Attachment 1

PSOMAS

TECHNICAL MEMORANDUM NO. 1

To: Trish Rhay and Steve Bucknam

From: Harvey R. Gobas, PE

Date: November 3, 2014

Subject: Review of Beverly Hills Water Supply Alternatives and Recommendations for Proceeding with Further Detailed Analysis

EXECUTIVE SUMMARY

Psomas was retained by the City of Beverly Hills to evaluate potential alternative water supply options for increasing the reliability of the City's water system and/or conservation measures that can be employed to reduce system demands. Nineteen (19) potential alternatives were identified. These 19 alternatives can be grouped into the following three categories:

- Twelve (12) Baseline Water Supply Alternatives – These options include Metropolitan Water District Supply, three (3) Groundwater Development Options (Central Basin Wells, Hollywood Basin Wells and Spring Water Capture), three (3) Recycled Water options (Regional, Scalping Plant and Greywater Approaches), three (3) Reverse Osmosis Capture and Treatment options (for treating 4.5, 3.0 or 1.5 Million Gallons per Day [MGD]), Urban Runoff Capture and Treatment; and Ocean Desalination;
- Five (5) Water Supply "Insurance" Alternatives – These options would not represent direct sources of water, but could provide reserves that the City can tap into during times of drought, thereby increasing the overall reliability of the City's water supply. These include Water Banking, Transfers, Exchanges (potable), Recycled Water Exchanges and Antelope Valley Water Bank Drought Insurance; and
- Two (2) Conservation Alternatives – These two options include Compliance with SBx7-7[1] and Tailoring a Conservation Plan to the Unique Characteristics of the City of Beverly Hills.

Eight (8) criterion measures were identified for use in comparing these 19 alternatives. They include: Cost, Volume, Reliability, Timing, Local Control, Legal/Institutional, Environmental and Operational Complexity. Our project team, with input from City staff, assigned values to these criteria for each of the 19 alternatives. Overall weightings were then applied to each of the eight criteria categories to allow ranking of the 19 alternatives. A comprehensive excel spreadsheet was developed to allow changes to be easily made to the values and weightings to determine how those changes would impact the overall rankings.

While an infinite number of permutations can be considered, we evaluated ten (10) widely varying **Weighting Scenarios.** They included the following scenarios: (1) All eight criteria equally weighted; (2) "Timing" was eliminated from consideration with the other seven criteria equally weighted; (3) Cost, volume and reliability were equally weighted with the other five criteria eliminated from consideration; (4, 5, 6 and 7) Four separate scenarios in which either cost, environment, reliability or volume were weighted three times higher than the other seven criteria; (8) Cost, volume, reliability and environmental were weighted three times higher than the other criteria, with timing eliminated; (9) Volume, reliability and local control were weighted three times higher than the other criteria with timing eliminated; and lastly (10) Volume, reliability, local control and environment were weighted five times higher than the other criteria with timing eliminated.

[1] This 2009 legislative package requires a statewide 20% reduction in urban per capita water use by 2020. It requires that urban water retail suppliers determine baseline water use and set reduction targets according to specified requirements, and requires agricultural water suppliers prepare plans and implement efficient water management practices (definition extracted from the Association of California Water Agencies website).

Based on this analysis, we recommend proceeding with detailed evaluations of the following nine alternatives: MWD, Water Banking, Conservation (both Tailored and SBx7-7 Conservation), Development of Central Basin and Hollywood Basin Wells (although not necessarily together), Antelope Valley Drought Insurance, Exchanges and Ocean Desalination. These nine alternatives consistently appeared among the top ranked alternatives for each of the ten weighted scenarios. The other ten alternatives consistently appeared in the bottom ten ranked alternatives regardless of which scenario was considered. The remaining ten alternatives should therefore be eliminated from further consideration.

INTRODUCTION

Psomas was retained by the City of Beverly Hills to evaluate potential alternative water supply options for increasing the reliability of the City's water system and/or conservation measures that can be employed to reduce system demands. With that in mind, nineteen potential alternatives were identified for initial evaluation with the intent of narrowing the list to the most promising of those alternatives for further detailed evaluation. Those nineteen alternatives, several of which were grouped in similar categories (i.e., 4a, 4b, etc.) are shown in Table 1 below:

Table 1
Water Supply Reliability or Conservation Alternatives

No.	Alternative No.	Description
1	1	Metropolitan Water District of Southern California
2	2	Ocean Desalination
3	3	Urban Runoff – Capture and Treat Dry Weather Flows
4	4a	Recycled Water Regional Approach
5	4b	Recycled Water – Scalping Plant Approach
6	4c	Recycled Water – Greywater Approach
7	4d	Recycled Water Exchanges
8	5	Exchanges
9	6	Transfers
10	7	Water Banking
11	8	Antelope Valley Water Bank Drought Insurance
12	9a	Groundwater – Capture Spring Water
13	9b	Groundwater – Develop Hollywood Basin Wells
14	9c	Groundwater – Develop Central Basin (La Brea) Wells
15	10a	Conservation – Comply with SBx7-7
16	10b	Conservation – Tailor to Unique CBH Characteristics
17	11a	Capture and Treat RO Reject Water (1.5 MGD)
18	11b	Capture and Treat RO Reject Water (3.0 MGD)
19	11c	Capture and Treat RO Reject Water (4.5 MGD)

Eight criterion were then identified for the purpose of comparing the various alternatives. Those criterion along with a brief defining example, include:

1. **Cost** – The lower the cost, the greater the advantage
2. **Volume** – The higher the volume contributed by the resource, the greater the advantage
3. **Reliability** – The greater the hydrologic certainty (that the resource has a lower likelihood of being impacted by climatic changes or severity (e.g., drought)), the greater the advantage

4. **Timing** – The shorter the time required to implement, the greater the advantage
5. **Local Control** – The more control CBH has over the resource, the greater the advantage
6. **Legal/Institutional** – The less obstacles required to implement, the greater the advantage
7. **Environmental** – The less environmental impacts, the greater the advantage
8. **Operational Complexity** – The easier to operate and maintain, the greater the advantage

Each alternative was evaluated based upon technical information and/or team knowledge. The information was summarized in a series of spreadsheets.

Values were then assigned to these criteria for each of the 19 alternatives. These values were based on a 1 to 5 scale as defined in more detail in the Exhibit labeled "City of Beverly Hills Water Resource Alternative Options Ranking Criteria Details," which can be found in the Appendix to this Technical Memorandum. These values were assigned based on the extensive combined experience of our project team members as well as discussions with City management and staff.

Overall weightings were then applied for each of the criteria categories, which included the development of ten (10) Weighting Scenarios for further review and evaluation. A comprehensive spreadsheet encompassing all of the above factors was then prepared for the purpose of ranking the nineteen alternatives.

ALTERNATIVE RANKING

An initial ranking of all alternatives was prepared in which each of the eight criteria were equally weighted, i.e., each was assigned a relative weighting of 12.5% with the total summing to 100%. The results of Weighting Scenario 1 analysis are presented in Table 2 below:

Table 2
Weighting Scenario 1: Equal Weighting (12.5%) Assigned to Each Criterion

Ranking	Alternative No.	Description
1	1	Metropolitan Water District of Southern California
2	7	Water Banking
3	10b	Conservation – Tailor to Unique CBH Characteristics
4	10a	Conservation – Comply with SBx7-7
5	9c	Groundwater – Develop Central Basin (La Brea) Wells
6	8	Antelope Valley Water Bank Drought Insurance
7	9b	Groundwater – Develop Hollywood Basin Wells
8	5	Exchanges
9	2	Ocean Desalination
10	11c	Capture and Treat RO Reject Water (4.5 MGD)
11	11b	Capture and Treat RO Reject Water (3.0 MGD)
12	11a	Capture and Treat RO Reject Water (1.5 MGD)
13	6	Transfers
14	4a	Recycled Water Regional Approach
15	4d	Recycled Water Exchanges
16	4b	Recycled Water – Scalping Plant Approach
17	9a	Groundwater – Capture Spring Water
18	4c	Recycled Water – Greywater Approach
19	3	Urban Runoff – Capture and Treat Dry Weather Flows

Based on feedback received from the City of Beverly Hills Public Works Commissioners as well as input from City management and staff, nine additional scenarios were considered including:

- **Weighting Scenario 2** – The Timing criterion is established at zero weighting with the other seven criteria having equal weightings of 14.3% totaling to 100%.

- **Weighting Scenario 3** – Cost, Volume and Reliability are assigned equal weightings of 33.3% and all other criteria are assigned a zero weighting.

- **Weighting Scenario 4** – Cost is weighted three times higher (30%) than all other criteria which are weighted at 10%

- **Weighting Scenario 5** – Environment is weighted three times higher (30%) than all other criteria which are weighted at 10%

- **Weighting Scenario 6** – Reliability is weighted three times higher (30%) than all other criteria which are weighted at 10%%

- **Weighting Scenario 7** – Volume is weighted three times higher (30%) than all other criteria which are weighted at 10%

- **Weighting Scenario 8** – Cost, Volume, Reliability and Environmental are weighted three times higher (20%) than the other criteria, which are weighted at 6.7% except for Timing (0%), which is deleted from consideration

- **Weighting Scenario 9** – Volume, Reliability and Local Control are weighted three times higher (23.1% each) than other criteria (7.7% each) with Timing (0%) deleted from consideration

- **Weighting Scenario 10** – Volume, Reliability, Local Control and Environment are weighted five times higher (21.7% each) than other criteria (4.3% each) with Timing (0%) deleted from consideration.

It is evident at this point, that an infinite number of possible permutations could be identified and ranked using the excel spreadsheet created for this purpose. However, it is recommended to evaluate the results of the ten (10) scenarios set forth above, before proceeding with additional analyses. Those results are summarized in Tables 3 through 10 on the following pages. Additional detailed information on all ten scenarios is presented in the Appendix.

Table 3
Weighting Scenario 2: Timing Deleted (0%); All Other Criteria Equally Weighted (14.3%)

Ranking	Alternative No.	Description
1	1	Metropolitan Water District of Southern California
2	10b	Conservation – Tailor to Unique CBH Characteristics
3	10a	Conservation – Comply with SBx7-7
4	9c	Groundwater – Develop Central Basin (La Brea) Wells
5	7	Water Banking
6	9b	Groundwater – Develop Hollywood Basin Wells
7	8	Antelope Valley Water Bank Drought Insurance
8	5	Exchanges
9	2	Ocean Desalination
10	11c	Capture and Treat RO Reject Water (4.5 MGD)
11	4a	Recycled Water Regional Approach
12	11b	Capture and Treat RO Reject Water (3.0 MGD)
13	11a	Capture and Treat RO Reject Water (1.5 MGD)
14	6	Transfers
15	4d	Recycled Water Exchanges
16	4b	Recycled Water – Scalping Plant Approach
17	9a	Groundwater – Capture Spring Water
18	4c	Recycled Water – Greywater Approach
19	3	Urban Runoff – Capture and Treat Dry Weather Flows

Table 4
Weighting Scenario 3: Cost, Volume and Reliability Equally Weighted (33.3%); All Other Criteria Deleted (0%)

Ranking	Alternative No.	Description
1	7	Water Banking
2	5	Exchanges
3	2	Ocean Desalination
4	1	Metropolitan Water District of Southern California
5	9c	Groundwater – Develop Central Basin (La Brea) Wells
6	4a	Recycled Water Regional Approach
7	10b	Conservation – Tailor to Unique CBH Characteristics
8	10a	Conservation – Comply with SBx7-7
9	8	Antelope Valley Water Bank Drought Insurance
10	11c	Capture and Treat RO Reject Water (4.5 MGD)
11	9b	Groundwater – Develop Hollywood Basin Wells
12	6	Transfers
13	4d	Recycled Water Exchanges
14	11b	Capture and Treat RO Reject Water (3.0 MGD)
15	11a	Capture and Treat RO Reject Water (1.5 MGD)
16	4c	Recycled Water – Greywater Approach
17	4b	Recycled Water – Scalping Plant Approach
18	9a	Groundwater – Capture Spring Water
19	3	Urban Runoff – Capture and Treat Dry Weather Flows

Table 5
Weighting Scenario 4: Cost is Weighted 30% and All Other Criteria are Weighted 10%

Ranking	Alternative No.	Description
1	1	Metropolitan Water District of Southern California
2	10a	Conservation – Comply with SBx7-7
3	7	Water Banking
4	10b	Conservation – Tailor to Unique CBH Characteristics
5	9c	Groundwater – Develop Central Basin (La Brea) Wells
6	5	Exchanges
7	11c	Capture and Treat RO Reject Water (4.5 MGD)
8	11a	Capture and Treat RO Reject Water (1.5 MGD)
9	9b	Groundwater – Develop Hollywood Basin Wells
10	8	Antelope Valley Water Bank Drought Insurance
11	2	Ocean Desalination
12	11b	Capture and Treat RO Reject Water (3.0 MGD)
13	6	Transfers
14	4a	Recycled Water Regional Approach
15	4d	Recycled Water Exchanges
16	9a	Groundwater – Capture Spring Water
17	4b	Recycled Water – Scalping Plant Approach
18	4c	Recycled Water – Greywater Approach
19	3	Urban Runoff – Capture and Treat Dry Weather Flows

Table 6
Weighting Scenario 5: Environment is Weighted 30%; All Other Criteria are Weighted 10%

Ranking	Alternative No.	Description
1	1	Metropolitan Water District of Southern California
2	10b	Conservation – Tailor to Unique CBH Characteristics
3	10a	Conservation – Comply with SBx7-7
4	8	Antelope Valley Water Bank Drought Insurance
5	7	Water Banking
6	9c	Groundwater – Develop Central Basin (La Brea) Wells
7	9b	Groundwater – Develop Hollywood Basin Wells
8	5	Exchanges
9	11c	Capture and Treat RO Reject Water (4.5 MGD)
10	11b	Capture and Treat RO Reject Water (3.0 MGD)
11	11a	Capture and Treat RO Reject Water (1.5 MGD)
12	2	Ocean Desalination
13	6	Transfers
14	4a	Recycled Water Regional Approach
15	4d	Recycled Water Exchanges
16	4b	Recycled Water – Scalping Plant Approach
17	9a	Groundwater – Capture Spring Water
18	4c	Recycled Water – Greywater Approach
19	3	Urban Runoff – Capture and Treat Dry Weather Flows

Table 7
Weighting Scenario 6: Reliability is Weighted 30%; All Other Criteria are Weighted 10%

Ranking	Alternative No.	Description
1	7	Water Banking
2	1	Metropolitan Water District of Southern California
3	10b	Conservation – Tailor to Unique CBH Characteristics
4	10a	Conservation – Comply with SBx7-7
5	9c	Groundwater – Develop Central Basin (La Brea) Wells
6	8	Antelope Valley Water Bank Drought Insurance
7	2	Ocean Desalination
8	9b	Groundwater – Develop Hollywood Basin Wells
9	5	Exchanges
10	11c	Capture and Treat RO Reject Water (4.5 MGD)
11	4a	Recycled Water Regional Approach
12	11b	Capture and Treat RO Reject Water (3.0 MGD)
13	11a	Capture and Treat RO Reject Water (1.5 MGD)
14	4b	Recycled Water – Scalping Plant Approach
15	4d	Recycled Water Exchanges
16	6	Transfers
17	4c	Recycled Water – Greywater Approach
18	9a	Groundwater – Capture Spring Water
19	3	Urban Runoff – Capture and Treat Dry Weather Flows

Table 8
Weighting Scenario 7: Volume is Weighted 30%; All Other Criteria are Weighted 10%

Ranking	Alternative No.	Description
1	1	Metropolitan Water District of Southern California
2	7	Water Banking
3	8	Antelope Valley Water Bank Drought Insurance
4	9c	Groundwater – Develop Central Basin (La Brea) Wells
5	5	Exchanges
6	2	Ocean Desalination
7	10b	Conservation – Tailor to Unique CBH Characteristics
8	6	Transfers
9	4a	Recycled Water Regional Approach
10	10a	Conservation – Comply with SBx7-7
11	9b	Groundwater – Develop Hollywood Basin Wells
12	4d	Recycled Water Exchanges
13	11c	Capture and Treat RO Reject Water (4.5 MGD)
14	11b	Capture and Treat RO Reject Water (3.0 MGD)
15	11a	Capture and Treat RO Reject Water (1.5 MGD)
16	4b	Recycled Water – Scalping Plant Approach
17	9a	Groundwater – Capture Spring Water
18	4c	Recycled Water – Greywater Approach
19	3	Urban Runoff – Capture and Treat Dry Weather Flows

Table 9

Weighting Scenario 8: Cost, Volume, Reliability and Environment are Weighted 20%; All Other Criteria are Weighted 6.7% with Timing Deleted (0%) from Consideration

Ranking	Alternative No.	Description
1	1	Metropolitan Water District of Southern California
2	7	Water Banking
3	10b	Conservation – Tailor to Unique CBH Characteristics
4	10a	Conservation – Comply with SBx7-7
5	9c	Groundwater – Develop Central Basin (La Brea) Wells
6	8	Antelope Valley Water Bank Drought Insurance
7	5	Exchanges
8	2	Ocean Desalination
9	4a	Recycled Water Regional Approach
10	9b	Groundwater – Develop Hollywood Basin Wells
11	11c	Capture and Treat RO Reject Water (4.5 MGD)
12	6	Transfers
13	11b	Capture and Treat RO Reject Water (3.0 MGD)
14	11a	Capture and Treat RO Reject Water (1.5 MGD)
15	4d	Recycled Water Exchanges
16	4b	Recycled Water – Scalping Plant Approach
17	9a	Groundwater – Capture Spring Water
18	4c	Recycled Water – Greywater Approach
19	3	Urban Runoff – Capture and Treat Dry Weather Flows

Table 10

Weighting Scenario 9: Volume, Reliability and Local Control are Weighted 23.1% with All Other Criteria Weighted 7.7% and Timing Deleted (0%)

Ranking	Alternative No.	Description
1	9c	Groundwater – Develop Central Basin (La Brea) Wells
2	7	Water Banking
3	2	Ocean Desalination
4	1	Metropolitan Water District of Southern California
5	10b	Conservation – Tailor to Unique CBH Characteristics
6	9b	Groundwater – Develop Hollywood Basin Wells
7	8	Antelope Valley Water Bank Drought Insurance
8	5	Exchanges
9	4a	Recycled Water Regional Approach
10	10a	Conservation – Comply with SBx7-7
11	4d	Recycled Water Exchanges
12	11c	Capture and Treat RO Reject Water (4.5 MGD)
13	11b	Capture and Treat RO Reject Water (3.0 MGD)
14	6	Transfers
15	11a	Capture and Treat RO Reject Water (1.5 MGD)
16	4b	Recycled Water – Scalping Plant Approach
17	9a	Groundwater – Capture Spring Water
18	3	Urban Runoff – Capture and Treat Dry Weather Flows
19	4c	Recycled Water – Greywater Approach

Table 11
Weighting Scenario 10: Volume, Reliability, Local Control and Environment are Each Weighted 21.7%; All Other Criteria are Weighted 4.3% with Timing Deleted (0%)

Ranking	Alternative No.	Description
1	8	Antelope Valley Water Bank Drought Insurance
2	10b	Conservation – Tailor to Unique CBH Characteristics
3	9c	Groundwater – Develop Central Basin (La Brea) Wells
4	7	Water Banking
5	1	Metropolitan Water District of Southern California
6	10a	Conservation – Comply with SBx7-7
7	9b	Groundwater – Develop Hollywood Basin Wells
8	5	Exchanges
9	2	Ocean Desalination
10	4a	Recycled Water Regional Approach
11	4d	Recycled Water Exchanges
12	11c	Capture and Treat RO Reject Water (4.5 MGD)
13	11b	Capture and Treat RO Reject Water (3.0 MGD)
14	4b	Recycled Water – Scalping Plant Approach
15	6	Transfers
16	11a	Capture and Treat RO Reject Water (1.5 MGD)
17	9a	Groundwater – Capture Spring Water
18	3	Urban Runoff – Capture and Treat Dry Weather Flows
19	4c	Recycled Water – Greywater Approach

FINDINGS AND CONCLUSIONS

Table 12 on the next page, summarizes the results of the **Weighting Scenario** analysis. The column to the far left shows the overall ranking of the 19 alternatives from highest to lowest. These rankings are based on the average ranking of each alternative as reflected in the second column from the left. The average rankings were calculated by summing the rankings of the noted alternative for each **Weighting Scenario** and then dividing by ten (the total number of scenarios). The last two columns describe the alternative and list the type of alternative (i.e., supply, insurance or conservation).

As can be seen, there is a clear delineation between the top nine ranked alternatives and the bottom ten alternatives (as reflected in the large gap between the ninth and tenth ranked alternatives; the 2.2 gap is the largest gap between any two ranked alternatives). In addition to Table 12, a Tabular Color Coded Summary of Supply/Reliability Alternatives by Weighting Scenario is also included in the Appendix.

Table 12
Summary of Weighting Scenario Analysis

Order of Ranking	Average Ranking	Alternative	Type of Alternative
Top Nine Ranked Alternatives			
1	2.1	MWD	Supply
2	2.7	Water Banking	Insurance
3	3.8	Conservation - Tailored	Conservation
4	4.3	Groundwater – Develop Central Basin	Supply
5	5.4	Conservation - Comply with SBx7-7	Conservation
6	5.9	Antelope Valley Water Bank Drought Insurance	Insurance
7	6.9	Exchanges	Insurance
8	7.7	Ocean Desalination	Supply
9	8.2	Groundwater – Develop Hollywood Basin	Supply
Bottom Ten Ranked Alternatives Note the Large 2.2 Gap Between Alternative Ranking Nos. 9 and 10			
10	10.4	Capture and Treat RO Plant Reject Water (4.5 MGD)	Supply
11	10.7	Recycled Water - Regional Approach	Supply
12	12.4	Capture and Treat RO Plant Reject Water (3.0 MGD)	Supply
13	13.0	Transfers	Insurance
14	13.2	Capture and Treat RO Plant Reject Water (1.5 MGD)	Supply
15	13.7	Recycled Water Exchanges	Insurance
16	15.8	Recycled Water - Scalping Plant Approach	Supply
17	17.1	Groundwater - Capture Spring Water	Supply
18	17.9	Recycled Water - Greywater Approach	Supply
19	18.8	Urban Runoff - Capture and Treat Dry Weather Flows	Supply

The **10 Scenarios** evaluated differ widely in their criteria weightings, yet the highest ranked alternatives are fairly consistent across the various combinations of weightings. This demonstrates that our analysis is not subject to significant movement caused by changing the relative weightings of the various criteria, i.e., it passes the sensitivity test.

Several important results can be seen from our analysis as summarized below:

1. **Metropolitan Water District is ranked No. 1** in six of the 10 scenarios, second in one scenario, fourth in two scenarios and fifth in the remaining one;
2. **Water Banking is ranked either first or second** in six of the ten scenarios and is in the top five in all ten scenarios;
3. **Conservation – Tailored to Unique CBH Characteristics** is in the top three in seven of the ten scenarios and in the top seven in all ten scenarios;

4. **Groundwater – Develop Central Basin Wells** is ranked in the top six in all ten scenarios;
5. **Conservation – Comply with SBx7-7** is ranked in the top four in six of the ten scenarios and in the top ten in the other four scenarios. It should be noted that, while SBx7-7 will achieve conservation goals, it is not truly an alternative in the same sense at the other nine alternatives since it is mandated by State law;
6. **Antelope Valley Drought Insurance** is ranked in the top seven in eight of the ten scenarios and in the top ten in all ten scenarios;
7. **Exchanges (excluding Recycled Water Exchanges)** are ranked twice in the top five and in the top nine in all ten scenarios;
8. **Ocean Desalination** is ranked twice in the top three and in the top nine in eight of the ten scenarios; and
9. **Groundwater – Develop Hollywood Basin** is ranked five times in the top seven scenarios and never lower than 11 in the rest of the scenarios;
10. All of the other alternatives consistently rank in the bottom half of the 19 scenarios.

RECOMMENDATIONS

Based on the above-noted findings and conclusions, we recommend proceeding with detailed evaluations of the following nine (9) highly ranked alternatives:

1. Metropolitan Water District;
2. Water Banking;
3. Conservation – Tailor to Unique CBH Characteristics;
4. Groundwater – Develop Central Basin Wells;
5. Conservation – Comply with SBx7-7;
6. Antelope Valley Drought Insurance;
7. Exchanges;
8. Ocean Desalination; and
9. Groundwater – Develop Hollywood Basin.

Four of the above options are **Baseline Supply Alternatives** (MWD, Central Basin Wells, Ocean Desalination and Hollywood Basin Wells); three of the recommended options are forms of **Water Supply Insurance**, which, if implemented, could increase the City's supply reliability (Water Banking, Antelope Valley Drought Insurance and Exchanges); and the last two options are **Conservation Measures** (Tailored to Unique CBH Characteristics and Comply with SBx7-7).

All other alternatives should be eliminated from further consideration at this time.

Appendix
to
Technical Memorandum No.1

- Ranking Criteria Details
- Alternative Ranking by Weighting Scenario
- Tabular Color-Coded Summary of Supply/Reliability Alternatives by Weighting Scenario

CITY OF BEVERLY HILLS WATER RESOURCE ALTERNATIVE OPTIONS

RANKING CRITERIA DETAILS

COST

The cost of the resource is greater than $2,500/AF	1
The cost of the resource is between $2,000-$2,500/AF	2
The cost of the resource is between $1,500-$2,000/AF	3
The cost of the resource is between $1,000-$1,500/AF	4
The cost of the resource is less than $1,000/AF	5

NARRATIVE

The criteria is based on the concept that the higher the cost, the greater the disadvantage. The bracketed cost ranges are based on 2014 dollars and are based on the expected ranges that would be anticipated for water sources that are evaluated for the CBH.

VOLUME

The volume of the resource is less than 500 AFY	1
The volume of the resource is between 500-1,500 AFY	2
The volume of the resource is between 1,500-2,500 AFY	3
The volume of the resource is between 2,500-3,500 AFY	4
The volume of the resource is greater than 3,500 AFY	5

The criteria is based on the concept that the higher the volume contributed by the resource, the greater the advantage. Small volumes <500 AFY are considered a significant disadvantage. Large volumes (>3,500 AFY) are considered a significant advantage.

RELIABILITY (Dependability)

The resource can be severely impacted.	1
The resource can be moderately to severely impacted.	2
The resource can be moderately impacted.	3
The resource can be slightly impacted.	4
The resource is not impacted and is always available.	5

The criteria is based on the concept of hydrologic certainty that "wet" water will be available. A source that is immune to current or future hydrologies would be considered as highly reliable (Number 5). An example would be ocean desalination as terrestrial hydrology would have a zero effect on the availability of the resource. Whereas State Project water can be highly dependent on Sierra Nevada snowpack and resulting hydrology of State Project dependent waters.

TIMING

The resource would take more than 20 years to develop and be available for consumptive use.	1
The resource would take between 5 to 20 years to develop and be available for consumptive use.	3
The resource would take less than 5 years to develop and be available for consumptive use.	5

The criteria is based on the concept of the ability of the proposed resource and associated agreements, legal/institutional constraints, and/or the construction of the related infrastructure could be completed within a set amount of years. A low number of years to successfully implement and make use of a resource is considered favorable whereas as high number of years is a disadvantage.

LOCAL CONTROL

The resource is not within local control (under CBH) and is subject to external influences.	1
The resource is under partial local control or agreements and potential adverse influences from external parties.	2
The resource is under partial local control or agreements and limited adverse influences from external parties.	3
Resource is under mostly local control but some external influences can impact the resource.	4
Resource is totally under local control.	5

NARRATIVE

Local control refers to whether the CBH controls the resource from generation to delivery to the CBH. If the resource and delivery are not under the control of CBH, it is considered a serious disadvantage. However, if the generation and delivery are under the control of CBH, then it is considered a significant advantage.

LEGAL/INSTITUTIONAL

Requires local or state legislation or institutional changes in order to implement.	1
Requires moderate to substantial Local legislation or institutional changes in order to implement.	2
Requires moderate permitting and institutional changes but are consistent with current State & Local requirements.	3
Requires minor permitting and some institutional changes but are consistent with current State & Local requirements.	4
No legal or institutional changes will be required to develop the resource.	5

Legal/institutional criteria refers to the degree of developing a particular resource will require legislation or institutional changes to be able to be implemented. It also includes the degree that litigation may occur as part of developing the resource. It does not pertain to CEQA impacts (that is covered in Environmental).

ENVIRONMENTAL

Will have adverse effects on the environment.	1
Will have moderate impact to the environment.	3
No impacts to the environment.	5

This criteria refers to the potential for developing the proposed resource and that environmental impacts will occur. Impacts that are adverse (unmitigable) are considered a serious disadvantage whereas a resource that poses little or no environmental impacts is considered a

OPERATIONAL COMPLEXITY (for CBH)

Will require dedicated additional personnel and/or substantial coordination with outside agencies to operate and maintain.	1
Will require some additional or part-time personnel to coordinate and manage the resource.	3
Does not require personnel for operations of the resource.	5

This criteria refers to the degree to which the CBH will be required to have dedicated additional personnel and/or substantial coordination to operate and maintain the resource. The concept is that the need for additional personnel indicates that the resource is complex to maintain and operate. Those resources that require substantial personnel are considered to be adverse (serious disadvantage) as opposed to those resources that require little or no staff (significant advantage).

Ranking Legend

Serious disadvantages	1
Some significant disadvantages	2
Issues but manageable	3
Some advantages	4
Significant advantages	5

NOTES:
AF=acre-feet; AFY=acre-feet per year, CBH= City of Beverly Hills; CEQA=California Environmental Quality Act;

ALTERNATIVES RANKED IN ORDER

Option	Water Resource Alternative	Weighting Score		Rank
1	Metropolitan Water District of Southern California	4.38	✓	1
7	Water Banking	3.88	✓	2
10b	Conservation – Tailor to Unique CBH Characteristics	3.75	✓	3
10a	Conservation – Comply with SBx7-7	3.75	✓	4
9c	Groundwater - Develop Central Basin (La Brea) Wells	3.75	✓	5
8	Antelope Valley Water Bank Drought Insurance	3.75	✓	6
9b	Groundwater - Develop Hollywood Basin Wells	3.50	✓	7
5	Exchanges	3.50	✓	8
2	Ocean Desalination	3.50	✗	9
11c	Capture and Treat R.O. Reject Water - 4.5 MGD	3.38	✗	10
11b	Capture and Treat R.O. Reject Water - 3.0 MGD	3.25	✗	11
11a	Capture and Treat R.O. Reject Water - 1.5 MGD	3.25	✗	12
6	Transfers	3.13	✗	13
4a	Recycled Water - Regional Approach	3.13	✗	14
4d	Recycled Water - Exchange	3.00	✗	15
4b	Recycled Water - Scalping Plant Approach	2.75	✗	16
9a	Groundwater - Capture Spring Water	2.63	✗	17
4c	Recycled Water - Greywater Approach	2.25	✗	18
3	Urban Runoff - Capture & Treat Dry Weather Flows	2.13	✗	19

ALTERNATIVE LIST

Rank	Option	Water Resource Alternative	Weighting Score
✓ 1	1	Metropolitan Water District of Southern California	4.38
✗ 9	2	Ocean Desalination	3.50
✗ 19	3	Urban Runoff - Capture & Treat Dry Weather Flows	2.13
✗ 14	4a	Recycled Water - Regional Approach	3.13
✗ 16	4b	Recycled Water - Scalping Plant Approach	2.75
✗ 18	4c	Recycled Water - Greywater Approach	2.25
✗ 15	4d	Recycled Water - Exchange	3.00
✓ 8	5	Exchanges	3.50
✗ 13	6	Transfers	3.13
✓ 2	7	Water Banking	3.88
✓ 6	8	Antelope Valley Water Bank Drought Insurance	3.75
✗ 17	9a	Groundwater - Capture Spring Water	2.63
✓ 7	9b	Groundwater - Develop Hollywood Basin Wells	3.50
✓ 5	9c	Groundwater - Develop Central Basin (La Brea) Wells	3.75
✓ 4	10a	Conservation – Comply with SBx7-7	3.75
✓ 3	10b	Conservation – Tailor to Unique CBH Characteristics	3.75
✗ 12	11a	Capture and Treat R.O. Reject Water - 1.5 MGD	3.25
✗ 11	11b	Capture and Treat R.O. Reject Water - 3.0 MGD	3.25
✗ 10	11c	Capture and Treat R.O. Reject Water - 4.5 MGD	3.38

SCENARIO 1 - Baseline (All Criterion Equal Weighting - 12.5%)

Criterion Selection Matrix

Option	Weighting Factor	Cost	Volume	Reliability	Timing	Local Control	Legal/ Institutional	Environmental	Operational Complexity	
	Relative	1	1	1	1	1	1	1	1	
	Actual	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%	100.0%
1	---	5	5	3	5	2	5	5	5	
7	---	3	5	5	3	3	2	2	5	
10b	---	1	2	3	3	5	1	1	1	
10a	---	2	5	5	1	2	4	3	3	
9c	---	1	2	5	3	4	3	3	1	
8	---	2	2	4	3	1	1	2	3	
9b	---	1	5	4	3	3	2	3	3	
5	---	4	5	4	3	3	3	3	3	
2	---	3	5	2	3	3	3	3	3	
11c	---	4	5	5	5	3	3	3	3	
11b	---	2	5	4	5	3	3	5	3	
11a	---	2	2	2	3	5	3	3	1	
6	---	3	3	4	3	5	4	3	3	
4a	---	4	4	4	3	5	4	3	3	
4d	---	5	2	4	3	4	4	5	3	
4b	---	4	3	4	3	4	4	5	3	
9a	---	4	1	4	3	4	4	3	3	
4c	---	3	2	4	3	4	4	3	3	
3	---	4	2	4	3	4	4	3	3	

5	Significant advantages
4	Some advantages
3	Issues but manageable
2	Some significant disadvantages
1	Serious disadvantages

ALTERNATIVES RANKED IN ORDER

Option	Water Resource Alternative	Weighting Score	Rank
1	Metropolitan Water District of Southern California	4.29	✓ 1
10b	Conservation – Tailor to Unique CBH Characteristics	3.86	✓ 2
10a	Conservation – Comply with SBx7-7	3.86	✓ 3
9c	Groundwater - Develop Central Basin (La Brea) Wells	3.86	✓ 4
7	Water Banking	3.72	✓ 5
9b	Groundwater - Develop Hollywood Basin Wells	3.57	✓ 6
8	Antelope Valley Water Bank Drought Insurance	3.57	✓ 7
5	Exchanges	3.57	✓ 8
2	Ocean Desalination	3.57	✗ 9
11c	Capture and Treat R.O. Reject Water - 4.5 MGD	3.43	✗ 10
4a	Recycled Water - Regional Approach	3.43	✗ 11
11b	Capture and Treat R.O. Reject Water - 3.0 MGD	3.29	✗ 12
11a	Capture and Treat R.O. Reject Water - 1.5 MGD	3.29	✗ 13
6	Transfers	3.14	✗ 14
4d	Recycled Water - Exchange	3.00	✗ 15
4b	Recycled Water - Scalping Plant Approach	2.71	✗ 16
9a	Groundwater - Capture Spring Water	2.57	✗ 17
4c	Recycled Water - Greywater Approach	2.14	✗ 18
3	Urban Runoff - Capture & Treat Dry Weather Flows	2.00	✗ 19

ALTERNATIVE LIST

Rank	Option	Water Resource Alternative	Weighting Score
✓ 1	1	Metropolitan Water District of Southern California	4.29
✗ 9	2	Ocean Desalination	3.57
✗ 19	3	Urban Runoff - Capture & Treat Dry Weather Flows	2.00
✗ 11	4a	Recycled Water - Regional Approach	3.43
✗ 16	4b	Recycled Water - Scalping Plant Approach	2.71
✗ 18	4c	Recycled Water - Greywater Approach	2.14
✗ 15	4d	Recycled Water - Exchange	3.00
✓ 8	5	Exchanges	3.57
✗ 14	6	Transfers	3.14
✓ 5	7	Water Banking	3.72
✓ 7	8	Antelope Valley Water Bank Drought Insurance	3.57
✗ 17	9a	Groundwater - Capture Spring Water	2.57
✓ 6	9b	Groundwater - Develop Hollywood Basin Wells	3.57
✓ 4	9c	Groundwater - Develop Central Basin (La Brea) Wells	3.86
✓ 3	10a	Conservation – Comply with SBx7-7	3.86
✓ 2	10b	Conservation – Tailor to Unique CBH Characteristics	3.86
✗ 13	11a	Capture and Treat R.O. Reject Water - 1.5 MGD	3.29
✗ 12	11b	Capture and Treat R.O. Reject Water - 3.0 MGD	3.29
✗ 10	11c	Capture and Treat R.O. Reject Water - 4.5 MGD	3.43

SCENARIO 2 - Timing Deleted; All Other Criterion = 14.3%

Criterion Selection Matrix

Option	Water Resource Alternative	Weighting Score	Rank	Rank	Option	Water Resource Alternative	Weighting Score	Weighting Factor	Cost	Volume	Reliability	Timing	Local Control	Legal/ Institutional	Environmental	Operational Complexity	
								Relative	1	1	1	0	1	1	1	1	
								Actual	14.3%	14.3%	14.3%	0.0%	14.3%	14.3%	14.3%	14.3%	100.0%
1	Metropolitan Water District of Southern California	4.29	✓ 1	✓ 1	1	Metropolitan Water District of Southern California	4.29	---	5	5	3		2	5	5	5	
10b	Conservation – Tailor to Unique CBH Characteristics	3.86	✓ 2	✗ 9	2	Ocean Desalination	3.57	---	3	5	5		3	2	2	5	
10a	Conservation – Comply with SBx7-7	3.86	✓ 3	✗ 19	3	Urban Runoff - Capture & Treat Dry Weather Flows	2.00	---	1	2	3		5	1	1	1	
9c	Groundwater - Develop Central Basin (La Brea) Wells	3.86	✓ 4	✗ 11	4a	Recycled Water - Regional Approach	3.43	---	2	5	5		2	4	3	3	
7	Water Banking	3.72	✓ 5	✗ 16	4b	Recycled Water - Scalping Plant Approach	2.71	---	1	2	5		4	3	3	1	
9b	Groundwater - Develop Hollywood Basin Wells	3.57	✓ 6	✗ 18	4c	Recycled Water - Greywater Approach	2.14	---	2	2	4		1	1	2	3	
8	Antelope Valley Water Bank Drought Insurance	3.57	✓ 7	✗ 15	4d	Recycled Water - Exchange	3.00	---	1	5	4		3	2	3	3	
5	Exchanges	3.57	✓ 8	✓ 8	5	Exchanges	3.57	---	4	5	4		3	3	3	3	
2	Ocean Desalination	3.57	✗ 9	✗ 14	6	Transfers	3.14	---	3	5	2		3	3	3	3	
11c	Capture and Treat R.O. Reject Water - 4.5 MGD	3.43	✗ 10	✓ 5	7	Water Banking	3.72	---	4	5	5		3	3	3	3	
4a	Recycled Water - Regional Approach	3.43	✗ 11	✓ 7	8	Antelope Valley Water Bank Drought Insurance	3.57	---	2	5	4		3	3	5	3	
11b	Capture and Treat R.O. Reject Water - 3.0 MGD	3.29	✗ 12	✗ 17	9a	Groundwater - Capture Spring Water	2.57	---	2	2	2		5	3	3	1	
11a	Capture and Treat R.O. Reject Water - 1.5 MGD	3.29	✗ 13	✓ 6	9b	Groundwater - Develop Hollywood Basin Wells	3.57	---	3	3	4		5	4	3	3	
6	Transfers	3.14	✗ 14	✓ 4	9c	Groundwater - Develop Central Basin (La Brea) Wells	3.86	---	4	4	4		5	4	3	3	
4d	Recycled Water - Exchange	3.00	✗ 15	✓ 3	10a	Conservation – Comply with SBx7-7	3.86	---	5	2	4		4	4	5	3	
4b	Recycled Water - Scalping Plant Approach	2.71	✗ 16	✓ 2	10b	Conservation – Tailor to Unique CBH Characteristics	3.86	---	4	3	4		4	4	5	3	
9a	Groundwater - Capture Spring Water	2.57	✗ 17	✗ 13	11a	Capture and Treat R.O. Reject Water - 1.5 MGD	3.29	---	4	1	4		4	4	3	3	
4c	Recycled Water - Greywater Approach	2.14	✗ 18	✗ 12	11b	Capture and Treat R.O. Reject Water - 3.0 MGD	3.29	---	3	2	4		4	4	3	3	
3	Urban Runoff - Capture & Treat Dry Weather Flows	2.00	✗ 19	✗ 10	11c	Capture and Treat R.O. Reject Water - 4.5 MGD	3.43	---	4	2	4		4	4	3	3	

5	Significant advantages
4	Some advantages
3	Issues but manageable
2	Some significant disadvantages
1	Serious disadvantages

ALTERNATIVES RANKED IN ORDER

Option	Water Resource Alternative	Weighting Score	Rank
7	Water Banking	4.67	✓ 1
5	Exchanges	4.33	✓ 2
2	Ocean Desalination	4.33	✓ 3
1	Metropolitan Water District of Southern California	4.33	✓ 4
9c	Groundwater - Develop Central Basin (La Brea) Wells	4.00	✓ 5
4a	Recycled Water - Regional Approach	4.00	✓ 6
10b	Conservation – Tailor to Unique CBH Characteristics	3.67	✓ 7
10a	Conservation – Comply with SBx7-7	3.67	✓ 8
8	Antelope Valley Water Bank Drought Insurance	3.67	✗ 9
11c	Capture and Treat R.O. Reject Water - 4.5 MGD	3.34	✗ 10
9b	Groundwater - Develop Hollywood Basin Wells	3.33	✗ 11
6	Transfers	3.33	✗ 12
4d	Recycled Water - Exchange	3.33	✗ 13
11b	Capture and Treat R.O. Reject Water - 3.0 MGD	3.00	✗ 14
11a	Capture and Treat R.O. Reject Water - 1.5 MGD	3.00	✗ 15
4c	Recycled Water - Greywater Approach	2.67	✗ 16
4b	Recycled Water - Scalping Plant Approach	2.67	✗ 17
9a	Groundwater - Capture Spring Water	2.00	✗ 18
3	Urban Runoff - Capture & Treat Dry Weather Flows	2.00	✗ 19

ALTERNATIVE LIST

Rank	Option	Water Resource Alternative	Weighting Score
✓ 4	1	Metropolitan Water District of Southern California	4.33
✓ 3	2	Ocean Desalination	4.33
✗ 19	3	Urban Runoff - Capture & Treat Dry Weather Flows	2.00
✓ 6	4a	Recycled Water - Regional Approach	4.00
✗ 17	4b	Recycled Water - Scalping Plant Approach	2.67
✗ 16	4c	Recycled Water - Greywater Approach	2.67
✗ 13	4d	Recycled Water - Exchange	3.33
✓ 2	5	Exchanges	4.33
✗ 12	6	Transfers	3.33
✓ 1	7	Water Banking	4.67
✗ 9	8	Antelope Valley Water Bank Drought Insurance	3.67
✗ 18	9a	Groundwater - Capture Spring Water	2.00
✗ 11	9b	Groundwater - Develop Hollywood Basin Wells	3.33
✓ 5	9c	Groundwater - Develop Central Basin (La Brea) Wells	4.00
✓ 8	10a	Conservation – Comply with SBx7-7	3.67
✓ 7	10b	Conservation – Tailor to Unique CBH Characteristics	3.67
✗ 15	11a	Capture and Treat R.O. Reject Water - 1.5 MGD	3.00
✗ 14	11b	Capture and Treat R.O. Reject Water - 3.0 MGD	3.00
✗ 10	11c	Capture and Treat R.O. Reject Water - 4.5 MGD	3.34

SCENARIO 3 - Cost, Volume & Reliability = 33.3%; All Other = 0%

Criterion Selection Matrix

Option	Water Resource Alternative	Weighting Factor	Cost	Volume	Reliability	Timing	Local Control	Legal/ Institutional	Environmental	Operational Complexity	
		Relative	1	1	1	0	0	0	0	0	
		Actual	33.3%	33.3%	33.3%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
7	Water Banking	---	5	5	3						
5	Exchanges	---	3	5	5						
2	Ocean Desalination	---	1	2	3						
1	Metropolitan Water District of Southern California	---	2	5	5						
9c	Groundwater - Develop Central Basin (La Brea) Wells	---	1	2	5						
4a	Recycled Water - Regional Approach	---	2	2	4						
10b	Conservation – Tailor to Unique CBH Characteristics	---	1	5	4						
10a	Conservation – Comply with SBx7-7	---	4	5	4						
8	Antelope Valley Water Bank Drought Insurance	---	3	5	2						
11c	Capture and Treat R.O. Reject Water - 4.5 MGD	---	4	5	5						
9b	Groundwater - Develop Hollywood Basin Wells	---	2	5	4						
6	Transfers	---	2	2	2						
4d	Recycled Water - Exchange	---	3	3	4						
11b	Capture and Treat R.O. Reject Water - 3.0 MGD	---	4	4	4						
11a	Capture and Treat R.O. Reject Water - 1.5 MGD	---	5	2	4						
4c	Recycled Water - Greywater Approach	---	4	3	4						
4b	Recycled Water - Scalping Plant Approach	---	4	1	4						
9a	Groundwater - Capture Spring Water	---	3	2	4						
3	Urban Runoff - Capture & Treat Dry Weather Flows	---	4	2	4						

5	Significant advantages
4	Some advantages
3	Issues but manageable
2	Some significant disadvantages
1	Serious disadvantages

ALTERNATIVES RANKED IN ORDER

Option	Water Resource Alternative	Weighting Score	Rank
1	Metropolitan Water District of Southern California	4.50	✓ 1
10a	Conservation – Comply with SBx7-7	4.00	✓ 2
7	Water Banking	3.90	✓ 3
10b	Conservation – Tailor to Unique CBH Characteristics	3.80	✓ 4
9c	Groundwater - Develop Central Basin (La Brea) Wells	3.80	✓ 5
5	Exchanges	3.60	✓ 6
11c	Capture and Treat R.O. Reject Water - 4.5 MGD	3.50	✓ 7
11a	Capture and Treat R.O. Reject Water - 1.5 MGD	3.40	✓ 8
9b	Groundwater - Develop Hollywood Basin Wells	3.40	✗ 9
8	Antelope Valley Water Bank Drought Insurance	3.40	✗ 10
2	Ocean Desalination	3.40	✗ 11
11b	Capture and Treat R.O. Reject Water - 3.0 MGD	3.20	✗ 12
6	Transfers	3.10	✗ 13
4a	Recycled Water - Regional Approach	2.90	✗ 14
4d	Recycled Water - Exchange	2.60	✗ 15
9a	Groundwater - Capture Spring Water	2.50	✗ 16
4b	Recycled Water - Scalping Plant Approach	2.40	✗ 17
4c	Recycled Water - Greywater Approach	2.20	✗ 18
3	Urban Runoff - Capture & Treat Dry Weather Flows	1.90	✗ 19

ALTERNATIVE LIST

Rank	Option	Water Resource Alternative	Weighting Score
✓ 1	1	Metropolitan Water District of Southern California	4.50
✗ 11	2	Ocean Desalination	3.40
✗ 19	3	Urban Runoff - Capture & Treat Dry Weather Flows	1.90
✗ 14	4a	Recycled Water - Regional Approach	2.90
✗ 17	4b	Recycled Water - Scalping Plant Approach	2.40
✗ 18	4c	Recycled Water - Greywater Approach	2.20
✗ 15	4d	Recycled Water - Exchange	2.60
✓ 6	5	Exchanges	3.60
✗ 13	6	Transfers	3.10
✓ 3	7	Water Banking	3.90
✗ 10	8	Antelope Valley Water Bank Drought Insurance	3.40
✗ 16	9a	Groundwater - Capture Spring Water	2.50
✗ 9	9b	Groundwater - Develop Hollywood Basin Wells	3.40
✓ 5	9c	Groundwater - Develop Central Basin (La Brea) Wells	3.80
✓ 2	10a	Conservation – Comply with SBx7-7	4.00
✓ 4	10b	Conservation – Tailor to Unique CBH Characteristics	3.80
✓ 8	11a	Capture and Treat R.O. Reject Water - 1.5 MGD	3.40
✗ 12	11b	Capture and Treat R.O. Reject Water - 3.0 MGD	3.20
✓ 7	11c	Capture and Treat R.O. Reject Water - 4.5 MGD	3.50

SCENARIO 4 - Cost = 30%; All Other Criterion = 10%

Criterion Selection Matrix

Weighting Factor	Cost	Volume	Reliability	Timing	Local Control	Legal/ Institutional	Environmental	Operational Complexity	
Relative	3	1	1	1	1	1	1	1	
Actual	30.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	100.0%
---	5	5	3	5	2	5	5	5	
---	3	5	5	3	3	2	2	5	
---	1	2	3	3	5	1	1	1	
---	2	5	5	1	2	4	3	3	
---	1	2	5	3	4	3	3	1	
---	2	2	4	3	1	1	2	3	
---	1	5	4	3	3	2	3	3	
---	4	5	4	3	3	3	3	3	
---	3	5	2	3	3	3	3	3	
---	4	5	5	5	3	3	3	3	
---	2	5	4	5	3	3	5	3	
---	2	2	2	3	5	3	3	1	
---	3	3	4	3	5	4	3	3	
---	4	4	4	3	5	4	3	3	
---	5	2	4	3	4	4	5	3	
---	4	3	4	3	4	4	5	3	
---	4	1	4	3	4	4	3	3	
---	3	2	4	3	4	4	3	3	
---	4	2	4	3	4	4	3	3	

5	Significant advantages
4	Some advantages
3	Issues but manageable
2	Some significant disadvantages
1	Serious disadvantages

SCENARIO 5 - Environmental = 30%; All Other Criterion = 10%

ALTERNATIVES RANKED IN ORDER

Option	Water Resource Alternative	Weighting Score		Rank
1	Metropolitan Water District of Southern California	4.50	✓	1
10b	Conservation – Tailor to Unique CBH Characteristics	4.00	✓	2
10a	Conservation – Comply with SBx7-7	4.00	✓	3
8	Antelope Valley Water Bank Drought Insurance	4.00	✓	4
7	Water Banking	3.70	✓	5
9c	Groundwater - Develop Central Basin (La Brea) Wells	3.60	✓	6
9b	Groundwater - Develop Hollywood Basin Wells	3.40	✓	7
5	Exchanges	3.40	✓	8
11c	Capture and Treat R.O. Reject Water - 4.5 MGD	3.30	✗	9
11b	Capture and Treat R.O. Reject Water - 3.0 MGD	3.20	✗	10
11a	Capture and Treat R.O. Reject Water - 1.5 MGD	3.20	✗	11
2	Ocean Desalination	3.20	✗	12
6	Transfers	3.10	✗	13
4a	Recycled Water - Regional Approach	3.10	✗	14
4d	Recycled Water - Exchange	3.00	✗	15
4b	Recycled Water - Scalping Plant Approach	2.80	✗	16
9a	Groundwater - Capture Spring Water	2.70	✗	17
4c	Recycled Water - Greywater Approach	2.20	✗	18
3	Urban Runoff - Capture & Treat Dry Weather Flows	1.90	✗	19

ALTERNATIVE LIST

Rank	Option	Water Resource Alternative	Weighting Score
1	1	Metropolitan Water District of Southern California	4.50
12	2	Ocean Desalination	3.20
19	3	Urban Runoff - Capture & Treat Dry Weather Flows	1.90
14	4a	Recycled Water - Regional Approach	3.10
16	4b	Recycled Water - Scalping Plant Approach	2.80
18	4c	Recycled Water - Greywater Approach	2.20
15	4d	Recycled Water - Exchange	3.00
8	5	Exchanges	3.40
13	6	Transfers	3.10
5	7	Water Banking	3.70
4	8	Antelope Valley Water Bank Drought Insurance	4.00
17	9a	Groundwater - Capture Spring Water	2.70
7	9b	Groundwater - Develop Hollywood Basin Wells	3.40
6	9c	Groundwater - Develop Central Basin (La Brea) Wells	3.60
3	10a	Conservation – Comply with SBx7-7	4.00
2	10b	Conservation – Tailor to Unique CBH Characteristics	4.00
11	11a	Capture and Treat R.O. Reject Water - 1.5 MGD	3.20
10	11b	Capture and Treat R.O. Reject Water - 3.0 MGD	3.20
9	11c	Capture and Treat R.O. Reject Water - 4.5 MGD	3.30

Criterion Selection Matrix

Option	Weighting Factor	Cost	Volume	Reliability	Timing	Local Control	Legal/ Institutional	Environmental	Operational Complexity	
	Relative	1	1	1	1	1	1	3	1	
	Actual	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	30.0%	10.0%	100.0%
1	---	5	5	3	5	2	5	5	5	
10b	---	3	5	5	3	3	2	2	5	
10a	---	1	2	3	3	5	1	1	1	
8	---	2	5	5	1	2	4	3	3	
7	---	1	2	5	3	4	3	3	1	
9c	---	2	2	4	3	1	1	2	3	
9b	---	1	5	4	3	3	2	3	3	
5	---	4	5	4	3	3	3	3	3	
11c	---	3	5	2	3	3	3	3	3	
11b	---	4	5	5	5	3	3	3	3	
11a	---	2	5	4	5	3	3	5	3	
2	---	2	2	2	3	5	3	3	1	
6	---	3	3	4	3	5	4	3	3	
4a	---	4	4	4	3	5	4	3	3	
4d	---	5	2	4	3	4	4	5	3	
4b	---	4	3	4	3	4	4	5	3	
9a	---	4	1	4	3	4	4	3	3	
4c	---	3	2	4	3	4	4	3	3	
3	---	4	2	4	3	4	4	3	3	

5	Significant advantages
4	Some advantages
3	Issues but manageable
2	Some significant disadvantages
1	Serious disadvantages

ALTERNATIVES RANKED IN ORDER

Option	Water Resource Alternative	Weighting Score	Rank
7	Water Banking	4.10	✓ 1
1	Metropolitan Water District of Southern California	4.10	✓ 2
10b	Conservation – Tailor to Unique CBH Characteristics	3.80	✓ 3
10a	Conservation – Comply with SBx7-7	3.80	✓ 4
9c	Groundwater - Develop Central Basin (La Brea) Wells	3.80	✓ 5
8	Antelope Valley Water Bank Drought Insurance	3.80	✓ 6
2	Ocean Desalination	3.80	✓ 7
9b	Groundwater - Develop Hollywood Basin Wells	3.60	✓ 8
5	Exchanges	3.60	✗ 9
11c	Capture and Treat R.O. Reject Water - 4.5 MGD	3.50	✗ 10
4a	Recycled Water - Regional Approach	3.50	✗ 11
11b	Capture and Treat R.O. Reject Water - 3.0 MGD	3.40	✗ 12
11a	Capture and Treat R.O. Reject Water - 1.5 MGD	3.40	✗ 13
4b	Recycled Water - Scalping Plant Approach	3.20	✗ 14
4d	Recycled Water - Exchange	3.20	✗ 15
6	Transfers	2.90	✗ 16
4c	Recycled Water - Greywater Approach	2.60	✗ 17
9a	Groundwater - Capture Spring Water	2.50	✗ 18
3	Urban Runoff - Capture & Treat Dry Weather Flows	2.30	✗ 19

ALTERNATIVE LIST

Rank	Option	Water Resource Alternative	Weighting Score
✓ 2	1	Metropolitan Water District of Southern California	4.10
✓ 7	2	Ocean Desalination	3.80
✗ 19	3	Urban Runoff - Capture & Treat Dry Weather Flows	2.30
✗ 11	4a	Recycled Water - Regional Approach	3.50
✗ 14	4b	Recycled Water - Scalping Plant Approach	3.20
✗ 17	4c	Recycled Water - Greywater Approach	2.60
✗ 15	4d	Recycled Water - Exchange	3.20
✗ 9	5	Exchanges	3.60
✗ 16	6	Transfers	2.90
✓ 1	7	Water Banking	4.10
✓ 6	8	Antelope Valley Water Bank Drought Insurance	3.80
✗ 18	9a	Groundwater - Capture Spring Water	2.50
✓ 8	9b	Groundwater - Develop Hollywood Basin Wells	3.60
✓ 5	9c	Groundwater - Develop Central Basin (La Brea) Wells	3.80
✓ 4	10a	Conservation – Comply with SBx7-7	3.80
✓ 3	10b	Conservation – Tailor to Unique CBH Characteristics	3.80
✗ 13	11a	Capture and Treat R.O. Reject Water - 1.5 MGD	3.40
✗ 12	11b	Capture and Treat R.O. Reject Water - 3.0 MGD	3.40
✗ 10	11c	Capture and Treat R.O. Reject Water - 4.5 MGD	3.50

SCENARIO 6 - Reliability = 30%; All Other Criterion = 10%

Criterion Selection Matrix

Option	Water Resource Alternative	Weighting Score	Rank	Weighting Factor	Cost	Volume	Reliability	Timing	Local Control	Legal/ Institutional	Environmental	Operational Complexity	
				Relative	1	1	3	1	1	1	1	1	
				Actual	10.0%	10.0%	30.0%	10.0%	10.0%	10.0%	10.0%	10.0%	100.0%
7	Water Banking	4.10	✓ 1	---	5	5	3	5	2	5	5	5	
1	Metropolitan Water District of Southern California	4.10	✓ 2	---	3	5	5	3	3	2	2	5	
10b	Conservation – Tailor to Unique CBH Characteristics	3.80	✓ 3	---	1	2	3	3	5	1	1	1	
10a	Conservation – Comply with SBx7-7	3.80	✓ 4	---	2	5	5	1	2	4	3	3	
9c	Groundwater - Develop Central Basin (La Brea) Wells	3.80	✓ 5	---	1	2	5	3	4	3	3	1	
8	Antelope Valley Water Bank Drought Insurance	3.80	✓ 6	---	2	2	4	3	1	1	2	3	
2	Ocean Desalination	3.80	✓ 7	---	1	5	4	3	3	2	3	3	
9b	Groundwater - Develop Hollywood Basin Wells	3.60	✓ 8	---	4	5	4	3	3	3	3	3	
5	Exchanges	3.60	✗ 9	---	3	5	2	3	3	3	3	3	
11c	Capture and Treat R.O. Reject Water - 4.5 MGD	3.50	✗ 10	---	4	5	5	5	3	3	3	3	
4a	Recycled Water - Regional Approach	3.50	✗ 11	---	2	5	4	5	3	3	5	3	
11b	Capture and Treat R.O. Reject Water - 3.0 MGD	3.40	✗ 12	---	2	2	2	3	5	3	3	1	
11a	Capture and Treat R.O. Reject Water - 1.5 MGD	3.40	✗ 13	---	3	3	4	3	5	4	3	3	
4b	Recycled Water - Scalping Plant Approach	3.20	✗ 14	---	4	4	4	3	5	4	3	3	
4d	Recycled Water - Exchange	3.20	✗ 15	---	5	2	4	3	4	4	5	3	
6	Transfers	2.90	✗ 16	---	4	3	4	3	4	4	5	3	
4c	Recycled Water - Greywater Approach	2.60	✗ 17	---	4	1	4	3	4	4	3	3	
9a	Groundwater - Capture Spring Water	2.50	✗ 18	---	3	2	4	3	4	4	3	3	
3	Urban Runoff - Capture & Treat Dry Weather Flows	2.30	✗ 19	---	4	2	4	3	4	4	3	3	

5	Significant advantages
4	Some advantages
3	Issues but manageable
2	Some significant disadvantages
1	Serious disadvantages

ALTERNATIVES RANKED IN ORDER

Option	Water Resource Alternative	Weighting Score	Rank
1	Metropolitan Water District of Southern California	4.50	1
7	Water Banking	4.10	2
8	Antelope Valley Water Bank Drought Insurance	4.00	3
9c	Groundwater - Develop Central Basin (La Brea) Wells	3.80	4
5	Exchanges	3.80	5
2	Ocean Desalination	3.80	6
10b	Conservation – Tailor to Unique CBH Characteristics	3.60	7
6	Transfers	3.50	8
4a	Recycled Water - Regional Approach	3.50	9
10a	Conservation – Comply with SBx7-7	3.40	10
9b	Groundwater - Develop Hollywood Basin Wells	3.40	11
4d	Recycled Water - Exchange	3.40	12
11c	Capture and Treat R.O. Reject Water - 4.5 MGD	3.10	13
11b	Capture and Treat R.O. Reject Water - 3.0 MGD	3.00	14
11a	Capture and Treat R.O. Reject Water - 1.5 MGD	2.80	15
4b	Recycled Water - Scalping Plant Approach	2.60	16
9a	Groundwater - Capture Spring Water	2.50	17
4c	Recycled Water - Greywater Approach	2.20	18
3	Urban Runoff - Capture & Treat Dry Weather Flows	2.10	19

ALTERNATIVE LIST

Rank	Option	Water Resource Alternative	Weighting Score
1	1	Metropolitan Water District of Southern California	4.50
6	2	Ocean Desalination	3.80
19	3	Urban Runoff - Capture & Treat Dry Weather Flows	2.10
9	4a	Recycled Water - Regional Approach	3.50
16	4b	Recycled Water - Scalping Plant Approach	2.60
18	4c	Recycled Water - Greywater Approach	2.20
12	4d	Recycled Water - Exchange	3.40
5	5	Exchanges	3.80
8	6	Transfers	3.50
2	7	Water Banking	4.10
3	8	Antelope Valley Water Bank Drought Insurance	4.00
17	9a	Groundwater - Capture Spring Water	2.50
11	9b	Groundwater - Develop Hollywood Basin Wells	3.40
4	9c	Groundwater - Develop Central Basin (La Brea) Wells	3.80
10	10a	Conservation – Comply with SBx7-7	3.40
7	10b	Conservation – Tailor to Unique CBH Characteristics	3.60
15	11a	Capture and Treat R.O. Reject Water - 1.5 MGD	2.80
14	11b	Capture and Treat R.O. Reject Water - 3.0 MGD	3.00
13	11c	Capture and Treat R.O. Reject Water - 4.5 MGD	3.10

SCENARIO 7 - Volume = 30%; All Other Criterion = 10%

Criterion Selection Matrix

Option	Water Resource Alternative	Weighting Score	Cost	Volume	Reliability	Timing	Local Control	Legal/ Institutional	Environmental	Operational Complexity
	Weighting Factor Relative	---	1	3	1	1	1	1	1	1
	Weighting Factor Actual	---	10.0%	30.0%	10.0%	10.0%	10.0%	10.0%	10.0%	100.0%
1	Metropolitan Water District of Southern California	4.50	5	5	3	5	2	5	5	5
7	Water Banking	4.10	3	5	5	3	3	2	2	5
8	Antelope Valley Water Bank Drought Insurance	4.00	1	2	3	3	5	1	1	1
9c	Groundwater - Develop Central Basin (La Brea) Wells	3.80	2	5	5	1	2	4	3	3
5	Exchanges	3.80	1	2	5	3	4	3	3	1
2	Ocean Desalination	3.80	2	2	4	3	1	1	2	3
10b	Conservation – Tailor to Unique CBH Characteristics	3.60	1	5	4	3	3	2	3	3
6	Transfers	3.50	4	5	4	3	3	3	3	3
4a	Recycled Water - Regional Approach	3.50	3	5	2	3	3	3	3	3
10a	Conservation – Comply with SBx7-7	3.40	4	5	5	5	3	3	3	3
9b	Groundwater - Develop Hollywood Basin Wells	3.40	2	5	4	5	3	3	5	3
4d	Recycled Water - Exchange	3.40	2	2	2	3	5	3	3	1
11c	Capture and Treat R.O. Reject Water - 4.5 MGD	3.10	3	3	4	3	5	4	3	3
11b	Capture and Treat R.O. Reject Water - 3.0 MGD	3.00	4	4	4	3	5	4	3	3
11a	Capture and Treat R.O. Reject Water - 1.5 MGD	2.80	5	2	4	3	4	4	5	3
4b	Recycled Water - Scalping Plant Approach	2.60	4	3	4	3	4	4	5	3
9a	Groundwater - Capture Spring Water	2.50	4	1	4	3	4	4	3	3
4c	Recycled Water - Greywater Approach	2.20	3	2	4	3	4	4	3	3
3	Urban Runoff - Capture & Treat Dry Weather Flows	2.10	4	2	4	3	4	4	3	3

5	Significant advantages
4	Some advantages
3	Issues but manageable
2	Some significant disadvantages
1	Serious disadvantages

SCENARIO 8 - Cost, Volume, Reliability & Environmental = 20%; Timing = 0%; All Others = 6.7%

ALTERNATIVES RANKED IN ORDER

Option	Water Resource Alternative	Weighting Score		Rank
1	Metropolitan Water District of Southern California	4.40	✓	1
7	Water Banking	4.00	✓	2
10b	Conservation – Tailor to Unique CBH Characteristics	3.93	✓	3
10a	Conservation – Comply with SBx7-7	3.93	✓	4
9c	Groundwater - Develop Central Basin (La Brea) Wells	3.80	✓	5
8	Antelope Valley Water Bank Drought Insurance	3.80	✓	6
5	Exchanges	3.80	✓	7
2	Ocean Desalination	3.67	✓	8
4a	Recycled Water - Regional Approach	3.60	✗	9
9b	Groundwater - Develop Hollywood Basin Wells	3.40	✗	10
11c	Capture and Treat R.O. Reject Water - 4.5 MGD	3.34	✗	11
6	Transfers	3.20	✗	12
11b	Capture and Treat R.O. Reject Water - 3.0 MGD	3.14	✗	13
11a	Capture and Treat R.O. Reject Water - 1.5 MGD	3.13	✗	14
4d	Recycled Water - Exchange	3.13	✗	15
4b	Recycled Water - Scalping Plant Approach	2.73	✗	16
9a	Groundwater - Capture Spring Water	2.40	✗	17
4c	Recycled Water - Greywater Approach	2.33	✗	18
3	Urban Runoff - Capture & Treat Dry Weather Flows	1.87	✗	19

ALTERNATIVE LIST

Rank	Option	Water Resource Alternative	Weighting Score
✓ 1	1	Metropolitan Water District of Southern California	4.40
✓ 8	2	Ocean Desalination	3.67
✗ 19	3	Urban Runoff - Capture & Treat Dry Weather Flows	1.87
✗ 9	4a	Recycled Water - Regional Approach	3.60
✗ 16	4b	Recycled Water - Scalping Plant Approach	2.73
✗ 18	4c	Recycled Water - Greywater Approach	2.33
✗ 15	4d	Recycled Water - Exchange	3.13
✓ 7	5	Exchanges	3.80
✗ 12	6	Transfers	3.20
✓ 2	7	Water Banking	4.00
✓ 6	8	Antelope Valley Water Bank Drought Insurance	3.80
✗ 17	9a	Groundwater - Capture Spring Water	2.40
✗ 10	9b	Groundwater - Develop Hollywood Basin Wells	3.40
✓ 5	9c	Groundwater - Develop Central Basin (La Brea) Wells	3.80
✓ 4	10a	Conservation – Comply with SBx7-7	3.93
✓ 3	10b	Conservation – Tailor to Unique CBH Characteristics	3.93
✗ 14	11a	Capture and Treat R.O. Reject Water - 1.5 MGD	3.13
✗ 13	11b	Capture and Treat R.O. Reject Water - 3.0 MGD	3.14
✗ 11	11c	Capture and Treat R.O. Reject Water - 4.5 MGD	3.34

Criterion Selection Matrix

Option	Weighting Factor	Cost	Volume	Reliability	Timing	Local Control	Legal/ Institutional	Environmental	Operational Complexity	
	Relative	3	3	3	0	1	1	3	1	
	Actual	20.0%	20.0%	20.0%	0.0%	6.7%	6.7%	20.0%	6.7%	100.0%
1	---	5	5	3		2	5	5	5	
2	---	3	5	5		3	2	2	5	
3	---	1	2	3		5	1	1	1	
4a	---	2	5	5		2	4	3	3	
4b	---	1	2	5		4	3	3	1	
4c	---	2	2	4		1	1	2	3	
4d	---	1	5	4		3	2	3	3	
5	---	4	5	4		3	3	3	3	
6	---	3	5	2		3	3	3	3	
7	---	4	5	5		3	3	3	3	
8	---	2	5	4		3	3	5	3	
9a	---	2	2	2		5	3	3	1	
9b	---	3	3	4		5	4	3	3	
9c	---	4	4	4		5	4	3	3	
10a	---	5	2	4		4	4	5	3	
10b	---	4	3	4		4	4	5	3	
11a	---	4	1	4		4	4	3	3	
11b	---	3	2	4		4	4	3	3	
11c	---	4	2	4		4	4	3	3	

5	Significant advantages
4	Some advantages
3	Issues but manageable
2	Some significant disadvantages
1	Serious disadvantages

SCENARIO 9 - Volume, Reliability & Local Control = 23.1%; Timing = 0%; All Others = 7.7%

Criterion Selection Matrix

ALTERNATIVES RANKED IN ORDER

Option	Water Resource Alternative	Weighting Score	Rank
9c	Groundwater - Develop Central Basin (La Brea) Wells	4.08	1
7	Water Banking	4.00	2
2	Ocean Desalination	3.92	3
1	Metropolitan Water District of Southern California	3.85	4
10b	Conservation – Tailor to Unique CBH Characteristics	3.77	5
9b	Groundwater - Develop Hollywood Basin Wells	3.77	6
8	Antelope Valley Water Bank Drought Insurance	3.77	7
5	Exchanges	3.77	8
4a	Recycled Water - Regional Approach	3.69	9
10a	Conservation – Comply with SBx7-7	3.62	10
4d	Recycled Water - Exchange	3.46	11
11c	Capture and Treat R.O. Reject Water - 4.5 MGD	3.39	12
11b	Capture and Treat R.O. Reject Water - 3.0 MGD	3.31	13
6	Transfers	3.23	14
11a	Capture and Treat R.O. Reject Water - 1.5 MGD	3.16	15
4b	Recycled Water - Scalping Plant Approach	3.15	16
9a	Groundwater - Capture Spring Water	2.77	17
3	Urban Runoff - Capture & Treat Dry Weather Flows	2.62	18
4c	Recycled Water - Greywater Approach	2.23	19

ALTERNATIVE LIST

Rank	Option	Water Resource Alternative	Weighting Score
4	1	Metropolitan Water District of Southern California	3.85
3	2	Ocean Desalination	3.92
18	3	Urban Runoff - Capture & Treat Dry Weather Flows	2.62
9	4a	Recycled Water - Regional Approach	3.69
16	4b	Recycled Water - Scalping Plant Approach	3.15
19	4c	Recycled Water - Greywater Approach	2.23
11	4d	Recycled Water - Exchange	3.46
8	5	Exchanges	3.77
14	6	Transfers	3.23
2	7	Water Banking	4.00
7	8	Antelope Valley Water Bank Drought Insurance	3.77
17	9a	Groundwater - Capture Spring Water	2.77
6	9b	Groundwater - Develop Hollywood Basin Wells	3.77
1	9c	Groundwater - Develop Central Basin (La Brea) Wells	4.08
10	10a	Conservation – Comply with SBx7-7	3.62
5	10b	Conservation – Tailor to Unique CBH Characteristics	3.77
15	11a	Capture and Treat R.O. Reject Water - 1.5 MGD	3.16
13	11b	Capture and Treat R.O. Reject Water - 3.0 MGD	3.31
12	11c	Capture and Treat R.O. Reject Water - 4.5 MGD	3.39

Option	Weighting Factor	Cost	Volume	Reliability	Timing	Local Control	Legal/ Institutional	Environmental	Operational Complexity	
	Relative	1	3	3	0	3	1	1	1	
	Actual	7.7%	23.1%	23.1%	0.0%	23.1%	7.7%	7.7%	7.7%	100.0%
9c	---	5	5	3		2	5	5	5	
7	---	3	5	5		3	2	2	5	
2	---	1	2	3		5	1	1	1	
1	---	2	5	5		2	4	3	3	
10b	---	1	2	5		4	3	3	1	
9b	---	2	2	4		1	1	2	3	
8	---	1	5	4		3	2	3	3	
5	---	4	5	4		3	3	3	3	
4a	---	3	5	2		3	3	3	3	
10a	---	4	5	5		3	3	3	3	
4d	---	2	5	4		3	3	5	3	
11c	---	2	2	2		5	3	3	1	
11b	---	3	3	4		5	4	3	3	
6	---	4	4	4		5	4	3	3	
11a	---	5	2	4		4	4	5	3	
4b	---	4	3	4		4	4	5	3	
9a	---	4	1	4		4	4	3	3	
3	---	3	2	4		4	4	3	3	
4c	---	4	2	4		4	4	3	3	

5	Significant advantages
4	Some advantages
3	Issues but manageable
2	Some significant disadvantages
1	Serious disadvantages

SCENARIO 10 - Volume, Reliability, Local Control & Environment = 21.7%; Timing = 0%; All Others = 4.3%

ALTERNATIVES RANKED IN ORDER

Option	Water Resource Alternative	Weighting Score		Rank
8	Antelope Valley Water Bank Drought Insurance	4.04	✓	1
10b	Conservation – Tailor to Unique CBH Characteristics	3.96	✓	2
9c	Groundwater - Develop Central Basin (La Brea) Wells	3.96	✓	3
7	Water Banking	3.91	✓	4
1	Metropolitan Water District of Southern California	3.91	✓	5
10a	Conservation – Comply with SBx7-7	3.78	✓	6
9b	Groundwater - Develop Hollywood Basin Wells	3.70	✓	7
5	Exchanges	3.70	✓	8
2	Ocean Desalination	3.70	✗	9
4a	Recycled Water - Regional Approach	3.65	✗	10
4d	Recycled Water - Exchange	3.52	✗	11
11c	Capture and Treat R.O. Reject Water - 4.5 MGD	3.31	✗	12
11b	Capture and Treat R.O. Reject Water - 3.0 MGD	3.26	✗	13
4b	Recycled Water - Scalping Plant Approach	3.26	✗	14
6	Transfers	3.22	✗	15
11a	Capture and Treat R.O. Reject Water - 1.5 MGD	3.09	✗	16
9a	Groundwater - Capture Spring Water	2.87	✗	17
3	Urban Runoff - Capture & Treat Dry Weather Flows	2.52	✗	18
4c	Recycled Water - Greywater Approach	2.22	✗	19

ALTERNATIVE LIST

Rank	Option	Water Resource Alternative	Weighting Score
✓ 5	1	Metropolitan Water District of Southern California	3.91
✗ 9	2	Ocean Desalination	3.70
✗ 18	3	Urban Runoff - Capture & Treat Dry Weather Flows	2.52
✗ 10	4a	Recycled Water - Regional Approach	3.65
✗ 14	4b	Recycled Water - Scalping Plant Approach	3.26
✗ 19	4c	Recycled Water - Greywater Approach	2.22
✗ 11	4d	Recycled Water - Exchange	3.52
✓ 8	5	Exchanges	3.70
✗ 15	6	Transfers	3.22
✓ 4	7	Water Banking	3.91
✓ 1	8	Antelope Valley Water Bank Drought Insurance	4.04
✗ 17	9a	Groundwater - Capture Spring Water	2.87
✓ 7	9b	Groundwater - Develop Hollywood Basin Wells	3.70
✓ 3	9c	Groundwater - Develop Central Basin (La Brea) Wells	3.96
✓ 6	10a	Conservation – Comply with SBx7-7	3.78
✓ 2	10b	Conservation – Tailor to Unique CBH Characteristics	3.96
✗ 16	11a	Capture and Treat R.O. Reject Water - 1.5 MGD	3.09
✗ 13	11b	Capture and Treat R.O. Reject Water - 3.0 MGD	3.26
✗ 12	11c	Capture and Treat R.O. Reject Water - 4.5 MGD	3.31

Criterion Selection Matrix

Option	Weighting Factor	Cost	Volume	Reliability	Timing	Local Control	Legal/ Institutional	Environmental	Operational Complexity	
	Relative	1	5	5	0	5	1	5	1	
	Actual	4.3%	21.7%	21.7%	0.0%	21.7%	4.3%	21.7%	4.3%	100.0%
8	---	5	5	3		2	5	5	5	
10b	---	3	5	5		3	2	2	5	
9c	---	1	2	3		5	1	1	1	
7	---	2	5	5		2	4	3	3	
1	---	1	2	5		4	3	3	1	
10a	---	2	2	4		1	1	2	3	
9b	---	1	5	4		3	2	3	3	
5	---	4	5	4		3	3	3	3	
2	---	3	5	2		3	3	3	3	
4a	---	4	5	5		3	3	3	3	
4d	---	2	5	4		3	3	5	3	
11c	---	2	2	2		5	3	3	1	
11b	---	3	3	4		5	4	3	3	
4b	---	4	4	4		5	4	3	3	
6	---	5	2	4		4	4	5	3	
11a	---	4	3	4		4	4	5	3	
9a	---	4	1	4		4	4	3	3	
3	---	3	2	4		4	4	3	3	
4c	---	4	2	4		4	4	3	3	

5	Significant advantages
4	Some advantages
3	Issues but manageable
2	Some significant disadvantages
1	Serious disadvantages

Tabular Color-Coded Summary of Supply/Reliability Alternatives by Weighting Scenario

RANKING	Scenario No.									
	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8	No. 9	No. 10
	All Equal	Timing Deleted, all others equal	Cost, Vol., Rel = 33%, all others=0	Cost=30%, all others=10%	Envir.=30%, all others=10%	Relia.=30%, all others=10%	Volume=30%, all others=10%	Cost, Vol., Rel. & Env.= 20%, all others=6.7%; timing=0	Vol., Rel., LC = 23.1%, all others=7.7%; timing=0	Vol., Rel., LC, Env. = 21.7%, all others=4.3%; timing=0
1	1	1	7	1	1	7	1	1	9c	8
2	7	10b	5	10a	10b	1	7	7	7	10b
3	10b	10a	2	7	10a	10b	8	10b	2	9c
4	10a	9c	1	10b	8	10a	9c	10a	1	7
5	9c	7	9c	9c	7	9c	5	9c	10b	1
6	8	9b	4a	5	9c	8	2	8	9b	10a
7	9b	8	10b	11c	9b	2	10b	5	8	9b
8	5	5	10a	11a	5	9b	6	2	5	5
9	2	2	8	9b	11c	5	4a	4a	4a	2
10	11c	11c	11c	8	11b	11c	10a	9b	10a	4a
11	11b	4a	9b	2	11a	4a	9b	11c	4d	4d
12	11a	11b	6	11b	2	11b	4d	6	11c	11c
13	6	11a	4d	6	6	11a	11c	11b	11b	11b
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16	4b	4b	4c	9a	4b	6	4b	4b	4b	11a
17	9a	9a	4b	4b	9a	4c	9a	9a	9a	9a
18	4c	4c	9a	4c	4c	9a	4c	4c	3	3
19	3	3	3	3	3	3	3	3	4c	4c

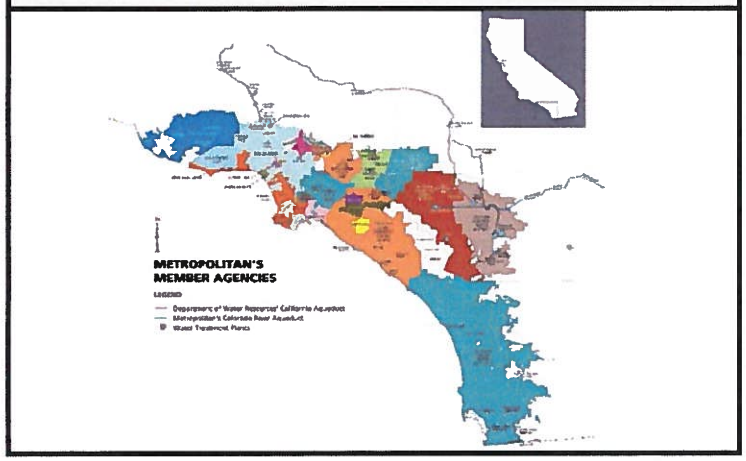
1	Metropolitan Water District of Southern California
2	Ocean Desalination
3	Urban Runoff – Capture and Treat Dry Weather Flows
4a	Recycled Water Regional Approach
4b	Recycled Water – Scalping Plant Approach
4c	Recycled Water – Greywater Approach
4d	Recycled Water Exchanges
5	Exchanges
6	Transfers
7	Water Banking
8	Antelope Valley Water Bank Drought Insurance
9a	Groundwater – Capture Spring Water
9b	Groundwater – Develop Hollywood Basin Wells
9c	Groundwater – Develop Central Basin (La Brea) Wells
10a	Conservation – Comply with SBx7-7
10b	Conservation – Tailor to Unique CBH Characteristics
11a	Capture and Treat RO Reject Water (1.5 MGD)
11b	Capture and Treat RO Reject Water (3.0 MGD)
11c	Capture and Treat RO Reject Water (4.5 MGD)

1: Metropolitan Water District of Southern California

Concept Description:

Metropolitan Water District of Southern California (MWD) is a wholesale water agency made up of 26 member agency. The CBH is a founding member and provides one of the 35 directors that govern MWD. MWD supplies include the State Water Project, The Colorado River, and numerous storage, water transfers, exchanges, fallowing projects, and banking projects. The MWD available supply, including storage has been adequate to meet MWD's needs for the last 20 years. However, to cautiously preserve its supplies MWD imposed allocations in 2009 and is considering imposing them again next year. In addition, in the event of a severe emergency or failure to agree on an allocation plan, MWD's code requires allocations to be generally distributed based upon "preferential rights" or cumulative fixed fees paid. Beverly Hills preferential rights is 0.98% of whatever water MWD has available. Minimum supplies, absent a major earthquake, are about 1.2 million AF/ year. The CBH share would be about 11,900 AF/year.

Location



Attributes

Advantages	Disadvantages
Proven, reliable sources	Reliability may degrade with time
Stable cost structure	Lack of local control
Excellent quality	SDCWA lawsuit could significantly impact cost
No additional facilities needed	Must have sufficient storage to plan for 7-day outage
All constructed	

Schedule

Already in service

Ranking

Selection Criteria	Rating
Cost	5
Volume	5
Reliability	3
Timing	5
Local Control	2
Legal/Institutional	5
Environmental	5
Operational Complexity	5

Ranking Legend

Serious disadvantages	1
Some significant disadvantages	2
Issues but manageable	3
Some advantages	4
Significant advantages	5

Cost:

Full Service Treated (2014) Tier 1 $890/AF

Full Service Treated (2014) Tier 2 $1,032/AF

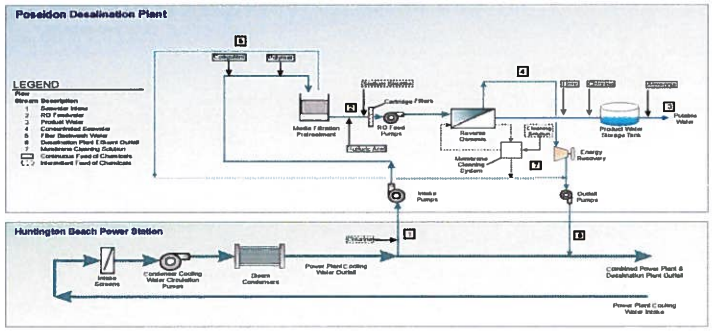
2: Ocean Desalination

Concept Description:

While the City of Beverly Hills (CBH) does not have direct ocean desalination opportunities, it is theoretically possible to "buy into" a planned coastal desalination plant and have water delivered by "exchange" through current Metropolitan service connections. The Huntington Beach desalination plant being planned by Poseidon Resources is closest to permitting and construction and is actively looking for water contractors. CBH would contract for a fixed amount of water for a specific term at a specific price. The water likely incur a "wheeling charge" for delivery/exchange by Metropolitan.

Location

The Plant is located in Huntington Beach, CA on the site of the AES Generating Station adjacent to Pacific Coast Highway



Attributes

Advantages	Disadvantages
Drought proof supply	Must pay MWD System Access Rate to move the water by Exchange to COBH
Provides baseload supply	Must be purchased irrespective of need
No direct operational responsibility	Requires first of its kind agreement for ocean desalination wheeling
Water would be by exchange, representing MWD's current water quality	Not clear plant will subscribe sufficiently to be cost-effective
The water supply would be controlled by the current HB City Council	The environmental community and current City Council oppose the plant
	Plant may have to change intake approach, incurring significant extra cost
	Local agencies have not committed to purchasing the water as of yet due to cost

Schedule

The Plant is currently awaiting approval by the CCC who have raised concerns over the proposed intake system. Studies are underway to assess use of beach wells. Such wells, if required, would add substantial cost to the project Assuming permits are issued and construction is initiated in the next 2 years, the Plant would come on line in approximately 2018-2020.

Ranking

Selection Criteria	Rating
Cost	3
Volume	5
Reliability	5
Timing	3
Local Control	3
Legal/Institutional	2
Environmental	2
Operational Complexity	5

Ranking Legend

Serious disadvantages	1
Some significant disadvantages	2
Issues but manageable	3
Some advantages	4
Significant advantages	5

Cost:

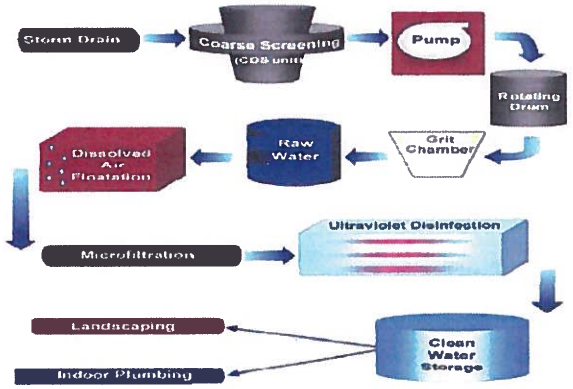
Poseidon Resources, the developer of the Huntington Beach plant has quoted a price of $1,424/ AF (Jan 2013 dollars, Huntington Beach Project) to local agencies to subscribe capacity of the plant. CBH would have to also negotiate and pay the Metropolitan Water District's Wheeling Rate which, under the current rate structure, is the System Access Rate ($243/AF) and Water Stewardship Rate ($41/AF), Treatment Surcharge (not applicable here) and power costs (at least $161/AF) for wheeling transactions. Total cost of this supply would be in excess of $1,900/AF (assuming the 2013 Poseidon pricing structure would continue to be honored).

3: Urban Runoff - Capture and Treat Dry Weather Flows

Concept Description:

Dry weather urban runoff in major storm channels can be collected, treated and reused to irrigate parks and open spaces. This alternative could be in competition with recycled water alternatives. It would require a separate distribution system and storage in addition to a treatment plant. The diversion would likely have to be in County of Los Angeles Flood Control Facility and coordination efforts would be involved with that agency.

Santa Monica Urban Runoff Recycling Facility



Attributes

Advantages	Disadvantages
Free source of water that is fairly reliable and drought proof	High capital and O&M cost
Reduces potable water demand	Requires land for treatment and storage
Environmental community support	Requires a separate distribution system
Removing and cleaning up source of somewhat polluted water	Depending on location could be competing with recycled water alternative
Potential grant or funding assistance available	Construction impacts due to treatment plant and new pipeline construction
	Conversion of existing irrigation systems sometimes difficult
	Could be some isolated community opposition due to treatment plant siting
	Diversion of tributary water to Ballona Cr.

Schedule

Could be implemented as soon as funding is available, however, planning, siting, design and construction could take at least 5 years.

Ranking

Selection Criteria	Rating
Cost	1
Volume	2
Reliability	3
Timing	3
Local Control	5
Legal/Institutional	1
Environmental	1
Operational Complexity	1

Ranking Legend

Serious disadvantages	1
Some significant disadvantages	2
Issues but manageable	3
Some advantages	4
Significant advantages	5

Cost:

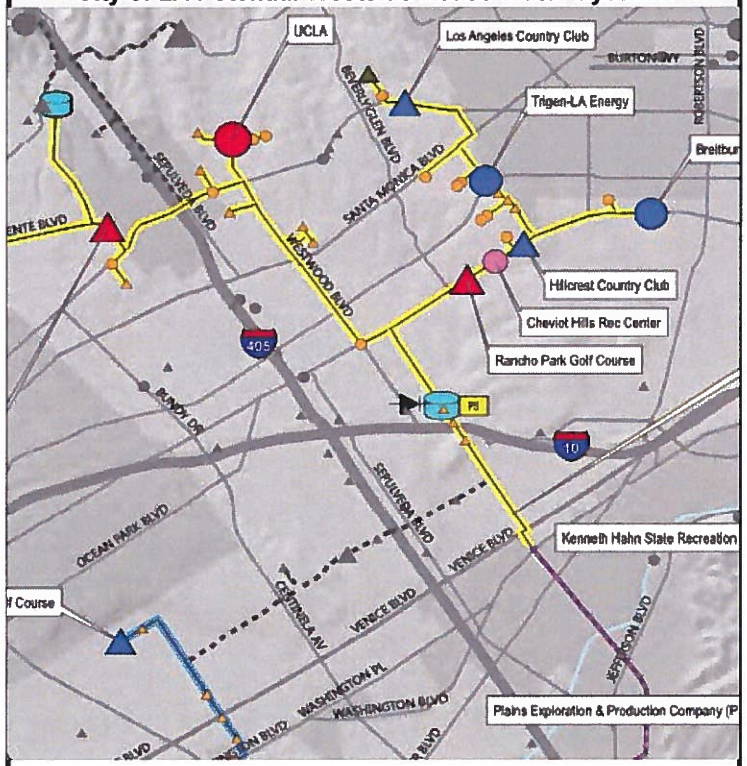
Estimated at greater than $2,500/AF.

4a: Recycled Water - Regional Approach

Concept Description:

While a recycled water source is currently not available to CBH, LADWP in their 2012 Non-Potable Reuse Master Planning Report includes a recycled water distribution system running up to the CBH's westerly boundary to serve LA Country Club. This facility is a part of DWP's "Potential Westside Service Area System". The assumption is made an agreement could be negotiated with DWP to provide additional capacity in this system and to extend it into CBH by running it easterly in San Vicente and Santa Monica Boulevards to serve landscaping along that corridor and potentially other uses such as parks and schools by extending pipelines off this main. This system is DWP's last tier of recycled water supply with a 20-year plan to develop a total of 59,000 AFY including their Existing, Proposed and Potential Non-Potable Reuse Systems along with 30,000 AFY of Groundwater Reuse so CBH has no control over when, and even if, it will actually occur.

City of LA Potential Westside Reuse Water Systems



Attributes

Advantages	Disadvantages
Reliable, drought proof supply	Fairly high up front capital cost
Reduces potable water demand	Construction impacts due to new pipeline installation
Environmental community support	Conversion of existing irrigation systems sometimes difficult
Low O&M costs	DWP negotiation and coordination required
Potential grant or funding assistance available	Limited local control

Schedule

Since CBH is on the end of DWP's Westside System, and that system will likely be one of the last phases of their distribution system, it may be 2035 before recycled water is available.

Ranking

Selection Criteria	Rating
Cost	2
Volume	5
Reliability	5
Timing	1
Local Control	2
Legal/Institutional	4
Environmental	3
Operational Complexity	3

Ranking Legend

Serious disadvantages	1
Some significant disadvantages	2
Issues but manageable	3
Some advantages	4
Significant advantages	5

Cost:

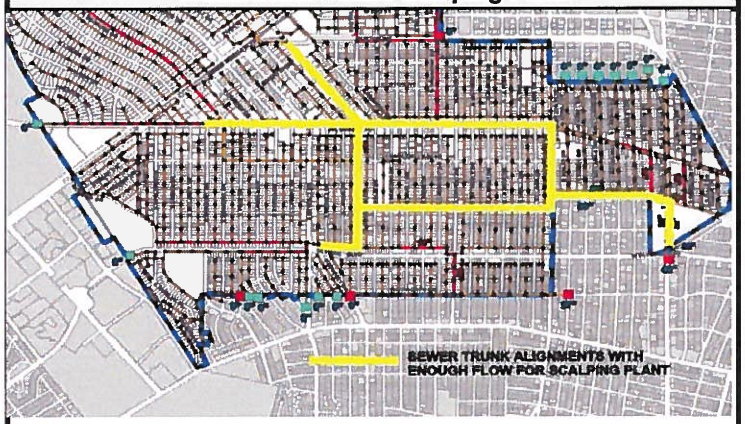
City of LA DWP's cost for Westside System was approximately $1,600/AF and assuming CBH can buy into that system for the same unit cost, extending it approximately 2.3 miles to serve local irrigation demands should run approximately $500 - $600/AF for a total of around $2,100-$2,200/AF.

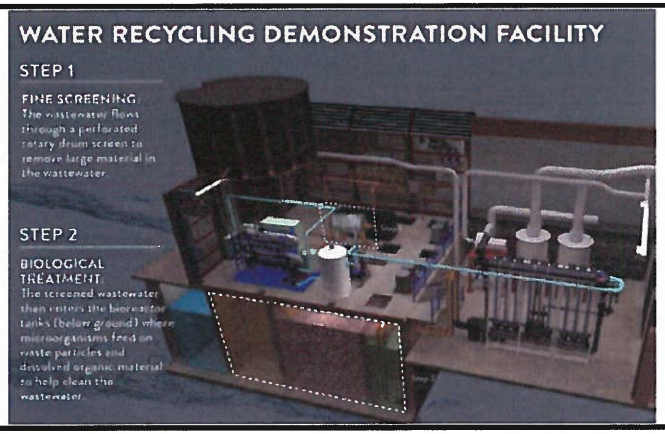
4b: Recycled Water - Scalping Plant Approach

Concept Description:

The CBH could construct small wastewater reclamation plant(s) along sewer trunks to "scalp" sewage, treat it to tertiary standards, return the solids to the trunk sewer, and pump the recycled water to a distribution system for irrigation of parks, greenbelts and schools.

Wastewater Reuse Scalping Plant





Attributes

Advantages	Disadvantages
Reliable, drought proof supply	Very high up front capital cost
Reduces potable water demand	Requires land for treatment plant
Environmental community support	High O&M cost
Local control	Construction impacts due to treatment plant and new pipeline construction
Requires a treatment plant site	Conversion of existing irrigation systems sometimes difficult
Potential grant or funding assistance available	Could be some isolated community opposition due to treatment plant siting
	The exact need and areas that be converted for use of recycled water need to be identified

Schedule

Would take approximately 5 years to plan, obtain a site, design, finance, construct, and permit a scalping plant. The irrigation system could be constructed to coincide with the availability of recycled water.

Ranking

Selection Criteria	Rating
Cost	1
Volume	2
Reliability	5
Timing	3
Local Control	4
Legal/Institutional	3
Environmental	3
Operational Complexity	1

Ranking Legend

Serious disadvantages	1
Some significant disadvantages	2
Issues but manageable	3
Some advantages	4
Significant advantages	5

Cost:

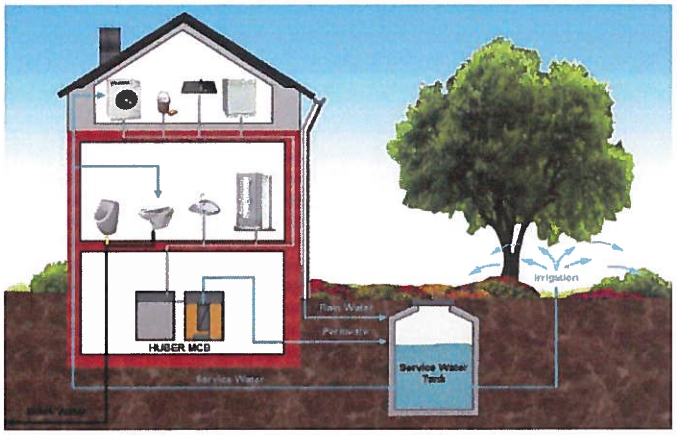
While large, regional wastewater reclamation plants are more prevalent, scalping plants are a way to obtain local control and avoid substantial pumping and distribution system costs. However, capital and O&M costs per acre-foot are substantially higher than regional systems due to the lost economies of scale for treatment. Another southern California City recently completed a demonstration scalping plant with total costs for amortized capital and O&M in the $7,500/AF range.

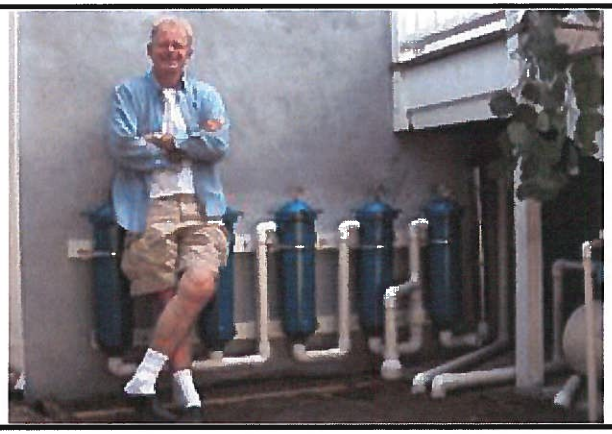
4c: Recycled Water - Greywater Approach

Concept Description:

Greywater recycling would involve local residents and businesses installing separate plumbing systems to capture greywater from washing machines, showers/baths and basins and then constructing tanks and pumps to enable them to utilize this water on their individual properties for irrigation of landscape. Greywater systems can be as simple as diverting washing machine water into a holding tank and from there sending it by gravity to drip irrigation systems or as complex as re-plumbing a home to capture water from basins, showers and washing machines, running it through a package treatment system, to a storage tank and pumping it to an irrigation system.

Greywater System





Attributes

Advantages	Disadvantages
No cost to CBH unless incentive rebate offered	High cost to homeowner or business owner
Reduces potable water demand	High cost per acre-foot
Reliable drought proof supply	Requires public support for implementation
Lower discharge to LA San District	

Schedule

Could be implemented immediately but since these would be private systems implementation is out of City control

Ranking

Selection Criteria	Rating
Cost	2
Volume	2
Reliability	4
Timing	3
Local Control	1
Legal/Institutional	1
Environmental	2
Operational Complexity	3

Ranking Legend

Serious disadvantages	1
Some significant disadvantages	2
Issues but manageable	3
Some advantages	4
Significant advantages	5

Cost:

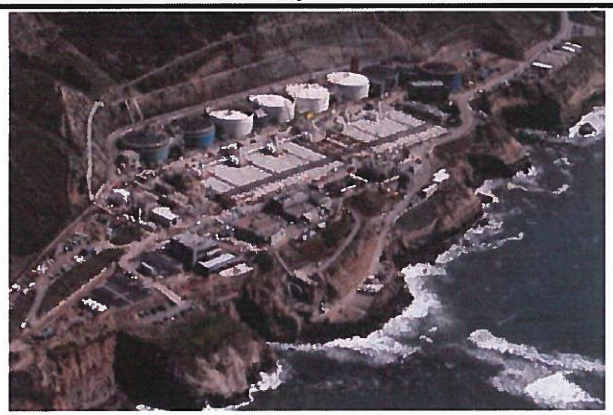
Costs for a simple system can be as low as $1,000 or less if installed by the owner to as much as tens of thousands of dollars if major re-plumbing and a treatment unit is professionally installed. Even a simple system could take over 10 years to recover the capital costs in water savings. If incentives were offered as in some states and municipalities, reduced pay-back could make these systems more prevalent. However, it would take thousands of them to result in an appreciable water savings as the average homeowner would save on the order of 0.1 to 0.2 AFY putting the cost in the range of $2,000 to $5,000/AF, assuming a 10-year life. However, since these are private systems, there is no cost to the City, with the exception of possible incentive rebates that could be offered.

4d: Recycled Water - Exchange

Concept Description:

With a regional project that would bring recyled water to CBH far from implementation, CBH could participate in another recycled water project and exchange that water for potable water. Pure Water San Diego is the City of San Diego's 20-year program to provide 90,000 AFY of potable reuse water from their Point Loma Wastewater Treatment Plant. A 15 MGD initial facility is planned to be operational by 2023 with the long term goal of producing 83 MGD by 2035. This alternative assumes the City of San Diego would allow CBH to financially participate in the project, exchanging the recylced water yield for an equivalent supply from MWDSC. The exchange would be subject to wheeling charges by MWDSC and the San Diego County Water Authority.

System



The City of San Diego's Point Loma Wastewater Treatment Plant

Attributes

Advantages	Disadvantages
Reliable, drought proof supply	Must pay MWDSC & SDCWA System Access Rates to move the water by Exchange to CBH
Provides benefits to Southern California region by providing funding to help move regional project along	Requires first of its kind agreement for recycled water wheeling
Potential grant of funding assistance available	High cost per AF
No direct operational responsibility	Multiple agencies involved including MWDSC, SDCWA and City of San Diego
Could potentially phase participation	

Schedule

First phase scheduled to be available by 2023, with future phase(s) planned

Ranking

Selection Criteria	Rating
Cost	1
Volume	5
Reliability	4
Timing	3
Local Control	3
Legal/Institutional	2
Environmental	3
Operational Complexity	3

Ranking Legend

Serious disadvantages	1
Some significant disadvantages	2
Issues but manageable	3
Some advantages	4
Significant advantages	5

Cost:

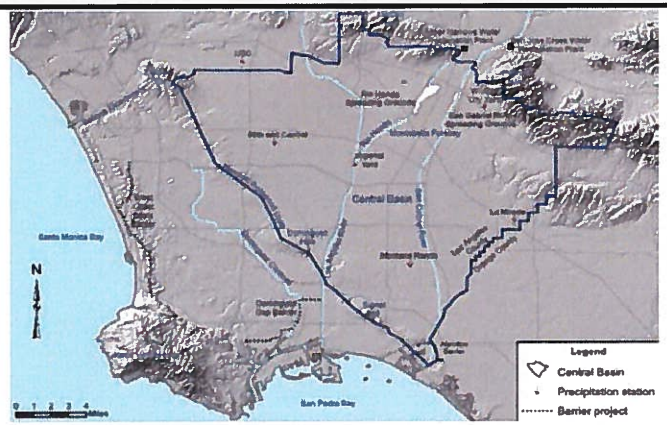
Current cost estimates for the San Diego project are upwards of $1,900/AF and we have assumed there would be a $100 incentive charge. CBH would have to negotiate and pay the Metropolitan Water District's Wheeling Rate which, under the current rate structure, is the System Access Rate ($243/AF) and Water Stewardship Rate ($41/AF), Treatment Surcharge and power costs (at least $161/AF) for wheeling transactions. In addition, San Diego County Water Authority would charge their "Transportation Rate", which is $101/AF for 2015. Based on the above, total cost of this supply would be in excess of $2,500/AF.

5: Exchanges

Concept Description:

Water exchanges are occasionally used to minimize capital investments or operating costs. One potential source of water for The CBH is the acquisition of water rights in the adjudicated portion of the Central Basin. While groundwater rights may be able to be purchased in this basin, the wells to extract the water would be a long distance from CBH, and much closer to the LADWP. Since the water would be of potable quality, it cannot be comingled with any facilities to take with from the unadjudicated portion of the Central Basin. Potentially, BH could purchase the water rights, construct the wells, and construct delivery facilities to the nearest connection to the LADWP system. The LADWP could then exchange the water to CBH at the current interconnection with the CBH and LADWP would charge administrative charge to compensate for the transaction. CBH would pay the capital and operating costs for the well pump station, pipelines meter connections and any upgrade needed at the existing connection.

Central Basin



Attributes

Advantages	Disadvantages
Southern California supply (local)	May be objections from other Central Basin pumpers
Reasonable cost	Rights may not be available
Two agency transaction	High initial capital outlay

Schedule

Three or more years from initiation.

Ranking

Selection Criteria	Rating
Cost	4
Volume	5
Reliability	4
Timing	3
Local Control	3
Legal/Institutional	3
Environmental	3
Operational Complexity	3

Ranking Legend

Serious disadvantages	1
Some significant disadvantages	2
Issues but manageable	3
Some advantages	4
Significant advantages	5

Cost:

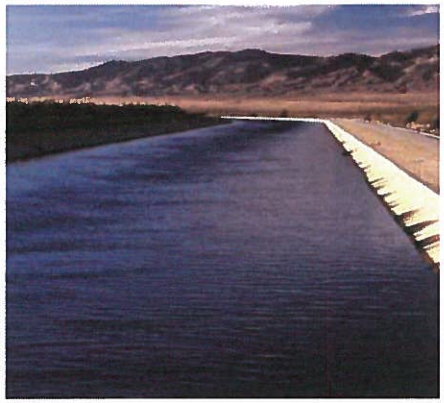
Approximately $1,100/AF.

6: Transfers

Concept Description:

A Water Transfer could provide an alternative source of supplemental water to the CBH. A water transfer is a contractual transfer of a block of water from an agency or individual which either has a legal water supply or water right that is in surplus to its needs and has the legal right and ability to sell or lease all or a portion of that water supply. Most of the current water transfer water is outside and north Los Angeles County. A water transfer would be wheeled through MWD using existing facilities and service connections including its capacity in the State Water Project facilities. CBH would contract for a fixed annual amount of water over a fixed period of time for a specific term and specific price. (i.e. a permanent long term annual supply or a fixed short term annual supply) Storing some or all the transferred water in a water bank is also an option and using in a time of need. In addition to the cost of the water, there will be wheeling charges for delivery, and exchange by MWD.

Location



Attributes

Advantages	Disadvantages
Water can be banked and used when needed	Must pay wheeling charges
Process and procedure well known and documented	Usually requires a take or pay contract
No direct operational responsibility	Usually a fixed multi year term contract
Can usually be arranged within one or two years	Wheeling subject to wheeling capacity availability in facilities
Take delivery through existing MWD connections	Availability of water for transfer could be limited
No water quality issues	May require a CEQA process
Subject to vulnerability of MWD facilities	May take several years to implement

Schedule

There is a limited amount of water available for transfer due to the drought. It will likely take one to two years to find transfer water, negotiate a contract and wheeling agreements as well as CEQA documentation. Could have in place in the 2016/17 time frame.

Ranking

Selection Criteria	Rating
Cost	3
Volume	5
Reliability	2
Timing	3
Local Control	3
Legal/Institutional	3
Environmental	3
Operational Complexity	3

Ranking Legend

Serious disadvantages	1
Some significant disadvantages	2
Issues but manageable	3
Some advantages	4
Significant advantages	5

Cost:

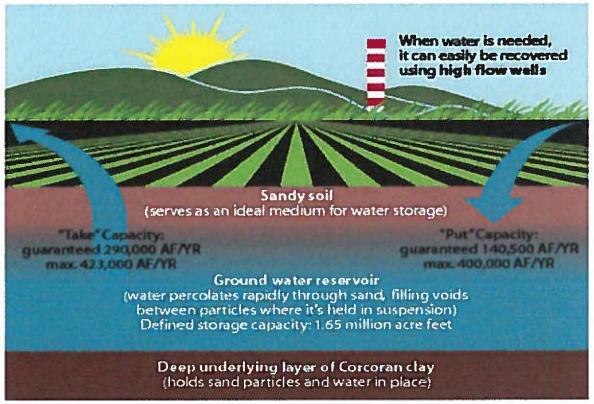
Assuming a 20 to 30 year term with an agency such as Rosedale Rio Bravo Water Storage District, cost would be in the range of $1,200 to $2,000.

7: Water Banking

Concept Description:

A water bank is a managed set of facilities for storing water in an underground basin in times of surplus for subsequent extraction in time of shortage. Southern California has pioneered this water management tool with the Kern Water Bank, the Semitropic Water Bank and the Antelope Valley Water Bank as prime examples. Each requires that the managing entity has the right to store and extract water, and requires access to a source of water, construction of pipelines, canals and pump stations to move the water to the bank, spreading basins to facilitate recharging the water into the ground, wells for extractions of the water when needed, and pipelines and pump stations to move the water to a regional water transportation facility such as the State Water Project. Agencies desiring to store water in the bank pay a buy-in fee for investment for capital facilities. This gives them the right to store water. The agency is charged a per acre foot charge for water deposited into the bank and is subject to a water loss factor. There is normally an annual storage fee and sometimes an annual loss factor. Upon call on the water, there is an extraction fee and a power cost to move the water. If the water is transported to the Metropolitan Water District, it will be subject to MWD's wheeling fee unless it is MWD water to begin with. Water banks currently soliciting participation include the Semitropic Bank and Antelope Valley Bank.

Location



Attributes

Advantages	Disadvantages
Own stored water	Extensive coordination
Considered exempt to MWD's allocations	Distance from Beverly Hills
Proven technique	Initial buy-in fee of $1,500/AF
Water available when SWP allocations are low	In extreme drought, there has to be water in the SWP in order to move the water
	Have to buy water in advance and store in bank

Schedule

One to two years to purchase water and set up in bank.

Ranking

Selection Criteria	Rating
Cost	4
Volume	5
Reliability	5
Timing	5
Local Control	3
Legal/Institutional	3
Environmental	3
Operational Complexity	3

Ranking Legend

Serious disadvantages	1
Some significant disadvantages	2
Issues but manageable	3
Some advantages	4
Significant advantages	5

Cost:

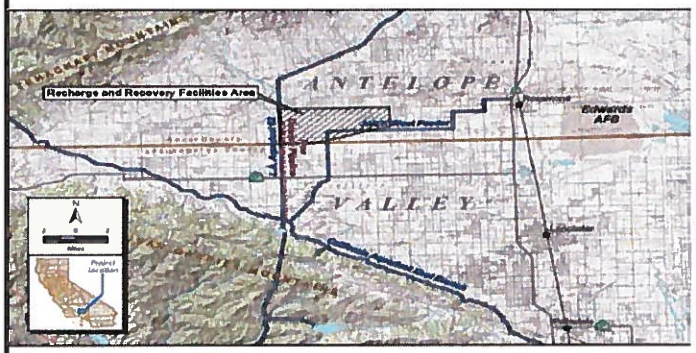
Put Fee - $78/ac-ft; Annual storage fee - $25/AF; agreed loss or leave behind of 10%; Take fee - $78/AF; Energy Fee - $80/AF; MWD water - $600/AF (no wheeling fee); Treatment cost 341/AF.
Approximately $1,300 per acre foot (based on banking and delivery of 1,000 ac-ft over a 5-year period).
An additional $1,500,000 initial fee that is presumed to be an asset and could be sold at a later date.

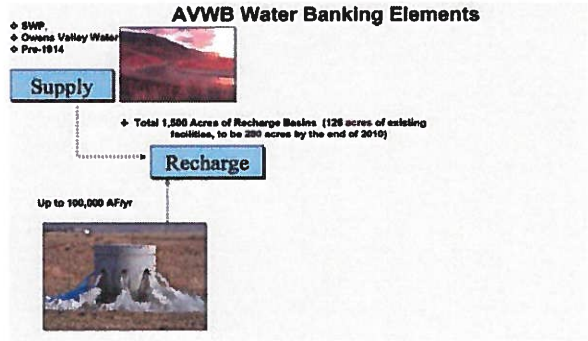
8: Antelope Valley Water Bank Drought Insurance

Concept Description:

The Antelope Valley Water Bank (AVWB) is a small (15,000 AF currently in storage) water bank in Kern County. The water in the bank is not saleable permanently outside of Kern County due to the regional wholesaler and county ordinances. State law does allow the loan of surface water for up to 5 years, as long as it is repaid at that time. AVWD is proposing two approaches to help mitigate the drought using its facilities. 1) A loan of the water to be repaid in 5 years; 2) Drought insurance whereby you pay an annual fee and exercise an option to take water when needed.
This scenario will cover the drought insurance option. Process = The City of Beverly Hills and AVWB would execute a 10-year agreement for 1,000 AF of water to be delivered in any year needed and repaid within 5 years. Multiple calls are permitted.

Antelope Valley Water Bank





Attributes

Advantages	Disadvantages
No capital outlay	Institutional complexity
Flexible call	Unproven
Considered extraordinary in MWD allocations	
Price is negotiable for initial purchaser	

Schedule

Could be implemented withis one year

Ranking

Selection Criteria	Rating
Cost	2
Volume	5
Reliability	4
Timing	5
Local Control	3
Legal/Institutional	3
Environmental	5
Operational Complexity	3

Ranking Legend

Serious disadvantages	1
Some significant disadvantages	2
Issues but manageable	3
Some advantages	4
Significant advantages	5

Cost:

Annual insurance cost $120/AF or $120,000 for 1,000 AF (assume for 5 years or $600,000
Cost of water when delivered $600 AF plus Metropolitan wheeling cost ($243/AF).
Cost of replacement water depends on source $600 per AF
Total cost of AF used 1 times in 5yrs is: $120,000 x 5 = $600,000 + ($600 x 1,000 =) $600,000 +other costs; Total = $1.98 million
With 10% loss
Cost/AF = $1.98 million/900 AF = $2,200 AF

9-a: Groundwater - Capture Spring Water

Concept Description:

Historically, the area in east Beverly Hills and the City of West Hollywood has experienced shallow groundwater conditions that required the installation of collection systems that collected the water and discharged the water to local storm drain system for any below grade structures such as parking garages. The concept is to collect this groundwater, treat (to recycled water requirements) and distribute to recycled water end users. The current concept is to develop approximately 1,000 acre-feet (600 gpm). The concept would also require approximately 12,000 feet of pipeline from the collection areas and back to a new water treatment plant located at the Department of Public Works facility. In addition, would require 30,000 feet of recycle line from plant to distribution areas (LA Country Club, Burton Way, Park in southwest corner of CBH.

City of Beverly Hills

Attributes

Advantages	Disadvantages
Local control of water resources supply	Long-term maintenance and operational cost to operate plant & collection system
Assists in maintaining historical rights in Hollywood Basin	Would be highly susceptible to anthropogenic effects from residential, commercial & industrial activities.
Low vulnerability to external influences	Requires a separate plant and distribution system
Utilization of a resource currently being discharged to the ocean	Volume produced would be unreliable and would likely decrease in summer months
Potential grant or funding assistance available	Conversion of existing irrigation systems sometimes difficult
	Would likely require agreement with private parties to acquire water
	Construction impacts due to new pipeline installation

Schedule

Both the collection system and the recycled water distribution systems are not present in the CBH or West Hollywood. Collection system and treatment plant would take approximately 3 years. Distribution system would take approximately 2 years

Ranking

Selection Criteria	Rating
Cost	2
Volume	2
Reliability	2
Timing	3
Local Control	5
Legal/Institutional	3
Environmental	3
Operational Complexity	1

Ranking Legend

Serious disadvantages	1
Some significant disadvantages	2
Issues but manageable	3
Some advantages	4
Significant advantages	5

Cost:

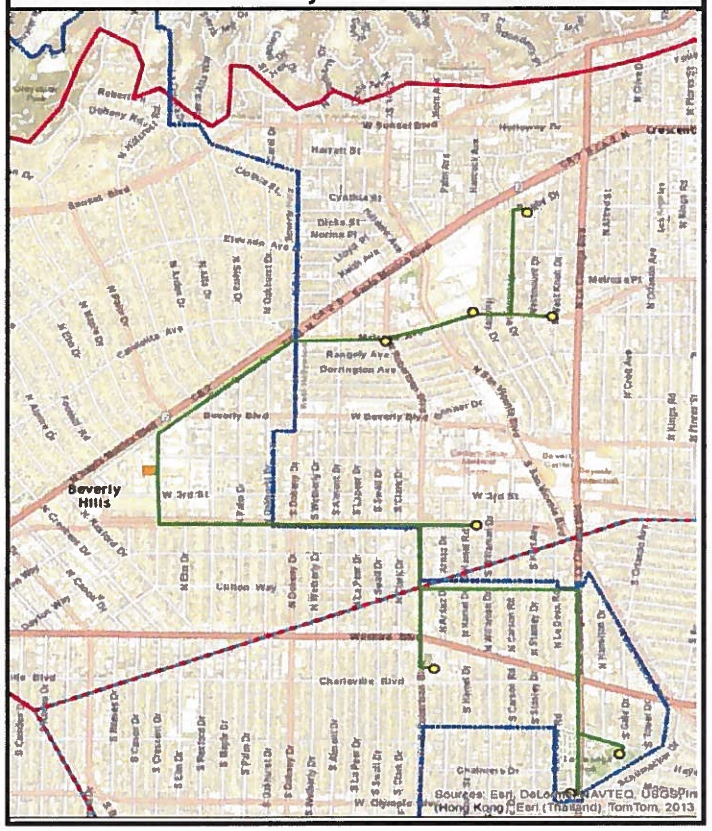
Preliminary costs for the proposed concept would indicate approximately $2,400/AF with a life expectancy of the system at approximately 30 years.

9-b: Groundwater - Develop Hollywood Basin Wells

Concept Description:

Historically, the City of Beverly Hills (CBH) has developed groundwater in the Hollywood Basin. This concept would develop groundwater resources within the Hollywood Basin using new production wells. Estimated sustainable yield is 2,000 to 3,000 AFY with the CBH currently extracting 1,000 AFY. The current concept is to develop an additional 1,500 AFY for a total of 2,500 AFY. Preliminary calculations indicate a requirement for six to eight wells each producing approximately 200-300 gallons per minute. The preliminary location would be similar to the previously installed wells near the eastern boundary of CBH. The concept would also require approximately 24,000 feet of pipeline from the production wells back to the existing treatment plant located at the Department of Public Works facility.

Hollywood Basin



Attributes

Advantages	Disadvantages
Less susceptible to short-term drought conditions	Long-term maintenance and operational cost to operate & maintain wells
Local control of water resource supply	Does not prevent other parties from developing resource
Assists in maintaining historical rights in Hollywood Basin	Would require upgrade of existing treatment plant
Potential grant or funding assistance available	Construction impacts due to new pipeline installation

Schedule

Five to ten years to implement

Ranking

Selection Criteria	Rating
Cost	3
Volume	3
Reliability	4
Timing	3
Local Control	5
Legal/Institutional	4
Environmental	3
Operational Complexity	3

Ranking Legend

Serious disadvantages	1
Some significant disadvantages	2
Issues but manageable	3
Some advantages	4
Significant advantages	5

Cost:

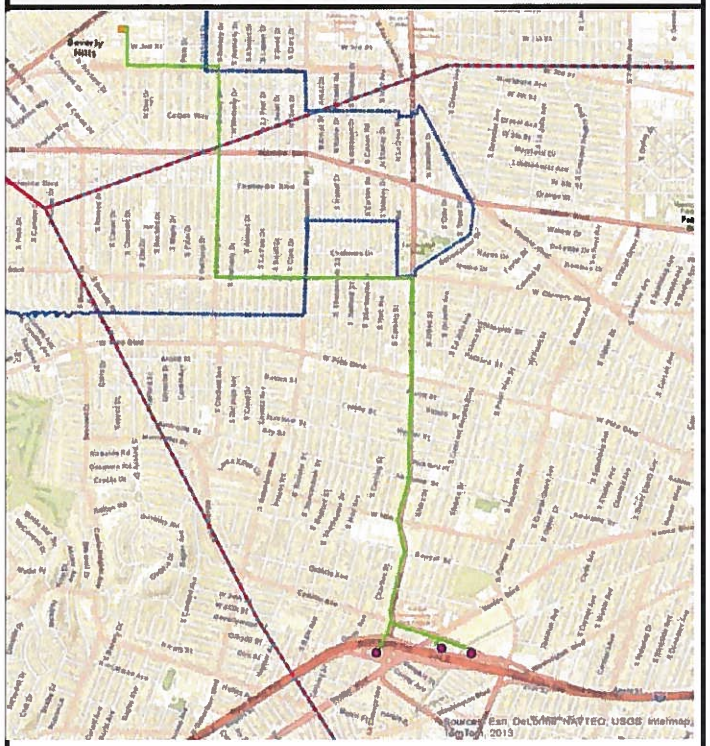
Preliminary costs for the proposed concept would indicate approximately $1,600/AF (2014) with a life expectancy of the wells at approximately 30 years.

9-c: Groundwater - Develop Central Basin (La Brea Sub-Basin) Wells

Concept Description:

Historically, the City of Beverly Hills (CBH) has developed groundwater in the La Brea Sub-Basin portion of the Central Basin (LBSB). This concept would develop groundwater resources within the LBSB using new production wells. Estimated sustainable yield in the LBSB is 3,000 AFY. The current concept is to develop 3,000 AFY in the LBSB and maintain 1,000 AFY in the Hollywood Basin (HB) for a total of 4,000 AFY from both the HB and LBSB. Preliminary calculations indicate a requirement for three wells each producing approximately 800 gallons per minute. The preliminary location would be similar to the previously installed wells near the confluence of Ballona Creek and the I-10 Freeway. The concept would also require approximately 23,000 feet of pipeline from the production wells back to the existing treatment plant located at the Department of Public Works facility.

La Brea Sub-Basin Portion of Central Basin



Attributes

Advantages	Disadvantages
Less susceptible to short-term drought conditions	Long-term maintenance and operational cost to operate & maintain wells
Local control of water resources supply	Does not prevent other parties from developing resource
Assists in maintaining historical rights in Central Basin	Would require upgrade of existing treatment plant
Potential grant or funding assistance available	Construction impacts due to new pipeline installation

Schedule

Five to ten years to implement

Ranking

Selection Criteria	Rating
Cost	4
Volume	4
Reliability	4
Timing	3
Local Control	5
Legal/Institutional	4
Environmental	3
Operational Complexity	3

Ranking Legend

Serious disadvantages	1
Some significant disadvantages	2
Issues but manageable	3
Some advantages	4
Significant advantages	5

Cost:

Preliminary costs for the proposed concept would indicate approximately $1,200/AF (2014) with a life expectancy of the wells at approximately 30 years.

10a: Conservation - Comply with SBx7-7

Concept Description:

The CBH desires to comply with SBx7-7 requiring a 20% reduction from the 10-year baseline average by Year 2020 as a minimum conservation goal. From the SBx7-7 update presented herein this results in a goal of 231 gallons per capita per day (gpcd) by 2020 with an interim target of 260 gpcd by 2015. Current water supply within the service area is 12,269 AFY (FY 2014) and current population is estimated at 42,858 resulting in a current use of 256 gpcd. Based on current usage a reduction of 1,175 AFY or 9.5% would be required utilizing the projected population for 2020. This would require additional conservation measures from water users in the service area averaging almost 200 AF each year for the next 6 years.

Water Use Efficiency

Attributes

Advantages	Disadvantages
This level of conservation meets State DWR guidelines	Revenue is reduced due to reduced sales
Permanent conservation results in permanent water demand reduction	Residents and businesses must be convinced to practice conservation
Demand reduction is reliable and drought proof	May require CBH to provide rebate incentives
Potential grant or funding assistance available	Landscaping palettes may need to be modified

Schedule

Would need to be implemented by 2020 to meet SBx 7-7 guidelines.

Ranking

Selection Criteria	Rating
Cost	5
Volume	2
Reliability	4
Timing	3
Local Control	4
Legal/Institutional	4
Environmental	5
Operational Complexity	3

Ranking Legend

Serious disadvantages	1
Some significant disadvantages	2
Issues but manageable	3
Some advantages	4
Significant advantages	5

Cost:

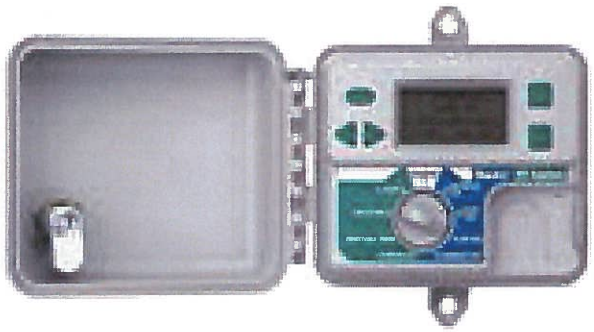
Costs to an agency for water use efficiency programs have been shown to vary from the neighborhood of $50/AF to $2,500/AF conserved of the useful life. However, the customer would also incur certain costs which could be offset by savings on their water bills on many of the programs. Customer costs are not included. Indoor savings from such programs as washing machine and dishwasher replacement rebates also save City on sewer discharge fees.

10b: Conservation - Tailor to Unique CBH Characteristics

Concept Description:

Recognizing the CBH unique characteristics, a suite of conservation practices could be developed to attain the State mandated SBx7-7 requirements plus some additional conservation reaching a total demand reduction over current levels of approximately 18% by 2025. This could be achieved by continuing to conserve 200 AF each year beyond 2020 to 2025 and could involve such programs and devices as large landscape surveys, pay for performance incentives, public spaces program, smart timers, rotary nozzles, computerized irrigation controllers, turf removal, HEF washers and toilets, UL or waterless urinals, cooling tower retrofits, etc.

Water Use Efficiency



Attributes

Advantages	Disadvantages
This level of conservation exceeds State DWR guidelines	Revenue is reduced due to reduced sales
Permanent conservation results in permanent water demand reduction	Customers must be convinced to participate and practice conservation
Demand reduction is reliable and drought proof	Will require CBH to provide some level of rebates and incentives
Potential grant or funding assistance available	Landscaping palettes may need to be modified

Schedule

231 gallons per capita day would need to be attained by 2020 to meet SBx7-7 guidelines. Additional conservation could be implemented over the next 5 years to 2025 equating to a total savings of over 18% and a per capita rate of 210.7.

Ranking

Selection Criteria	Rating
Cost	4
Volume	3
Reliability	4
Timing	3
Local Control	4
Legal/Institutional	4
Environmental	5
Operational Complexity	3

Ranking Legend

Serious disadvantages	1
Some significant disadvantages	2
Issues but manageable	3
Some advantages	4
Significant advantages	5

Cost:

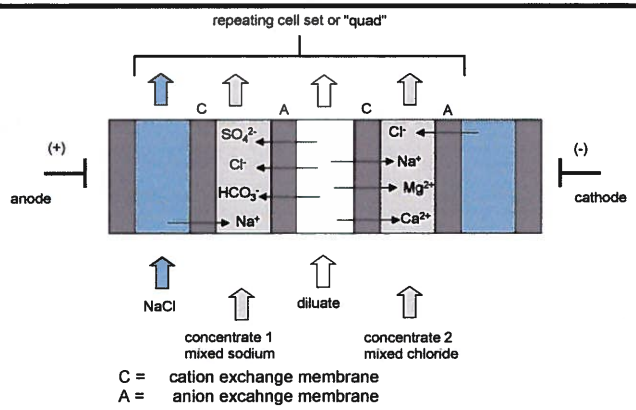
Costs to an agency for water use efficiency programs have been shown to vary from the neighborhood of $50/AF to $2,500/AF conserved of the useful life. However, the customer would also incur certain costs which could be offset by savings on their water bills on many of the programs. Customer costs are not included. Indoor savings from such programs as washing machine and dishwasher replacement rebates also save City on sewer discharge fees.

11a: Capture and Treat R.O. Reject Water - 1.5 MGD Plant Size

Concept Description:

Desalination with reverse osmosis (RO) membranes can be used to diversify and expand municipal water supplies, but desalination generates a concentrate byproduct that must be managed. Sustainable and environmentally responsible management of RO concentrate will be a prerequisite to expanded use of brackish and recycled water. For many inland communities, sustainable management of RO concentrate will require zero liquid discharge (ZLD) desalination. In ZLD desalination, concentrate is treated to recover it as product water, and there is no discharge of liquid waste from the plant. A new electrodialysis technology, electrodialysis metathesis (EDM), has emerged that offers the potential to reduce the costs and energy requirements for ZLD. The concept is to apply this technology to the RO concentrate from the CBH RO plant to try and capture the wastewater for beneficial use. Plant size is 1.5 MGD

Existing RO Treatment Plant



Attributes

Advantages	Disadvantages
Eliminate discharge of wastewater from RO plant	Operational complexity
Maximizes yield from existing facility	Unproven technology that has not been commercially demonstrated
Potential grant or funding assistance available	Handling and disposal of concentrate
	High energy requirement
	Space requirements
	Quantity of water generated dependent on plant throughput
	Increase to per unit discharge cost of waste stream to sewer system.

Schedule

Unknown. Further product development and commercial backing is needed to bring the EDM technology to market

Ranking

Selection Criteria	Rating
Cost	4
Volume	1
Reliability	4
Timing	3
Local Control	4
Legal/Institutional	4
Environmental	3
Operational Complexity	3

Ranking Legend

Serious disadvantages	1
Some significant disadvantages	2
Issues but manageable	3
Some advantages	4
Significant advantages	5

Cost:

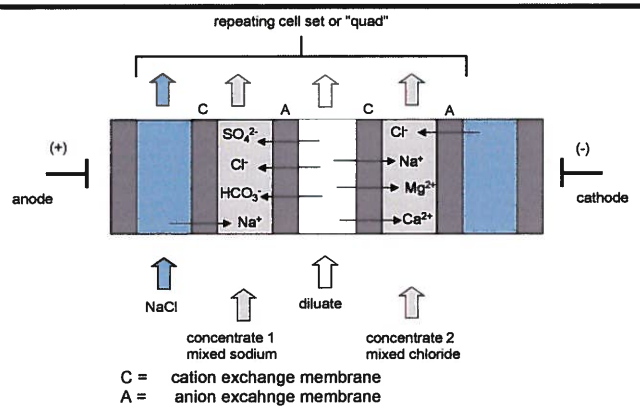
$840 to $1,300/AF

11b: Capture and Treat R.O. Reject Water - 3.0 MGD Plant Size

Concept Description:

Same concept as 11a except plant throughput has increased to maximum capacity of 3.0 MGD. The project anticipates that Option 9b, Groundwater Production from the Hollywood Basin would be required to achieve the plant capacity of 3.0 MGD.

Existing RO Treatment Plant



Attributes

Advantages	Disadvantages
Eliminate discharge of wastewater from RO plant	Operational complexity. Would require expanding capacity of existing plant.
Potential grant or funding assistance available	Unproven technology that has not been commercially demonstrated
	Handling and disposal of concentrate
	High energy requirement
	Space requirements
	Quantity of water generated dependent on plant throughput
	Increase to per unit discharge cost of waste stream to sewer system.

Schedule

Unknown. Further product development and commercial backing is needed to bring the EDM technology to market

Ranking

Selection Criteria	Rating
Cost	3
Volume	2
Reliability	4
Timing	3
Local Control	4
Legal/Institutional	4
Environmental	3
Operational Complexity	3

Ranking Legend

Serious disadvantages	1
Some significant disadvantages	2
Issues but manageable	3
Some advantages	4
Significant advantages	5

Cost:

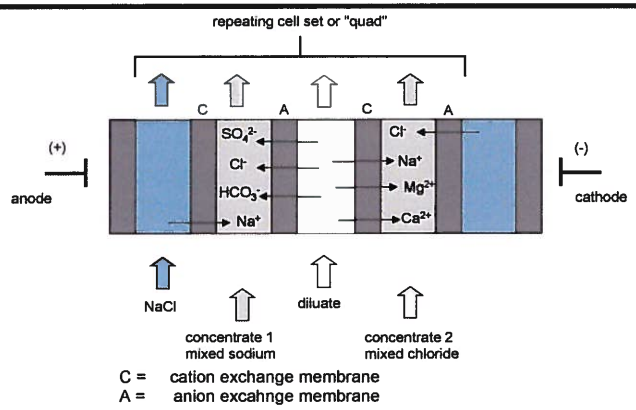
$1,300 to $1,600/AF

11c: Capture and Treat R.O. Reject Water - 4.5 MGD Plant Size

Concept Description:

Same concept as 11a except plant throughput increased to maximum capacity of 4.5 MGD. The project anticipates that Option 9c, Groundwater Production from the Central Basin (unadjudicated part) would be required to achieve the plant capacity of 4.5 MGD.

Expand RO Treatment Plant



Attributes

Advantages	Disadvantages
Eliminate discharge of wastewater from RO plant	Operational complexity
Maximizes yield from existing facility	Unproven technology that has not been commercially demonstrated
Potential grant or funding assistance available	Handling and disposal of concentrate
	High energy requirement
	Space requirements
	Quantity of water generated dependent on plant throughput
	Increase to per unit discharge cost of waste stream to sewer system.

Schedule

Unknown. Further product development and commercial backing is needed to bring the EDM technology to market

Ranking

Selection Criteria	Rating
Cost	4
Volume	2
Reliability	4
Timing	3
Local Control	4
Legal/Institutional	4
Environmental	3
Operational Complexity	3

Ranking Legend

Serious disadvantages	1
Some significant disadvantages	2
Issues but manageable	3
Some advantages	4
Significant advantages	5

Cost:

$1,100 to $1,400/AF.