works system components shall contain permanent signage that reads as follows: “CAUTION GRAYWATER TREATMENT WORKS. DO NOT DRINK. DO NOT CONNECT TO THE POTABLE DRINKING WATER SYSTEM. NOTICE: CONTACT BUILDING MANGEMENT BEFORE PERFORMING ANY WORK ON THIS WATER SYSTEM.”
 - c. Each area being irrigated shall be identified with permanent signage that reads as follows: CAUTION GRAYWATER BEING USED FOR IRRIGATION. DO NOT DRINK. DO NOT CONNECT TO THE POTABLE DRINKING WATER SYSTEM.”
 - d. Plumbing fixtures flushed with nonpotable water shall be identified with permanent signage that reads as follows: “Nonpotable water is utilized to flush this fixture. CAUTION NONPOTABLE WATER – DO NOT DRINK.” In addition to the required wording, the pictograph as shown in the IPC Figure 1301.3 shall be provided.

GRAYWATER TREATMENT WORKS SYSTEM SETBACK REQUIREMENTS

All irrigation systems must meet the setback distances in table below:

<u>Minimum Horizontal Distance Required From</u>	<u>Graywater Storage Tank</u>	<u>Irrigation Field</u>	<u>Mulch Basin</u>
Buildings	5 feet	2 feet	10 feet
Property line adjoining private property	10 feet	10 feet	10 feet
Property line adjoining private property with supporting property line survey	1.5 feet	1.5 feet	1.5 feet
Water supply wells	50 feet	100 feet	100 feet
Streams and lakes	Outside of Floodway	Outside of Floodway / 100 yr. Floodplain	Outside of Floodway / 100 yr. Floodplain

**CITY & COUNTY OF DENVER
COMMUNITY PLANNING & DEVELOPMENT
BUILDING PERMIT POLICY**

Subject: Graywater Treatment Works Systems

Approved: Scott Prisco, AIA, Building Official

**Number: IPC Chapters
13 & 14**

Issued Date: March 20, 2018

Page: 9 of 10

Seepage pits or cesspools	5 feet	5 feet	5 feet
OWTS disposal field	5 feet	25 feet	25 feet
OWTS tank	5 feet	10 feet	10 feet
Domestic potable water service pipe	10 feet	10 feet	10 feet
Public water main	10 feet	10 feet	10 feet

OPERATION AND MAINTENANCE MANUALS

1. All graywater treatment works systems must have an Operation and Maintenance (O&M) manual available. At a minimum, the O&M manual must include the items listed below, in addition to all information specified in the CCD Board of Environmental Health Graywater Design Criteria Document in effect at the time of the installation of the graywater treatment works system.
 - a. A graywater treatment works system description that includes an equipment list, design basis data including, but not limited to, design volumes, design flow rates of each component and service area, system as-built drawing, and process description;
 - b. Maintenance information for the graywater treatment works system including, but not limited to, a component maintenance schedule; instructions for component repair, replacement, or cleaning; replacement component source list; testing and frequency for potable containment devices; and instructions for periodic removal of residuals;
 - c. Operational ranges for disinfectant concentration levels, filter replacement parameters, pressure ranges, tank levels, valve status under normal operation and other relevant parameters;
 - d. Step-by-step instructions for starting and shutting down the graywater treatment works system including, but not limited to, valve operation, any electrical connections, cleaning procedures, visual inspection, and filter installation;
 - e. A guide for visually evaluating the graywater treatment works system and narrowing any problem scope based on alarm activations, effluent characteristics, system operation, and history; and
 - f. A list of graywater control measures in which the graywater treatment works system must be operated.
2. The graywater treatment works system must be operated and maintained in accordance with the O&M manual and must include all manufacturer recommended maintenance activities.
3. The O&M manual must remain with the graywater treatment works system throughout the system's life and be updated each time upgrades or modifications are made to the system.

**CITY & COUNTY OF DENVER
COMMUNITY PLANNING & DEVELOPMENT
BUILDING PERMIT POLICY**

Subject: Graywater Treatment Works Systems

Approved: Scott Prisco, AIA, Building Official

**Number: IPC Chapters
13 & 14**

Issued Date: March 20, 2018

Page: 10 of 10

4. The O&M manual must be transferred, upon change of ownership or occupancy, to the new owner or tenant.
5. Category D graywater treatment works systems with a capacity to receive greater than 2000 gallons per day must maintain operation and maintenance records for a minimum period of five (5) years.

GRAYWATER DATABASE

All graywater treatment works systems will be included in a searchable database for storing the locations of all graywater treatment works systems in the Denver. The database is managed by DDPHE and maintained to include at a minimum the following:

1. The legal address of each facility with a graywater treatment works system, the allowed graywater uses at each facility, and the system's description;
2. The contact information (name, address, email, and phone number) for the legally responsible party associated with each graywater treatment works system; and
3. Where required, the certified operator associated with each graywater treatment works system.

Any changes to the legally responsible party, certified operator, and/or status of the graywater treatment works system shall be updated within sixty (60) days by notifying DDPHE.

END OF DOCUMENT