

---

# 7 Evaluation of Implementation Alternatives

---

This chapter introduces alternative short-term and long-term implementation approaches for delivery of water to Williamson County under the requirements of HB1437. The short-term alternative recognizes the need to verify conservation estimates from the selected strategies and solidify the processes necessary for effective management of the program. Long-term alternatives recognize the need to address the concerns of the BRA and its customers on the costs of water produced under the HB1437 program.

This chapter summarizes the engineering analyses presented in two Technical Memoranda: Attachment 18 - *Evaluation Criteria and Selection Process for HB1437 Water Replacement Strategies*, and Attachment 19 - *Estimates of the Conservation Charge for HB1437 Water Replacement Strategies*.

## 7.1 Uncertainties and Evaluation Criteria

Short-term approaches should be formulated in a way that addresses some of the uncertainties to result in sound long-term decisions. The principal uncertainties addressed in the alternative formulations include:

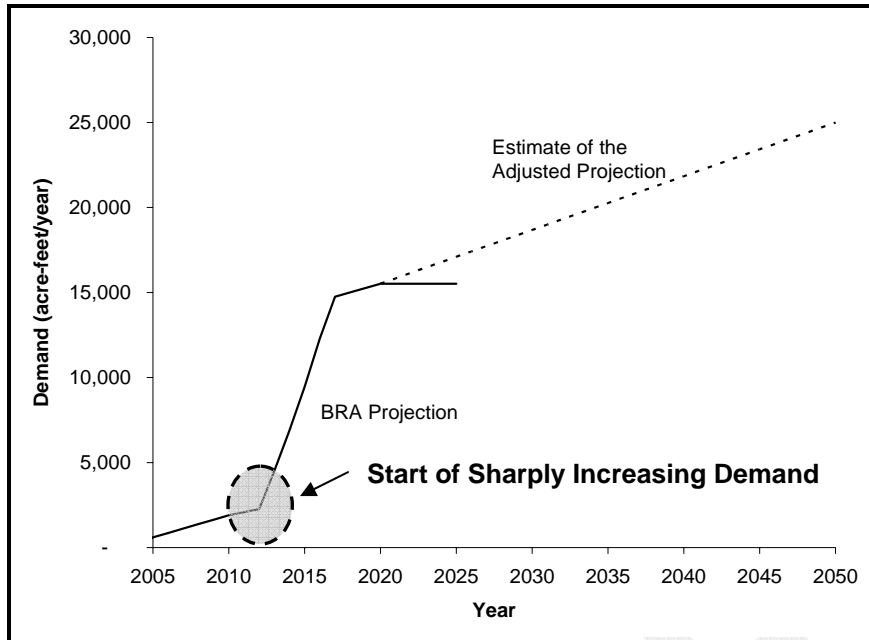
- Williamson County water demands.
- Reliability of conservation strategies i.e. On-farm precision land leveling, and in-district automated check structures and SCADA controls.
- Cost uncertainties that result from long term viability of EQIP.
- Implementation uncertainties regarding farmer participation and identification of suitable farms.

### 7.1.1 Williamson County Demand

Demand projections for water in Williamson County are more reliable for the first few years than they may be further into the future. Demand projections during these early years are relatively modest but are expected to quickly escalate during the period 2012 - 2017 when demands from the City of Round Rock are expected to begin (see Figure 7.1).

The exact date for this increase is uncertain but accommodating this change will require significant lead-time for financing and construction. A 50% contingency was added to the 2012 demand projections to address the timing and implementation uncertainties of the demand upsurge. A 3,500 acre-feet per year target volume was adopted for the short-term alternatives. This adjusted demand includes the Brazos projection for 2012 (2,260 acre-feet per year), plus the 50% contingency.

**Figure 7.1 2025 Projected Water Demands, AF/yr**



### 7.1.2 Reliability of Conservation Estimates

Field studies are currently being conducted for the LCRA-SAWS Water Project which may provide additional information to increase the reliability of water conservation estimates for the precision land leveling and automated check structure strategies. Results from these studies are not expected until 2006. Therefore, a short-term alternative formulated with several strategies will efficiently provide field data for two conservation strategies which could be used to update alternative formulations for meeting long-term water demands.

### 7.1.3 EQIP Funding

The USDA Farm Bill that authorizes the current EQIP program will expire after 2007, so there is no assurance that EQIP will continue beyond that time. While adequate EQIP funding is currently available to fund short-term conservation projects, there is a possibility that the amount of funding for future on-farm conservation projects will be significantly reduced. Therefore, it is reasonable to expect EQIP participation in the short-term projects, but unreasonable to expect it over the long-term. As such surcharge rates for the no-EQIP alternatives probably present a more realistic estimate of the long-term surcharge.

### 7.1.4 Implementation Uncertainties

For an alternative to be successful, the ease or complexity of implementation must be considered. Precision land leveling is considered moderately complex as it will require

---

identification of qualifying farms located within the LCRA irrigation districts plus development of separate agreements with individual farmers to ensure the conservation strategies are properly constructed and maintained.

The NRCS has a well developed process and procedures for developing on-farm conservation strategies. A cooperation agreement between the LCRA and NRCS is recommended to take advantage of this knowledge and reduce implementation uncertainties for those strategies with EQIP funding. .

In-district alternatives are considered somewhat less risky and less complex because fewer parties are involved .providing a higher level of management control over the strategy and increased reliability of conservation estimates.

### 7.1.5 Evaluation Criteria

Presented below are the primary evaluation criteria used to evaluate and select short-term alternatives.

- Conservation Charge
- Ease/speed of implementation
- Risk
- Reliability and drought performance
- Sustainability
- Compatibility with long-term strategies

## 7.2 Short-Term Alternatives

Two short-term alternatives, STA-1 and STA-2, were formulated to develop 3,500 acre-feet per year of conserved water production. Both alternatives include: 1) an existing groundwater well, capped at 600 a-f/yr as back up water; and 2) 50% EQIP funding for the precision land leveling component.

- STA-1. This is the one strategy alternative which includes on-farm precision land leveling of approximately 4,700 acres each year for three years sized to produce 3,500 a-f/yr of conserved water. A total of 14,000 acres of land would be leveled.
- STA-2. This is the combination alternative. In this alternate, a combination of on-farm precision land leveling, and automated check structures and SCADA control systems. It includes leveling 6,000 acres over a three year period to produce an estimated 1,500 acre-feet per year of conserved water. Additionally, it includes installing automated check structures and control systems on selected canals in the Garwood District to produce an additional 2,000 a-f/yr of conserved water.

Both short-term alternatives include one round of field maintenance for the precision level fields. Farmer experience indicate that leveled fields need to be re-leveled periodically, usually after three farming cycles, or they will lose their ability to conserve water. Therefore, the cost for the precision level component for both alternatives include one

---

round of maintenance leveling. This maintenance cost is paid 100% from the Ag Conservation Fund.

## 7.2.2 Conservation Surcharge

Conservation surcharge percentages for the two alternatives are summarized in Table 7.2 below. Additional details are presented in Appendix B.

Given the uncertainties of cost estimation, the conservation charge of these two strategies is considered equal, and for the purpose of the evaluation, estimated to be 25%.

**Table 7.2 Costs to Each User for Alternate Short-Term Strategies<sup>3</sup>**

Strategy	Conservation Charge
STA-1. Precision Land Leveling, end Contract in 2012 <sup>2</sup>	21%
STA-2. Combination, end Contract in 2012*	25%

<sup>1</sup> EQIP % = 50%

<sup>2</sup> Required to deliver 3,500 acre-feet per year.

<sup>3</sup> See Appendix B for additional detail of the cost analysis.

## 7.2.3 Evaluation Discussion

Because the estimated conservation charges for the two short-term alternatives are essentially the same, the non-cost criteria evaluation were necessary to complete the evaluation and selection process. A discussion of this evaluation is presented below.

### 7.2.3.1 Ease/Speed of Implementation

Although the precision-leveling-only alternative (STA-1) is a proven strategy to construct and implement, it is more complex to implement in terms of agreements and funding transactions. Construction-wise, many farmers are familiar with precision leveling and its potential benefits; contractors are readily available to install this practice; and EQIP contracts are already in place for more than the total area needed to achieve the targeted water conservation.

The in-district check system is more capital intensive to install, requires more planning and design effort, and is somewhat less scaleable than precision leveling.

However, the combination of these two strategies (STA-2) mitigates these drawbacks by constructing the precision leveling component first before the in-district check system. This approach allows the capital reserves in the Ag Fund to build up to fund the in-district improvements. Conserved water from the precision leveling will satisfy early demands, until sufficient funds are available for the design and construction of the in-district components

---

### 7.2.3.2 Risk

The combination alternative has several advantages over the single strategy alternative. It provides an opportunity to test two attractive water conservation strategies without making large-scale investments in either one. Additionally, it presents a diversified production approach which will reduce the risk of not producing the conserved water necessary to comply with the no net loss condition. If the performance of either component fails to produce the desired level of conservation, it can be reassessed and modified, or abandoned.

Management of water conservation with the combination approach gives LCRA control of the in-division improvements, and farmer's control of the individual field projects, producing a more reliable system for developing the necessary water for Williamson County.

The combination alternative also hedges against another risk, the expiration of the EQIP subsidy for precision leveling. Without the EQIP subsidy, the one-strategy precision leveling alternative conservation charge will exceed the cost of the combination strategy.

### 7.2.3.3 Reliability

Both strategies are proven methods for conserving agriculture water, but both will be affected during drought conditions. How well they will perform is uncertain therefore, an alternate supplemental source such as groundwater is required to improve the reliability of both alternatives. Each alternative assumes a limited amount of groundwater production as part of the operating cost estimate.

### 7.2.3.4 Sustainability

While precision land leveling is proven strategy, it also depends upon periodic maintenance leveling to sustain its long term conservation potential. The in-division strategy requires maintenance but not the kind of periodic capital investment necessary of for precision land leveling. The in-division improvements are seen as being somewhat more sustainable because they do not rely on this long term maintenance investment.

## 7.2.4 Conclusions for Short-Term Alternatives

The combination alternative, STA-2, is the preferred short-term alternative. It is cost effective; it fulfills the short-term water demands; and it provides a higher level of reliability over the single strategy alternative.

This alternate is a combination system of on-farm precision land leveling, and automated check structures and SCADA as described below:

- Conservation charge: 25% (from 2005 to 2012)
- Conservation Strategy
  - Precision leveling of approximately 6,000 acres
  - Automated Check Structures and SCADA in a portion of the Garwood District.
- Conserved Water Production – 3,500 a-f/yr
- Water Demand Period – 2005 – 2012 ( plus field maintenance in 2014 – 2016)

- 
- Groundwater – 600 a-f/yr (maximum) from an existing well in Lakeside Division
  - Funding:
    - precision leveling: EQIP - 50% / Ag Fund – 30% / Farmer - 20%
    - in-division controls: Ag Fund – 100%

## 7.3 Long-Term Alternatives

Planning for municipal water supplies considers much longer planning horizons than the short-term alternatives discussed above. Typically water planners make a 50-year assessment of water needs and supplies, and then develop alternative(s) that meet these criteria. To address this need, an expanded version of the proposed short-term combination plan was developed and analyzed for its effect on the conservation charge and changes to long-term risks.

Two long-term combination alternatives, LTA-1 and LTA-2, were analyzed: Both used the same strategies, financing, and production capacity; but differed in the level of EQIP financing. The characteristics of these alternatives are summarized below:

- EQIP Funding:
  - LTA-1: With EQIP
    - Precision Land Leveling: EQIP - 50% / Ag Fund – 30% / Farmer - 20%
    - Automated Check/SCADA: Ag Fund – 100%
  - LTA-1: No EQIP
    - Precision Land Leveling EQIP - 0% / Ag Fund – 80% / Farmer - 20%
    - Automated Check/SCADA: Ag Fund – 100%
- Bond Financing – 2-30-yr bonds
  - Bond Pack No. 1: 2005 – 2035
  - Bond Pack No. 2: 2016 - 2046
- Conservation Strategy
  - Precision leveling of approximately 54,000 acres
  - Automated Check Structures and SCADA in Garwood District
- Conserved Water Production: Total 25,000 a-f/yr
  - Precision Land Leveling : 13,500 a-f/yr
  - Automated Check/SCADA: 12,000 a-f/yr
- Water Demand Period – 2005 – 2050

- Groundwater – 600 a-f/yr (maximum) from an existing well in Lakeside Division

### 7.3.2 Water Costs

#### 7.3.2.1 Conservation Surcharge

Appendix A presents the projected costs estimates and cash flows for the two long-term alternatives.

A summary of these results are presented in Table 7.4 and show the conservation surcharge to range between 31 and 40%, depending on the level of EQIP funding. This range is up from the current authorized surcharge rate of 25%, and is attributed to the additional construction cost, and additional cost for debt financing.

**Table 7.4 Estimated Conservation Surcharges for Long-term Alternatives**

Long-term Alternative	Funding Variables			Conservation Surcharge
	% EQIP for Leveling	% Farmer for Leveling	% Maintenance from Ag Fund	
LTA-1 Combination (with EQIP)	50	20	100%	31%
LTA-2 Combination (without EQIP)	0	20	100%	40%

#### 7.3.2.2 Raw Water Costs

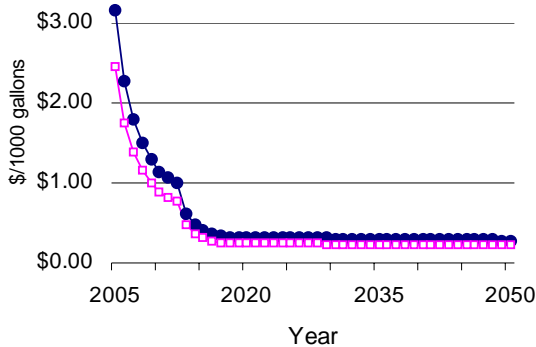
Table 7.5 summarizes the unit costs of water for the two alternatives. Over the life of the project, conservation costs to Williamson County water users are expected to range between 14 cents and 18 cents per 1000 gallons depending on the availability of EQIP funding.

**Table 7.5 Comparison of EQIP funding on Raw Water Cost**

Surcharge	Without EQIP		With EQIP	
	40.00%		31.00%	
	\$/1000	\$/a-f	\$/1000	\$/a f
Conservation cost	\$0.18	\$59.84	\$0.14	\$46.38
Normal cost	\$0.35	\$115.00	\$0.35	\$115.00
Total Cost	\$0.54	\$174.84	\$0.50	\$161.38

In debt financed water supply systems, the unit cost of water delivered will vary from year to year depending on what part of the project life-cycle is being considered, and as shown in the figure below, the unit costs for HB1437 water is no different.

**HB1437 Yearly Cost of Raw Water  
With & Without EQIP**



**Summary of Costs**

Surcharge Line

- 40% Surcharge - No EQIP
- 31% Surcharge - With EQIP

40% Surcharge

Project Lifetime Cost = \$0.54/1,000 gallons

31% Surcharge

Project Lifetime Cost = \$0.50/1,000 gallons

Notes:

1. Yearly Costs = Total Cost in Year / Total Volume of Water Delivered in Year

As shown in the graph, the unit cost of water (total dollars expended in a year divided by total volume of water delivered in a year) is initially high, but quickly declines and, by the year 2015, is essentially at the project life costs of \$0.50 - \$0.54 per 1000 gallons

## 7.4 Conclusions and Recommendations

The evaluation indicates that water replacement alternatives under HB1437 should be developed in a 2-step approach: short-term (2005 – 2012), and long-term (post 2012). This will allow Williamson County demands to be met while developing the operation and management processes necessary for the long-term. The recommendations for each time frame are presented below.

For the short-term period, through year 2012, the combination alternative (STA-02) should be implemented. This alternative will allow the validation of two conservation strategies and the development of the management process for long-term operations. This will also allow additional data on conservation rates for two strategies without making a full commitment to a one single one.

Selection of this short-term strategy will require extending the agreement with BRA through 2012 to maintain the conservation charge at 25 percent.

For the long-term period, post 2012, an expanded version of the combination alternative would be developed to include automated check structure(s) and data system(s); balancing reservoir(s); reduced irrigation for second crop or other voluntary conservation. The precise

---

make-up of the long-term alternative would be contingent on the operational results from the short-term alternative and revised demand projections from Williamson County customers.

DRAFT