

4B.9 Live Oak County Water Supply Plan

Table 4B.9-1 lists each water user group in Live Oak County and their corresponding surplus or shortage in years 2030 and 2060. For each water user group with a projected shortage, a water supply plan has been developed and is presented in the following subsections.

**Table 4B.9-1.
Live Oak County Surplus/(Shortage)**

Water User Group	Surplus/(Shortage) ¹		Comment
	2030 (acft/yr)	2060 (acft/yr)	
Choke Canyon WSC	2	4	Projected surplus — supplies and demands split between Live Oak and McMullen Counties
EI Oso WSC	0	0	Supply equals demand
City of George West	0	0	Supply equals demand
McCoy WSC	2	14	Projected surplus
City of Three Rivers	3,271	3,463	Projected surplus
County-Other	(44)	0	Projected shortages in 2020, 2030, and 2040 — see plan below
Manufacturing	(559)	(764)	Projected shortages for entire planning period
Steam-Electric	none	none	No demands projected
Mining	(928)	(1,755)	Projected shortages for entire planning period
Irrigation	(514)	(373)	Projected shortages for entire planning period
Livestock	0	0	Supply equals demand

¹ From Tables 4A-15 and 4A-16, Section 4 – Comparison of Water Demands with Water Supplies to Determine Needs.

4B.9.1 Choke Canyon WSC

Choke Canyon WSC has service areas in Live Oak and McMullen Counties, with a portion of their total water demand and supplies allocated to each county (Tables 4A-16 and 4A-18). In January 2004, Choke Canyon WSC was purchased by the City of Three Rivers. Choke Canyon water supply demands are met with groundwater from the Gulf Coast Aquifer and surface water supplies from the City of Three Rivers. No shortages are projected for Choke Canyon WSC and no changes in water supply are recommended.

4B.9.2 El Oso WSC

El Oso Water Supply Corporation is located in both Bee and Live Oak Counties; consequently, its water demand and supply values are split into tables for each county. The El Oso Water Supply Corporation receives groundwater supplies from the Gulf Coast Aquifer. No shortages are projected for El Oso Water Supply Corporation and no changes in water supply are recommended.

4B.9.3 City of George West

The City of George West's demands are met with groundwater from the Gulf Coast Aquifer. No shortages are projected for George West. In 2000 the City of George West has a per capita per day usage of 227 gallons per capita per day (gpcd) and an estimated usage of 213 gpcd in 2060 (after built-in savings for low flow plumbing fixtures), based on TWDB water demand and population projections. The CBRWPG recommends additional water conservation of 15 percent by 2060 for all municipal entities with reported use greater than 165 gpcd in 2060.

4B.9.4 McCoy WSC

McCoy WSC's demands are met with groundwater from the Carrizo-Wilcox Aquifer. No shortages are projected for McCoy WSC and no changes in water supply are recommended.

4B.9.5 City of Three Rivers

The City of Three Rivers' demands are met with surface water rights on the Nueces River. No shortages are projected for Three Rivers. In 2000 the City of Three Rivers has a per capita per day usage of 202 gallons per capita per day (gpcd) and an estimated usage of 188 gpcd in 2060 (after built-in savings for low flow plumbing fixtures), based on TWDB water demand and population projections. The CBRWPG recommends additional water conservation of 15 percent by 2060 for all municipal entities with reported use greater than 165 gpcd in 2060.

Part of the City of Three River's surplus has been reallocated to Manufacturing use in the county (Table 4B.9-2).

**Table 4B.9-2.
Reallocation of Surplus Supplies by Decade for City of Three Rivers**

<i>Plan Element</i>	<i>2010</i>	<i>2020</i>	<i>2030</i>	<i>2040</i>	<i>2050</i>	<i>2060</i>
Original Projected Surplus (acft/yr)	3,353	3,289	3,271	3,304	3,381	3,463
Reallocated Surplus (acft/yr)	337 ¹	483 ¹	559 ¹	615 ¹	657 ¹	764 ¹
Remaining Projected Surplus (acft/yr)	3,016	2,806	2,712	2,689	2,724	2,699

¹ Reallocated to Live Oak-Manufacturing users (Section 4B.9)

4B.9.6 County-Other

4B.9.6.1 Description

- Source: Groundwater - Gulf Coast Aquifer
- Estimated Reliable Supply: 764 acft per year
- System Description: Individual Wells and Small Water Supply Systems

4B.9.6.2 Options Considered

County-Other demand in Live Oak County has shortages of 32 acft/yr in 2020, 44 acft/yr in 2030, and 14 acft/yr in 2040. Projected groundwater demands decrease after 2030, and groundwater supplies are sufficient to meet projected demands in 2050 and 2060. Groundwater supplies are limited by the estimated well capacity, based on the procedure in Section 4A.2. Table 4B.9-3 lists the water management strategies, references to the report section discussing the strategy, total project cost, and unit costs that were considered for meeting the shortage for County-Other in Live Oak County.

**Table 4B.9-3.
Water Management Strategies Considered for Live Oak County-Other**

<i>Option</i>	<i>Yield (acft/yr)</i>	<i>Approximate Cost¹</i>	
		<i>Total</i>	<i>Unit (\$/acft)</i>
Gulf Coast Aquifer Groundwater Supplies — Drill Additional Well(s) (Section 4C.7)	80	\$240,000 ²	\$300 ²

¹ Unless otherwise noted, costs are Total Project Cost and Unit Cost (\$/acft/yr) for treated water delivered to the water supply entity or entities. Unit cost is for full utilization of project capacity.
² Source of Cost Estimate: Section 4C.7. Table 4C.7-5, 0.1 MGD water treatment plant fully utilized. Cost estimates are based on size and depth of well(s) to meet needs.

4B.9.6.3 Water Supply Plan

Working within the planning criteria established by the Coastal Bend RWPG and TWDB, the following water supply plan is recommended to meet the projected shortages for County-Other in Live Oak County:

- Gulf Coast Aquifer Supplies – Drill Additional Well(s).

In addition to the management strategy listed above, the RWPG supports strategies for increased conservation and reuse of existing supplies.

4B.9.6.4 Costs

The function of the County-Other demand projection category is to capture the demands of single family rural municipal demands as well as demands for small rural water supply systems. The recommended Water Supply Plan including anticipated costs is summarized by decade in Table 4B.9-4.

**Table 4B.9-4.
Recommended Plan Costs by Decade for Live Oak County-Other**

<i>Plan Element</i>	<i>2010</i>	<i>2020</i>	<i>2030</i>	<i>2040</i>	<i>2050</i>	<i>2060</i>
Projected Surplus/(Shortage) (acft/yr)	—	(32)	(44)	(14)	—	—
Gulf Coast Aquifer Groundwater Supplies — Drill Additional Well(s)						
Supply From Plan Element (acft/yr)	—	80	80	80	80	80
Total Annual Cost (\$/yr)	—	\$24,000	\$24,000	\$24,000	\$24,000	\$24,000
Total Unit Cost (\$/acft)	—	\$300	\$300	\$300	\$300	\$300

4B.9.7 Manufacturing

4B.9.7.1 Description

- Source: Groundwater - Gulf Coast Aquifer and Nueces Basin run-of-the-river surface water rights for manufacturing use (owned by the City of Three Rivers)
- Estimated Reliable Supply: 800 acft/yr (surface water)
630 to 809 acft/yr (groundwater)
- System Description: Individual Wells and various manufacturing operations

4B.9.7.2 Options Considered

Manufacturing demand in Live Oak County has shortages during the entire planning period and increase from 337 acft/yr in 2010 to 764 acft/yr in 2060. Groundwater supplies are limited by drawdown criteria established by the CBRWPG (Section 3). Table 4B.9-5 lists the water management strategies, references to the report section discussing the strategy, total project cost, and unit costs that were considered for meeting the shortage for Manufacturing in Live Oak County.

**Table 4B.9-5.
Water Management Strategies Considered for Live Oak County-Manufacturing**

Option	Yield (acft/yr)	Approximate Cost ¹	
		Total	Unit (\$/acft)
Voluntary Redistribution of City of Three Rivers surplus (Section 4C.12)	337 to 764	N/A ²	500 ³
¹ Unless otherwise noted, costs are Total Project Cost and Unit Cost (\$/acft/yr) for treated water delivered to the water supply entity or entities. Unit cost is for full utilization of project capacity. ² Costs not applicable (see discussion in Section 4C.12.2). ³ Unit cost of \$500 per acft assumed to be comparable to cost of Garwood water. City of Three Rivers rates were requested. When available, these costs should be revised as appropriate. N/A = Not applicable.			

4B.9.7.3 Water Supply Plan

Working within the planning criteria established by the Coastal Bend RWPG and TWDB, the following water supply plan is recommended to meet the projected shortages for County-Other in Live Oak County:

- Voluntary Redistribution of City of Three Rivers surplus.

It is probable that Live Oak manufacturing users could avoid excessive drawdowns by spreading out the area of their wells, instead of concentrating them in a small area represented by a cluster of adjacent cells. This option is discussed in Section 4C.7.2, including costs to drill an additional two (2) wells to meet the projected shortages.

In addition to the management strategy listed above, the RWPG supports strategies for increased conservation and reuse of existing supplies.

4B.9.7.4 Costs

The recommended Water Supply Plan is summarized by decade in Table 4B.9-6. There are no costs associated for redistribution.

**Table 4B.9-6.
Recommended Plan Costs by Decade for Live Oak-Manufacturing**

<i>Plan Element</i>	<i>2010</i>	<i>2020</i>	<i>2030</i>	<i>2040</i>	<i>2050</i>	<i>2060</i>
Projected Surplus/(Shortage) (acft/yr)	(337)	(483)	(559)	(615)	(657)	(764)
Voluntary Redistribution of City of Three Rivers surplus						
Supply From Plan Element (acft/yr)	337	483	559	615	657	764
Total Annual Cost (\$/yr)	\$168,500 ¹	\$241,500 ¹	\$279,500 ¹	\$307,500 ¹	\$328,500 ¹	\$382,000 ¹
Total Unit Cost (\$/acft)	\$500 ¹	\$500 ¹	\$500 ¹	\$500 ¹	\$500 ¹	\$500 ¹
¹ Unit cost of \$500 per acft assumed to be comparable to cost of Garwood water. City of Three Rivers rates were requested. When available, these costs should be revised as appropriate.						

4B.9.8 Steam-Electric

No steam-electric demand exists or is currently projected for the county.

4B.9.9 Mining

4B.9.9.1 Description

- Source: Groundwater – Gulf Coast Aquifer
- Estimated Reliable Supply: 3,105 to 3,841 acft/yr
- System Description: Various mining operations

4B.9.9.2 Options Considered

The mining supply in Live Oak County has shortages for the entire planning period and increase from 64 acft per year in 2010 to 1,755 acft per year in 2060. Groundwater supplies are limited by drawdown criteria established by the CBRWPG (Section 3). Table 4B.9-7 lists the water management strategies, references to the report sections discussing the strategy, total project cost, and unit costs that were considered for meeting the Live Oak County mining shortages.

**Table 4B.9-7.
Water Management Strategies Considered for Live Oak County-Mining**

Option	Yield (acft/yr)	Approximate Cost¹	
		Total	Unit (\$/acft)
Mining Water Conservation (Section 4C.4)	97 to 801 ²	N/A ²	N/A ²
No Action	—	N/A ³	N/A ³

¹ Unless otherwise noted, costs are Total Project Cost and Unit Cost (\$/acft/yr) for treated water delivered to the water supply entity or entities. Unit cost is for full utilization of project capacity.
² Yield based on 15 percent reduction in demand recommended by CBRWPG (Section 4C.4.2).
³ Total economic impact of not meeting needs (i.e. “no action” alternative) not included in TWDB Report (see Appendix F). Annual impact of not meeting needs is presented by decade in Table 4B.5-3.
 N/A = Not applicable.

4B.9.9.3 Water Supply Plan

Working within the planning criteria established by the Coastal Bend RWPG and TWDB, the following water supply plan is recommended to meet the projected near-term and long-term shortages for Live Oak County mining:

- Mining Water Conservation (includes reuse)
- No Action

Mining water conservation is only able to meet a portion of the projected shortage. The socioeconomic impact of not meeting mining needs will be considered for the final plan.

It is probable that Live Oak mining users could avoid excessive drawdowns by spreading out the area of their wells, instead of concentrating them in a small area represented by a cluster of adjacent cells. This option is discussed in Section 4C.7.2, including costs to drill an additional 5 wells to meet the projected shortages. The costs estimates take into consideration size and depth of wells.

In addition to the management strategies listed above, the RWPG supports strategies for increased conservation and reuse of existing supplies.

4B.9.9.4 Costs

For mining water conservation, the Water Conservation Implementation Task Force Guide includes a list of Best Management Practices for industries (included in Section 4C.4) but does not include specific costs. Therefore, no additional capital costs can be reasonably

calculated for the mining water plan. The recommended Water Supply Plan including anticipated costs is summarized by decade in Table 4B.9-8.

**Table 4B.9-8.
Recommended Plan Costs by Decade for Live Oak County-Mining**

<i>Plan Element</i>	<i>2010</i>	<i>2020</i>	<i>2030</i>	<i>2040</i>	<i>2050</i>	<i>2060</i>
Projected Surplus/(Shortage) (acft/yr)	(64)	(478)	(928)	(1,234)	(1,504)	(1,755)
Mining Water Conservation						
Supply From Plan Element (acft/yr)	97	216	344	485	639	801
Annual Cost (\$/yr)	N/A	N/A	N/A	N/A	N/A	N/A
Unit Cost (\$/acft)	N/A	N/A	N/A	N/A	N/A	N/A
No Action						
Annual Cost (\$/yr) ¹	\$2,030,000	\$10,560,000	\$19,330,000	\$26,630,000	\$32,150,000	\$37,350,000
¹ Includes lost output, lost income, and lost business taxes associated with not meeting needs. N/A = Not applicable.						

4B.9.10 Irrigation

4B.9.10.1 Description

- Source: Groundwater - Gulf Coast Aquifer and Nueces Basin Run-of-River Water Rights for irrigation use in Live Oak County (owned by the City of Corpus Christi)
- Estimated Reliable Supply: 1,704 to 2,649 acft/yr (groundwater)
200 acft/yr (surface water)
- System Description: Various on-farm irrigation systems

4B.9.10.2 Options Considered

The Irrigation supply in Live Oak County shows a projected shortage for the entire planning period. Due to projected water demand declines for irrigation users in Live Oak County, shortages decrease from 627 acft/yr in 2010 to 373 acft/yr in 2060. The county-wide decline in water use is likely due to expected reductions in irrigated land in the future, however this would imply a reversal of the trend observed in reported irrigated acreage from 1994 to 2000 (Section 4C.2). Shortages are approximately 19 percent and 16 percent of demand in 2010 and 2060, respectively. Groundwater supplies are limited by the approach used to calculate groundwater and surface water supplies based on 2000 use (Section 4A.2). Table 4B.9-9 lists the water management strategies, references to the report sections discussing the strategy, total project cost, and unit costs that were considered for meeting the Live Oak County Irrigation shortages.

**Table 4B.9-9.
Water Management Strategies Considered for Live Oak County-Irrigation**

Option	Yield (acft/yr)	Approximate Cost ¹	
		Total	Unit (\$/acft)
Irrigation Conservation (Section 4C.2)	17 to 342 ²	\$59,166/yr ²	\$173 ²
Gulf Coast Aquifer Supplies – Drill Additional Well(s) (Section 4C.7)	1,210	\$805,000 ³	\$64 ³
¹ Unless otherwise noted, costs are Total Project Cost and Unit Cost (\$/acft per year) for treated water delivered to the water supply entity or entities. Unit cost is for full utilization of project capacity. ² Source of Cost Estimate: Section 4C.2. Irrigation Conservation presented for furrow irrigation as conservative cost estimate. LESA/LEPA are less expensive options. ³ Source of Cost Estimate: Section 4C.7, Table 4C.7-8. Cost estimates are based on size and depth of well(s) to meet needs.			

4B.9.10.3 Water Supply Plan

Working within the planning criteria established by the Coastal Bend RWPG and TWDB, the following water supply plan is recommended to meet the projected shortages for Irrigation in Live Oak County:

- Irrigation Conservation (Furrow/LESA/LEPA);
- Gulf Coast Aquifer Supplies- Drill Additional Well(s)

Although irrigation demands are projected to decrease, the affects of irrigation conservation will not be significant in earlier decades. To meet near-term shortages drilling three additional wells will provide the additional water supply to meet projected shortages. Irrigation conservation savings are anticipated to increase from 17 acft/yr in 2010 to 342 acft/yr in 2060 (Section 4C.2). In addition to the management strategies listed above, the RWPG supports strategies for increased conservation and reuse of existing supplies.

4B.9.10.4 Costs

The recommended Water Supply Plan including anticipated costs is summarized by decade in Table 4B.9-10.

**Table 4B.9-10.
Recommended Plan Costs by Decade for Live Oak County-Irrigation**

<i>Plan Element</i>	<i>2010</i>	<i>2020</i>	<i>2030</i>	<i>2040</i>	<i>2050</i>	<i>2060</i>
Projected Surplus/(Shortage) (acft/yr)	(627)	(569)	(514)	(464)	(416)	(373)
Irrigation Conservation						
Supply From Plan Element (acft/yr)	17	52	103	169	248	342
Annual Cost (\$/yr)	\$59,166	\$59,166	\$59,166	\$59,166	\$59,166	\$59,166
Unit Cost (\$/acft)	\$173	\$173	\$173	\$173	\$173	\$173
Gulf Coast Aquifer Supplies – Drill Additional Well(s)						
Supply From Plan Element (acft/yr)	1,210	1,210	1,210	1,210	1,210	1,210
Annual Cost (\$/yr)	\$78,000	\$78,000	\$78,000	\$78,000	\$78,000	\$78,000
Unit Cost (\$/acft)	\$64	\$64	\$64	\$64	\$64	\$64
Total Annual Cost (\$/yr)	\$137,166	\$137,166	\$137,166	\$137,166	\$137,166	\$137,166
Total Unit Cost (\$/acft) ¹	\$128	\$152	\$185	\$230	\$289	\$366
¹ Weighted average unit cost of the one or two management strategies that have associated total annual costs, based on projected supply needed.						

4B.9.11 Livestock

The livestock demands in Live Oak County are met by groundwater from the Gulf Coast Aquifer and surface water from local on-farm sources. No shortages are projected for livestock and no changes in water supply are recommended.