CROCKETT COUNTY GROUNDWATER CONSERVATION DISTRICT

MANAGEMENT PLAN

2008-2018

Adopted: August 4, 2008

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DISTRICT MISSION

The Crockett County Groundwater Conservation District is dedicated to the implementation of sound management strategies that will preserve and protect its groundwater resources within the District. The District strives to promote conservation, as well as preserve the quality and quantity of its water resources within the District for the benefit of the citizens and economy of the area.

TIME PERIOD FOR THIS PLAN

This plan becomes effective upon adoption by the Board of Directors of the Crockett County Groundwater Conservation District and approval by the Texas Water Development Board executive administrator. This plan remains in effect until September 1, 2013, or until such time as a revised or amended plan is approved.

STATEMENT OF GUIDING PRINCIPLES

The Crockett County Groundwater Conservation District recognizes the vital importance of groundwater to the economy of Crockett County as well as the entire GMA 7 area. Being the predominate water resource, the District is dedicated to conserving and protecting the quantity and quality of this valuable natural resource through prudent and cost effective management. Management planning should be based on awareness of the hydrologic properties of the specific aquifers within the District as well as quantification of existing and future resource data. The goals set forth within the plan are intended to provide for the conservation, preservation, protection, recharge, prevention of waste and pollution, as well as the efficient and prudent use of groundwater resources within the District. The goals of this plan can best be achieved through guidance from the locally elected board members who have an understanding of local conditions as well as technical support from the Texas Water Development Board and qualified consulting agencies. This management plan is intended only as a reference tool to provide guidance in the execution of district activities, but should allow flexibility in achieving its goals.

GENERAL DESCRIPTION OF THE DISTRICT

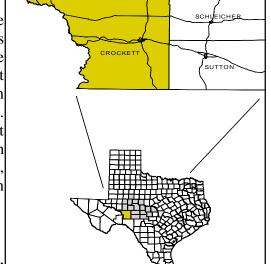
History

The Crockett County Groundwater Conservation District, formerly Emerald Underground Water Conservation District, was created by Acts of the 71st Legislature (1989). The district was confirmed by the citizens of Crockett County on January 26, 1991. In 2007, by Acts of the 80th Legislature, H.B. 4009, the District's name was changed to Crockett County Groundwater Conservation District. Members of the current Board of Directors are: George Bunger, Jr.-President, Paul C. Perner, III -Vice President, Larry Williams-Secretary, James W. Owens and Carlon A. Stapper. The District General Manager is Dennis Clark. The Crockett County Groundwater Conservation District encompasses all of Crockett County with the exception of the

metes and bounds of the Crockett County Water Control & Improvement District No. 1. Historically, Crockett County's economy has been centered around agriculture, but in the last several years, oil and gas has become the dominate industry. The agricultural income is derived from sheep and goats as well as some beef cattle production. Due to the topography and climate of the area, there is very little farming. Recreational hunting has also become a major supplemental income to the county.

Location and Extent

Crockett County, having an areal extent of 2,795.60 square miles or approximately 1,789,182.62 acres of land, is located in southwest Texas on the western edge of the Edwards Plateau. Crockett County is the eighth largest county in Texas with the Pecos River forming its western boundary. On the west lie Pecos and Terrell counties. Crane, Upton, Reagan and Irion counties border Crockett County on the north. On the east lie Schleicher and Sutton counties with Val Verde County on the south. Ozona, being the only town in the county, is centrally located in the eastern part of Crockett County.



Topography and Drainage

Crockett County's topography is characterized by deep,

narrow, steep walled canyons and flat mesas in the ¹Figure 1. Location of the Crockett County Groundwater Conservation District southern and western portions. Broad valleys and flat divides

make up the northern part of the county; the northeastern area is a large flat divide. The altitude ranges from about 1,800 feet in the southwest to over 3,000 feet in the northwest. Karst topography, characterized by numerous sinkholes having underground drainage, occurs in the northeastern quarter of the county on the upper flat divide between the Colorado River and Rio Grande drainage basins.

Drainage of Crockett County is by means of intermittent, dendritic streams. On the east side of the county a dry tributary of Devils River drains southeastward into Sutton County. Johnsons Run and Howards Creek bisect central Crockett County and drain southward, joining Devils River and the Pecos River, respectively, in Val Verde County. In the Northwestern part of Crockett County, Live Oak Creek drains southward into the Pecos River at Lancaster Hill. The dry bed of Spring Creek originates in the northeastern corner of the county and runs northeastward. Generally, the county can be said to lie in the Rio Grande drainage basin. Only the extreme northeastern corner of the county lies in the Colorado River drainage basin.¹

¹ Texas Water Development Board Report 47 - <u>Occurrence and Quality of Ground Water</u> <u>in Crockett County, Texas</u> - May 1967

Groundwater Resources of the Crockett County G.C.D.

The primary sources of groundwater in Crockett County are derived from the Edwards-Georgetown aquifer of Cretaceous age, sands of the Trinity Group or Trinity aquifer and unconsolidated alluvium of Quaternary age which overlies the older Cretaceous rocks principally along the Pecos River, Live Oak Creek, Howard Creek and Johnson Draw.

Most of the water wells in Crockett County produce water from the Edwards-Georgetown and the Trinity aquifers for domestic and livestock purposes. Generally, the wells yield only small quantities of water, 1 to 20 gallons per minute, although yields of up to 2,000 gallons per minute have been reported in both aquifers. Groundwater is encountered at varying depths depending primarily upon topography. Water levels in the alluvium along the Pecos River may be only a few feet below surface, while on the high divides, the water level may occur as much as 600 feet below land surface.

The quality of water from wells in Crockett County varies within wide limits, but is generally good quality. The water is typically very hard and generally high in fluoride content. Samples from a few wells indicate that the water is undesirable for domestic use, but only a very few are considered unusable.²

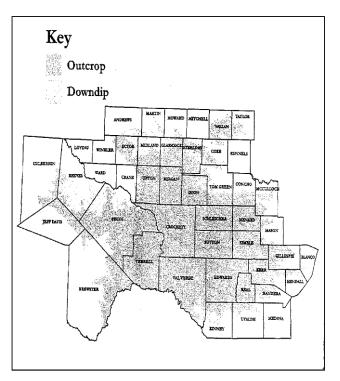


Figure 2. Location of Edwards-Trinity (Plateau) Aquifer

Surface Water Resources of Crockett County GCD

There are no surface water management entities in Crockett County and little to no available surface water within the district with the exception of the Pecos River which forms the western boundary of the district. Although there are a few small surface impoundments used to store pumped groundwater for livestock consumption, they are not viewed by the district as an efficient means of storage.

²Texas Water Development Board Report 47 - <u>Occurrence and Quality of Ground Water</u> <u>in Crockett County, Texas</u> - May 1967

MANAGED AVAILABLE GROUNDWATER

An estimate of the managed available groundwater for the Crockett County Groundwater Conservation District has not been determined at this time. Upon establishing a Desired Future Condition for the aquifers located within Groundwater Management Area 7 and subsequent calculation of the estimated amount of managed available groundwater, the District will amend this portion of the plan.

GROUNDWATER USE

Based on available Texas Water Development Board Water Use Survey data, the annual estimated usage in the District has varied from a low of 2,081 acre-feet to a high of 3,374 acre-feet during the five years beginning in 1999 and ending in 2003.

				Steam				
Year	Aquifer	Municipal	Manufacturing	Electric	Irrigation	Mining	Livestock	Total
1980	EDWARDS-TRINITY PLATEAU	1,806	0	0	1,800	141	772	4,519
1984	EDWARDS-TRINITY PLATEAU	1,744	12	0	338	609	682	3,385
1985	EDWARDS-TRINITY PLATEAU	1,494	61	0	600	652	599	3,406
1986	EDWARDS-TRINITY PLATEAU	1,378	38	0	500	4	710	2,630
1987	EDWARDS-TRINITY PLATEAU	1,086	37	0	500	582	708	2,913
1988	EDWARDS-TRINITY PLATEAU	1,513	9	0	500	576	769	3,367
1989	EDWARDS-TRINITY PLATEAU	1,637	10	0	412	449	797	3,305
1990	EDWARDS-TRINITY PLATEAU	1,457	6	0	350	449	799	3,061
1991	EDWARDS-TRINITY PLATEAU	1,430	18	0	350	388	838	3,024
1992	EDWARDS-TRINITY PLATEAU	1,355	19	0	350	36	658	2,418
1993	EDWARDS-TRINITY PLATEAU	1,683	9	0	441	54	617	2,804
1994	EDWARDS-TRINITY PLATEAU	1,906	14	0	419	64	628	3,031
1995	EDWARDS-TRINITY PLATEAU	1,849	23	0	356	64	503	2,795
1996	EDWARDS-TRINITY PLATEAU	1,807	28	0	374	64	471	2,744
1997	EDWARDS-TRINITY PLATEAU	1,675	40	0	374	73	485	2,647
1998	EDWARDS-TRINITY PLATEAU	1,827	33	0	1,152	21	488	3,521
1999	EDWARDS-TRINITY PLATEAU	1,558	24	0	1,152	73	567	3,374
2000	EDWARDS-TRINITY PLATEAU	1,653	31	0	160	21	614	2,479
2001	EDWARDS-TRINITY PLATEAU	1,213	21	0	214	21	612	2,081
2002	EDWARDS-TRINITY PLATEAU	1,291	42	0	195	2	552	2,082
2003	EDWARDS-TRINITY PLATEAU	1,189	50	0	376	1	553	2,169

Historical Groundwater Pumpage Summary for Crockett County

NOTE: All Pumpage reported in acre-feet

TWDB: 03/28/2007

Source: TWDB Water Use Survey Database (http://www.twdb.state.tx.us/wushistorical/DesktopDefault.aspx?PageID=2)

ANNUAL AMOUNT OF RECHARGE FROM PRECIPITATION

The estimated annual amount of recharge from precipitation to the District into the Edwards Group and Pecos Valley Aquifer is 41,774 acre-feet.

The estimated annual amount of recharge from precipitation to the District into the Undifferentiated Trinity Group is 2,293 acre-feet.³

ANNUAL VOLUME OF WATER THAT DISCHARGES FROM THE AQUIFER TO SPRINGS AND SURFACE WATER BODIES

The estimated annual volume of water that discharges from the Edwards Group and Pecos Valley Aquifer to springs, streams and rivers is 6,444. The estimated annual volume of water that discharges from the Undifferentiated Trinity Group is 16,143.³

ANNUAL VOLUME OF FLOW INTO THE DISTRICT

The estimated annual volume of flow into the District within the Edwards Group and Pecos Valley Aquifer is 10,586 acre-feet. The estimated annual volume of flow into the District within the Undifferentiated Trinity Group is 14,634 acre-feet.³

ANNUAL VOLUME OF FLOW OUT OF THE DISTRICT

The estimated annual volume of flow out of the District within the Edwards Group and the Pecos Valley Aquifer is 33,627 acre-feet.

The estimated annual volume of flow out of the District within the Undifferentiated Trinity Group is 16,424 acre-feet.³

ANNUAL VOLUME OF FLOW BETWEEN AQUIFERS

The estimated net annual volume of flow within the District from the Edwards Group and the Pecos Valley Aquifer into the Undifferentiated Trinity Group is 20,377 acre-feet.³

³ GAM Run 08-27 by Cynthia K. Ridgeway, P.G., Texas Water Development Board, Groundwater Availability Modeling Section, May 21, 2008

PROJECTED SURFACE WATER SUPPLY

There are no surface water management entities in Crockett County and little to no available surface water within the district with the exception of the Pecos River which forms the western boundary of the district. Although there are a few small surface impoundments used to store pumped groundwater for livestock consumption, they are not viewed by the district as an efficient means of storage.

Table 2 - Projected Surface Water SuppliesCrockett CountyTotal County Surface Water Supplies Data

(acre-feet per year)

RWPG	Water User Group	County	River Basin	Source Name	2000	2010	2020	2030	2040	2050	2060
F	Livestock	Crockett	Colorado	Livestock Local Supply	6	4	4	4	4	4	4
F	Livestock	Crockett	Rio Grande	Livestock Local Supply	153	127	127	127	127	127	127
	Total Projected Surface Water Supplies (acre-feet per year) =					131	131	131	131	131	131

Source: Volume 3, 2007 State Water Planning Database (http://www.twdb.state.tx.us/DATA/db07/defaultReadOnly.asp)

PROJECTED TOTAL WATER DEMAND

Due to the sparse population and limited pumping, there has been little effect on water levels and water quality over the majority of the Edwards-Trinity (Plateau) Aquifer in Crockett County. However, since 2003, there have been several large ranches within the district sub-divided into 100 to 200 acre plats. Water use in these subdivisions is limited to widely scattered, low impact domestic and livestock wells, which to this point have not shown any effect on existing water supplies. Based on estimated projections and population statistics, water resource demands should not increase substantially well into the year 2060, at which point it is estimated that the total demand for Crockett County will be 5,475 acre-feet.

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Crockett County <u>Total County</u> Water Demands Data

Table 3 - Projected Water Demands

RWPG	Water User Group	County	River Basin	2000	2010	2020	2030	2040	2050	2060
F	County Other	Crockett	Rio Grande	44	43	43	42	41	40	39
F	Steam Electric Power	Crockett	Rio Grande	1,171	973	776	907	1,067	1,262	1,500
F	Mining	Crockett	Rio Grande	355	402	421	431	441	450	459
F	Irrigation	Crockett	Rio Grande	160	525	518	508	498	492	482
F	Livestock	Crockett	Colorado	23	30	30	30	30	30	30
F	Livestock	Crockett	Rio Grande	744	967	967	967	967	967	967
F	Crockett County WCID #1	Crockett	Rio Grande	1,535	1,688	1,832	1,883	1,907	1,955	1,998
Total P	Total Projected Water Demands (acre-feet per year) =				4,628	4,587	4,768	4,951	5,196	5,475

Source: Volume 3, 2007 State Water Planning Database (http://www.twdb.state.tx.us/DATA/db07/defaultReadOnly.asp)

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Table 4 - Projected Water DemandsCrockett County Groundwater Conservation DistrictGroundwater Conservation District Water Demands Data

RWPG	Water User Group	County	River Basin	2000	2010	2020	2030	2040	2050	2060
F	County Other*	Crockett	Rio Grande	44	43	43	42	41	40	39
F	Steam Electric Power*	Crockett	Rio Grande	1,170	973	776	907	1,066	1,261	1,499
F	Mining*	Crockett	Rio Grande	355	402	421	431	441	450	459
F	Irrigation*	Crockett	Rio Grande	160	525	518	508	498	492	482
F	Livestock*	Crockett	Colorado	23	30	30	30	30	30	30
F	Livestock*	Crockett	Rio Grande	744	967	967	967	967	967	967
Total P	Total Projected Water Demands (acre-feet per year) =			2,496	2,939	2,754	2,884	3,042	3,239	3,475

Source: Volume 3, 2007 State Water Planning Database (http://www.twdb.state.tx.us/DATA/db07/defaultReadOnly.asp)

3/28/2007

* Since the District does not cover all of Crockett County, it is recommended that all estimates presented in the management plan be based on a proportional area percentage. This percentage can be derived by dividing the amount of acres or square miles covered by the District by the total number of acres or square miles contained within Crockett County. The percentage derived by the T.W.D.B. is 99.95% (i.e. 0.9995; see the 'Area' tab), but any estimate that the District provides is preferable. It is recommended that the generic county-wide data (e.g. county other, manufacturing, steam electric power, irrigation, livestock) be converted to a percentage of the total county-wide data. These generic county-wide data have been converted to a proportional value (relative to the size of the District) by multiplying each value from the 'County Water Demands' worksheet by 0.9995.

WATER SUPPLY NEEDS

Based on current supply and demand calculations and projections, there are no projected water needs for Crockett County through 2060 according to the 2007 State Water Plan.

Table 5 - Projected Water Needs Crockett County

RWPG	WUG	County	River Basin	2010	2020	2030	2040	2050	2060
F	County Other	Crockett	Rio Grande	0	0	0	0	0	0
F	Steam Electric Power	Crockett	Rio Grande	0	0	0	0	0	0
F	Mining	Crockett	Rio Grande	0	0	0	0	0	0
F	Irrigation	Crockett	Rio Grande	0	0	0	0	0	0
F	Livestock	Crockett	Colorado	0	0	0	0	0	0
F	Livestock	Crockett	Rio Grande	0	0	0	0	0	0
F	Crockett County WCID #1	Crockett	Rio Grande	0	0	0	0	0	0
		0	0	0	0	0	0		

Source: Volume 3, 2007 State Water Planning Database

WATER MANAGEMENT STRATEGIES

Presently, there are no water management strategies listed in the 2007 State Water Plan because there are no water needs projected for the county through 2060. Preservation and protection of groundwater quantity and quality has been the guiding principle of the District since its creation. The goals and objectives of this plan will provide guidance in the performance of existing District activities and practices. District rules adopted in 1992 address groundwater withdrawals by means of spacing and/or production limits, waste, and well drilling completion as well as capping and plugging of unused or abandoned wells. These rules are meant to provide equitable conservation and preservation of groundwater resources, protect vested property rights and prevent confiscation of property.

In pursuit of the District's mission to provide for conserving, preserving, protecting, recharging and preventing waste of water resources, the District may exercise the powers, rights and privileges to enforce its rules by injunction, mandatory injunction, or other appropriate remedies in a court of competent jurisdiction as provided for in TWC 36.102.

ACTIONS, PROCEDURES, PERFORMANCE AND AVOIDANCE FOR PLAN IMPLEMENTATION

All District activities will be carried out in accordance with this plan and will utilize the provisions of this plan as a guide in prioritizing all District operations.

District rules adopted in 1992 shall be amended and enforced, as necessary, to implement this plan. All rules adopted or amended by the District shall be pursuant to TWC Chapter 36 and the provisions of this plan.

The District shall treat all citizens with equity. Citizens may apply to the District for discretion in enforcement of the rules on grounds of adverse economic effect or unique local characteristics. In granting discretion to any rule, the Board shall consider the potential for adverse effect on adjacent owners and aquifer conditions. The exercise of said discretion by the Board shall not be construed as limiting the power of the Board.

METHODOLOGY

The methodology that the District will use to trace its progress on an annual basis in achieving all of its management goals will be as follows:

The District Manager will prepare and present an annual report to the Board of Directors on District performance in regards to achieving management goals and objectives for the previous fiscal year, during the first meeting of each new fiscal year. The reports will include the number of instances each activity was engaged in during the year.

The annual report will be maintained on file at the District office.

GOALS, MANAGEMENT OBJECTIVES AND PERFORMANCE STANDARDS

<u>Goal</u>

1.0 Provide for the efficient use of groundwater within the District. (36.1071(a)(1))

Management Objective

1.1 Provide public information programs on water conservation

Performance Standard

1.1a – Annually report to the Board of Directors on the number of programs conducted during the year.

Management Objective

1.2 Each year the District will publish one article or newsletter on water conservation

Performance Standard

1.2a – Annually report to the Board of Directors on the number of articles or newsletters published each year.

Goal

2.0 Control and Prevent the Waste of Groundwater (36.1071(a)(2))

Management Objective

2.1 Each year, register all new wells drilled in the District.

Performance Standards

2.1a - District will maintain files including information on the drilling and completion of all new wells in the District.

2.1b - Annually report to the Board of Directors on the number of new wells registered during the year.

<u>Goal</u>

3.0 Natural Resource Issues. Gather and maintain groundwater data to improve the understanding of the aquifers and their hydrogeologic properties. This data will help in determining groundwater availability and future planning. (36.1071(a)(5))

Management Objective

3.1 Annually measure 90 percent of wells in the water level monitoring network within the District.

Performance Standards

3.1a - Annually report to the Board of Directors the number of wells monitored annually in the District's water level monitoring network.

Management Objective

3.2 Maintain a district-wide rainfall event network using voluntary monitors and automatic digital rainfall collectors to help evaluate recharge.

Performance Standards

3.2a - Annually report to the Board of Directors the total number of rain gauges in the rainfall monitoring network.

3.2b - Annually report to the Board of Directors the annual rainfall within the District.

Management Objective

3.3 Annually sample 45 percent of the wells in the water quality monitoring network within the District.

Performance Standard

3.3a - Annually report to the Board of Directors the number of wells sampled annually in the District's water quality monitoring network.

3.3b – Annually report to the Board of Directors any substantial water quality changes that were observed.

Management Objective

3.4 Each year the District will monitor all local periodicals for all public notices for application for fluid injection well permits within the District's boundaries. Each notice will be followed up with a request for copies of the permit application from the Texas Railroad Commission and filed in the District's office.

Performance Standard

3.4a - Annually report to the Board of Directors the number of notices and permit applications filed each year.

<u>Goal</u>

4.0 Implement management strategies that address drought conditions. (36.1071 (a) (6))

Management Objective

4.1 Each year the District will monitor the Palmer Drought Severity Index, Standardized Precipitation Index and the Crop Moisture Index to help develop strategies that would offset adverse climatic conditions.

Performance Standards

4.1a - Provide a report quarterly to the Board of Directors on climatic conditions and proposed management strategies.

<u>Goal</u> 5.0 Conservation and Precipitation Enhancement (36.1071 (a)(7))

Management Objective: Conservation

5.1 Provide and distribute literature on water conservation to area residents.

Performance Standards

5.1a - The district staff will provide information to area residents about water conservation by publishing at least one newsletter or newspaper article annually.

5.1b - Annual report to the Board of Directors listing the number of times newsletters or newspaper articles were published.

Management Objective: Precipitation Enhancement

5.2 The District will participate in the West Texas Weather Modification Association rainfall enhancement program.

Performance Standards

5.2a - Report monthly to the Board of Directors on West Texas Weather Modification Association activities.

5.2b - Annually provide to the Board of Directors the West Texas Weather Modification Association Annual Report.

5.2c – Annually provide to the Board of Directors the number of meetings attended by at least one District employee.

<u>Goal</u>

6.0 Desired Future Condition (36.1071(a)(8))

The desired future conditions of the groundwater within the District have not yet been established in accordance with Chapter 36.108 of the Texas Water Code. The District is actively participating in the joint planning process and the development of a desired future condition for the portion of the aquifer(s) within the District. Therefore, this goal is not applicable to the District at this time.

MANAGEMENT GOALS DETERMINED NOT-APPLICABLE

<u>Goal</u>

7.0 Control and Prevention of Subsidence. (36.1071 (a) (3))

The rigid geologic framework of the region precludes significant subsidence from occurring.

Goal 8.0 Conjunctive Surface Water Management Issues (36.1071 (a) (4))

There exists only one permitted surface water user in Crockett County - this being treated waste water expelled from Crockett County Water Control and Improvement District No. 1's waste water treatment facility located south of the town of Ozona. The Crockett County G.C.D. has no jurisdiction over surface water or permitted surface water users.

<u>Goal</u>

9.0 Recharge Enhancement (36.1071 (a) (7))

The size of the District, the diverse topography, and limited knowledge of any specific recharge sites makes any type of recharge enhancement project economically unfeasible. This management goal is not applicable to the operation of the District.

<u>Goal</u>

10.0 Rainwater Harvesting (36.1071 (a) (7))

The arid nature of the area within the District, with annual rainfall averaging 15 inches or less, makes the cost of rainwater harvesting projects economically unfeasible. This management goal is not applicable to the operations of the District.

<u>Goal</u>

11.0 Brush Control (36.1071 (a) (7))

The District recognizes the benefits of brush control through increased spring flows and the enhancement of native turf which limits runoff. However, most brush control projects within the District are carried out and funded through the NRCS and ample educational material and programs on brush control are provided by the Texas Agrilife Extension Service. This management goal is not applicable to the operations of the District.

Summary Definitions

"Board of Directors" - the Board of Directors of the Crockett County Groundwater Conservation District

"District" - the Crockett County Groundwater Conservation District

"Waste" - as defined by Chapter 36 of the Texas Water Code means any one or more of the following:

(1) withdrawal of groundwater from a groundwater reservoir at a rate and in an amount that causes or threatens to cause intrusion into the reservoir of water unsuitable for agricultural, gardening, domestic, or stock raising purposes;

(2) the flowing or producing of wells from a groundwater reservoir if the water produced is not used for a beneficial purpose;

(3) escape of groundwater from a groundwater reservoir to any other reservoir or geologic strata that does not contain groundwater;

(4) pollution or harmful alteration of groundwater in a groundwater reservoir by saltwater or by other deleterious matter admitted from another stratum or from the surface of the ground;

(5) willfully or negligently causing, suffering, or allowing groundwater to escape into any river, creek, natural watercourse, depression, lake, reservoir, drain, sewer, street, highway, road, or road ditch, or onto any land other than that of the owner of the well unless such discharge is authorized by permit, rule, or order issued by the commission under Chapter 26;

(6) groundwater pumped for irrigation that escapes as irrigation tailwater onto land other than that of the owner of the well unless permission has been granted by the occupant of the land receiving the discharge.

(7) for water produced from an artesian well "waste" has the meaning assigned by Section 11.205.