

Water Use Definition and Summary of Methodologies for Water Use Estimates

Updated on 9/23/2023 by Water Use Survey Team

Regional and state water plans present planning data by water use category, municipal and non-municipal including manufacturing, irrigation, steam electric power generation, mining, and livestock (RULE §357.31). This document explains what is included in each water use category and provides a summary of methodology for estimating water use for each water use category. Surface water (fresh/brackish), groundwater (fresh/brackish) and reuse intake volumes are included except for seawater.

1 Definition

1.1 Municipal Water Use

Water use for residential (domestic), commercial, and institutional purposes. Municipal water use also includes water used for public services, such as public pools, parks, firefighting, water and wastewater treatment, and municipal buildings, and some is unaccounted for because of leaks, flushing, tower maintenance, and other system losses.

1. Residential (domestic) Water Use:

Residential water use includes indoor and outdoor uses at residences, and includes uses such as drinking, food preparation, bathing, washing clothes and dishes, flushing toilets, watering lawns and gardens, and maintaining pools. Residential water use includes potable and non-potable water provided to households by a public water supplier (retail) and self-supplied water use. Self-supplied domestic water use is typically withdrawn from a private source, such as a well.

- a. **Single Family:** A classification of housing where a single detached dwelling or separate house is a free-standing residential building. Also includes duplexes.
- b. **Multi Family:** A classification of housing where multiple housing units for residents are contained within one building or complex. A common form is an apartment building or condominiums.

2. Commercial:

A place of business such as a hotel, restaurant, or office building which uses water. Such facilities are included in the categories for construction, retail/wholesale trade, transportation, information, and professional activities. Commercial water use does not include water used for multi-family residences, agricultural, industrial, or institutional users.

3. Institutional:

The use of water by an establishment dedicated to public service, such as a school, university, church, hospital, military base, nursing home, prison, or government facility. All facilities dedicated to public service are considered institutional regardless of ownership. (Examples: educational services, health care, recreation, and public administration).

1.2 Non-Municipal Water Use

1. Agricultural

- a. **Irrigation:** Irrigation water use includes water that is applied by an irrigation system to sustain plant growth in agricultural and horticultural practices. Irrigation also includes water that is used for pre-irrigation, frost protection, chemical application, weed control, field preparation, crop cooling, harvesting, dust suppression, and leaching salts from the root zone. Estimates of irrigation withdrawals are generally accounted for at the point of diversion (wells, springs, streams, rivers, canals, ponds) and include water that is lost in conveyance prior to application on fields, water consumed as evapotranspiration (ET) from plants and evaporated from the ground, or water that recharges aquifers as it seeps past the root zone. Some aquaculture use is included for primarily crawfish only when used in conjunction with rice production. TWDB includes self-supplied water use for golf courses in irrigation water use.
- b. **Livestock:** Livestock water use is water associated with livestock watering, feedlots, dairy operations, and other on-farm needs. Livestock includes dairy cows and heifers, beef cattle and calves, sheep and lambs, goats, hogs and pigs, horses, and poultry. Other livestock water uses include cooling of facilities for the animals and products, dairy sanitation and wash down of facilities, animal waste-disposal systems, and incidental water losses. The livestock category excludes on-farm domestic use, lawn and garden watering, and irrigation water use. TWDB includes aquaculture water use in livestock water use.

2. Industrial:

The use of water in processes designed to convert materials of a lower order of value into forms that have greater usability and commercial value, and the development of power by means other than hydroelectric. Water Use for purposes such as fabricating, processing, washing, diluting, cooling, or transporting a product; incorporating water into a product; or for sanitation needs within the manufacturing facility. Some industries that use large amounts of water produce commodities such as food, paper, chemicals, refined petroleum, or primary metals.

- a. **Manufacturing** water use includes water needed at large, self-supplied industrial facilities for processing and producing food, goods, and other materials (chemical, refinery, paper mills, food processing, etc.).
- b. **Mining** water use is for the extraction of minerals that may be in the form of solids, such as coal, iron, sand, and gravel; liquids, such as crude petroleum; and gases, such as natural gas. The category includes quarrying, milling of mined materials, injection of water for secondary oil recovery or for unconventional oil and gas recovery (such as hydraulic fracturing), and other operations associated with mining activities. Dewatering is not reported as a mining withdrawal unless the water was used beneficially, such as dampening roads for dust control.
- c. **Steam-electric** water for thermoelectric power is used in the process of generating electricity with steam-driven turbine generators. The estimated water use for steam-electric power generation facilities represents the volume consumed in the cooling process and not returned to streams and rivers. This category includes fossil fuel facilities, biomass facilities, and nuclear facilities. TWDB does not estimate water use at renewable energy facilities, such as solar and wind farms, because water use is minimal at these facilities. Additionally, water use estimates do not include cogeneration plants that generate power for manufacturing or mining processes.

Table 1 below shows the 6-digit North American Industry Classification System (NAICS) codes included in each water use category.

Water Use Category	NAICS Codes
Manufacturing	115110 - 115210, 221119 - 400000, 486110 - 486991
Steam-electric power	220000 - 221119
Mining	211111 - 213116
Livestock	112111 - 112991
Municipal	400000 -486110 486991 - 999999

2 Water Use Estimating Methods

Historical water use data collected and estimated by the TWDB provides the foundation for municipal and each non-municipal water use category in regional and state water planning process. The TWDB conducts an annual Water Use Survey (WUS) that is sent to municipal entities and industrial facilities within the state of Texas. TWDB also estimates water use not captured through the annual WUS program by analyzing secondary information sources for non-surveyed water use categories (irrigation, livestock, oil and gas mining, and domestic/rural purposes) to develop annual statewide water use estimates combined for all water use categories.

The estimate does not include intake volumes from seawater but includes reuse volumes reported. Additionally, only consumptive use is included in steam-electric power water use category. Annual water use estimates for all water use categories are available by planning region, county, basin, and aquifer.

2.1 Municipal

1. Surveyed water use

Water use estimates are developed through the TWDB's annual Water Use Survey of community public water systems (the volume of water taken into the water system, minus water sales to other water systems and large industrial facilities). The survey also collects retail water volumes and connection for each end user (single/multi family, commercial and institutional). Additionally, water use reported by any industrial facilities surveyed with municipal NAICS code is included.

2. Non-surveyed water use estimate

Municipal use includes also domestic rural use (non-system) that are estimated by applying a statewide rural area average gallon per person daily calculated based on the use reported by all water supply corporations, mobile home parks and investor-owned water systems to estimated rural population who are relying on private wells not served by any public water systems.

2.2 Irrigation

1. Surveyed water use

TWDB's annual Water Use Survey does not survey any farmers or agricultural water users.

2. Non-surveyed water use estimate

Annual water use estimates are developed at the county level by applying a calculated evapotranspiration-based “crop water need” estimate to reported irrigated acreage from the Farm Service Agency. These estimates are then adjusted based on surface water use collected from agricultural water right holders by Texas Commission on Environmental Quality as well as comments/input from groundwater conservation districts, irrigation districts, and river authorities. Irrigation water use estimates (prior to 2003) were based upon five-year irrigation surveys conducted in coordination with the U.S. Department of Agriculture-Natural Resources Conservation Service.

Non-surveyed estimates are developed annually by the TWDB Conservation Division. More information on this process may be found on the [Irrigation Water Use Estimates](#) webpage.

2.3 Livestock

1. **Surveyed water use**

Water use estimates are developed through the TWDB’s annual Water Use Survey of aquaculture including fish hatcheries.

2. **Non-surveyed water use estimate**

Water use estimates are calculated by applying a water use coefficient for each livestock category to county level inventory estimates from the Agricultural Census and Survey data from USDA-Texas Agricultural Statistics Service.

Non-surveyed estimates are developed annually by the TWDB Projections and Socioeconomic Analysis Department. More information on this process, please see the [methodology summary](#) for more details.

2.4 Manufacturing

1. **Surveyed water use**

Water use estimates are developed through the TWDB’s annual Water Use Survey (the volume of water taken into the facility, minus water sales to other water systems and industrial facilities). Water use is also summarized by industry type based on NAICS code reported by industrial facilities.

2. **Non-surveyed water use estimate**

Non-surveyed manufacturing use volumes reported by surveyed municipal water sellers are also included in these estimates.

2.5 Mining

1. **Surveyed water use**

Water use estimates are developed through the TWDB’s annual Water Use Survey for the categories including aggregates, coal and lignite, and other (the volume of water taken into the facility, minus water sales to other water systems and industrial facilities).

2. **Non-surveyed water use estimate**

Water use is a combination of reported water use to the TWDB annual WUS and additional oil and gas water use estimates provided by the TWDB using the FracFocus database. Oil and gas water use estimates are then broken down by water source based on a TWDB- contracted study, [Oil & Gas Water Use in Texas: Update to the 2022 Mining Water Use Study](#), with the Bureau of Economic Geology (BEG).

Non-surveyed estimates are developed annually by the TWDB Projections and Socioeconomic Analysis Department. More information on this process, please see the [methodology summary](#) for more details.

2.6 Steam Electric Power

1. **Surveyed water use**

Water use estimates are developed through the TWDB’s annual Water Use Survey (the volume of water taken into the facility, minus water sales to other water systems and industrial facilities). These estimates represent the volume consumed in the cooling process and not returned to streams and rivers.

2. **Non-surveyed water use estimate**

Non-surveyed steam-electric power use volumes reported by surveyed municipal water sellers are also included in these estimates.

Table 2 below summarizes the surveyed and non-surveyed estimates methods by water use category.

Water Use Category	Surveyed?	Non-Surveyed Estimated by TWDB staff
Municipal:	Yes All community PWSs	- Domestic/rural water use not served by any water systems applying the rural average GPCD to the estimated domestic/rural population
Irrigation	No	- Calculated evapotranspiration-based “crop water need” estimate to reported irrigated acreage and surface water withdrawal reported by water right holders via TCEQ (developed by TWDB Conservation).
Livestock	Yes (partial) Aquaculture (fish hatcheries)	- Estimated by applying a water use coefficient for each livestock category to county level inventory estimates (Developed by TWDB Projections and Socioeconomic Analysis). - Non-surveyed mining use volumes reported by surveyed municipal water sellers.
Manufacturing	Yes Manufacturing facilities	- Non-surveyed manufacturing use volumes reported by surveyed municipal water sellers.
Mining	Yes (partial) Aggregate/surface mining facilities	- Oil and gas water use estimates using the FracFocus database (developed by TWDB Projections and Socioeconomic Analysis). - Non-surveyed mining use volumes reported by surveyed municipal water sellers are also included in these estimates.
Steam-Electric	Yes Fossil fuel steam-electric plants	- Non-surveyed steam-electric use volumes reported by surveyed municipal water sellers.

For any questions, please contact the [Water Use Survey Team](#), (512) 463-7952.