Item 9

**CARSON CITY UTILITY FINANCIAL OVERSIGHT COMMITTEE**
**REQUEST FOR COMMITTEE ACTION**

**Date Submitted:** March 16, 2015 **Meeting Date:** March 24, 2015

**To:** Utility Financial Oversight Committee

**From:** Darren Schulz, Director of Public Works

**Subject Title:** For Possible Action: Review and discussion of domestic water supplementation for calendar year 2014 with possible recommendations to the Board of Supervisors.

**Staff Summary:** For calendar year 2014, 104.57 million gallons of domestic water was used to supplement the reclaimed water supply, which will result in a transfer of $71,108 from the sewer fund to the water fund for fiscal year 14/15. The Committee may make recommendations to the Board of Supervisors regarding domestic water supplementation for calendar year 2015 and beyond.

**Type of Action Requested:** (check one)

( ) None – Informational Only
( X ) Formal Action/Motion

**Recommended Commission Action:** I move to recommend to the Board of Supervisors, that Public Works continue to supplement the reclaimed water system with domestic water until the reclaimed water supply can meet the demands; transfer the cost of domestic water from the Sewer Fund to the Water Fund annually; and use the First Amendment to the Interlocal Agreement relating to water service between Douglas County and Carson City to determine the cost of the water.

**Explanation for Recommended Commission Action:** On April 17, 2014, the Board of Supervisors approved a Reclaimed Water Contingency Plan, which allows for domestic water to be used to augment the reclaimed water system in an effort to prevent reclaimed water shortages. For calendar year 2014, 104.57 million gallons of domestic water added to the Steward Pond reservoir. No reclaimed watering restriction was implemented for calendar year 2014. With continuing drought conditions and low levels of reclaimed water production, staff estimates a continued shortfall in available reclaimed water.

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

**Fiscal Impact:** Estimated $100,000 per year

**Alternatives:** NA

**Supporting Material:**

- Memo regarding the augmentation of reclaimed water with domestic water for calendar year 2014.

**Item 9**

- First Amendment to the Interlocal Agreement relating to water service between Douglas County and Carson City.

**Prepared By:** David Bruketta, Utility Manager

**Reviewed By:**

D M Bruketta
(Utility Manager) Date: 3/16/15

(Public Works Director) Date: 3/16/15

(District Attorney) Date: 3/16/15

(Finance Director) Date: 3/16/15

**Committee Action Taken:**

Motion: _____ 1) _____ Aye/Nay
2) _____

_____ (Vote Recorded By)

Memo

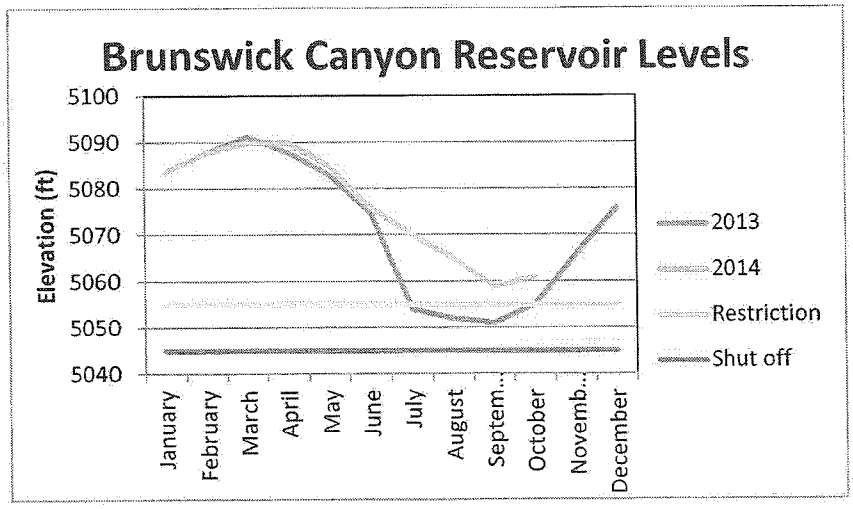
October 30, 2014

To: Darren Schulz
From: David Bruketta DB
Regarding: Update - augmenting reclaimed water with domestic water for calendar year 2014

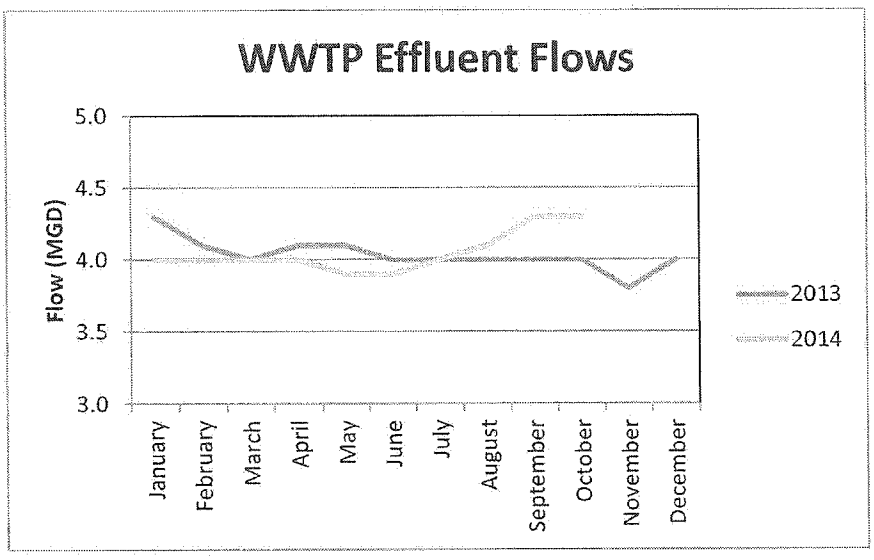
Due to projected shortages of reclaimed water, the Board of Supervisors (BOS) approved a Reclaimed Water Contingency Plan on April 17, 2014 (Appendix 1). This plan allows the Public Works Director to start domestic water supplementation at Stewart Pond, in an effort to avoid or delay reclaimed watering restrictions. The BOS directed staff to have a third party independently verify the shortfall projections and present to the Utility Financial Oversight Committee (Committee). Manhard Consulting Ltd., prepared a report and made the presentation regarding effluent availability and the use of domestic water for augmenting irrigation demands (Appendix 2). The presentation was on June 3, 2014 and supports the initial projections. The Committee recommended the continued use of domestic water for augmenting effluent shortfalls with the cost coming from the wastewater operating funds for fiscal year 14/15.

Domestic water supplementation at Stewart Pond started in May and continued through September. The total amount of supplementation was 104.57 million gallons. Using a reimbursement cost of $0.68/1000 gallons, the augmentation from the wastewater fund to the water fund will be $71,108.

Due to the supplementation, the removal of Carson City Parks from the reclaimed water service and closure of the reclaimed water overhead fill stations, there were no reclaimed watering restrictions this year. The storage levels in Brunswick Canyon remained above the restriction level and we were able to meet the summer demand, although, in September, we came close to the restriction level. The chart below compares reservoir levels from the past two years. Last year, when the reclaimed watering restrictions started in August, Public Works set up the domestic water supplementation line to Stewart Pond and provided approximately 30 million gallons of supplementation.



The reclaimed water flows from the treatment plant have remained relatively flat over the past couple of years. The past two months have seen a small uptick in flow and time will tell it that that trend continues.




The plan moving forward would be to bring the discussion back to the Committee in 2015 seeking a recommendation on whether supplementation should continue, who is going to pay for it and what it will cost. Hopefully a longer term plan, 3 – 5 years, can be established. In addition, we might have more information on what, if anything is happening with plans for the Empire Ranch Golf Course.

Please let me know if you need any additional information.

Thanks

Appendix 1
1 of 15

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
(XXX) 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

Reviewed By: Del M Brubetta Date: 4/8/14
(Department Head)

Concurrences: Marcia A Works Date: 4/8/14
(City Manager)

Date: 4/8/14
(District Attorney)

Date: 4/8/14
(Finance Director)

Board Action Taken:

Motion: _____ 1) _____ Aye/Nay
2) _____

_____
(Vote Recorded By)

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

**Reclaimed Water Contingency Plan**

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**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**

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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 |

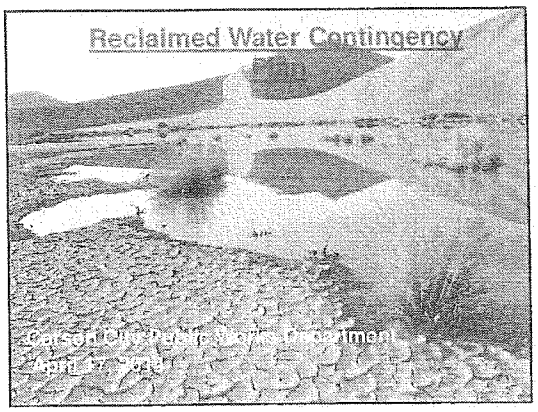
2 Allocate available water per acre

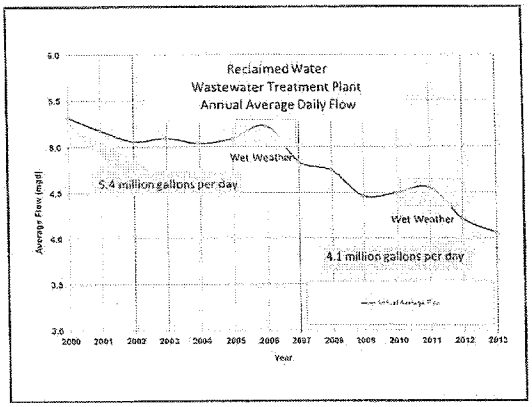
| | | |
|---|---|---|
| Total Flow | 4.4 | MGD |
| Total Acres | 1084 | Acres |
| Water per Acre | 4059 | Gallons/ Acre |

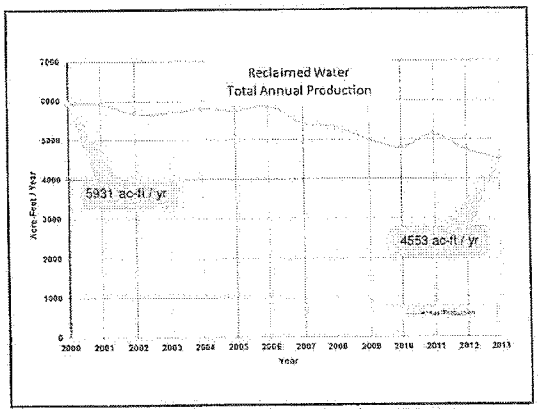
3 Distribute water to re-users

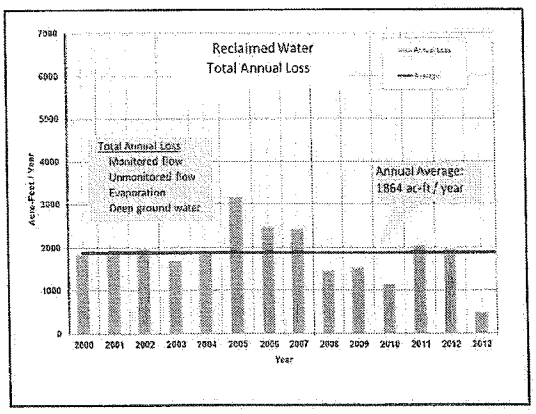
| Re-use site | Acres | Allocation (MGD) |
|---|---|---|
| Prison Farms | 491 | 2.0 |
| Empire Ranch | 210 | 0.9 |
| Eagle Valley | 213 | 0.9 |
| Silver Oak | 170 | 0.7 |
| Total | 1084 | 4.4 |

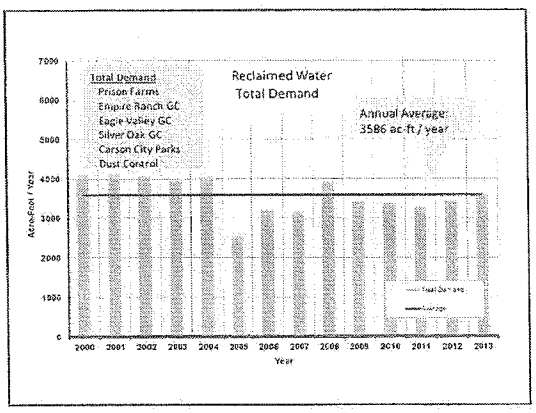
* MGD = million gallons per day

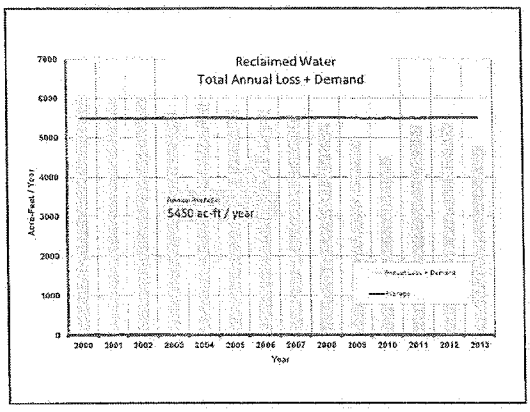

Reclaimed Water Contingency

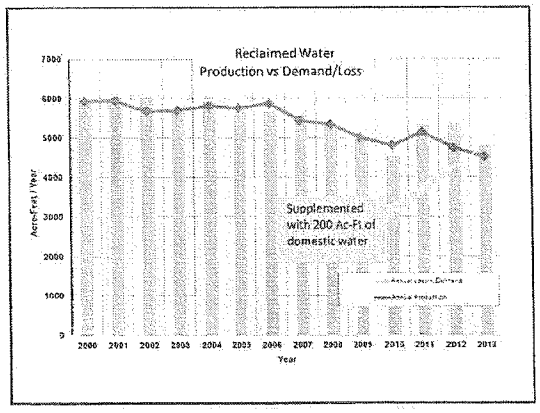

Reclaimed Water
Wastewater Treatment Plant
Annual Average Daily Flow
Wet Weather
5.4 million gallons per day
Wet Weather
4.1 million gallons per day
Average Flow (mgd)
Year

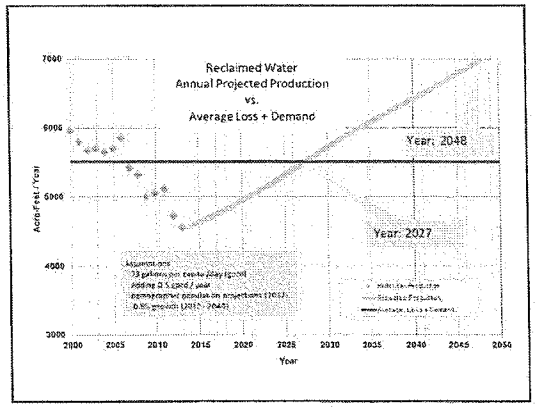

Reclaimed Water
Total Annual Production
5931 ac-ft / yr
4553 ac-ft / yr
Acre-Feet / Year
Year

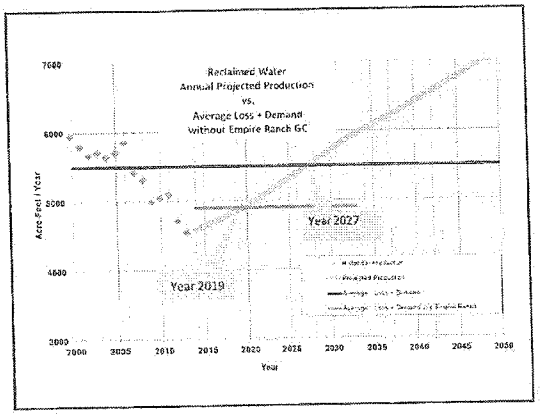

Reclaimed Water
Total Annual Loss
Total Annual Loss
Monitored flow
Unmonitored flow
Evaporation
Deep ground water
Annual Average:
1864 ac-ft / year
Acre-Feet / Year
Year


Reclaimed Water
Total Demand
Total Demand
Prison Farms
Empire Ranch GC
Eagle Valley GC
Silver Oak GC
Carson City Parks
Dust Control
Annual Average
3586 ac-ft / year
Acre-Feet / Year
Year


Reclaimed Water
Total Annual Loss + Demand
5450 ac-ft / year
Acre-Feet / Year
Year


Reclaimed Water
Production vs Demand/Loss
Supplemented
with 200 Ac-Ft of
domestic water
Acre-Feet / Year
Year


Reclaimed Water
Annual Projected Production
vs.
Average Loss + Demand
Year: 2048
Year: 2027
Acre-Feet / Year
Year




CCMC 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

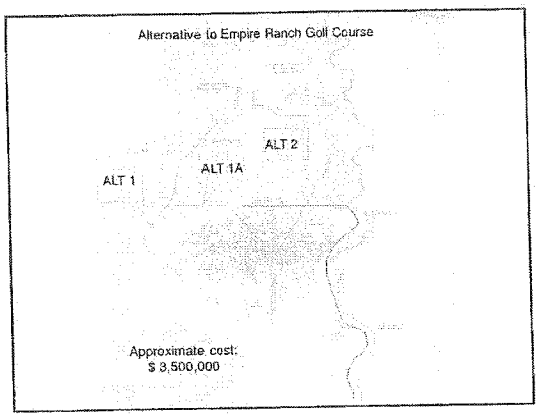
**Options in Reclaimed Water Contingency Plan (continued):**

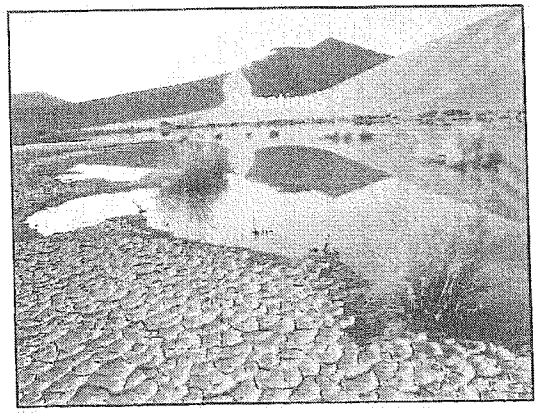
- Determine who pays the cost for domestic water supplementation
  - Recommend: Transfer funds from sewer to water to cover cost
    - Estimated costs ($0.671 / 1000 gallons):
      - 240 ac-ft ($52,475)
      - 860 ac-ft ($188,036)
    - Option 1 – Implement CCMC 12.10.020 Monthly commodity Charge ($0.10 / 1000 gallons) to re-users to help offset cost.
      - Prison Farms: 1100 ac-ft ($ 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 bucks

- 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


Alternative to Empire Ranch Golf Course
ALT 2
ALT 1A
ALT 1
Approximate cost:
$ 3,500,000



**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,

D M Bruketta

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

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# 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.

BHC CONSULTANTS

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.

BHC CONSULTANTS

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

| WRP Flows (mgd) | WRP Flows (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

BHC CONSULTANTS

**Analysis of Reservoir Storage and Irrigated Land Requirements with Alternative Seepsage Losses**

| WRP Flows (mgd) | WRP Flows (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

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**Item 6**

# CARSON CITY UTILITY FINANCIAL OVERSIGHT COMMITTEE
# REQUEST FOR COMMITTEE ACTION

**Date Submitted:** May 22, 2014 **Meeting Date:** June 3, 2014

**To:** Utility Financial Oversight Committee

**From:** Darren Schulz, Public Works Director

**Subject Title:** For Possible Action: To review a report from Manhard Consulting, Ltd regarding effluent availability and the use of domestic water for augmenting irrigation demands.

**Staff Summary:** The Committee will review a report prepared by Manhard Consulting, Ltd regarding effluent availability and the use of domestic water for augmenting irrigation demands of the prison farm and golf courses and may make recommendations to the Board of Supervisors.

**Type of Action Requested:** (check one)
( ) None – Information Only
( x ) Formal Action/Motion

**Recommended Commission Action:** I move to recommend to the Board of Supervisors continued use of domestic water for augmenting effluent shortfalls with costs to be paid utilizing wastewater operating funds.

**Explanation for Recommended Commission Action.** Wastewater Treatment Facility flows have reduced significantly over the last 13 years and the reduced effluent amount available for irrigation use has resulted in a shortage. Projections indicate a shortage of 500 to 900 acre feet annually resulting in the need to augment the effluent with potable water. Options are presented to outline the costs and potential short and long term considerations.

**Applicable Statue, Code, Rule or Policy:** N/A

**Fiscal Impact:** Cost to the wastewater fund for augmenting the water fund in the range of approximately $100,000- $300,000 annually.

**Alternatives:** Other direction by the Committee.

**Supporting Material:** Manhard Consulting, Ltd Report

**Prepared By:** Darren Schulz, Public Works Director

**Reviewed By:**

_____ Date: _____
(Public Works Director)

_____ Date: _____
(Finance Director)

_____ Date: _____
(District Attorney's Office)

**Committee Action Taken:**

Motion: _____ 1) _____ Aye/Nay
2) _____ _____
_____
_____
_____
_____

_____ (Vote Recorded By)

# CARSON CITY

# RECLAIMED WATER ANALYSIS

*Prepared for:*

Carson City Public Works

Carson City, Nevada

*Prepared by:*

Manhard

*3476 Executive Pointe Way #12*

*Carson City, Nevada, 89706*

*May 27, 2014*

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Manhard

# CARSON CITY

# RECLAIMED WATER ANALYSIS

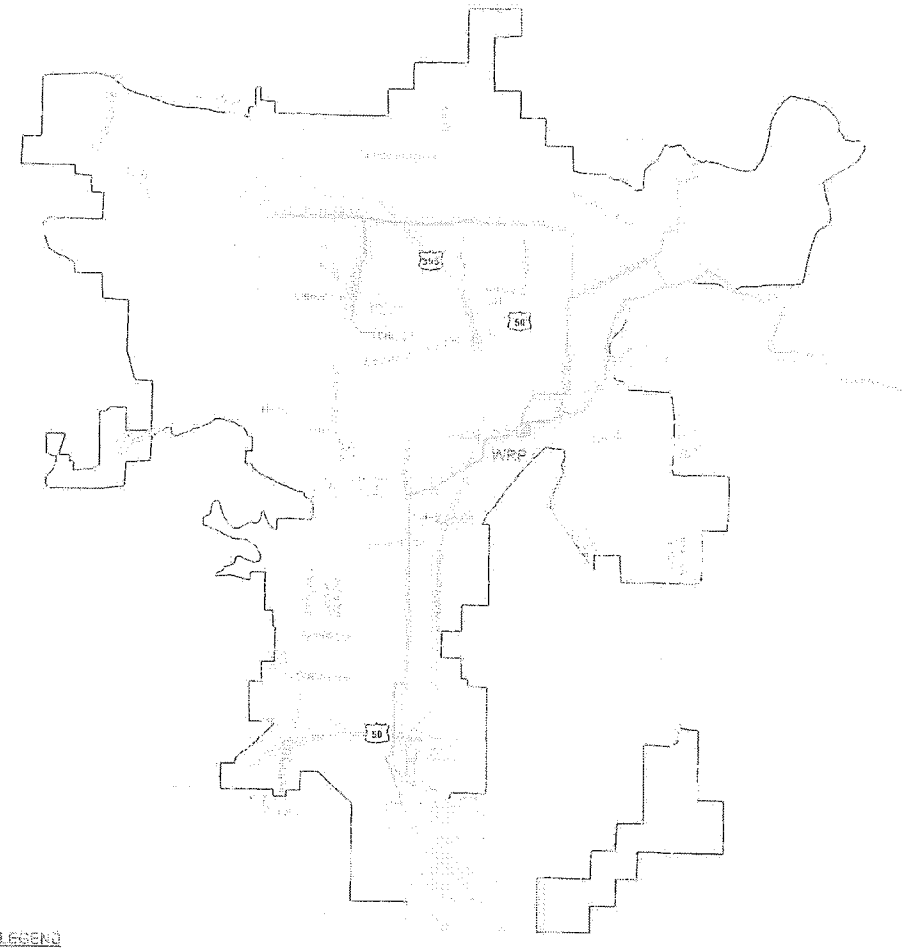
## INTRODUCTION

Carson City, Nevada's Wastewater Treatment Plant (WWTP) has produced treated effluent that has been stored in Brunswick Canyon Reservoir in the winter months and delivered to a number of sites for irrigation during the spring, summer, and fall. The irrigation sites include the South Carson Prison Farms, Empire Ranch Golf Course, Eagle Valley Golf Course, Silver Oak Golf Course, and a number of Carson City Park facilities. Figure 1 shows the reclaimed water reuse areas and the related reclaimed distribution system. In addition to the irrigated areas outlined, reclaimed water fill stations have been provided for water trucks providing dust control throughout the city.

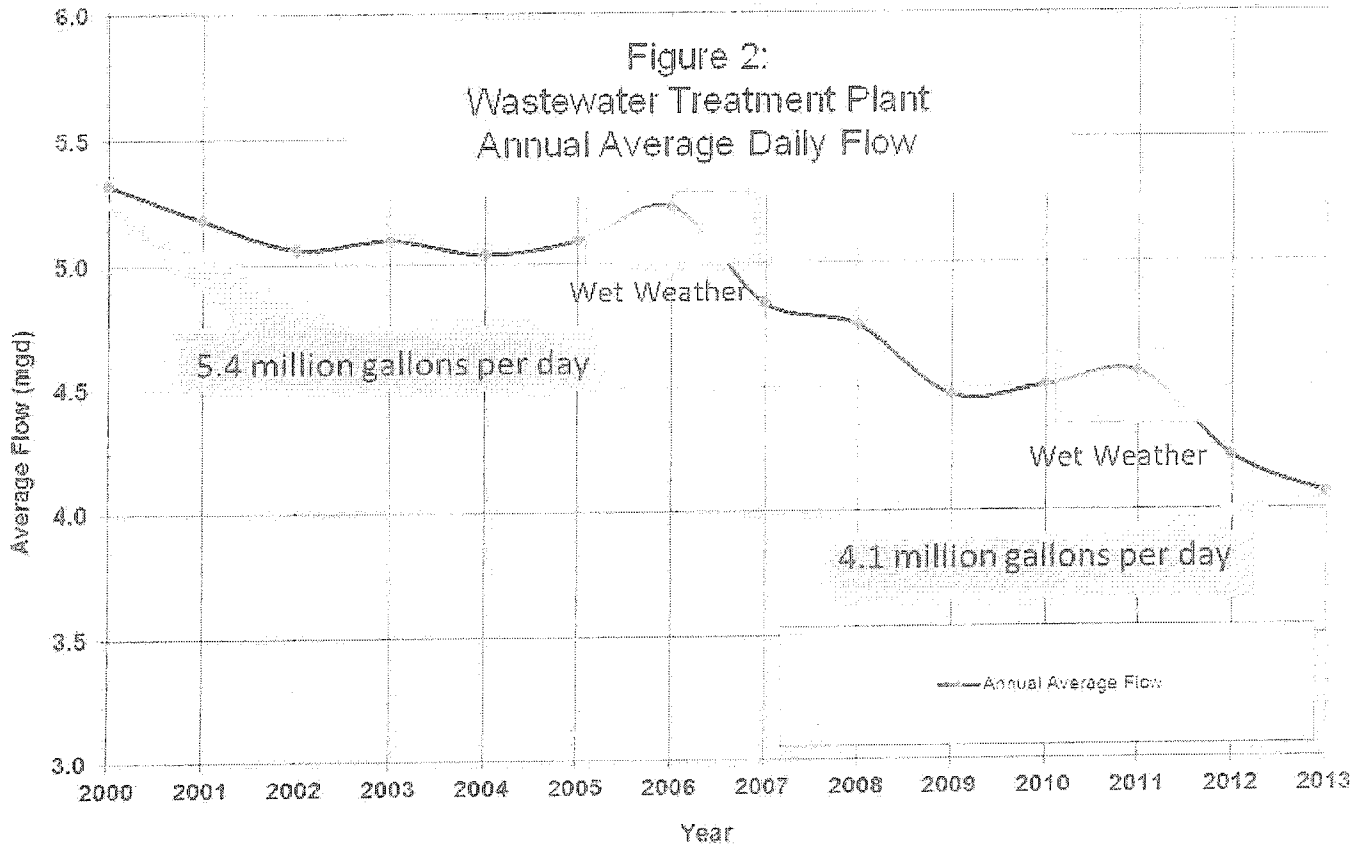
The wastewater treatment facility has experienced a significant reduction in average daily flow from 5.5 million gallons per day (mgd) in the year 2000 to a current average of 4.1 mgd. Figure 2 is a graph showing the average flows over the last 13 years. The flow reduction has resulted in a shortage of reclaimed water needed to continue irrigation of the sites that have been historically irrigated. Starting in 2013, an augmentation of potable water was utilized to meet the needs of the historically irrigated sites. Carson City Public Works, in recognition of the reduction of reclaimed water flows, worked to remove the Carson City park facilities and the dust control fill stations from the reclaimed system. With another dry winter in 2013-2014, it has become apparent that there will be a shortage of reclaimed water to provide irrigation to the remaining sites in 2014 and into the future.

Manhard Consulting has been tasked with reviewing all pertinent information provided by Carson City and its' consultants related to the reclaimed water situation, provide an analysis of the historical data, develop projections, and provide alternatives to the current and future reclaimed water shortage challenge.

FIGURE 1: RECLAIMED WATER SYSTEM MAP




Source: Carson City Public Works




Source: Carson City Public Works

## *HISTORICAL OVERVIEW*

Carson City Public Works provided Manhard Consulting considerable data for review and analysis of the current Carson City reclaimed water shortage. Data included meter history of the plant flows, reclaimed water site usage, studies by Carollo and BHC Consultants related to the wastewater treatment facilities, agreements for effluent use, and miscellaneous related data.

The reduction in wastewater treatment plant flows from 5.4 mgd to the current 4.1 mgd occurred from 2000 to 2013 with the most significant reduction occurring since 2006. During the early 2000's, the studies and concerns over reclaimed water were how to manage the excess reclaimed water and where to expand for reclaimed use. With the un-predicted reduction in WWTP flows, the current situation results in a need to address reclaimed shortage.

While it is hard to detail the basis for the reduction in WWTP flows, a number of reasons can be cited. A general trend of reduced wastewater flows are recognized by many of the area wastewater agencies and are generally explained by the use of low flow fixtures in new and remodeled construction, more efficient appliances such as dishwashers and clothes washers, and the general conservation by consumers based on the economy and general practices. Additional reduction in Carson City can be attributed to the reduction of infiltration into the collection system that occurs in older lines located in high groundwater areas. A significant number of wastewater collection mains have been reconstructed with the freeway project and most were located in high groundwater areas. In addition, drought conditions can contribute to the lowering of the groundwater table thereby removing the groundwater influence on areas of the older collection system. While it is not unusual to expect some reduction in flows based on these considerations, the amount of reduction of 5.4 mgd to 4.1 mgd has been significant.

Carson City recognized the need early on to be able to discharge reclaimed water to irrigated areas and worked towards developing agreements to assure the ability to dispose of reclaimed water. The result included agreements with the State of Nevada for the South Carson Prison Farms, the Darling Ranch (currently Empire Ranch Golf Course), and Silver Oak Golf Course. Eagle Valley Golf Course was originally developed to provide a location for reclaimed water disposal as well as the economic and recreation benefit to the City. The agreements outline minimum and maximum amount of delivery. Carson City Municipal code outlines the priorities of these uses and indicates the priority order to be the following. Included are the minimum and maximum amounts outlined as well:

Table 1 - PRIORITIES

| | | Min Quantity (Acre Feet) | Max Quantity (Acre Feet) |
|---|---|---|---|
| 1 | . State of Nevada Prison Farms | 1100 | 3000 |
| 2 | . Darling Ranch (Empire Ranch) | 790 | 1385 |
| 3 | Eagle Valley Golf Course | 1000 | |
| 4 | Silver Oak Golf Course | 500 | 790 |

While Manhard Consulting has reviewed the agreements and Municipal code related to the priorities and amount of reclaimed intended to be utilized by the parties, Manhard is taking an engineering approach to the review of the reclaimed water challenge and recommends legal review to determine the legal aspects of the agreement amounts and priorities.

While the wastewater plant flows reduced in the last 13 years, the reclaimed total usage has varied from 2500 acre feet to over 4000 acre feet in the early 2000's. Manhard has taken the last four years of meter data to provide a more current picture of plant flows and related reclaimed out flows. The average annual plant flows ranged from 4.5 and 4.6 mgd in 2010 and 2011 to 4.2 and 4.1 mgd in 2012 and 2013. Manhard and Public Works chose this data set recognizing that 2010 and 2011 were average to wet weather years and 2012-2013 represented lower than average precipitation years. This period should also represent the most recent reclaimed usages for the various irrigated areas.

A significant variable exists within the Carson City wastewater system and is important in considering the reclaimed water shortage. As indicated previously, reclaimed water is pumped to the Brunswick storage reservoir during the winter months and holds the varied storage throughout the year. Historic data indicates that the storage reservoir has losses associated with evaporation and leakage. The amount of loss at the reservoir can be summarized by the difference in the plant flows and the reclaimed usage. This loss variable has changed over time from as much as 2000 acre feet to as little as 1500 Acre feet.

Appendix A holds the spreadsheet calculations for the reclaimed usage for the period from 2010 to 2013 and the following is a summary table of the results in acre feet:

Table 2 - RECLAIMED USAGE 2010-2013 (ACRE FEET)

| | 2010 | 2011 | 2012 | 2013 | AVE | MAX |
|---|---|---|---|---|---|---|
| Prison Farms | 1397 | 1510 | 968 | 1083* | 1240 | 1510 |
| Empire Ranch | 536 | 531 | 680 | 765 | 628 | 765 |
| Eagle Valley | 792 | 778 | 920 | 828 | 830 | 920 |
| Silver Oak | 428 | 420 | 486 | 465 | 450 | 486 |
| Parks, Dust | 205 | 182 | 197 | 162 | 187 | 205 |
| TOTALS | 3358 | 3421 | 3251 | 3303 | 3335 | 3886 |

*Carson meter error, utilized State meter data

As indicated above, the Brunswick Canyon approximate annual losses can be calculated by taking the plant reclaimed flows and subtracting the reclaimed usage. The following summarizes the 2010- 2014 loss estimates:

Table 3 – RESERVOIR LOSS ESTIMATES

| | 2010 | 2011 | 2012 | 2013 | AVE |
|---|---|---|---|---|---|
| Annual Plant Flow (MGD) | 4.5 | 4.6 | 4.2 | 4.1 | |
| Annual Plant Flow (Ac Ft) | 5041 | 5153 | 4704 | 4593 | |
| Annual Recl Usage (Ac Ft) | 3358 | 3421 | 3251 | 3303 | |
| Water Augment (Ac Ft) | | | | 200 | |
| Reservoir Losses (Ac Ft) | 1683 | 1732 | 1453 | 1490 | 1590 |

The Brunswick reclaimed storage reservoir fills during the winter and as irrigation season begins the reservoir is drawn down and refills again at the end of the year. Figure 3 indicates how the reservoir storage has varied from 2011 to present. The storage curves show the peak storage occurring in March-April and the refilling generally starting in September-October. A review of the storage curves indicates the adequate storage in 2011 and the 2012 season meeting the needs before dropping close to the shut off water surface elevation. Reviewing the 2013 curve indicates that the storage was approaching the shut off elevation before potable water augmentation began in August. This allowed for the storage volume to remain above the shut off elevation until reclaimed storage started to refill in October. Note that 2014 had started behind the previous years in total storage before irrigation started in March. Potable water augmentation started in April allowing the current storage curve to trend with the 2013 storage curve.

By studying the relationship of the previous plant flows, the reclaimed uses, the reservoir losses and the reservoir storage curves, projections of the reclaimed shortages and the related alternative solutions can be developed.

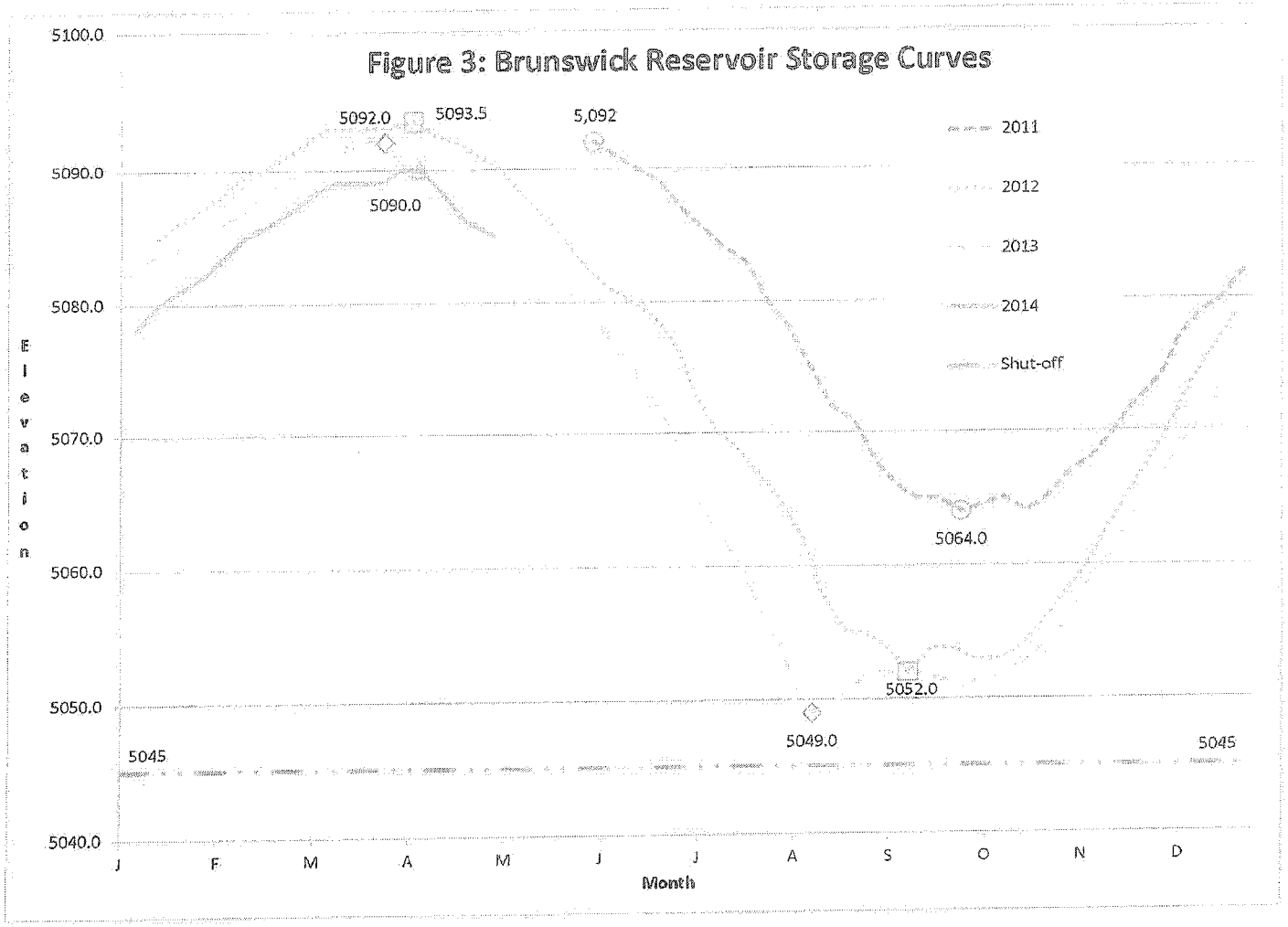


Figure 3: Brunswick Reservoir Storage Curves
5100.0
5090.0
5080.0
5070.0
5060.0
5050.0
5040.0
Reservoir Level
5092.0
5093.5
5,092
5090.0
5064.0
5052.0
5049.0
5045
5045
2011
2012
2013
2014
Shut-off
J
F
M
A
M
J
J
A
S
O
N
D
Month

A review of the last four years of reclaimed water usage indicates that the Empire Ranch, Eagle Valley, and Silver Oak golf courses have had an increase in usage over the last two years while the Prison Farms have had a reduction in usage. This is likely explained by the reduced winter precipitation in the last two years requiring additional irrigation for the golf courses. The Prison Farms were asked to consider reducing their use. With their ability to reduce the planting areas, plant drought tolerant crops, and adjust amount of irrigation, they have achieved reduction in irrigation use. The reduction in the prison farm use has generally off-set the increase in golf course use, however, as indicated by the Brunswick reservoir storage curves and by the reduction in plant flows, there will be a shortfall for 2014.

As previously indicated, Public Works has removed the Parks facilities and the dust control fill stations from the reclaimed system thereby saving 160 to 200 acre feet of reclaimed water for use at the Prison Farms and golf courses. To estimate the shortfall for 2014, Manhard developed scenarios based on the last four years of use and with a likely range of Brunswick storage reservoir losses of 1600 to 2000 acre feet. The following table shows shortfalls estimating for each user the average use over the last four years, the highest use over the last four years, and the highest use over the last two years which might most likely reflect the drought year use for 2014. In addition, the minimum uses outlined in the user's agreements are also outlined. All of these scenarios are then coupled with a range of Brunswick reservoir losses from 1600 to 2000 acre feet. The following table summarizes the results:

Table 4 – RECLAIMED WATER SHORTFALL SCENARIOS (ACRE FEET)

| | 4-YR AVE | 4-YR MAX | 2-YR MAX | CONTRACT MINIMUMS |
|---|---|---|---|---|
| Prison Farms | 1240 | 1510 | 1083 | 1100 |
| Empire Ranch | 628 | 765 | 765 | 790 |
| Eagle Valley | 830 | 920 | 920 | 1000 |
| Silver Oak | 450 | 486 | 486 | 500 |
| TOTAL DEMAND | 3335 | 3886 | 3254 | 3390 |
| SHORTFALL: | | | | |
| W/ 2000 AC FT LOSS | 835 | 1386 | 754 | 890 |
| W/ 1600 AC FT LOSS | 435 | 986 | 354 | 490 |

Due to the Prison Farms being the highest user and the highest priority, it is clear that the Prison Farm use can have a high variable impact on the shortfall projections. Manhard Consulting met with the Prison Farms operators and discussed their usage. They indicated that while they would like to be able to use 1500 acre feet of irrigation water, they felt they would be able to stick to the minimum of 1100 acre feet which was very close to what was used in 2013. This provides a significant reduction in the range of potential shortfall that might be expected for 2014. With this assumption, the resulting shortfall range for 2014 would be 354 acre feet to 890 acre feet with the likely scenario being based on flows representing the last two year high values of 354 to 754 acre feet.

Carson City is well into the irrigation season for 2014 and the alternatives to respond to the shortfalls that might be available for consideration for future years are not likely attainable for this year. With that understanding, it is assumed that augmentation with potable water will have to be continued and increased to accommodate the estimated shortfall projections for 2014. Augmentation is currently being accomplished via a water pipeline discharging to the Stewart Ponds located off of Bigelow Drive in south Carson City. These ponds are the irrigation source for the Prison Farms and provide the most logical and inexpensive location to provide augmentation to the reclaimed system with potable water. The initial augmentation from late April into May has been approximately 1 million gallons per day or approximately 100 acre feet. Assuming the high end shortfall number of 890 acre feet, 790 additional acre feet will need to be augmented through approximately the end of September which will require 120 days of 2.15 million gallons per day. Available storage can be compared with the Brunswick storage curves and use information and augmentation can be adjusted if the lower range of the shortfalls are realized. Figure 4 shows the estimated Brunswick storage curves that would result without augmentation, with augmentation at the current augmentation rate and the proposed additional augmentation rate that will result in the same storage at the end of the year as shown at the beginning of the year.

With the assumption that potable water will be used to augment the reclaimed water shortfall for 2014, the related costs need to be estimated. With the reclaimed shortage challenge being a part of the wastewater facilities, the logic would be for the costs to be encountered and processed through the wastewater fund. With the water facilities providing the water augmentation, the water fund would logically charge the cost of the water production to the wastewater fund. Public Works has provided an initial estimated range of $0.60 to $1.00 per 1000 gallons for the production charge. This amount will require additional review to assure the appropriate rate and will allow for an approximate range of cost to be charged to the sewer fund for 2014. Again, assuming a range of shortfall to be augmented of 354 acre feet to 890 acre feet, the range of cost to be charged from the water fund to the sewer fund will be from $69,000 to $115,000 for the lower estimated use to a range of $174,000 to $290,000 for the higher estimated use. Actual metered use at the end of the augmentation period will determine the final charge. Public Works has indicated that the sewer fund could absorb the charge in the 2014 estimated operations costs but would require a solution to the shortfall for the following budget year and into the future.

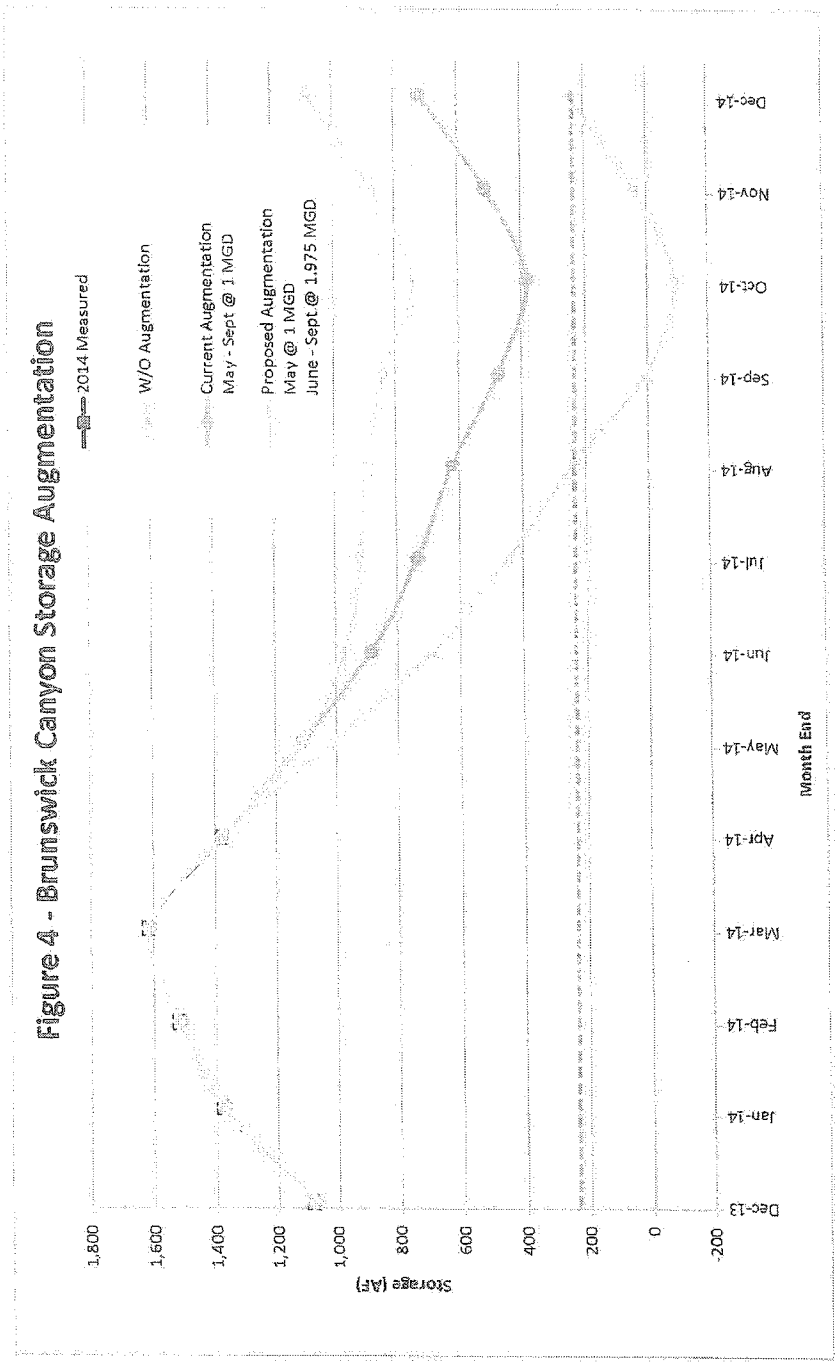


Figure 4 - Brunswick Canyon Storage Augmentation
2014 Measured
W/O Augmentation
Current Augmentation
May - Sept @ 1 MGD
Proposed Augmentation
May @ 1 MGD
June - Sept @ 1,975 MGD
Storage (AF)
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
-200
Dec-13
Jan-14
Feb-14
Mar-14
Apr-14
May-14
Jun-14
Jul-14
Aug-14
Sep-14
Oct-14
Nov-14
Dec-14
Month End

Additional review of the historical data indicates that it is likely that the shortfall will continue into the future. To estimate the range of time until the reclaimed water shortfall is eliminated, population growth rates of 0.5% and 2% were reviewed using the current approximation of 73 gallons per day per capita of wastewater use. Once again by utilizing the range of shortfall between 354 acre feet to 890 acre feet, it is anticipated that it will take between 15 and 36 years at 0.5% and 4 to 9 years at 2% growth to eliminate the shortfall. This is based on population growth. Business relocating to Carson City that have high wastewater use would shorten these time lines. As the shortfall is eliminated, parks and dust control fill stations can be re instated as reclaimed sites. It is important to note that as growth continues a solution for the additional reclaimed disposal should be planned. Developing and acquiring additional sites or conversion of the plant to additional treatment allowing for river disposal are considerations that have been proposed by the City's wastewater consultants. These considerations will have an impact on the future planning and budgeting for the wastewater system.

With the understanding that the current reclaimed water shortage will continue into the future, it is important to review alternatives to solving the shortage challenge. The first alternative would be to continue the augmentation with potable water. As indicated, the current range of costs for accomplishing this is $69,000 to $290,000 annually based on preliminary estimates of water production costs. If augmentation is the desired solution, the determination needs to be made as to how the costs are going to paid. The following are some alternatives for payment of the augmentation amount during the time period moving forward until the shortfall is eliminated:

Option 1- Absorb the $69,000 to $290,000 annual augmentation cost within the wastewater budget by reducing the capital improvement plan a like amount.

Option 2- Implement the previously reviewed commodity charge of $0.10 per 1000 gallons, thereby charging the reclaimed users an amount that would partially off-set the augmentation costs. For instance, based on the usage outlined by the minimum contract amounts, the following would be collected annually to off-set the $194,000 to $290,000 high end of the range of costs:

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)

The remaining augmentation costs not covered by the commodity charge would reduce the capital improvement plan by a like amount.

Option 3- Implement a higher commodity charge that would cover the full cost of the augmentation. Again, based on the minimum contract amounts that generate the $194,000 to $290,000 augmentation costs, the resulting commodity charge would be $0.17 to $0.26 per 1000 gallons. The resulting range of costs to the users based on this scenario would be:

Prison Farms: ($60,930 to $93,187) Empire Ranch: ($43,759 to $66,925)

Eagle Valley: ($55,391 to $84,715) Silver Oak: ($27,695 to $42,358)

It is important to discuss the policy considerations for each of the options for payment of potable water augmentation to resolve the reclaimed water shortage challenge. Again, it is important to note that this is an engineering approach to the solution and will require legal analysis to determine the true legal impacts of the existing reclaimed agreements. With that said, Option 1 assumes that it is the responsibility of the Carson Wastewater Facilities and fund to provide the minimum amount of reclaimed water outlined in the wastewater agreements. Option 2 divides the responsibility of payment for the augmentation between Carson wastewater and the reclaimed users to resolve the shortage problem and Option 3 puts all of the cost to the reclaimed users. Economic impacts to the reclaimed user entities as well as regional economic impacts are significant considerations when reviewing the options. From a conservation standpoint, option 2 and 3 provide some conservation incentive due to the commodity charge.

Another consideration is to eliminate the need for potable water augmentation by temporarily eliminating a portion of the irrigated area utilizing the reclaimed water. To look at this option, Manhard collected the acreages for each of the irrigated sites to determine the amount of acreage that would have to be temporarily eliminated to remove the augmentation need. It is important to emphasize that this would be a temporary solution as the need for re-use sites will still be important with future growth. A review of the historical data indicates varying irrigation rates based on wet to dry weather years and from site to site. The following represents the acreages and the reclaimed use and application rates based on the last 4 year average:

Table 5 - RE-USE ACREAGES AND 4 YR AVE APPLICATION RATES

| | Irrig Ac | 4yr Ave Ac Ft | Rate Ac Ft/Ac |
|---|---|---|---|
| Prison Farms | 491* | 1240 | 2.53 |
| Empire Ranch | 195 | 628 | 3.22 |
| Eagle Valley | 213 | 830 | 3.90 |
| Silver Oak | 151 | 450 | 2.98 |
| Total | 1027 | 3148 | 3.07 |

*Represents acreage that has been reduced from 538 total acres through removal of fields from production

The 4 year average again has been used to represent the dry and wet year usage. From Table 4, the shortfall range for this scenario was 435 to 835 acre feet based on the 1600 to 1800 acre feet of losses in Brunswick Reservoir. Utilizing this range and the average application rate of 3.07 acre feet per acre, the amount of acreage required to be removed from irrigation to temporarily eliminate potable water augmentation would be 142 to 272 acres with an average of 207 acres.

This average calculation was utilized for the overall acreage and related acreage removal to not prejudice any one site or user. The intent of the calculation is to provide an amount of area that could be targeted for removal from the re-use area that will generally eliminate the need for potable water augmentation over the longer term.

Option 4-Consider removing approximately 200 acres from the re-use system to eliminate the need for potable water augmentation for the long term.

Clearly there are a number of considerations related to this option. The costs of removal of the re-use area from irrigation, the cost to replace in the future, the economic impacts of removal, and the legal impacts of the removal are just a few of the considerations. A more detailed look at the economics as well as the engineering associated with the targeted area will be required if Option 4 is determined to be a desirable option.

Alternatives to enhance the irrigation system at the various sites to try and more efficiently irrigate was also considered. However, the cost of irrigation system enhancement versus the amount of application reduction did not appear to be a viable solution. This option could also be further studied but with the range of costs associated with potable water augmentation, the costs of this option quickly eliminated it from consideration. In addition, replacement of the reclaimed use reduction in the future also helped eliminate the option.

Review of the various reclaimed water agreements from a legal standpoint is an important step in the management of the reclaimed water in the future. Recognizing that the agreements were generally based on Carson City having significant excess reclaimed water, an appropriate step would be to re-visit the agreements based on the current, un-predicted reclaimed shortage scenario.

***SUMMARY***

Carson City's Wastewater Treatment Plant has experienced a significant reduction in flows over the last 13 years and the reduction has resulted in a shortage of reclaimed water to satisfy all of the reclaimed users that have historically relied on the previous flows. A review of the historical data and the related documents has confirmed an annual reclaimed shortage in the range of 354 to 890 acre feet.

Carson City has removed Parks and dust control fill stations from the re-use system and now provides reclaimed water to the State Prison Farms, Empire Ranch Golf Course, Eagle Valley Golf Course, and Silver Oak Golf Course. Carson City Public Works recognized the reclaimed shortage in August of 2013 and provided potable water augmentation to get through the 2013 irrigation year. With another dry winter, augmentation was again started in late April of this year. With the irrigation season well underway, the potable water augmentation will continue and the amounts have been estimated to assure delivery to the various sites to complete the 2014 irrigation season.

The Carson City water fund will charge the wastewater fund for the potable water augmentation at a rate ranging from $0.60 to $1.00 per 1000 gallons. Utilizing the estimated range of reclaimed shortage, the cost will range from $69,000 to $115,000 on the low end to $174,000 to $290,000 on the high end. The actual metered flow at the end of the irrigation season coupled with a final production rate will determine the final charge for the year. Public Works proposes to absorb this cost into the 2014 operations budget, however, since the augmentation is likely to be required in the future, the following options for resolution are proposed:

Option 1- Absorb the $69,000 to $290,000 annual augmentation cost within the wastewater budget by reducing the capital improvement plan a like amount.

Option 2- Implement the previously reviewed commodity charge of $0.10 per 1000 gallons, thereby charging the reclaimed users an amount that would partially off-set the augmentation costs. The remaining augmentation costs not covered by the commodity charge would reduce the capital improvement plan by like amount.

Option 3- Implement a commodity charge in the range of $0.17 to $0.26 per 1000 gallons to cover the full cost of augmentation by the reclaimed users

Policy considerations include the responsibility of the reclaimed shortage either falling on the wastewater facilities and fund, the reclaimed users, or a combination of the two. Economic impacts both to the users and the region are a consideration as well. Option 2 and 3 do provide some incentive for conservation.

Based on a population growth rate of 0.5%, the reclaimed shortfall could extend from 15 to 36 years. However, if Carson realizes a growth rate closer to 2%, the shortfall will likely be eliminated within 4 to 9 years. These time periods are based on population growth and don't include the possibility of business growth contributing to wastewater flow increases. With this understanding, it's clear that the potable water augmentation costs may support another solution if Carson's growth rate remains low.

Option 4- Consider removing approximately 200 acres from the re-use system to eliminate the need for potable augmentation long term.

This option involves economic, engineering, and legal considerations depending on the approximate 200 acres targeted for removal. A more detailed look at these considerations are warranted if this is a desirable option and if it is believed that Carson's growth rate remains low thereby sustaining the costs for potable water augmentation resulting in significant long term costs.

Another alternative considered was investing in the enhancement of the irrigation systems throughout the re-use areas. Preliminary review of the costs versus the amount of re-use application reduction did not warrant further consideration.

In summary, after review of all of the documentation and analyzing the projections, the use of potable water for augmentation is a logical solution particularly considering the estimate ranges that have been developed based on the significant variables in the system. It might be most appropriate to continue the potable water augmentation for a few years to determine more specific shortage ranges and related costs. However, it will be important to choose one of the first three options to clarify how the reclaimed shortage costs will be paid. A few additional years of augmentation will further clarify more specific flows and costs. That time period may also shed light on the Carson's expected growth rate further clarifying the re-use shortage time period. More specific analysis of Option 4 may also be explored during this time period if Carson's growth rate remains low.

# APPENDIX A

# RECLAIMED USAGE
# 2010-2013
# SPREADSHEETS

Manhard

# Flow Meter Summary by Year 2010 - 2013

| Year | 2010 | | 2011 | | 2012 | | 2013* | |
|---|---|---|---|---|---|---|---|---|
| | gallons | AF | gallons | AF | gallons | AF | gallons | AF |
| Eagle Valley GC Usage | 258,112,000 | 792 | 253,382,000 | 778 | 299,773,200 | 920 | 269,643,600 | 828 |
| Empire Ranch GC Usage | 174,807,000 | 536 | 173,021,000 | 531 | 221,436,000 | 680 | 249,394,000 | 765 |
| Silver Oak GC Usage | 139,527,161 | 428 | 136,934,029 | 420 | 158,418,617 | 486 | 151,417,169 | 465 |
| Pet Cemetary | 928,100 | 3 | 1,073,900 | 3 | 0 | 0 | 0 | 0 |
| Governors Field | 7,575,400 | 23 | 6,860,900 | 21 | 8,275,500 | 25 | 6,702,200 | 21 |
| Upper Centenial Park | 7,485,000 | 23 | 6,119,000 | 19 | 8,178,000 | 25 | 5,499,000 | 17 |
| Saliman Landscape | 110,960 | 0 | 91,050 | 0 | 92,500 | 0 | 98,470 | 0 |
| Edmonds Park | 22,787,800 | 70 | 23,861,200 | 73 | 27,821,000 | 85 | 27,804,700 | 85 |
| Lone Mtn. Cemetery | 7,255,400 | 22 | 6,708,400 | 21 | 8,744,400 | 27 | 6,634,200 | 20 |
| Prison Farm Usage | 455,065,070 | 1397 | 492,177,830 | 1510 | 315,429,000 | 968 | 352,897,097* | 1083* |
| WWRP Landscape | 125,700 | 0 | 87,300 | 0 | 71,100 | 0 | 66,300 | 0 |
| Butti Way Reuse Overheads | 107,900 | 0 | 360,800 | 1 | 100,200 | 0 | 159,900 | 0 |
| Butti Way Reuse Hyd S. | 87,000 | 0 | 824,000 | 3 | 320,000 | 1 | 80,000 | 0 |
| Arrowhead Dr. Reuse OvrHd | 3,668,000 | 11 | 2,643,000 | 8 | 1,459,000 | 4 | 0 | 0 |
| College PrkWy | 16,524,356 | 51 | 10,729,494 | 33 | 9,494,098 | 29 | 5,729,375 | 18 |
| Total Million Gallons | 1,094 | 0 | 1,115 | 0 | 1,060 | 0 | 977 | 0 |
| Priority Customer Total | 1,027,511,231 | 3153 | 1,055,514,859 | 3239 | 995,056,817 | 3054 | 1,023,351,866 | 3141 |
| Total (gallons) | **1,094,166,847** | **3,358** | **1,114,873,903** | **3,421** | **1,059,612,615** | **3,252** | **1,076,126,011** | **3,303** |

* Carson City Prison Farm meter error - State meter of 1083 AC-FT used for yearly total.

Manhard

# Priority Customer Flow Meter Summary by Month 2010 - 2013

| | Month | Jan (gallons) | Feb (gallons) | Mar (gallons) | Apr (gallons) | May (gallons) | Jun (gallons) | Jul (gallons) |
|---|---|---|---|---|---|---|---|---|
| Eagle Valley GC Usage | 2010 | 0 | 0 | 5,770,400 | 21,741,200 | 31,224,700 | 39,712,200 | 60,994,500 |
| | 2011 | 434,000 | 22,000 | 1,289,000 | 20,093,800 | 28,939,600 | 36,617,300 | 46,797,500 |
| | 2012 | 2,016,000 | 1,930,000 | 12,212,000 | 25,860,200 | 47,437,200 | 47,702,800 | 47,677,200 |
| | 2013 | 255,000 | 0 | 12,126,000 | 26,789,400 | 38,063,600 | 44,736,800 | 54,479,800 |
| Empire Ranch GC Usage | 2010 | 0 | 1,000 | 934,000 | 17,979,000 | 19,081,000 | 26,895,000 | 39,633,000 |
| | 2011 | 0 | 1,000 | 730,000 | 13,421,000 | 17,572,000 | 26,163,000 | 30,968,000 |
| | 2012 | 1,841,000 | 3,337,000 | 10,514,000 | 17,812,000 | 33,672,000 | 34,592,000 | 38,659,000 |
| | 2013 | 0 | 1,597,000 | 7,636,000 | 19,070,000 | 33,980,000 | 32,905,000 | 44,960,000 |
| Silver Oak GC Usage | 2010 | 0 | 2,221 | 1,248,217 | 7,170,096 | 11,025,893 | 22,661,583 | 36,702,636 |
| | 2011 | 0 | 0 | 105,110 | 8,896,950 | 16,866,503 | 18,474,103 | 27,329,918 |
| | 2012 | 1,385,613 | 544,590 | 1,158,623 | 10,059,154 | 24,083,054 | 25,039,678 | 26,757,435 |
| | 2013 | 0 | 1,340,401 | 7,052,079 | 12,645,298 | 21,153,703 | 25,784,688 | 28,075,000 |
| Prison Farm Usage | 2010 | 0 | 0 | 711,000 | 3,969,960 | 60,158,170 | 81,118,460 | 119,698,590 |
| | 2011 | 0 | 5,000 | 5,000 | 8,172,830 | 58,668,000 | 89,961,000 | 110,369,000 |
| | 2012 | 0 | 0 | 8,032,000 | 19,776,800 | 69,499,380 | 48,443,090 | 44,693,190 |
| | 2013* | 0 | 0 | 8,367,100 | 39,304,260 | 67,099,030 | 46,266,810 | 0 |
| Monthly Total | 2010 | 0 | 3,221 | 8,663,617 | 50,860,256 | 121,489,763 | 170,387,243 | 257,028,726 |
| | 2011 | 434,000 | 28,000 | 2,129,110 | 50,584,580 | 122,046,103 | 171,215,403 | 215,464,418 |
| | 2012 | 5,242,613 | 5,811,590 | 31,916,623 | 73,508,154 | 174,691,634 | 155,777,568 | 157,786,825 |
| | 2013* | 255,000 | 2,937,401 | 35,181,179 | 97,808,958 | 160,296,333 | 149,693,298 | 127,514,800 |
| Max Month | 2010-2013 | 5,242,613 | 5,811,590 | 35,181,179 | 97,808,958 | 174,691,634 | 171,215,403 | 257,028,726 |

* Carson City Prison Farm meter error - State meter of 1083 AC-FT used for yearly total.

Manhard

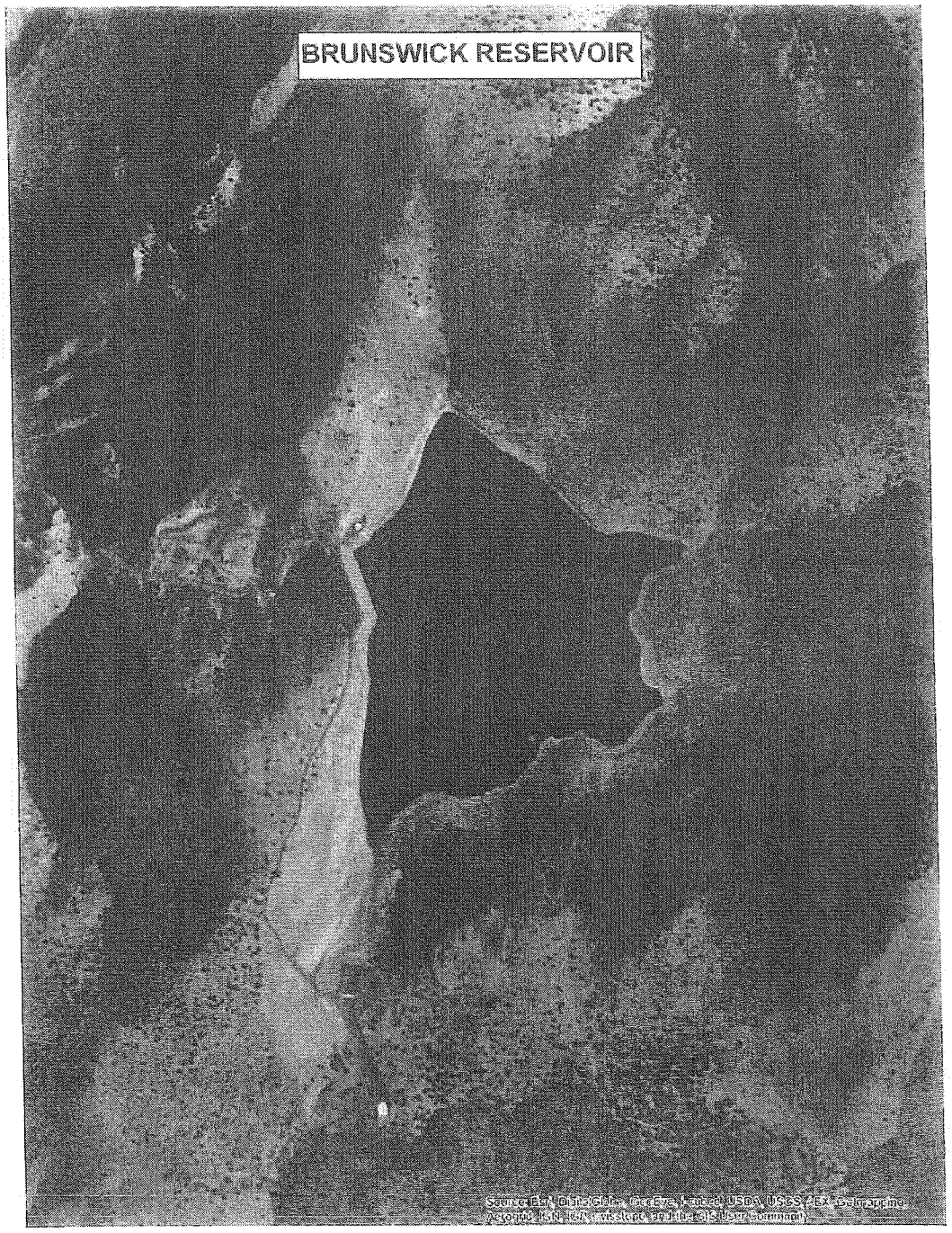
# Priority Customer Flow Meter Summary by Month 2010 - 2013

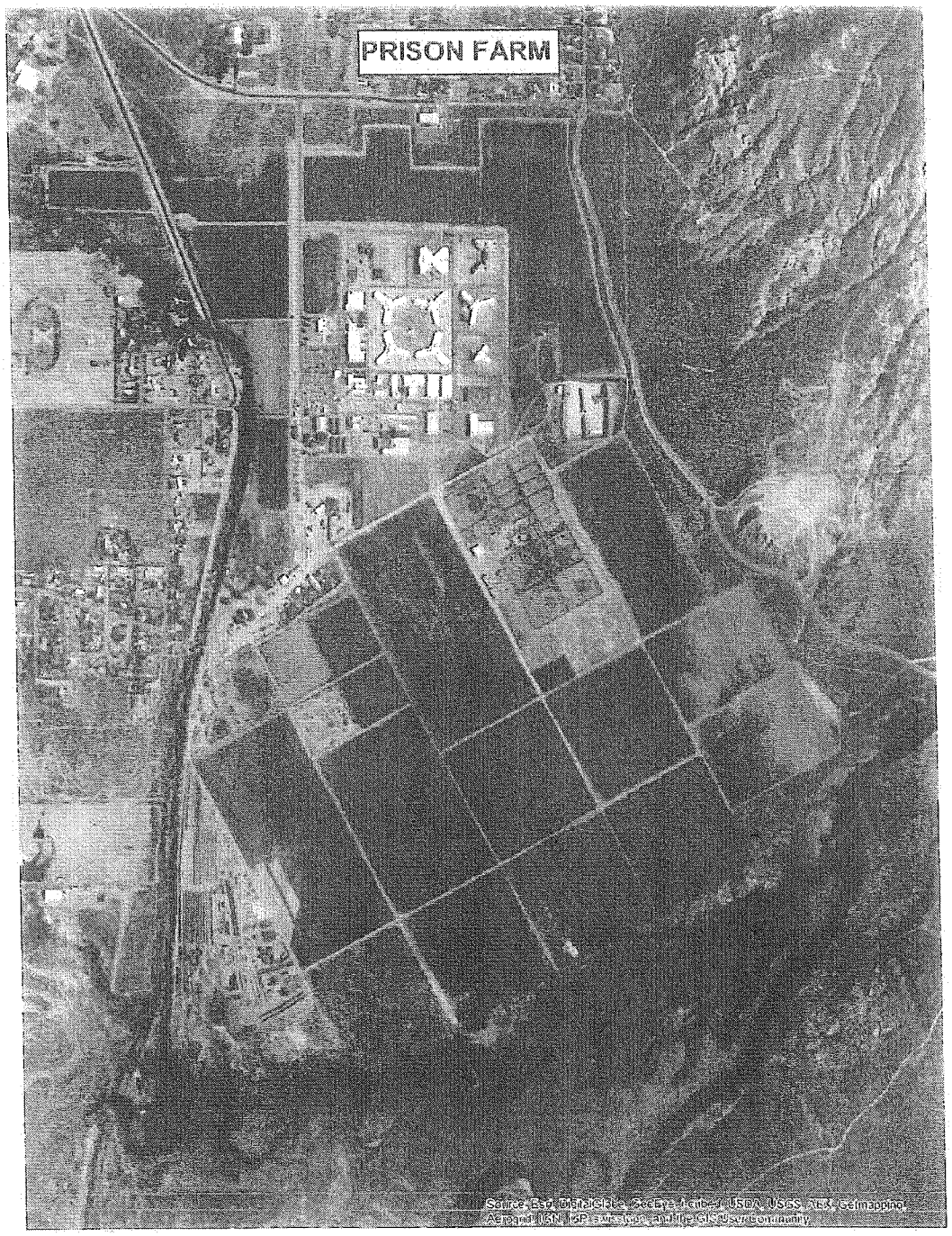
| | Month | Aug (gallons) | Sep (gallons) | Oct (gallons) | Nov (gallons) | Dec (gallons) | Total (gallons) | Total (AF) |
|---|---|---|---|---|---|---|---|---|
| Eagle Valley GC Usage | 2010 | 39,510,800 | 50,184,500 | 4,385,100 | 3,221,800 | 1,386,800 | 2.58E+08 | 792 |
| | 2011 | 43,655,700 | 41,462,800 | 22,525,100 | 2,183,200 | 9,362,000 | 2.53E+08 | 778 |
| | 2012 | 51,552,000 | 28,251,800 | 25,995,000 | 9,139,000 | 0 | 3.00E+08 | 920 |
| | 2013 | 32,240,000 | 30,902,000 | 23,731,000 | 6,320,000 | 0 | 2.70E+08 | 828 |
| Empire Ranch GC Usage | 2010 | 28,508,000 | 33,876,000 | 7,874,000 | 26,000 | 0 | 1.75E+08 | 536 |
| | 2011 | 27,293,000 | 31,402,000 | 13,968,000 | 9,289,000 | 2,214,000 | 1.73E+08 | 531 |
| | 2012 | 35,876,000 | 22,230,000 | 16,699,000 | 6,204,000 | 0 | 2.21E+08 | 680 |
| | 2013 | 32,600,000 | 37,586,000 | 27,530,000 | 11,530,000 | 0 | 2.49E+08 | 765 |
| Silver Oak GC Usage | 2010 | 26,396,314 | 27,942,635 | 6,024,747 | 3,685 | 349,134 | 1.40E+08 | 428 |
| | 2011 | 25,766,158 | 24,871,238 | 8,531,127 | 3,628,534 | 2,464,388 | 1.37E+08 | 420 |
| | 2012 | 32,020,784 | 18,963,601 | 14,650,182 | 3,755,903 | 0 | 1.58E+08 | 486 |
| | 2013 | 21,910,000 | 18,086,000 | 12,100,000 | 3,270,000 | 0 | 1.51E+08 | 465 |
| Prison Farm Usage | 2010 | 81,119,070 | 98,123,820 | 10,166,000 | 0 | 0 | 4.55E+08 | 1397 |
| | 2011 | 84,236,000 | 89,054,000 | 51,510,000 | 202,000 | 0 | 4.92E+08 | 1510 |
| | 2012 | 66,754,390 | 25,264,100 | 32,105,750 | 860,300 | 0 | 3.15E+08 | 968 |
| | 2013* | 30,953,000 | 39,325,320 | 22,437,120 | 421,000 | 0 | 3.53E+08 | 1083 |
| Monthly Total | 2010 | 175,534,184 | 210,126,955 | 28,449,847 | 3,251,485 | 1,715,934 | 1.03E+09 | 3153 |
| | 2011 | 180,950,858 | 186,790,038 | 96,534,227 | 15,302,734 | 14,040,388 | 1.06E+09 | 3239 |
| | 2012 | 186,203,174 | 94,709,501 | 89,449,932 | 19,959,203 | 0 | 9.95E+08 | 3054 |
| | 2013* | 117,703,000 | 125,899,320 | 85,798,120 | 21,541,000 | 0 | 1.02E+09 | 3141* |
| Max Month | 2010-2013 | 186,203,174 | 210,126,955 | 96,534,227 | 21,541,000 | 14,040,388 | 1.28E+09 | 3914 |

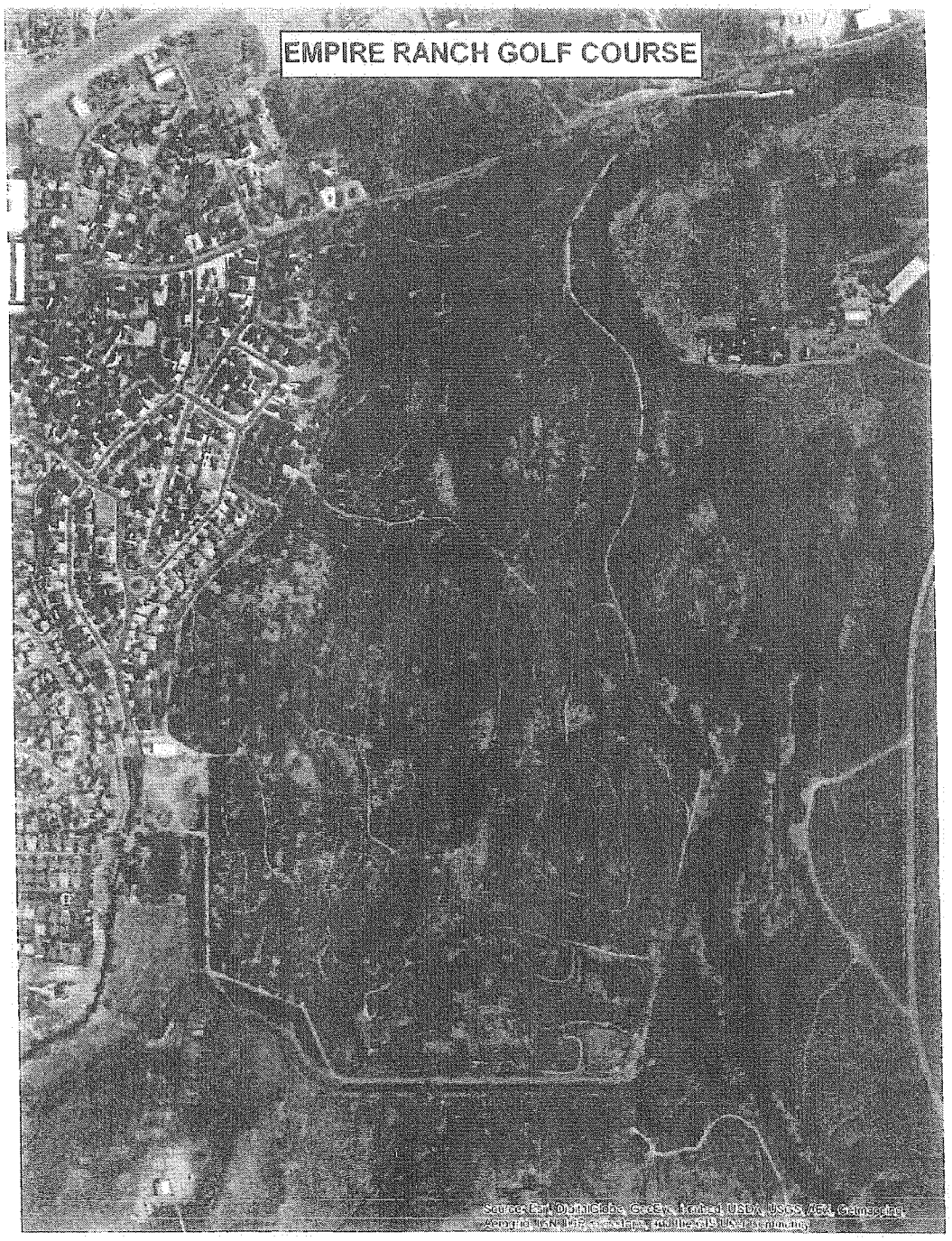
* Carson City Prison Farm meter error - State meter of 1083 AC-FT used for yearly total.

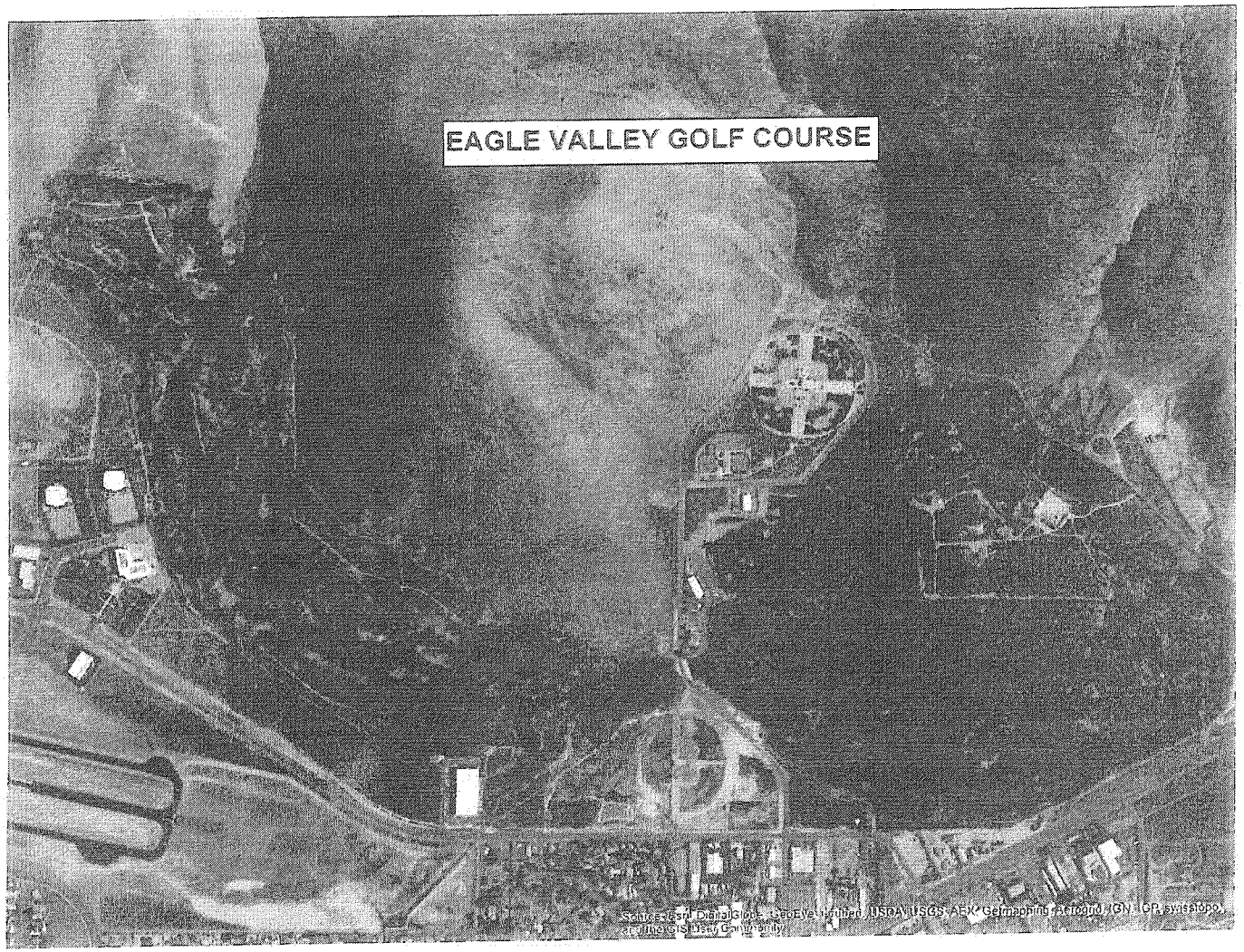
# APPENDIX B

# AERIALS OF RE-USE SITES


BRUNSWICK RESERVOIR
Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community


PRISON FARM


EMPIRE RANCH GOLF COURSE


EAGLE VALLEY GOLF COURSE

APPROVED JULY 18, 2013 ITEM #1m

BOCC

0827992 Page : 2 of 5

BK : 0713
PG : 7379
7/30/2013

FILED
No. 2013.143
2013 JUL 29 AM 11:30
TED THRAN
CLERK

**FIRST AMENDMENT**

**TO**

**INTERLOCAL AGREEMENT RELATING TO WATER SERVICE**

**(North Douglas County and Carson City Water Line Intertie Project)**

**BETWEEN**

**DOUGLAS COUNTY**

**AND**

**CARSON CITY**

WHEREAS, Douglas County ("COUNTY"), a political subdivision of the State of Nevada, and Carson City, a consolidated municipality and political subdivision of the State of Nevada ("CARSON CITY"), are public agencies pursuant to NRS 277.100; and

WHEREAS, COUNTY and CARSON CITY both own and administer water rights and are authorized by the laws of Nevada to construct, improve, maintain, provide capital improvements and related services for and to operate water supply and distribution systems capable of supplying public drinking water to federal and state standards; and

WHEREAS, on January 21, 2010, COUNTY and CARSON CITY entered into an Interlocal Agreement Relating to Water Service, recorded with the Douglas County Recorder's Office as Instrument 0757630, Book 0110, Page 4458 (the "Interlocal Agreement"); and

WHEREAS, COUNTY and CARSON CITY desire to amend the Interlocal Agreement to establish an interim wholesale water rate until the North Douglas County and Carson City Water Line Intertie Project is completed (the "Project"); and

WHEREAS, COUNTY and CARSON CITY desire to jointly calculate a wholesale water rate once the Project is completed and sufficient operating data is collected.

NOW, THEREFORE, in consideration of the promises and provisions contained in this First Amendment to Interlocal Agreement to Provide Wholesale Water Service ("First Amendment"), and other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the Parties mutually agree as follows:

1. Paragraph 2 of the Agreement shall be amended to read as follows:

   **TERM.** This Agreement is to provide a means for delivering and sharing water resources between the Parties. The nature of the Agreement requires that the Parties use their best efforts to maintain the Agreement as long as the Parties' customers require water from the interconnection of the water systems maintained by the Parties. Therefore, the Parties intend the Agreement to be in effect in perpetuity unless the Agreement is otherwise terminated as provided herein.

2. Paragraph 3(c) of the Agreement shall be amended to read as follows:

**CARSON CITY'S RESPONSIBILITIES.** The costs in subsections 7(a) and 7(b) below will be evaluated for appropriateness on an annual basis by the Public Works Directors of each Party. CARSON CITY agrees to purchase and take delivery of water from DOUGLAS at the delivery rates provided for in Exhibit "B" and promptly pay to DOUGLAS any and all expenses incurred by COUNTY to deliver water from COUNTY to CARSON CITY. In addition to the cost of any wholesale water purchased by COUNTY from the Town of Minden for delivery to CARSON CITY, CARSON CITY will pay the operations, maintenance and other costs incurred by COUNTY to provide water to CARSON CITY.

3. Paragraph 7 shall be amended to include, in addition to its current language, the addition of Paragraph 7(e) that shall read as follows:

The wholesale water rates shown in Exhibit "B" are based on the assumption that CARSON CITY will begin accepting delivery of water from COUNTY by April 1, 2014. If CARSON CITY fails to accept water from COUNTY by July 1, 2014, then COUNTY and CARSON CITY agree to meet and confer to reach a solution to address any issues caused by CARSON CITY'S failure to take delivery of water from COUNTY. If an agreement cannot be reached between COUNTY and CARSON CITY by November 1, 2014, the Parties agree to comply with the provisions of Paragraph 15 of this Agreement.

4. Paragraph 7 shall be amended to include, in addition to its current language, the addition of Paragraph 7(f) that shall read as follows:

On January 1st of each year, in the event that CARSON CITY utilizes, on average, more water from COUNTY during the prior calendar year than the water rights transferred to and held by the Town of Minden for the benefit of CARSON CITY, COUNTY may charge CARSON CITY a fee equal to 0.25% of the price of a water right then in effect as set by the Town of Minden Board for each excess acre-foot, or portion thereof, utilized by CARSON CITY. CARSON CITY may not utilize more water than the water rights it has transferred to the Town of Minden for more than two consecutive years.

5. Effective July 1, 2013, Exhibit "B," incorporated by reference in Paragraph 7 of the Interlocal Agreement, is amended and replaced with the Attached Exhibit "B," Douglas County Wholesale Water Rates to Carson City.

6. Article 22 is amended and revised as follows:

**GOVERNING LAW; VENUE.** The laws of the State of Nevada apply in interpreting and construing this Agreement. The Parties agree that venue in any judicial action concerning this Agreement will be in the Ninth Judicial District Court in and for the County of Douglas, State of Nevada.

IN WITNESS WHEREOF, the Parties have caused this First Amendment to Interlocal Agreement Relating to Water Service to be executed as of the _____ day of June, 2013.

**Douglas County**

By: _____
Greg Lynn, Chairman
Douglas County Board of Commissioners

**Carson City**

By: _____
Robert L. Crowell, Mayor
Carson City Board of Supervisors

Attest:

By: _____
Ted Thran
Douglas County Clerk/Treasurer

By: _____
Clerk to the Board

Attest:

By: _____
Alan Glover
Clerk/Recorder

Approved as to form:

By: _____
Douglas County District Attorney

Approved as to form:

By: _____ CDDA
Carson City District Attorney

# Exhibit "B," Douglas County Wholesale Water Rates to Carson City

| Fiscal Year | Depreciation | O&M and Power | Douglas Total Rate per 1,000 gal. | Minden Total Rate per 1,000 gal. | Douglas Wholesale Rate to Carson City per 1,000 gal. |
|---|---|---|---|---|---|
| FY 2013-14 | $ 0.050 | $ 0.081 | $ 0.131 | $ 0.540 | $ 0.671 |
| FY 2014-15 | $ 0.050 | $ 0.081 | $ 0.131 | $ 0.555 | $ 0.686 |
| FY 2015-16 | $ 0.050 | $ 0.081 | $ 0.131 | $ 0.563 | $ 0.694 |
| FY 2016-17 | $ 0.101 | $ 0.081 | $ 0.182 | $ 0.595 | $ 0.777 |
| FY 2017-18 | $ 0.101 | $ 0.081 | $ 0.182 | $ 0.625 | $ 0.807 |
| FY 2018-19 | $ 0.151 | $ 0.081 | $ 0.232 | $ 0.720 | $ 0.952 |
| FY 2019-20 | $ 0.151 | $ 0.081 | $ 0.232 | $ 0.750 | $ 0.982 |
| FY 2020-21 | $ 0.202 | $ 0.081 | $ 0.283 | $ 0.780 | $ 1.063 |
| FY 2021-22 | $ 0.202 | $ 0.081 | $ 0.283 | $ 0.800 | $ 1.083 |
| FY 2022-23 | $ 0.252 | $ 0.081 | $ 0.333 | $ 0.810 | $ 1.143 |

**CERTIFIED COPY**

The document to which this certificate is attached is a full, true and correct copy of the original on file and on record in my office.

DATE: July 29, 2013

Clerk of the 9th Judicial District Court of the State of Nevada, in and for the County of Douglas.

By _____ Deputy