

**City of Carson City
Agenda Report**

Date Submitted: April 8, 2014

Agenda Date Requested: April 17, 2014
Time Requested: 90 minutes

To: Mayor and Supervisors

From: Public Works Department

Subject Title: For Possible Action: To accept the Public Works Department Reclaimed Water Contingency Plan.

Staff Summary: Reclaimed water shortages are projected to continue for the near term. Staff is presenting the historical trends of reclaimed water production, usage / loss and projecting future supply. Staff has prepared a reclaimed water contingency plan to manage the projected shortfalls (David Bruketta).

Type of Action Requested: (check one)

Resolution Ordinance
 Formal Action/Motion Other (Discussion only)

Does This Action Require A Business Impact Statement: () Yes (X) No

Recommended Board Action: I move to accept the Public Works Reclaimed Water Contingency Plan.

Explanation for Recommended Board Action: Reclaimed water production has decreased 24 % over the past 13 years and demand/loss is exceeding supply. Projections show reclaimed water shortages of 240 acre-feet to 860 acre-feet, annually. Public Works prepared a contingency plan to deal with the shortfalls.

Applicable Statute, Code, Policy, Rule or Regulation: NA

Fiscal Impact: \$52,475 to \$188,036 annually

Explanation of Impact: Estimated cost to provide the domestic water supplementation needed to cover the reclaimed water shortage.

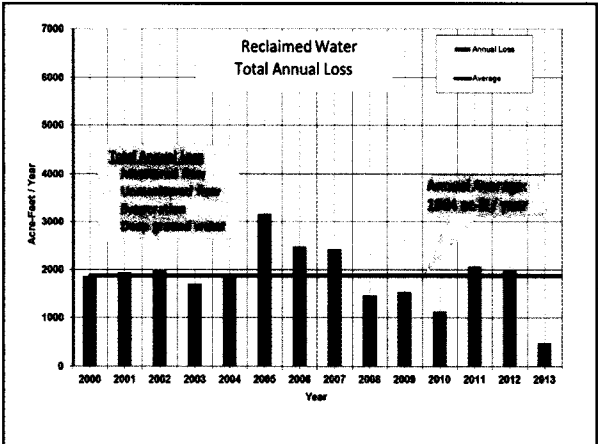
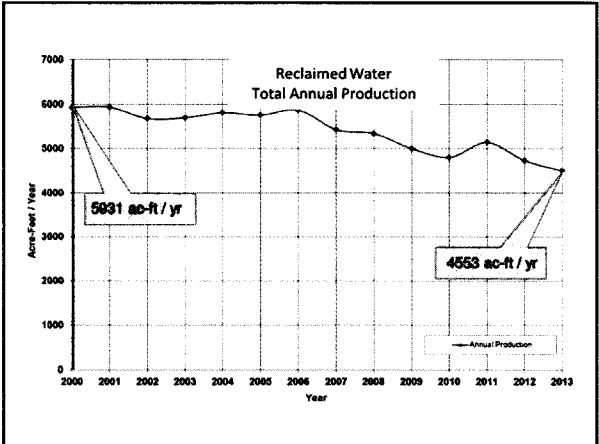
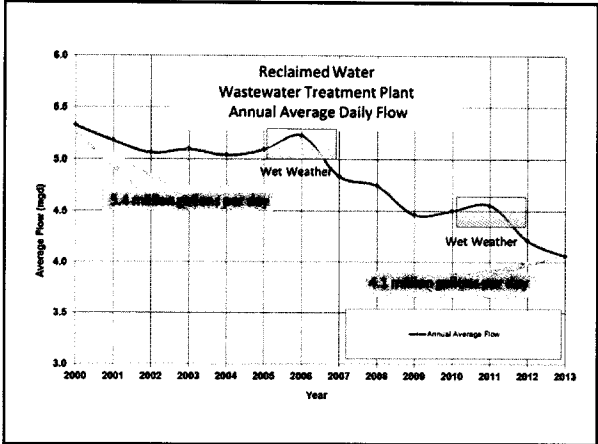
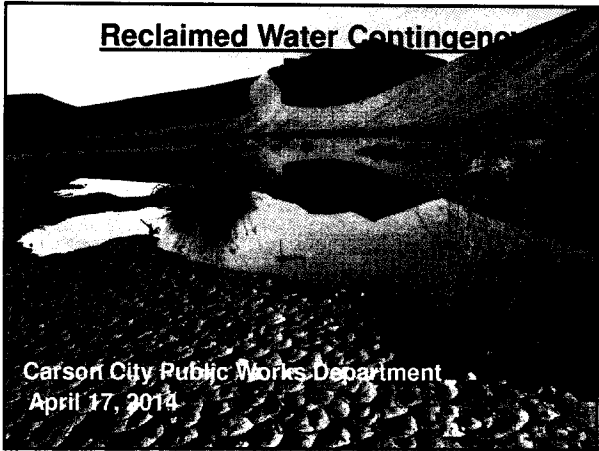
Funding Source: Wastewater utility fund

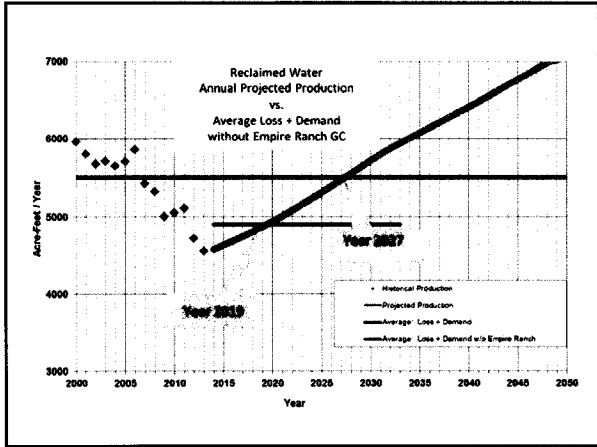
Alternatives: Provide additional direction to staff.

Supporting Material:

- Power point presentation;
- Public Works Reclaimed Water Contingency Plan;
- Notification letter to re-users, dated April 3, 2014;
- Memorandum from BHC Consultants, Analysis of Reclaimed Water Storage and Irrigated Land Requirements; Potential Impacts of Loss of Empire Ranch Golf Course as a Reuse Site, dated February 18, 2014;

Prepared By: David Bruketta, Utility Manager





COCM 12.10.220 Priority of reclaimed water service.

At such time as the establishment of this ordinance, the quantity of reclaimed water is limited; therefore, Carson City recognizes a first in time priority program for the establishment of service. The priority of service and the annual quantity provided is as follows:

1. State of Nevada Prison Farm	1,100
2. Darling Ranch	1,385
3. Eagle Valley Golf Course	1,000
4. Silver Oak Golf Course	500

Any future reclaimed water use will be prioritized based on the date of service. The utilities director in the month of February, on an annual basis, will evaluate the quantity of reclaimed water available and notify all users on the availability of the resource and potential shortages.

1. State of Nevada Prison Farm	1,100	3,000	1,176
2. Darling Ranch	790*	1,385	650
3. Eagle Valley Golf Course	1,000		849
4. Silver Oak Golf Course	500	790	467

*Min quantity should be 790 ac-ft, not 1,385 ac-ft.

- Min Annual Quantity defined in Municipal Code and contracts
- Max Annual Quantity defined in contracts
- Typical annual usage: Average usage of the past 4 years

Carson City actions for this year:

- Conversion of Carson City Parks to domestic water
- Conversion of dust control to domestic water
 - Combined - saves about 160 ac-ft / year
- Started domestic water supplementation
- Notified re-users of shortage
 - Voluntary 25% reduction, letter dated 4/3/2014
- Developed a Reclaimed Water Contingency Plan

Public Works Reclaimed Water Contingency Plan

- Included as supplemental material
- Determine if there is a projected shortfall of reclaimed water
- 3 Stage process
 - 1 – notification with cutback recommendation
 - 2 – notification with updated information and potential restriction date
 - 3 – watering restrictions
- Reconcile costs for domestic water supplementation
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- Options
 - Supplement shortage with domestic water
 - Who pays for cost of domestic water
 - Voluntary vs mandatory cutbacks
 - How to distribute reclaimed water during watering restrictions

Options in Reclaimed Water Contingency Plan

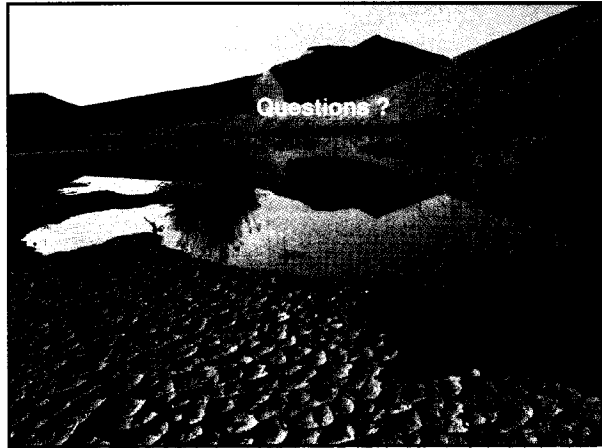
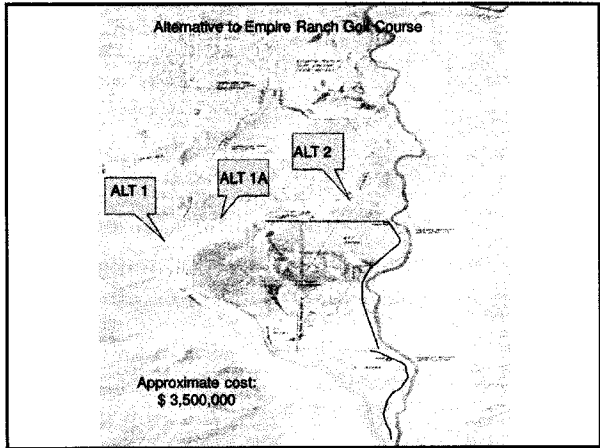
- Supplement reclaimed water shortage with domestic water
 - Recommend: Supplementation
 - Option 1 – No supplementation
 - Option 2 – Limited supplementation

Options in Reclaimed Water Contingency Plan (continued):

- Determine who pays the cost for domestic water supplementation
 - Recommend: Transfer funds from sewer to water to cover cost
 - Estimated costs (\$0.671 / 1000 gallons):
 - 240 ac-ft (\$52,475)
 - 860 ac-ft (\$188,036)
 - Option 1 – Implement CCMC 12.10.020 Monthly commodity Charge (\$0.10 / 1000 gallons) to re-users to help offset cost.
 - Prison Farms: 1100 ac-ft (\$ 35,840)
 - Empire Ranch: 790 ac-ft (\$ 25,740)
 - Eagle Valley: 1000 ac-ft (\$ 32,582)
 - Silver Oak: 500 ac-ft (\$ 16,291)
 - Option 2 – Users cover the full cost
 - Option 3 – Water Utility covers the cost

Short term issues (this year) - continued:

- Voluntary vs mandatory cut backs
 - Recommend: Voluntary until contracts can be addressed
 - Option 1: direct staff to renegotiate contracts adding language for mandatory cut backs
- Establish how to distribute water during restrictions
 - Recommend: Acres Method
 - Option 1: Contracts – no water distribution until minimum allocation met based on CCMC defined priority.
 - Option 2: Past history – 9 hole equivalency method of distribution





**Standard Operating Procedure
Carson City Public Works
Wastewater Reclamation Facility**

Reclaimed Water Contingency Plan

PURPOSE: For dealing with a situation where reclaimed water demands that exceeds supply.

POLICY: This plan may be put into action upon authorization from the City Manager, or designee.

PROCEDURE: In the Spring, the Utility Manager shall evaluate the reclaimed water supply and demand for the remainder of the calendar year and estimate if there will be a supply shortage. If a shortage is predicted, the following actions will be taken:

Stage 1 – Voluntary cutbacks 1st notification (email):

- The Utility Manager shall notify all re-users of the supply shortage and what actions will be needed to avoid watering restrictions.
- The Public Works Director may start domestic water supplementation at Stewart Pond.

Stage 2 - Voluntary cutbacks 2nd notification (email):

- The Utility Manager shall notify all re-users of the continued supply shortage, what actions will be needed to avoid watering restrictions and provide an estimated time frame on when water restrictions will happen unless changes are made.
- The Public Works Director may start/continue domestic water supplementation at Stewart Pond.

Stage 3 – Watering restrictions:

- The supplemental supply in Brunswick Canyon is nearly empty and only supply available is what is coming from the wastewater treatment plant.
- The Utility Manager shall estimate how much reclaimed water is available daily from the wastewater treatment plant and allocate that volume based on the “Acres” calculation method (see appendix 1).
- With a one (1) week notice, the Utility Manager shall notify all re-users of the watering restriction date and their allocated daily volume.
- It shall be the responsibility to the re-user to monitor their daily usage and ensure they stay within their allocated daily volume.
- If a re-user exceeds their daily allocation, the Utility Manager may shut down supply to that re-user for the remainder of the day.
- The Utility Manager will provide weekly updates (email) to each re-user of their daily usages until watering restriction are lifted.
- The Public Works Director may start/continue domestic water supplementation at Stewart Pond.

At the end of the calendar year, the Utility Manager shall summarize the year’s activities. Costs occurred from domestic water supplementation shall be paid via a service charge from the sewer fund to the water fund.

**Standard Operating Procedure
Carson City Public Works
Wastewater Reclamation Facility**

Reclaimed Water Contingency Plan

Appendix 1 – Acres Calculation

During watering restrictions, the only available source of reclaimed water is what is being produced at the wastewater treatment plant on a daily basis and any supplemental domestic water. Each re-user will be allocated a daily volume based on their acreage (as defined in the Effluent Management Plan).

1. Determine how much reclaimed water will be available daily.
 - a. Effluent flow + domestic water flow

2. Allocate available water per acre
 - a. (Effluent flow + domestic water flow) / total acres

3. Distribute available water to each golf course based on their total acres.

Example calculations:

- 1 Determine daily available water

Effluent Flow	3.9	MGD
Domestic Flow	0.5	MGD
Total Flow	4.4	MGD

- 2 Allocate available water per acre

Total Flow	4.4	MGD
Total Acres	1084	Acres
Water per Acre	4059	Gallons/ Acre

- 3 Distribute water to re-users

Re-use site	Acres	Allocation (MGD)
Prison Farms	491	2.0
Empire Ranch	210	0.9
Eagle Valley	213	0.9
Silver Oak	170	0.7
Total	1084	4.4

* MGD = million gallons per day

**PUBLIC WORKS
DEPARTMENT**

ADMINISTRATION

3505 Butti Way
Carson City, NV 89701-3498
Ph: 775-887-2355
Fx: 775-887-2112

FLEET SERVICES

3303 Butti Way, Building 2
Carson City, NV 89701-3498
Ph: 775-887-2356
Fx: 775-887-2258

OPERATIONS

(Water, Sewer, Wastewater,
Streets, Landfill, Environmental)
3505 Butti Way
Carson City, NV 89701-3498
Ph: 775-887-2355
Fx: 775-887-2112

**ENGINEERING/
TRANSPORTATION/
CAPITAL PROJECTS**

3505 Butti Way
Carson City, NV 89701-3498
Ph: 775-887-2355
Fx: 775-887-2112

BUILDING and SAFETY

PERMIT CENTER
108 E. Proctor Street
Carson City, NV 89701-4240
Ph: 775-887-2310
Fx: 775-887-2202

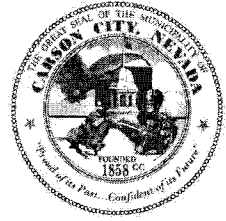
PLANNING

108 E. Proctor Street
Carson City, NV 89701-4240
Ph: 775-887-2180
Fx: 775-887-2278

HEARING IMPAIRED

Dial 711

CARSON CITY NEVADA
Consolidated Municipality and State Capital



April 3, 2014

Dear Reclaimed Water Users:

This year is setting up to be another dry year with limited availability of reclaimed water supply. In fact, the supply is even less than last year, when we had watering restriction that started on August 7. Without changes in your watering demand now, we could have watering restrictions starting as early as July. In order to prevent this, we are requesting a 25% reduction in usage effective immediately, that continues throughout the year. Without this reduction, or a reduction of less than 25%, the result will be an empty storage reservoir that supplies the summer demand relief. Once the storage reservoir is empty, we will be dependent upon what is produced from the wastewater treatment plant on a daily basis.

On April 17, 2014, Public Works will be discussing reclaimed water and presenting a Reclaimed Water Contingency Plan to the Board of Supervisors. I encourage you to have a representative from your agency attend and participate in the discussion.

If you have any questions, please contact me at 283-7357.

Sincerely,

David Bruketta, Utility Manager

cc: Tim Bryant, State of Nevada, Department of Corrections, Ranch Manager
Jim Wiggins, Empire Ranch Golf Course General Manager
Jim Kepler, Eagle Valley Golf Course General Manager
Terrie McNutt, Silver Oak Golf Course General Manager
Darren Schulz, Carson City Director of Public Works





MEMORANDUM

Date: February 18, 2014
To: Andrew Burnham, David Bruketta, Darren Schulz
From: Martin Harper, PE
Subject: Analysis of Reclaimed Water Storage and Irrigated Land Requirements:
Potential Impact of Loss of Empire Ranch Golf Course as a Reuse Site

Introduction

The purpose of this analysis is to evaluate the potential impacts of losing the Empire Ranch Golf Course irrigation site on future reclaimed water reservoir storage and irrigated land requirements in Carson City. Empire Ranch Golf Course currently irrigates 194 acres of turf, lakes and wetland areas (Effluent Management Plan for Empire Ranch Golf Course, Resource Concepts, Inc., 2005). The total amount of irrigated area in Carson City using reclaimed water is 1,084 acres, so Empire Ranch Golf Course represents about 18% of the total area.

The golf course is permitted by NDEP to utilize 1,385 acre-feet per year (AF/Y) of reclaimed water for irrigation. Carson City has a contract to deliver a minimum of 790 AF/Y and a maximum of 1,385 AF/Y. The theoretical hydraulic loading for an average year was calculated to be 955 AF/Y in the Effluent Management Plan prepared for the site (Resource Concepts, Inc. 2005). Actual reclaimed water quantities delivered during 2008 through 2012 ranged from 509 to 593 AF/Y and averaged 562 AF/Y during this period. Total reclaimed water volumes delivered for irrigation at all nine current reuse sites in Carson City averaged 3,610 AF/Y during the period from 2008 through 2012. Thus, irrigation at Empire Ranch Golf Course represented an average of about 16% of the total irrigation volume during the 5 year period. The potential loss of this site means that other areas must be developed to utilize the reclaimed water currently delivered to Empire Ranch Golf Course for irrigation or other means of disposal of reclaimed water must be pursued by Carson City.

As suggested by the range in quantities delivered to Empire Ranch Golf Course reported above, the other reuse sites also have historically received varying quantities of reclaimed water depending on its availability and the amount of actual precipitation each year. The range in reclaimed water quantities delivered to the other eight reuse sites, determined by adding minimum and maximum quantities delivered from 2008 through 2012, was 2,714 to 3,338 AF/Y, excluding Empire Ranch Golf Course usage. This range indicates that Carson City has some flexibility in delivering reclaimed water to all reuse sites which mitigates potential impacts if Empire Ranch Golf Course is not available as a reuse site in the future.

Analysis Methodology

This analysis estimated the amount of irrigated land required with and without Empire Ranch Golf Course as a reuse site in the future. The average annual wastewater flow rate at the Carson City Wastewater Reclamation Plant (WRP) averaged about 4.5 million gallons per day (mgd) from 2009 through 2012 and continued to drop to nearly 4.0 mgd in 2013. Future scenarios were evaluated using five different average annual flow rates ranging from 4.0 to 9.0 mgd. These flows were intended to cover the likely range in future per capita flow rates during water-conservation and more liberal usage periods as well as the uncertainty of future build-out populations in Carson City and other commitments to provide wastewater treatment services to entities beyond Carson City corporate limits.



The analysis also estimated future reclaimed water storage needs for the future flow scenarios. Reclaimed water produced during non-irrigation season must be stored for use in the subsequent irrigation season. Brunswick Reservoir has an existing storage capacity of 3,500 acre-feet (AF) based on an average annual design flow of 6.2 mgd (6,950 AF/Y) and minimal seepage losses. Allowances for storage of local runoff generated in the Brunswick Reservoir watershed and losses due to evaporation from the reservoir water surface are roughly balanced, thus, the design reservoir storage is roughly 50 percent of the annual WRP wastewater flow volume because non-irrigation season is generally 6 months in duration.

Results

The analysis of storage and irrigated land requirements are shown in the attached table for the five wastewater flow scenarios and the current reservoir seepage rate of 2,000 AF/Y. The following observations are made based on the information provided in the table:

- Additional irrigated land required ranges from about 400 acres to nearly 1,400 acres if Empire Ranch Golf Course continues to be available as a reuse site.
- Additional irrigated land requirements increase by 194 acres if Empire Ranch is not available as a reuse site. Total additional land required ranges from about 200 acres to 1,560 acres.
- Brunswick Reservoir storage capacity is adequate for higher flows up to 8.0 mgd. About 550 AF of additional storage would be required at 9.0 mgd.

Even though existing (2013) average annual flows continue to decrease, they are likely to increase in the future due to population growth. Current projections for growth in Carson City are 0.5% per year and based on that growth rate, average annual flows will reach 5.0 mgd in 40 years and 6.0 mgd in 80 years. The 5.0 mgd threshold is significant, as the total reuse area provided by the existing reuse sites is adequate for that flow. However, if Empire Ranch Golf Course becomes unavailable as a reuse site, it should be replaced with another 200 acre reuse site before the 5.0 mgd threshold is reached.

These observations are based on the assumption that current Brunswick Reservoir seepage rate remains unchanged in the future. Changes in reservoir seepage losses are possible, however. For example, higher Brunswick Reservoir water surface elevations due to greater volumes of stored water would provide greater hydraulic head that could increase seepage rates. Higher seepage rates means that less reclaimed water would be stored in Brunswick Reservoir during non-irrigation season and available for irrigation during the subsequent irrigation season. For example, if the seepage rate increased to 3,000 AF/Y, about 45 acres of additional reuse area would be required when future flows reach 6.0 mgd if Empire Ranch Golf Course is available. If the golf course is unavailable, the additional reuse area would increase to about 240 acres. Brunswick Reservoir provides adequate storage volume for future flows up to 9.0 mgd if the seepage rate is 3,000 AF/Y.

Seepage rates could also decrease in the future if the reservoir bottom area or the subsurface soils become plugged due to deposition of suspended material or algae grown in the reservoir. Lower seepage rates mean that more reclaimed water would be stored in the reservoir during non-irrigation season and available for irrigation the next year. The lower seepage rate also may mean that additional storage is required. For example, if seepage rates decreased to 1,000 AF/Y, between 650 and 850 acres of additional reuse area (depending on the availability of Empire Ranch Golf Course) would be required when future flows reach 6.0 mgd. No additional storage is required until future flows exceed 7.0mgd; however, about 480 AF of additional storage is required at 8.0 mgd, and increases to 1,050 AF at 9.0 mgd.



Conclusions

Empire Ranch Golf Course is a significant element of the Carson City reclaimed water reuse system. If reuse for irrigation at the golf course is no longer possible, about 600 AF/Y would become available at current (2013) flows for reuse at other existing or new sites in Eagle Valley.

For the future flow scenario of 5.0 mgd and a continued seepage rate of 2000 AF/Y, no additional reuse area is required if Empire Ranch Golf Course is available as a reuse site. If Empire Ranch Golf Course is not available, about 200 acres of additional reuse area is required. Brunswick Reservoir will provide adequate storage capacity for future flows up to 8.0 mgd.



Analysis of Reservoir Storage and Irrigated Land Requirements with Current Seepage Losses

WRP Flows (mgd)	(AF/Y)	Brunswick Reservoir Loss (AF/Y)	Net Reclaimed Water (AF/Y)	Reservoir Storage Req'd (AF)	Additional Storage Req'd (AF)	Irrigation Area Req'd (A)	Additional Area Req'd (A)	Additional Area w/o Empire Ranch (A)
4.0	4483	2000	2483	1242	0	752	0	0
5.0	5604	2000	3604	1802	0	1092	8	202
6.0	6724	2000	4724	2362	0	1432	348	542
7.0	7845	2000	5845	2923	0	1771	687	881
8.0	8966	2000	6966	3483	0	2111	1027	1221
9.0	10086	2000	8086	4043	543	2450	1366	1560

Notes:

1. Brunswick Reservoir storage capacity = 3500 AF
2. Irrigation area determined using average annual irrigation rate = 3.3 AF/A/Y
3. Existing irrigated area at reuse sites = 1084 A
4. Empire Ranch Golf Course irrigated area = 194 A



Analysis of Reservoir Storage and Irrigated Land Requirements with Alternative Seepage Losses

WRP Flows (mgd)	(AF/Y)	Brunswick Reservoir Loss (AF/Y)	Net Reclaimed Water (AF/Y)	Reservoir Storage Req'd (AF)	Additional Storage Req'd (AF)	Irrigation Area Req'd (A)	Additional Area Req'd (A)	Additional Area w/o Empire Ranch (A)
4.0	4483	1000	3483	1742	0	1055	0	0
5.0	5604	1000	4604	2302	0	1395	311	505
6.0	6724	1000	5724	2862	0	1735	651	845
7.0	7845	1000	6845	3423	0	2074	990	1184
8.0	8966	1000	7966	3983	483	2414	1330	1524
9.0	10086	1000	9086	4543	1043	2753	1669	1863
4.0	4483	3000	1483	742	0	494	0	0
5.0	5604	3000	2604	1302	0	789	0	0
6.0	6724	3000	3724	1862	0	1128	44	238
7.0	7845	3000	4845	2423	0	1468	384	578
8.0	8966	3000	5966	2983	0	1808	724	918
9.0	10086	3000	7086	3543	0	2147	1063	1257

Notes:

1. Brunswick Reservoir storage capacity = 3500 AF
2. Irrigation area determined using average annual irrigation rate = 3.3 AF/A/Y
3. Existing irrigated area at reuse sites = 1084 A
4. Empire Ranch Golf Course irrigated area = 194 A