# AGENDA
# IRVINE RANCH WATER DISTRICT
# BOARD OF DIRECTORS
# REGULAR MEETING

**March 14, 2011**

**PLEDGE OF ALLEGIANCE**

**CALL TO ORDER** 5:00 P.M., Board Room, District Office
15600 Sand Canyon Avenue, Irvine, California

**ROLL CALL** Directors Reinhart, Matheis, Swan, Withers and President LaMar

## NOTICE

If you wish to address the Board on any item, including Consent Calendar items, please file your name with the Secretary. Forms are provided on the lobby table. Remarks are limited to five minutes per speaker on each subject. Consent Calendar items will be acted upon by one motion, without discussion, unless a request is made for specific items to be removed from the Calendar for separate action.

## COMMUNICATIONS TO THE BOARD

1. A. Written:

   B. Oral: Mrs. Joan Irvine Smith relative to the Dyer Road Wellfield.

2. ITEMS RECEIVED TOO LATE TO BE AGENDIZED

   Recommendation: Determine that the need to discuss and/or take immediate action on item(s) introduced come to the attention of the District subsequent to the agenda being posted.

## PRESENTATION

3. PARTNER COMMENDATION

   In celebration of the District's 50th anniversary, the IRWD Board of Directors will recognize key "Partners in Service". This evening the first Certificate of Commendation will be presented to Mrs. Joan Irvine Smith.

**WORKSHOP**

4. UPDATE ON CIENEGA SELENIUM AND NITRATE REMOVAL PROJECT

Recommendation: That the Board direct staff to proceed with the necessary actions relative to completing the on-going ABMet design verification studies, terminating final design, notifying the U. S. Bureau of Reclamation that the currently proposed project is not proceeding to construction, and coordinating with regional participants on alternative project concepts and other potential grant funding opportunities.

**CONSENT CALENDAR** **Next Resolution No. 2011-6** **Items 5-12**

5. MINUTES OF REGULAR BOARD MEETING

Recommendation: That the minutes of the February 28, 2011 Regular Board Meeting be approved as presented.

6. RATIFY/APPROVE BOARD OF DIRECTORS' ATTENDANCE AT MEETINGS AND EVENTS

Recommendation: That the Board ratify/approve the meetings and events for Steven LaMar, Mary Aileen Matheis, Douglas Reinhart, Peer Swan and John Withers.

7. SANTIAGO AQUEDUCT COMMISSION REAPPOINTMENT OF MEMBER AND ALTERNATES

Recommendation: That the Board adopt a resolution rescinding Resolution No. 2001-6 and appointing member and alternate members to the Santiago Aqueduct Commission. Reso. No. 2011-

8. PUBLIC GOODS CHARGE LEGISLATION

Recommendation: Receive and file.

9. 2011 STATE LEGISLATIVE UPDATE

Recommendation: That the Board take a SUPPORT position on AB 741 (Huffman) and SB 215 (Huff) and a WATCH position on AB 262 (Harkey), AB 403 (Campos) and AB 964 (Huffman).

| CONSENT CALENDAR - Continued | Next Resolution No. 2011-6 | Items 5-12 |
|---|---|---|

10. PARTICIPATION IN THE UNIVERSITY OF CALIFORNIA IRVINE (UCI) GROUNDWATER RESOURCES MANAGEMENT INTERNATIONAL CONFERENCE

Recommendation: That the Board support IRWD's participation in the UCI Groundwater Resources Management Conference.

11. MEMBERSHIP IN CALDESAL

Recommendation: That the Board support IRWD's membership in CalDesal.

12. REVISED PERSONNEL POLICIES AND PROCEDURES

Recommendation: That the Board adopt two resolutions: 1) rescinding Resolution No. 2008-60, adopting revised Appendix "A-1" to its Conflict of Interest Code and readopting Conflict of Interest Code and Appendix "A-2", and 2) rescinding Resolution No. 2008-61 and establishing revised Personnel Policies (for Policy No. 45).

Reso. No. 2011-

Reso. No. 2011-

## ACTION CALENDAR

13. ADDITIONAL CONTRIBUTIONS FOR FISCAL YEAR 2010-11 TO THE CALIFORNIA PUBLIC EMPLOYEES RETIREMENT SYSTEM

Recommendation: That the Board approve an additional contribution of $6 million as an advance from the District's replacement funds to reduce the District's actuarially-determined unfunded pension liability.

14. WATER SUPPLY ASSESSMENT FOR UPTOWN NEWPORT VILLAGE SPECIFIC PLAN PROJECT

Recommendation: That the Board approve the Water Supply Assessment for City of Newport Beach Uptown Newport Village Specific Plan project (PA 2010-133).

15. PEER REVIEWS OF THE PILOT CARBON SEQUESTRATION PROJECT

Recommendation: That the Board approve staff's recommendation that the District's interests in developing a Pilot Carbon Sequestration Project be put on-hold until such a time when key conditions required to produce an economically viable project become favorable.

## OTHER BUSINESS

Pursuant to Government Code Section 54954.2, members of the Board of Directors or staff may ask questions for clarification, make brief announcements, make brief reports on his/her own activities. The Board or a Board member may provide a reference to staff or other resources for factual information, request staff to report back at a subsequent meeting concerning any matter, or direct staff to place a matter of business on a future agenda. Such matters may be brought up under the General Manager's Report or Directors' Comments

16. A. General Manager's Report

B. Directors' Comments

1)

2)

3)

4)

5)

C. CLOSED SESSION relative to PUBLIC EMPLOYEE DISCIPLINE/DISMISSAL/RELEASE (Government Code Section 54957).

D. Adjourn.

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Availability of agenda materials: Agenda exhibits and other writings that are disclosable public records distributed to all or a majority of the members of the Irvine Ranch Water District Board of Directors in connection with a matter subject to discussion or consideration at an open meeting of the Board of Directors are available for public inspection in the District's office, 15600 Sand Canyon Avenue, Irvine, California ("District Office"). If such writings are distributed to members of the Board less than 72 hours prior to the meeting, they will be available from the District Secretary of the District Office at the same time as they are distributed to Board Members, except that if such writings are distributed one hour prior to, or during, the meeting, they will be available at the entrance to the Board of Directors Room of the District Office.

The Irvine Ranch Water District Board Room is wheelchair accessible. If you require any special disability-related accommodations (e.g., access to an amplified sound system, etc.), please contact the District Secretary at (949) 453-5300 during business hours at least seventy-two (72) hours prior to the scheduled meeting. This agenda can be obtained in alternative format upon written request to the District Secretary at least seventy-two (72) hours prior to the scheduled meeting.

March 14, 2011
Prepared by: F. Sanchez/P. Weghorst
Submitted by: G. Heiertz
Approved by: Paul Jones

WORKSHOP

# UPDATE ON CIENEGA SELENIUM AND NITRATE REMOVAL PROJECT

## SUMMARY:

The proposed Cienega Selenium and Nitrate Removal Project, located at the Peters Canyon Wash adjacent to Barranca Parkway, would implement the General Electric (GE) ABMet Biological Filtration System. Project facilities are being designed by HDR Engineering, Inc. A number of institutional issues are affecting the projected costs, schedule and feasibility of the Project. Staff will provide an update on these issues and will make recommendations relative to completing design verification studies, terminating the design, making use of a grant for the project, and coordinating with regional participants on alternative project concepts.

## BACKGROUND:

The Cienega Selenium and Nitrate Removal Project consists of a selenium and nitrate removal process utilizing General Electric's (GE) proprietary ABMet System. A Project Location Map and Site Plan are attached as Exhibit "A". The Project would provide a method by which cost sharing participants can comply with National Pollutant Discharge Elimination System (NPDES) discharge permits, construction dewatering permits, and stream discharge Total Maximum Daily Load (TMDL) requirements. By reducing concentrations of pollutants entering Upper Newport Bay, the Project will reduce biological risks to wildlife such as birds and fish.

The Project is currently being designed by HDR. The design verification studies are in progress and HDR's 60% design package has been reviewed by staff. The design is currently on hold due to institutional issues affecting the Project as discussed with the Engineering and Operations Committee on January 18, 2011 and February 15, 2011. The design was originally scheduled for completion in spring 2011 and construction was to have begun by the summer of 2011.

### Design Verification Study:

The design of the Project incorporates ABMet reactors, ozone treatment, and reoxygenation facilities that were sized based on information collected in previous pilot and bench tests. Field verification tests of these technologies were undertaken to verify the design of each treatment process. These design verification tests are producing valuable information that will lead to revisions in the design of an ABMet-based project that will result in construction cost reductions. Staff recommends that these design verification studies be continued to completion so that the research is available for potential future applications. HDR and GE will have their concluding report for the design verification studies complete in May 2011.

Institutional Challenges:

There are a number of institutional challenges that are affecting the projected costs, schedule, and feasibility of the Project. These include:

1. Lack of commitment from the Regional Water Quality Control Board with respect to the expected NPDES, construction dewatering and TMDL compliance benefits that would be derived from the Project;
2. Reluctance of the watershed stakeholders to make the necessary capital funding commitments for the Project based upon the regulatory compliance uncertainty;
3. Difficulty in obtaining Irvine Unified School District (IUSD) approval of a change in IRWD's easement for the Project;
4. Anticipated schedule impacts due to delayed submittals to the US Department of Education (DOE) for easement revisions and California Department of General Services Division of the State Architect (DSA) for construction plan review; and
5. Scheduling constraints imposed by the Cooperative Agreement between IRWD and the Bureau of Reclamation for the $5.5 million grant for the Project.

Below is a discussion of these issues and their impacts on the Project.

*Regulatory Issues and Compliance:*

Staff has been working with potential Project participants to secure assurances from the Regional Board that participation in the project will provide regulatory compliance with the selenium TMDL limits. This effort has been coordinated by the County of Orange through the Newport Bay Watershed Committee's Nitrogen and Selenium Management Plan (NSMP) group, and supported by legal counsel representing the City of Irvine, the Irvine Company and others.

Until recently, the Regional Board had been in favor of implementing the Project as a regional compliance project that could be used by all the cities in the watershed to help meet their regulatory obligations. This approach was based upon a regional offset program whereby compliance for selenium removal is achieved in the entire watershed by funding removal projects in the areas where high concentrations and loads of selenium exist: most notably, Peters Canyon Wash upstream of its confluence with San Diego Creek (at the Cienega de las Ranas) and Big Canyon Wash. Recently, legal counsel for the Regional Board has stated that a regional offset program is not consistent with EPA requirements for mitigation of bio-accumulative pollutants such as selenium, and that under this requirement compliance will need to be achieved at each discharge point in the watershed as well as for natural high groundwater discharges to the stream. This revised approach would make the Cienega Project, as it is currently being designed, infeasible and certainly not fundable from the cost-sharing participant point of view.

*Funding Commitments from Project Participants:*

Potential capital cost-sharing participants for the Project included the cities of Irvine, Lake Forest, Newport Beach, Orange, Santa Ana, Tustin, Costa Mesa, Laguna Woods, and Laguna Hills, as well as the County of Orange, Orange County Flood Control District and the Irvine Company. Staff had communicated to the participants that IRWD would construct the facility

only if full funding commitments were secured by March 2011. At the Board's direction, staff also communicated to the stakeholders that IRWD would not fund any of the capital expenditures, but would fund future operations and maintenance for the project.

Staff has been working with the project participants to develop a cost-sharing formula that was satisfactory to all the parties. Despite many lengthy discussions, significant lack of consensus remains on the cost-allocations. Some potential participants, led by the City of Newport Beach, have taken a position that water retailers such as IRWD should make additional capital contributions to the Project because these entities sell water used for irrigation; IRWD staff has rejected this position. To date, commitments have not been received from any of the parties due to the lack of consensus on a cost-sharing formula, as well as the uncertainties regarding regulatory compliance.

Without the Regional Board's approval of a regional offset program and resolution of the regulatory compliance benefits, staff believes the parties are not in a position to commit to funding the Project. It is expected that at least another year will be required for the Regional Board and the project participants to reach an agreement on what type of project would be mutually acceptable and whether a regional offset project will be allowed.

*IUSD Easement Changes:*

In 2005, IRWD purchased a 3.75 acres non-exclusive easement from IUSD for the Project. The easement allowed for the Project to be constructed substantially below ground. Staff and Director Withers negotiated revisions to IRWD's easement for the Project with IUSD that would have allowed for a substantial portion of the Project to be constructed above ground. The requested revisions, depicted in Exhibit "B", included:

- IRWD quitclaiming 2.2 acres of non-exclusive easement area back to IUSD;
- Converting an area of 1.6 acres from non-exclusive use to exclusive use; and
- Incorporating an additional 0.65 acres of non-exclusive use easement.

These revisions were proposed to IUSD staff and legal counsel, and then presented to the full IUSD Board of Directors both in public session and in IUSD Board committee meetings. On January 18, 2011, IUSD met to consider IRWD's request in Closed Session and forwarded the following considerations for approval of the easement modifications:

- Construction of two ball fields funded by IRWD in the quitclaimed area;
- Construction of a restroom facility funded by IRWD;
- All costs of DSA's approval for the Cienega Selenium and Nitrate Removal Facility to be reimbursed by IRWD;
- IUSD legal costs for the easement modification to be reimbursed by IRWD;
- IUSD staff costs for the easement modification to be reimbursed by IRWD;
- An additional environmental document be prepared by an independent third-party consultant to confirm that the selenium removal in the GE ABMet System will not pose a hazard or contamination for the IUSD project on their 20-acre site;

- IRWD funding of a "scientific educational program" for students that visit the Cienega Selenium and Nitrate Removal Facility to learn about the process; and
- Define the extent of potential expansion of the treatment facility to ensure there will not be another DSA and/or Consent Instrument modification in the future.

These requested considerations would increase the costs of the Project. The alternative to fulfilling IUSD's requests is to comply with the stipulations of the original easement and construct the Project facilities underground. Converting to a subsurface design would create at least a four-month delay in finalizing the design for the Project and would significantly increase the cost of design and construction. HDR has estimated that constructing the entire ABMet treatment facility below ground would cost about 40 percent more than constructing the Project above ground.

*Department of Education and State Architect Approvals:*

IRWD's existing easement for the Project was consented to by the DOE. Any alteration to the easement would also require DOE consent and approval of the above ground portion of the Project being not available for "educational uses." The existing easement identifies that open fields located above the anticipated subsurface treatment facility would be available for use by students. The IUSD and its legal counsel expect that getting DOE to consent to IRWD's requested changes to the easement could take four to six months.

DSA's purpose is to ensure that projects constructed on school district properties throughout California do not result in unreasonable risks to students using the constructed facilities. DSA has stated that its review and potential approval of a fully compliant set of final design plans and specifications for the Project will take a minimum of eight weeks. DSA also indicated that the review process would be the same whether the Project is constructed above or below ground, even though the Project will not be accessible to students in either alternative. Although IUSD has the authority to grant a waiver for DSA review and approval of Project design, IUSD staff has indicated that they are not likely to recommend that the IUSD Board grant a waiver for the Project.

*U.S. Bureau of Reclamation Grant Schedule Constraints:*

The Cooperative Agreement between IRWD and Reclamation for the $5.5 million American Recovery and Reinvestment Act (ARRA) grant for the Project requires that Project construction be substantially complete by the end of September 2011. Staff met with the Regional Director of the Bureau of Reclamation's Lower Colorado Region in Boulder City on February 11 to discuss the sources of the delays and to make an official request for a one-year extension. At this meeting, staff received an extension for the Project until June 30, 2012. Staff has evaluated the potential of resolving all of the above institutional constraints and potential design and delivery methods and has concluded that it is not possible to meet the June 30, 2012 deadline.

Not completing the Project may not foreclose IRWD's ability to use a portion of the Reclamation grant to cover 25 percent of IRWD's expenditures to date. Staff will meet with the Reclamation to determine how much of the grant IRWD will be able to take benefit of without constructing the Project.

Staff Conclusions:

Without the Regional Board's approval of a regional offset program and clarification of the regulatory compliance issues, securing capital funding commitments from the cost-sharing participants for the currently proposed project is not feasible. In addition, even if an offset program and regulatory compliance issues were quickly resolved with the Regional Board, and if IUSD were to immediately approve IRWD's request for a change in the easement without further negotiation, it would be impracticable to complete the final design documents, secure DOE and DSA approvals, and bid, award, construct and start-up the project within the June 30, 2012 Bureau of Reclamation grant funding deadline. Given these constraints and all the other issues described above, staff, with the concurrence of the Engineering and Operations Committee, has suspended design work on the currently proposed ABMet Project.

Alternative Projects:

*Potential Storage and Diversion Project:*

Should a project move forward in the future, staff believes that a more focused and less expensive project may exist to initially address some of the storm water and direct discharge problems in Peters Canyon wash upstream of the project site. Staff has had preliminary meetings with the Orange County Sanitation District, the cities of Irvine and Tustin, the County of Orange and the Irvine Company to develop initial phase alternatives to the ABMet based project that would focus on diverting storm water channels and drains into a pipeline that would tie into a pump station, reservoir and force-main sewer to Orange County Sanitation District (OCSD). HDR has developed a conceptual design for a storage and diversion system as depicted in Exhibit "C". There is interest by the City of Irvine, County of Orange and the City of Tustin in evaluating such a project.

Currently, there is not enough information available to support a design process for the conceptual diversion project. Staff recommends that the Board direct staff to coordinate with the NSMP working group on the development of a work plan for a point-source monitoring plan and other data collection programs that will produce information that can provide a basis for a preliminary design for a storage and diversion project.

*Potential Hybrid Project:*

The implementation of a storage and diversion project could serve as a first phase to a hybrid project that would take advantage of the benefits of a diversion project for addressing selenium and nitrate loadings from storm water channel discharges and the benefits of an ABMet treatment project that could be implemented as a regional offset program in the future. At staff's direction, HDR has developed a conceptual design for a hybrid project as shown in Exhibit "D". This drawing does not include the connections to upstream storm water channel diversions and other direct discharges. It does reflect a hybrid project that would include a 1.5 cfs storage and diversion project with a 1.5 cfs ABMet system constructed below ground.

The implementation of a second phase ABMet project would be dependent upon the successful negotiation of a regional offset program and resolution of associated regulatory compliance issues with the Regional Board. Staff recommends that the Board direct staff to continue to participate with the regional project participants through the NSMP work group on resolving regional offset and regulatory compliance issues with the Regional Board, developing a potential alternative project for the Cienega site, and seeking other potential grant funding opportunities.

FISCAL IMPACTS:

Fiscal impacts are as described above.

ENVIRONMENTAL COMPLIANCE:

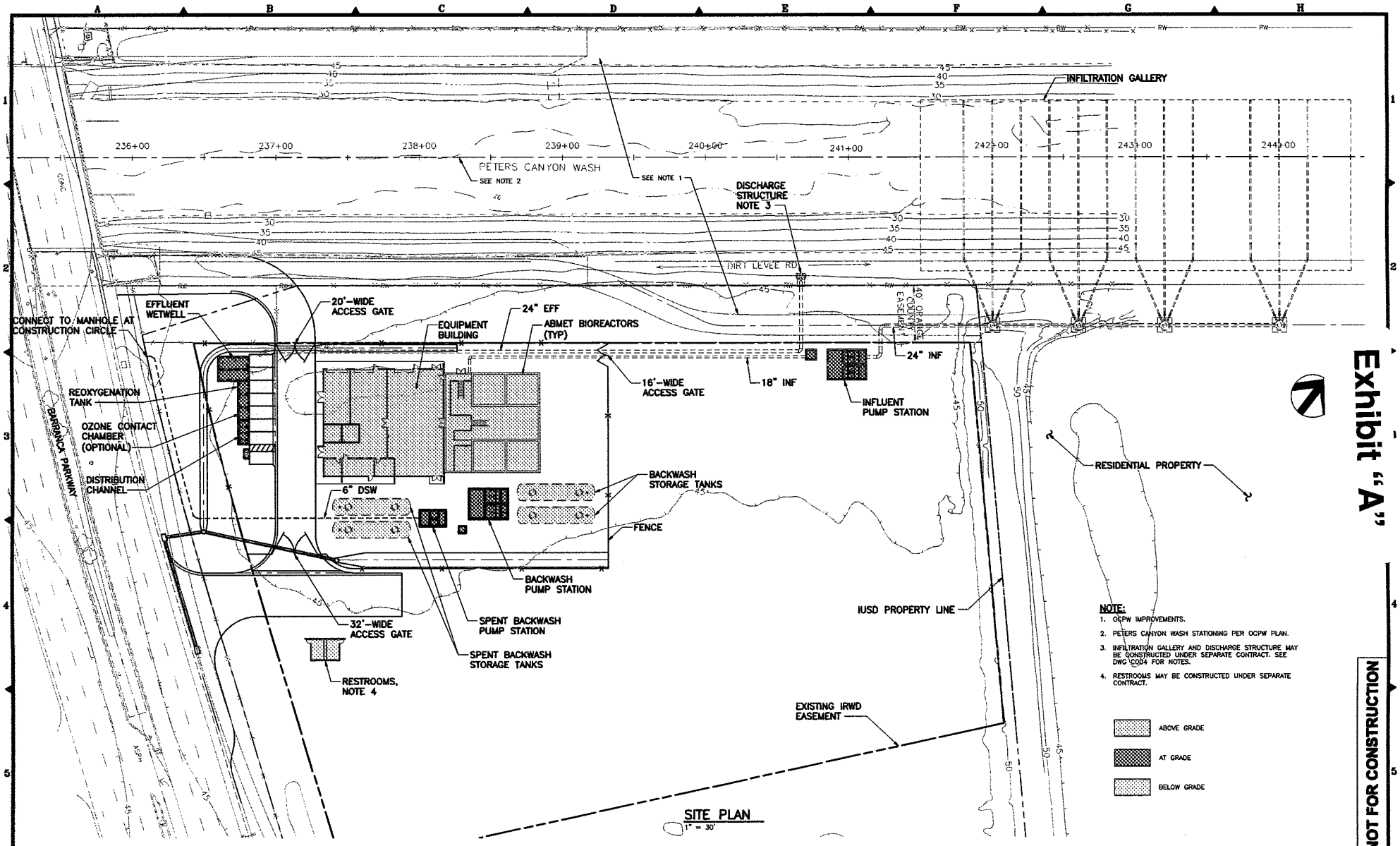
A Final Environmental Impact Report (EIR) has been prepared and certified for the San Diego Creek Watershed Natural Treatment System, including Site 67 (the Cienega Project), and the Project was approved in compliance with the California Environmental Quality Act (CEQA) of 1970 (as amended), codified at California Public Resources Code Sections 21000 et. seq., and the State CEQA Guidelines in the Code of Regulations, Title 14, Division 6, Chapter 3. The Final EIR indicated that additional assessment of Site 67 would be necessary once final designs were developed to ensure compliance with CEQA. In conformance with California Code of Regulations Title 14, Division 6, Chapter 3, an addendum to the January 2004 Irvine Ranch Water District San Diego Creek Watershed Natural Treatment System Environmental Impact Report (EIR) was prepared and adopted by the Board.

RECOMMENDATION:

THAT THE BOARD DIRECT STAFF TO PROCEED WITH THE NECESSARY ACTIONS RELATIVE TO COMPLETING THE ON-GOING ABMET DESIGN VERIFICATION STUDIES, TERMINATING FINAL DESIGN, NOTIFYING THE UNITED STATES BUREAU OF RECLAMATION THAT THE CURRENTLY PROPOSED PROJECT IS NOT PROCEEDING TO CONSTRUCTION, AND COORDINATING WITH REGIONAL PARTICIPANTS ON ALTERNATIVE PROJECT CONCEPTS AND OTHER POTENTIAL GRANT FUNDING OPPORTUNITIES.

LIST OF EXHIBITS:

Exhibit "A" – Project Site Plan
Exhibit "B" – Proposed Easement Revisions for the Cienega Project
Exhibit "C" – Cienega Storage and Diversion Project Concept
Exhibit "D" – Hybrid Diversion and ABMet Project Concept

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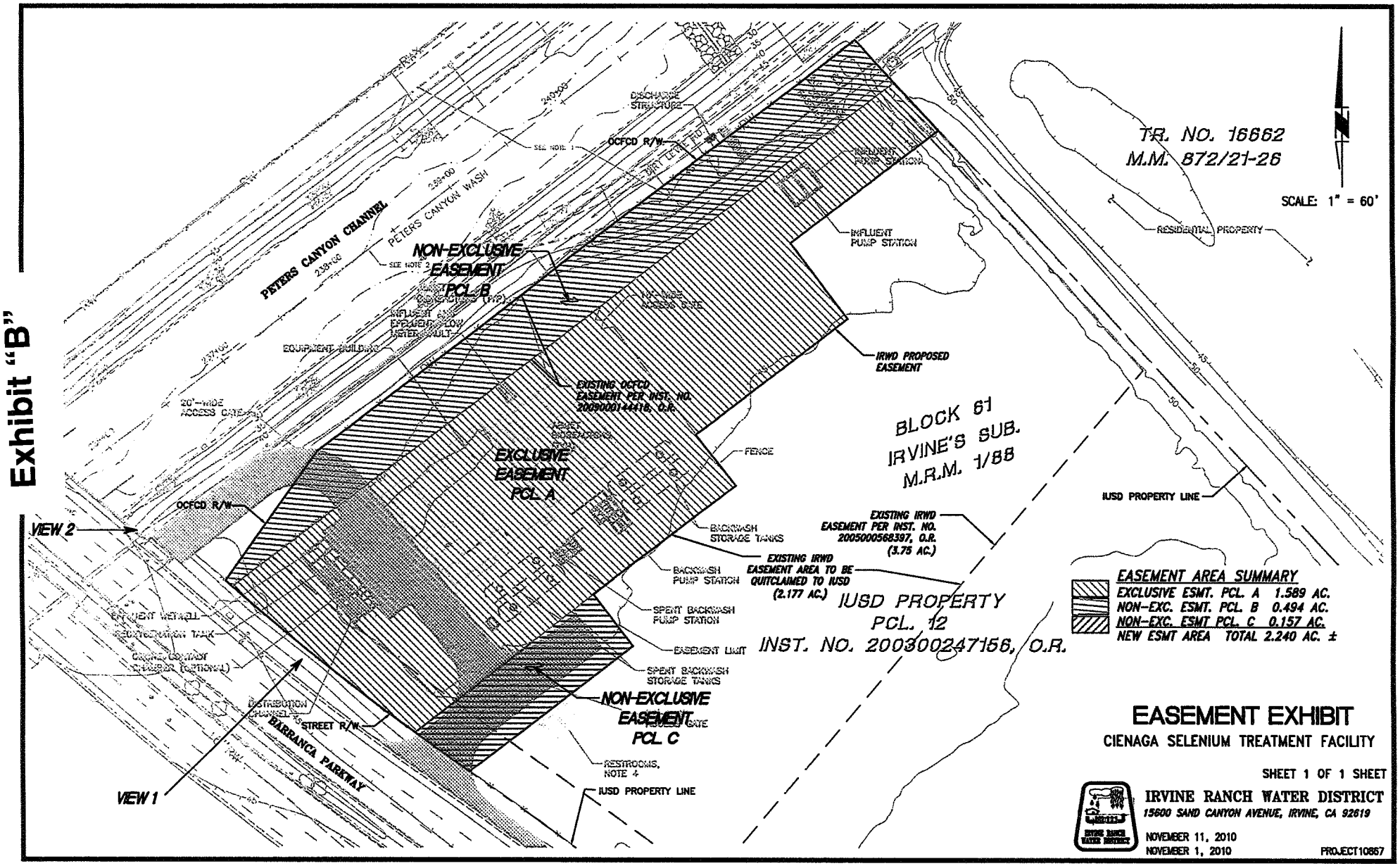
| HDR Engineering, Inc.<br>3230 El Camino Real<br>Suite 200<br>Irvine, Ca. 92602-1377 | IRVINE RANCH WATER DISTRICT<br>CIENEGA SELENIUM AND NITROGEN REMOVAL PROJECT<br>60% DESIGN | 3 CFS ABMET<br>SITE PLAN |

Exhibit "B"




# EASEMENT EXHIBIT

CIENAGA SELENIUM TREATMENT FACILITY

SHEET 1 OF 1 SHEET

IRVINE RANCH WATER DISTRICT
15600 SAND CANYON AVENUE, IRVINE, CA 92619

NOVEMBER 11, 2010
NOVEMBER 1, 2010

PROJECT10867

ESMT EXHIBIT.DWG

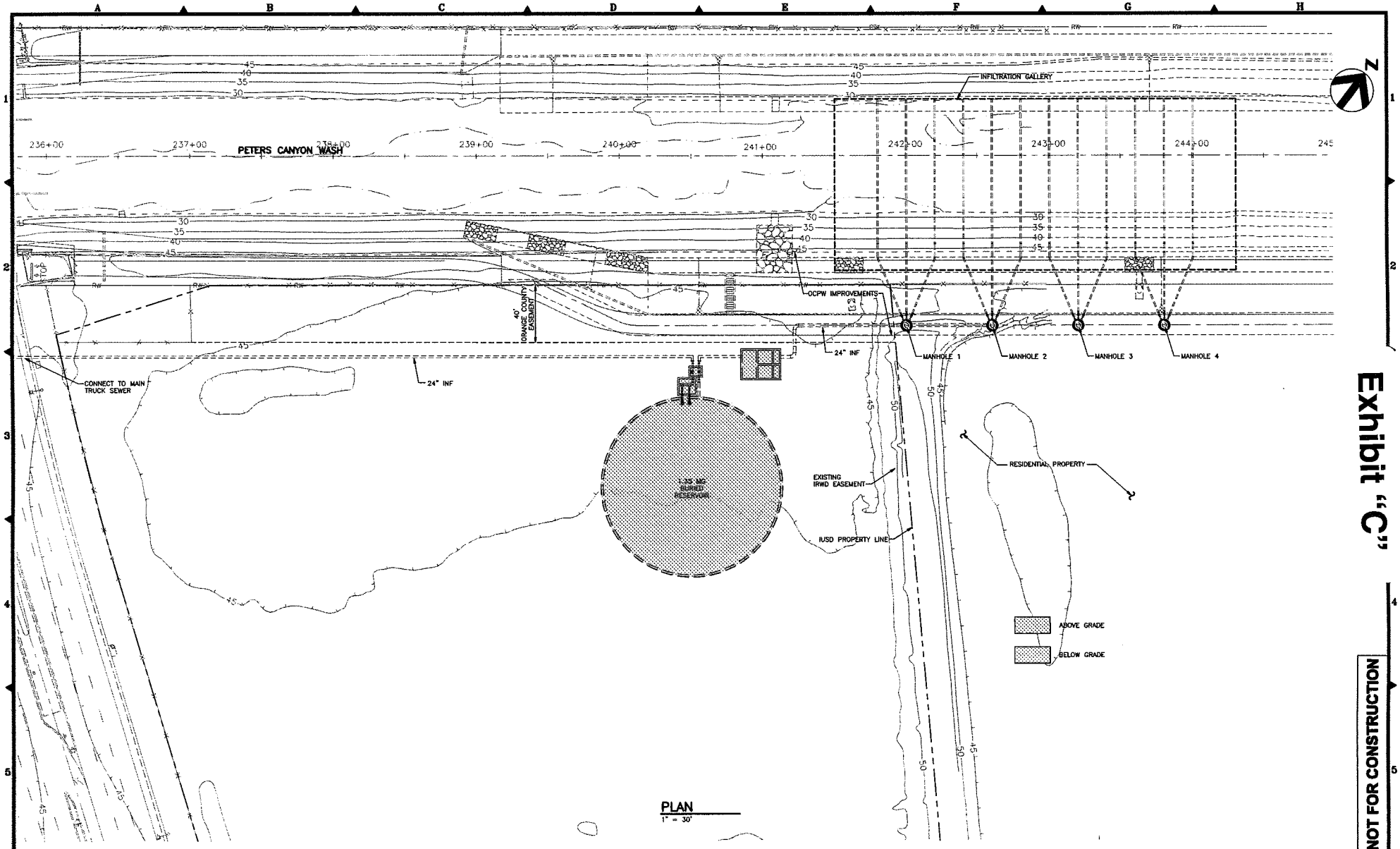



Exhibit "C"

NOT FOR CONSTRUCTION

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| HDR Engineering, Inc.<br>2230 El Camino Real<br>Suite 260<br>Irvine, Ca. 92602-1377 | IRVINE RANCH WATER DISTRICT<br>CIENEGA SELENIUM AND NITROGEN REMOVAL PROJECT<br>60% DESIGN | ALTERNATIVE 1<br>BURIED 3 CFS DIVERSION<br>SITE PLAN |

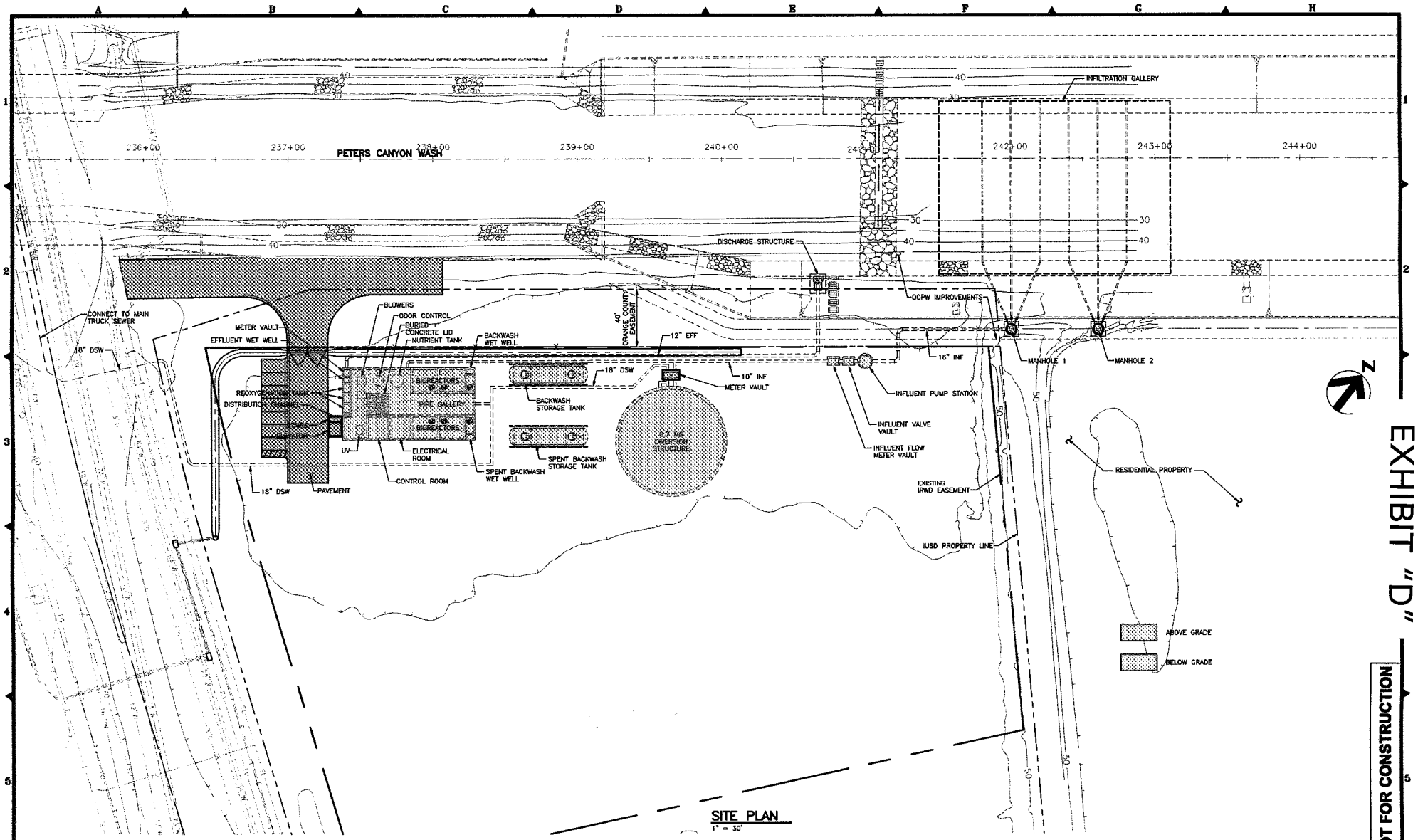


EXHIBIT "D"

NOT FOR CONSTRUCTION

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| HDR Engineering, Inc.<br>3230 El Camino Real<br>Suite 200<br>Irvine, Ca. 92602-1377 | IRVINE RANCH WATER DISTRICT<br>CIENEGA SELENIUM AND NITROGEN REMOVAL PROJECT<br>60% DESIGN | ALTERNATIVE 5<br>BURIED 1.5 CFS ABMET AND 1.5 CFS DIVERSION<br>SITE PLAN |

March 14, 2011
Prepared and
Submitted by: L. Bonkowski
Approved by: P. Jones

CONSENT CALENDAR

MINUTES OF REGULAR BOARD MEETING

SUMMARY:

Provided are the minutes of the February 28, 2011 Regular Board Meeting for approval.

FISCAL IMPACTS:

None.

ENVIRONMENTAL COMPLIANCE:

Not applicable.

COMMITTEE STATUS:

Not applicable.

RECOMMENDATION:

THAT THE MINUTES OF THE FEBRUARY 28, 2011 REGULAR BOARD MEETING BE APPROVED AS PRESENTED.

LIST OF EXHIBITS:

Exhibit "A" – February 28, 2011 Regular Board Meeting

lb Cover Memo for Minutes

EXHIBIT "A"

MINUTES OF REGULAR MEETING – FEBRUARY 28, 2011

The regular meeting of the Board of Directors of the Irvine Ranch Water District (IRWD) was called to order at 5:00 p.m. by President LaMar on February 28, 2011 in the District office, 15600 Sand Canyon Avenue, Irvine, California.

Directors Present: Reinhart, LaMar, and Withers

Directors Absent: Swan and Matheis

Also Present: General Manager Jones, Assistant General Manager Cook, Director of Planning/Water Resources Heiertz, Director of Engineering Burton, Director of Finance Cherney, Treasurer Jacobson, Secretary Bonkowski, Legal Counsel Arneson, Director of Public Affairs Beeman, Director of Operations Pedersen, Director of Wastewater Operations Posey, Mr. Paul Weghorst, Ms. Kirsten McLaughlin, Mr. Jim Reed, Ms. Paula Knott, Mr. and Mrs. Sarkissian, and other members of the public and staff.

WRITTEN COMMUNICATIONS:

Secretary Bonkowski reported that today she had received a letter from MSA Land Solutions, Inc., a letter from Price, Postel & Parma LLP, a letter from Ms. Sarah Sarkissian, and a letter from Mr. Geoffrey Sarkissian, all in regard to Action Calendar item No. 17 (see pages 3 through 5).

ORAL COMMUNICATIONS:

1) Ms. Paula Knott, a student from Santiago Canyon College, provided an overview of its intern program and the value of this program to IRWD and other local water agencies. President LaMar said that staff would follow up with Dr. Jim Gates, administrator of the program.

2) Mrs. Joan Irvine Smith addressed the Board of Directors with respect to the Dyer Road Wellfield. Mrs. Smith said it was her understanding that currently wells 4, C-8, C-9, 10, 15 and 17 will operate in accordance with the District's annual pumping plan. Wells 2, 7, 13 and 14 will operate a portion of the week. Wells 1, 3, 4, 5, 6, 7, 11, 12, 16 and 18 will be off. The District's currently planned pumping for February is 2,940 AF. This was confirmed by Mr. Jones, General Manager of the District.

With respect to the Orange County Basin Groundwater Conjunctive Use Program being coordinated by Municipal Water District of Orange County (MWDOC) and Orange County Water District (OCWD), a Notice of Completion was approved by the OCWD Board of Directors on March 19, 2009. Metropolitan Water District has given notice to OCWD to extract 22,000 acre feet in fiscal year 2009/10. The extraction is being performed by agencies that constructed conjunctive use wells under this program. IRWD is not a participant. This was confirmed by Mr. Jones.

With respect to the OCWD annexation of certain IRWD lands, on June 5, 2009, IRWD received a letter from OCWD noting that OCWD has completed the formal responses to comments they previously received on the draft program Environmental Impact Report. The letter further noted that with this task completed, OCWD has exercised its right to terminate the 2004 Memorandum of Understanding (MOU) regarding annexation. OCWD also indicated that due to the lack of progress on the annexation issue, the draft program Environmental Impact Report will not be completed. On June 8, 2009, the OCWD completed the Long-Term Facilities Plan which was received and filed by the OCWD Board in July 2009. Staff has been coordinating with the City of Anaheim (Anaheim) and Yorba Linda Water District (YLWD) on their most recent annexation requests and has reinitiated the annexation process with OCWD. IRWD, YLWD and Anaheim have negotiated a joint MOU with OCWD to process and conduct environmental analysis of the annexation requests. The MOU was approved by the OCWD Board on July 21, 2010. This was confirmed by Mr. Jones.

With respect to the Groundwater Emergency Service Plan, IRWD has an agreement in place with various south Orange County water agencies, MWDOC and OCWD, to produce additional groundwater for use within IRWD and transfer imported water from IRWD to south Orange County in case of emergencies. IRWD has approved the operating agreement with certain south Orange County water agencies to fund the interconnection facilities needed to affect the emergency transfer of water. MWDOC and OCWD have also both approved the operating agreement. This was confirmed by Mr. Jones.

CONSENT CALENDAR

On MOTION by Withers, seconded and unanimously carried, CONSENT CALENDAR ITEMS 5 THROUGH 11 WERE APPROVED AS FOLLOWS:

5. MINUTES OF REGULAR BOARD MEETING

Recommendation: That the minutes of the February 14, 2011 Regular Board Meeting be approved as presented.

6. RATIFY/APPROVE BOARD OF DIRECTORS' ATTENDANCE AT MEETINGS AND EVENTS

Recommendation: That the Board ratify/approve the meetings and events for Steven LaMar, Mary Aileen Matheis, Douglas Reinhart, Peer Swan and John Withers.

7. UPCOMING PROJECTS STATUS REPORT

Recommendation: Receive and file.

8. JANUARY 2011 FINANCIAL REPORTS

Recommendation: That the Board receive and file the Treasurer's Investment Summary Report and the Monthly Interest Rate Swap Summary for January 2011; approve the January 2011 Summary of Wire Transfers and ACH payments in the total amount of $14,709,616.53;

and approve the January 2011 Warrants Nos. 317040 through 317698, Workers' Compensation Distributions and voided checks in the total amount of $4,717,512.38.

9. DISTRICT STRATEGIC MEASURES DASHBOARDS

Recommendation: That the Board receive and file the Strategic Measures Dashboards and information items.

10. MICHELSON WATER RECYCLING PLANT PHASE 2 EXPANSION AND FLOOD PROTECTION IMPROVEMENTS - CONTRACT CHANGE ORDER NO. 33

Recommendation: That the Board approve Contract Change Order No. 33 with J. R. Filanc Construction Co., in the amount of $282,840, for the MWRP Phase 2 Expansion and Flood Protection Improvements, projects 20214, 20542, 30214, and 30542.

11. EAST IRVINE ZONE 3 RESERVOIR COMPLEX SECURITY LIGHTING PROJECT

Recommendation: That the Board authorize an increase to the fiscal year 2010-11 Capital Budget in the amount of $110,000, from $2,032,800 to $2,142,800; approve an Expenditure Authorization in the amount of $110,000, and authorize the General Manager to execute a Contract Change Order with Halcyon Electric in the amount of $85,700 for the East Irvine Zone 3 Reservoir Complex Lighting, project 11367.

ACTION CALENDAR

MODJESKA CANYON STORM DAMAGE REPAIR GRANT OF EASEMENT AND COMPROMISE AND RELEASE AGREEMENT

General Manager Jones reported that the intense rainstorms that swept through Orange County in December 2010 caused severe flooding and water system damage in the canyon and foothill areas of IRWD's service area. Mr. Jones said that the 12-inch raw water supply pipeline from Harding Canyon Dam to Manning Water Treatment Plant and an adjacent 8-inch potable water main were broken in Modjeska Canyon. The pipelines were damaged when the creek washed away a substantial portion of the rear yard at 28612 Markuson Road (Andrews Property) and undermined a concrete thrust restraint block, allowing the pipe joints to pull apart. Mr. Jones said that the District completed temporary repairs to the pipelines in late January 2011 and placed the pipelines back in service, but it remains vulnerable to future storm water damage. He said that staff coordinated with Mr. Andrews, the property owner where the thrust block was undermined, during construction of the temporary pipelines repairs. Mr. Andrews raised a concern with the pipelines not being installed in an easement. He also contended that inadequate design and construction of the pipelines to withstand breakage and release of water may have caused or contributed to the damage or loss of his property which staff disputed. Although staff found no evidence that the pipelines were improperly designed or constructed, discussions were initiated with Mr. Andrews to develop a mutually beneficial solution that would protect the pipelines and his property from future storm water damage.

Mr. Jones said that the pipelines crossing the Andrews' property were constructed in 1984 by the Santiago County Water District (SCWD). The pipelines were originally planned to be installed in an easement granted to SCWD through the property adjacent to the Andrews property, but during construction the pipelines alignment was altered to avoid several large oak trees. The revised pipelines alignment was selected with the knowledge and consent of the property owner at the time, but an easement for the revised pipelines alignment was never prepared and recorded by SCWD. In or about 1989, Mr. Andrews procured the property and claimed SCWD did not have a right to have the pipelines on his property. SCWD contended that the use of the pipelines on the Andrews property had been continuous and under a claim of right for 15 years or more and that a prescriptive right was established after five years of continuous use. SCWD unsuccessfully attempted to resolve the easement dispute with Mr. Andrews per a letter dated August 20, 2002.

Mr. Jones said that to properly protect the existing pipelines from future storm water damage, staff determined that approximately 200 linear feet of rock protection could be installed, leaving approximately 50 linear feet of slope along the Andrews property unprotected. Staff and Mr. Andrews determined it would be mutually beneficial to install rock protection for the entire property and settle all potential claims and disputes over the easement. The Grant of Easement and Compromise and Release Agreement has been reviewed by IRWD legal counsel, and Mr. Andrews has signed the document and submitted his 20% payment in the amount of $15,000. Due to the desire of both the District and Mr. Andrews to rapidly install the rock protection and prevent future damage to both the pipelines and the Andrews Property, staff negotiated a sole source construction bid with Rock Structures Construction Company in the amount of $61,200.

Using a PowerPoint presentation, Director of Engineering Burton provided photos of the pre-flood aerial view of Mr. Andrews' property which included the approximate creek location; photos of the storm flows on December 23, 2010; the District's pipeline repair during a low creek flow; completed pipeline repair; the storm flow on February 26, 2010; and a view from the rear of Mr. Andrews property. He then reviewed the completed coordination effort which included site visits with Mr. Andrews, a site visit with the flood protection specialty contractor, and the Army Corps of Engineers. He said that there was also coordination with the Fish and Game and the Regional Water Quality Control Board along with the County of Orange and National Resources Conservation Service. He said that site visits were also held with the downstream neighbors, Mr. and Mrs. Sarkissian, where staff staked the pre-flood extent of the creek bank. Additionally, he said that a certified arborist visited the site.

Mr. Burton then showed photos of the view towards the west side of Mr. Andrews' property noting the erosion and undermining of the trees at the property line and noted the northerly meander of the creek. He said that result of the coordinated effort concluded that the rip-rap will not extend off Mr. Andrews property nor extend into the creek past the pre-flood bank limits, and the termination of rip-rap will be keyed per the flood protection contractor/civil engineer's recommendations. He further said that the creek will be restored to the current alignment after construction.

Mr. Geoffrey Sarkissian thanked staffed for their efforts and the willingness to work with him and his wife. He said he was concerned with planning process, requested that a hydrogeologist and arborist be involved, and that he would like the contract amended with Mr. Andrews and the

District in regard to the ending point of the rip-rap work. Mr. Jones said that the rip-rap work was necessary for the District to protect its assets. Mrs. Sarah Sarkissian raised concern with the rip-rap work as she felt that it did not qualify as an emergency. She said that she was in favor of the District making repairs on the pipeline, but opposed the rip-rap work as proposed, and requested that a hydrogeologist review the bank repair work. Mr. Jones recommended, in light of the discussion, that staff be authorized to work with Mr. Andrews to negotiate modifications of the proposed draft agreement in order to permit the District to determine the length of the protective work and the configuration of its endpoints in consultation with an engineer and to address the concerns of the Sarkissians with regard to risk to their downstream property. Mrs. Sarkissian requested an opportunity to submit comments on the draft agreement and she was invited to submit such comments to the District's legal counsel. Director Reinhart said that in his view, staff should look at alternatives for moving these pipelines farther away from the creek. Mr. Jones concurred, but recommended that this be pursued in parallel with measures protecting the pipelines in place as realignment alternatives may take some time to develop. Following discussion with the Board, staff was asked to submit an item to the Engineering and Operations Committee meeting to examine the pipeline alignment and long-term solutions. On MOTION by Withers, seconded and unanimously carried, THE BOARD AUTHORIZED THE ADDITION OF PROJECT 11585 IN THE AMOUNT OF $90,200 TO THE FISCAL YEAR 2010-11 CAPITAL BUDGET; APPROVED AN EXPENDITURE AUTHORIZATION FOR PROJECT 11585 IN THE AMOUNT OF $90,200; AND AUTHORIZED THE GENERAL MANAGER AND LEGAL COUNSEL TO FURTHER NEGOTIATE THE TERMS OF THE DRAFT GRANT OF EASEMENT AND COMPROMISE AND RELEASE AGREEMENT WITH MR. MARK ANDREWS, THE PROPERTY OWNER OF 28612 MARKUSON ROAD, MODJESKA, CALIFORNIA TO REFLECT THE GENERAL MANAGER'S RECOMMENDATION AS OUTLINED WITH REGARD TO DETERMINING THE CONFIGURATION OF THE PROTECTIVE WORK AND AUTHORIZED THE GENERAL MANAGER TO EXECUTE THE AGREEMENT AS SO MODIFIED.

VARIANCE REQUEST FOR STRAND RANCH CONSTRUCTION MANAGEMENT

General Manager Jones reported that on October 2008, the Board approved a contract in the amount of $214,300 with Dee Jaspar and Associates (DJA) for construction management of the Strand Ranch Recharge Facilities. Mr. Jones said that several variances to the contract have been previously approved.

Mr. Jones said that additional work has been requested of DJA and Wildermuth Environmental, Inc. (WEI) in support of the construction of the project recovery and recharge facilities. DJA has prepared a variance in support of this additional work for a total of $171,550. The requested work includes: 1) WEI well construction oversight as a result of sequencing changes in the Strand Ranch well drilling. The original cost estimate and schedule was based on two wells being drilling simultaneously with well construction oversight being performed with one geologist observing two drill and/or development rigs. The well driller was unable to mobilize and begin drilling the first two wells at the same time because of conditions out of their control. As a result, WEI was required to spend more time on oversight of the construction of these two wells for a total additional cost of $99,000; 2) Additional construction management work by DJA to provide daily inspection services that include reporting, project coordination, maintenance of records, progress payment preparation and quality control inspections during the processes of bore hole reaming, well construction and pump development. DJA's requested cost

is $23,400; and 3) WEI groundwater flow modeling in support of the well field design and to assist the District with responses to comments received from the Kern Water Bank Authority and Kern County Water Agency related to Addendum No. 1 of the FEIR. The cost of this additional work is $37,000; and 4) construction management by DJA to modify one of the transfer structures used to move water between the supply channel and recharge basins on the north side of the Cross Valley Canal. DJA prepared the change order and will provide construction inspection and testing services for the work for a cost of $11,050.

On MOTION by Reinhart, seconded and unanimously carried, THE BOARD APPROVED VARIANCE NO. 6 TO THE PROFESSIONAL SERVICES AGREEMENT WITH DEE JASPAR AND ASSOCIATES IN THE AMOUNT OF $171,550 FOR ADDITIONAL WELL DRILLING CONSTRUCTION OVERSIGHT, GROUNDWATER FLOW MODELING AND CONSTRUCTION MANAGEMENT OF STEEL WORK MODIFICATIONS TO AN EXISTING TRANSFER STRUCTURE.

OPERATIONS CENTER FACILITIES EXPANSION PHASE 1 MEZZANINE CONVERSION CONSTRUCTION AWARD

General Manager Jones reported that RRM Design Group (RRM) was retained to develop plans and specifications for additional office space within the Michelson Operations Center by converting storage space at the warehouse mezzanine into offices. RRM's design also included seismic upgrades to the existing warehouse. The mezzanine conversion will provide an additional 2,246 square feet of office space to accommodate present and future operations staffing levels.

Mr. Jones said that this project requires extensive coordination to minimize disruption to the Purchasing Department's office space, the IRWD warehouse, and administrative areas of the Michelson Operations Center. The project will also require ongoing coordination with the other current construction projects at MWRP, namely the Phase 2 Expansion and Operation Center Facilities Expansion Phase 1 Storage Building.

Mr. Jones said that staff requested a proposal from Malcolm Pirnie to provide construction management and inspection services for this project. Malcolm Pirnie is currently providing key personnel for construction management and inspection to augment the MWRP Phase 2 Expansion team. He said that staff recommends awarding a sole-source Professional Services Agreement to Malcolm Pirnie in the amount of $92,748 to provide construction management and inspection for the project.

Mr. Jones said that the mezzanine conversion construction project was advertised for bid on December 2, 2010 to a select list of five contractors: Philco Construction, Snyder Langston, Spectra Company, Miller Contracting, and Lacy Construction. Four contractors, Philco Construction, Snyder Langston, Miller Contracting, and Lacy Construction, attended the mandatory pre-bid meeting on December 13, 2010. Lacy Construction subsequently declined to bid stating they were not able to meet the bonding requirements. The bid opening was held on February 2, 2011 with bids received from Philco Construction, Snyder Langston, and Miller Contracting. Snyder Langston is the apparent low bidder with a bid amount of $722,361. The engineer's estimate was $741,735.

Director Reinhart reported that the Construction Phase Consulting Services section of this item was reviewed at the Engineering and Operations Committee on February 15, 2011. On MOTION by Reinhart, seconded and unanimously carried, THE BOARD APPROVED A BUDGET REDUCTION IN THE AMOUNT OF $1,876,000 EACH FROM $3,015,200 TO $1,139,200 FOR PROJECTS 11422, 21422, AND 31422; APPROVED EXPENDITURE AUTHORIZATIONS IN THE AMOUNT OF $496,400 EACH FOR PROJECTS 11422, 21422, AND 31422; AUTHORIZED THE GENERAL MANAGER TO EXECUTE A SOLE SOURCE PROFESSIONAL SERVICES AGREEMENT WITH MALCOLM PIRNIE IN THE AMOUNT OF $92,748, FOR CONSTRUCTION MANAGEMENT AND INSPECTION SERVICES; AND AUTHORIZED THE GENERAL MANAGER TO EXECUTE A CONSTRUCTION CONTRACT WITH SNYDER LANGSTON IN THE AMOUNT OF $722,361 FOR THE OPERATIONS CENTER FACILITIES EXPANSION PHASE I MEZZANINE CONVERSION, PROJECTS 11422, 21422 AND 31422.

SAN JOAQUIN MARSH REGIONAL NATURAL TREATMENT SYSTEM FACILITY NO. 62 AND SMALL AREA MITIGATION SITE 1 CONSULTANT SELECTIONS

General Manager Jones reported that the Preliminary Design Report for the San Joaquin Marsh Regional Natural Treatment System (NTS) Facility No. 62 and Small Area Mitigation Site 1 (SAMS 1) has been completed by CH2M Hill and a viable project alternative has been determined.

Mr. Jones said that the purpose of the proposed project is to improve the quality of surface water runoff within the San Diego Creek watershed. By improving the water quality of San Diego Creek, NTS Site 62 will help meet the established Total Maximum Daily Load (TMDL) objectives for the watershed including nitrogen, sediment, phosphorus, pathogens, pesticides, and selenium. Additional goals of the project are to enhance the habitat and ecosystem of the existing SAMS 1 site and provide aesthetic improvement of the area for the community. The SAMS 1 is an area of interest for the permitting resource agencies due to its current deteriorated condition and need for an improved watering system.

Mr. Jones said that grant funding has been approved from the EPA for a 46.70% cost-share of the total project cost, up to $992,800. This amount can be applied to the preliminary design, final design, and construction of the South San Joaquin Marsh Natural Treatment System for dry-weather flows diverted from San Diego Creek. The total project cost is estimated at $2,350,000, and it is anticipated that the full $992,800 EPA grant will be utilized.

Mr. Jones said that CH2M Hill was selected out of four consultants, based upon qualifications, for the PDR phase of the project in February 2010. Staff believes the design experience and skilled resource agency coordination that CH2M Hill possesses are unique to completing the final design of the project within the schedule stipulated by the EPA grant funding requirements. Staff recommends awarding Sole Source Professional Services Agreement to CH2M Hill in the amount of $301,677 based on their understanding of the project, excellent qualifications, and performance in the PDR phase.

Mr. Jones said that staff requested proposals to provide environmental compliance and permitting services from three consultants; ICF International (ICFI), LSA, and Dudek, with ICFI declining to submit. Staff recommends awarding the project to Dudek in the amount of $145,994 based on

their outstanding proposal, knowledge and understanding of key issues, and excellent qualifications of their project team.

Director Reinhart reported that this item was reviewed and approved by the Engineering and Operations Committee on February 15, 2011. On MOTION by Reinhart, seconded and unanimously carried, THE BOARD APPROVED AN EXPENDITURE AUTHORIZATION IN THE AMOUNT OF $528,000 FOR PROJECT 10835; AUTHORIZED THE GENERAL MANAGER TO EXECUTE A PROFESSIONAL SERVICES AGREEMENT IN THE AMOUNT OF $301,677 WITH CH2M HILL FOR THE PREPARATION OF CONSTRUCTION PLANS AND SPECIFICATIONS; AND AUTHORIZED THE GENERAL MANAGER TO EXECUTE A PROFESSIONAL SERVICES AGREEMENT IN THE AMOUNT OF $145,994 WITH DUDEK FOR THE PERMITTING AND ENVIRONMENTAL COMPLIANCE OF THE SAN JOAQUIN MARSH REGIONAL NTS FACILITY NO. 62 AND SMALL AREA MITIGATION SITE 1, PROJECT 10835.

ORANGE PARK ACRES SEWER CONNECTION FEES

General Manager Jones reported that staff is recommending adoption of a resolution establishing sewer connection fees in the Orange Park Acres (OPA) area, both for Improvement District (ID) 256 to facilitate customers currently seeking sewer service and for the future Ridgeline Development. The purpose of setting sewer connection fees for OPA at this time is to: 1) establish a fee for individual homeowners that are interested in connecting to the public sewer system in advance of the proposed community sewer being constructed; 2) differentiate the sewer connection fee for the future Ridgeline Development which is expected to construct a sewer system for the development and subsequently dedicate that sewer system to IRWD; and 3) provide OPA residents with a cost basis for a sewer connection fee that can be compared to the cost obligation for a General Obligation (G.O.) bond to construct a community sewer system.

Mr. Jones said that staff recommends that sewer connection fees be escalated annually based on the Engineering News Record's Construction Cost Index for Los Angeles. Should the OPA community authorize G.O. bonds to construct a community sewer system, staff recommends that the connection fees be adjusted accordingly at that time.

Using a PowerPoint presentation, Principal Engineer Hoolihan provided an overview of the OPA Sewer Connection fees. He reviewed the sewer connection fees for ID 256 which would include all OPA residences requiring sewer service. He said that that the connection fees would be based on sewer cost, construction cost, Orange County Sanitation District's CORF buy-in, and sewer replacement buy-in. He reviewed the sewer connection fees for Planning Area OPA1 which includes the Ridgeline development property, the developer to build a sewer system, and the connection fee based on CORF buy-in and sewer replacement buy-in.

Mr. Hoolihan reviewed the sewer connection fees along with payment options. These options included a one-time payment of $24,500, consistent with IRWD's current rules and regulations for collection of a connection fee, and two, a deferred payment option allowing homeowners to pay only the sewer replacement fund buy-in ($1,100) at the time service is requested and defer the payment of the remainder of the connection fee for two years. After the second year, the remainder of the connection fee ($23,400) would be collected though 60 equal monthly

payments including interest. Option 2 would give the homeowner the opportunity to participate in a bond funding to pay the remaining $23,400 of the connection fee if the G.O. bond authority is approved by the community to construct a sewer system in OPA. A customer choosing either Option 1 or 2 would be refunded any amount that is paid and is later determined to be reimbursable from bond proceeds.

President LaMar reported that this item was reviewed at the Finance and Personnel Committee on February 1, 2011, and the Committee concurred with the staff recommendation. On MOTION by LaMar, seconded and unanimously carried, THE BOARD APPROVED SETTING CONNECTION FEES OF $24,500 FOR IMPROVEMENT DISTRICT 256; DESIGNATED THE RIDGELINE PROPERTY AS THE PLANNING AREA OPA1 AND SETTING CONNECTION FEES FOR OPA1 AT $4,200, EFFECTIVE IMMEDIATELY; ADOPTED THE FOLLOWING RESOLUTION BY TITLE MAKING CHANGES TO THE CONNECTION FEES; AND APPROVED A FUTURE ESCALATION OF SUCH FEES IN THE AMOUNT THAT IS EFFECTIVE JULY 1 OF EACH FISCAL YEAR BASED ON THE ENGINEERING NEWS RECORD'S CONSTRUCTION COST INDEX FOR LOS ANGELES, UNLESS THE BOARD ACTS TO ADJUST THE CONNECTION FEES DIFFERENTLY.

RESOLUTION NO. 2011- 3

RESOLUTION OF THE BOARD OF DIRECTORS OF IRVINE RANCH WATER DISTRICT, ORANGE COUNTY, CALIFORNIA ADOPTING CHANGES TO CONNECTION FEES AS SET FORTH IN THE SCHEDULE OF RATES AND CHARGES IN EXHIBIT "B" TO THE RULES AND REGULATIONS OF IRVINE RANCH WATER DISTRICT FOR WATER, SEWER, RECYCLED WATER, AND NATURAL TREATMENT SYSTEM SERVICE

2011 REFUNDING BONDS AND VARIABLE RATED DEBT RESTRUCTURING

General Manager Jones reported that on February 14, 2011, the Board approved refunding the 2008-B bonds and reissuing as Index Tender Notes (ITN), extending the letters of credit (LOC) with Bank of America on the 1989, 1991 and 1993 issues, extending the LOC with US Bank on the 2009-A issue, and replacing the State Street LOC on the 1995 bonds and the Landesbank Baden-Wurttemberg (LBBW) LOC on the 2008-A bonds with new LOCs from Sumitomo Mitsui (Sumitomo). Mr. Jones said that included in the restructuring was the staff recommendation and Board approval to replace Bank of America (B of A) as LOC provider and JP Morgan as remarketing agent for the 2009-B bonds with Barclays Capital for both services. He said that Barclay's has rescinded its proposal and staff will recommend to the Finance and Personnel Committee that the 2009-B issue remain with Bank of America as LOC provider and JP Morgan as remarketing agent. As part of the LOC proposal, Sumitomo requires the bonds be converted from daily variable rate mode to weekly variable rate mode.

On February 14, 2011, the Board approved refunding the 2008-B bonds and reissuing as Index Tender Notes (ITN). In connection with the refunding, legal counsel has prepared a resolution declaring intention to issue the consolidated refunding bonds, setting March 28, 2011 as the date for

a public hearing on the matter, and approval as to form a resolution of issuance. Additionally, staff recommends that Orrick, Herrington & Sutcliffe, and Bowie, Arneson, Wiles & Giannone be retained as co-bond counsel.

On MOTION by Withers, seconded and unanimously carried, THE BOARD APPROVED THE RETENTION OF ORRICK HERRINGTON & SUTCLIFFE, AND BOWIE, ARNESON, WILES AND GIANNONE AS CO-BOND COUNSEL, AND ADOPTED THE FOLLOWING RESOLUTIONS BY TITLE:

RESOLUTION NO. 2011-4

RESOLUTION OF THE BOARD OF DIRECTORS
OF THE IRVINE RANCH WATER DISTRICT
DECLARING INTENTION TO ISSUE CONSOLIDATED
REFUNDING BONDS OF SAID DISTRICT
(REFUNDING SERIES 2011A-1 AND 2011A-2)

RESOLUTION NO. 2011-5

RESOLUTION OF THE BOARD OF DIRECTORS OF
THE IRVINE RANCH WATER DISTRICT AUTHORIZING
CERTAIN ACTIONS IN CONNECTION WITH CONVERSIONS
OF INTEREST RATE MODES AND EXTENSIONS AND
REPLACEMENTS OF LETTERS OF CREDIT
(CONSOLIDATED SERIES 1989, CONSOLIDATED SERIES 1991,
CONSOLIDATED SERIES 1993, CONSOLIDATED SERIES 1995,
CONSOLIDATED REFUNDING SERIES 2008A, CONSOLIDATED
SERIES 2009A AND CONSOLIDATED SERIES 2009B)

GENERAL MANAGER'S REPORT

General Manager Jones reported that he met with Mr. Jan Scherfig from the Civil Engineering School at UCI as they are planning a conference on groundwater treatment and water recycling. Mr. Scherfig asked for IRWD's participation with tours of our facility along with presentations on water banking and integration. He said that he will be submitting an item to the Water Resources Policy and Communications Committee for a recommendation on participation along with a minimal financial donation.

DIRECTORS' COMMENTS

Director LaMar reported that he will be attending ACWA's Washington, DC conference on Federal Affairs. He said that last week he attended the Southern California Water Committee's Regional Task Force meeting and MWDOC's Water Policy Forum.

CLOSED SESSION

President LaMar said that two Closed Sessions would be held with legal counsel relative to: 1) existing litigation - Government Code Section 54956.9(a) – SEMA Construction vs. the City of Tustin and City of Tustin vs. IRWD; and 2) Existing litigation – Government Code 54956.9(a) - United States, States of California, et al., ex rel. Hendrix v. J-M Manufacturing Company, Inc. et al.

OPEN SESSION

Following the Closed Session, the meeting was reconvened with Directors Withers, Reinhart and LaMar present. No action was reported.

ADJOURNMENT

There being no further business, President LaMar adjourned the meeting.

APPROVED and SIGNED this14th day of March, 2011.

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President
IRVINE RANCH WATER DISTRICT

_____

Secretary
IRVINE RANCH WATER DISTRICT

APPROVED AS TO FORM:

_____

Legal Counsel - Bowie, Arneson, Wiles & Giannone

March 14, 2011
Prepared and
Submitted by: N. Savedra
Approved by: P. Jones

CONSENT CALENDAR

RATIFY/APPROVE BOARD OF DIRECTORS' ATTENDANCE AT MEETINGS AND EVENTS

SUMMARY:

Pursuant to Resolution 2006-29 adopted on August 28, 2006, approval of attendance of the following events and meetings are required by the Board of Directors.

Events/Meetings

| | |
|---|---|
| Steven LaMar | |
| 3/16/11 | IRWD Overview Meeting with Lake Forest Councilmember Scott Voights |
| 3/22/11 | Irvine City Council Meeting – IRWD Certificate of Recognition |
| 3/24/11 | SCWC Stormwater Task Force Meeting |
| Mary Aileen Matheis | |
| 3/21-22/11 | Watereuse California Annual Conference |
| 4/18-20/11 | Urban Water Institute's Conference, Irvine, CA |
| Doug Reinhart | |
| 2/08/11 | Meeting with Tom Rosales to discuss SOCWA issues |
| 3/17/11 | Santiago Aqueduct Commission Meeting |
| 4/04/11 | OPA Homeowners Association Community Meeting |
| Peer Swan | |
| 3/14/11 | IRWD Historical Advisory Group Meeting |
| 3/29/11 | ACWA Region 10 Membership Meeting |
| John Withers | |
| 3/11/11 | Lake Forest City Council's Leadership Breakfast Meeting |
| 3/22/11 | Irvine City Council Meeting – IRWD Certificate of Recognition |

RECOMMENDATION:

RATIFY/APPROVE THE MEETINGS AND EVENTS FOR STEVEN LaMAR, MARY AILEEN MATHEIS, DOUG REINHART, PEER SWAN AND JOHN WITHERS AS DELINEATED ABOVE.

LIST OF EXHIBITS:

None

March 14, 2011
Prepared by: L. Bonkowski
Submitted and
Approved by: Paul Jones

CONSENT CALENDAR

SANTIAGO AQUEDUCT COMMISSION
REAPPOINTMENT OF MEMBER AND ALTERNATES

SUMMARY:

The District's Board President has made changes to agency representation on the Santiago Aqueduct Commission (Commission). In order to update these changes with the Commission, staff has prepared a resolution reappointing the Member and Alternates to the Santiago Aqueduct Commission (Commission) as follows:

- Jim Reed, Member
- Douglas Reinhart, Alternate
- Paul Cook, Alternate

BACKGROUND:

The Irvine Ranch Water District (District) is a member of the Santiago Aqueduct Commission Joint Powers Agreement whereby it provides for a Commission consisting of seven members, with one member from the District along with alternate(s) to serve in the absence of the regular member.

The District's Board President makes changes to the agency representation from time to time on various agency representation. In order to update the change on the Commission, it is necessary to resend Resolution No. 2001-6 to reflect Mr. Douglas Reinhart and Mr. Paul Cook as the alternate members. Mr. Jim Reed continues as member.

FISCAL IMPACTS:

None.

ENVIRONMENTAL COMPLIANCE:

None.

COMMITTEE STATUS:

This item has not been reviewed by Committee.

RECOMMENDATION:

THAT THE FOLLOWING RESOLUTION BE ADOPTED BY TITLE:

RESOLUTION NO. 2011-

RESOLUTION OF THE BOARD OF DIRECTORS OF IRVINE RANCH WATER DISTRICT, RESCINDING RESOLUTION NO. 2001-6 AND APPOINTING MEMBER AND ALTERNATE MEMBERS TO THE SANTIAGO AQUEDUCT COMMISSION

LIST OF EXHIBITS:

Exhibit "A" - Resolution

# EXHIBIT "A"

RESOLUTION NO. 2011-

RESOLUTION OF THE BOARD OF DIRECTORS OF IRVINE RANCH WATER DISTRICT, RESCINDING RESOLUTION NO. 2001-6 AND APPOINTING MEMBER AND ALTERNATE MEMBERS TO THE SANTIAGO AQUEDUCT COMMISSION

WHEREAS, Amendment No. 2 to the Santiago Aqueduct Commission (SAC) Joint Powers Agreement provides for a Commission consisting of seven members, one member to be selected by the Irvine Ranch Water District (IRWD);

WHEREAS, IRWD may also designate alternates to serve in the absence of the regular members; and

WHEREAS, the Board of Directors of IRWD wishes to change the appointment of the member and alternates designated by Resolution No. 2001-6.

NOW, THEREFORE, the Board of Directors of IRWD does hereby resolve, determine and order as follows:

Section 1. That Resolution No. 2001-6 be and hereby is rescinded.

Section 2. That Jim Reed, a consultant for the IRWD, be and the same is hereby appointed member of the SAC.

Section 3. That Douglas Reinhart, a member of the Board of Directors of IRWD and Paul Cook, Assistant General Manager, be and the same are hereby appointed alternate members of the SAC.

Section 4: The Secretary of IRWD is hereby directed to forward a certified copy of this resolution to the Santiago Aqueduct Commission.

ADOPTED, SIGNED AND APPROVED this 14th day of March 2011.

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President, IRVINE RANCH WATER DISTRICT and of the Board of Directors thereof

_____

Secretary, IRVINE RANCH WATER DISTRICT and of the Board of Directors thereof

APPROVED AS TO FORM:

_____

Legal Counsel
BOWIE, ARNESON, WILES AND GIANNONE

March 14, 2011
Prepared by: Kirsten McLaughlin
Submitted by: Beth Beeman
Approved by: Paul Jones

CONSENT CALENDAR

## PUBLIC GOODS CHARGE LEGISLATION

### SUMMARY:

A University of California Berkeley policy analysis report completed on behalf of the California Public Utilities Commission and the Water Energy Team of the Climate Action Team titled *Implementing a Public Goods Charge for Water* was released in July. The report recommends implementing a public goods charge for water to finance projects to meet California's targets for both water conservation and greenhouse gas reduction. In response to this report, Senator Simitian introduced SB 34 in December, a spot bill for legislation related to a public goods charge for water. Subsequently, on February 23, the Public Policy Institute of California released a report titled *Managing California's Water: from Conflict to Reconciliation* which includes a discussion regarding a public goods charge for water management.

### BACKGROUND:

The UC Berkeley report, *Implementing a Public Goods Charge for Water,* recommends that the State pass legislation requiring all water providers assess a volumetric public goods surcharge on all water bills, similar to the existing public goods charge for energy. The funds generated by this charge would support the water supply targets adopted in SB 7x7 (Steinberg) and would fund the energy and water conservation programs specified in AB 32. The UC Berkeley report goes on to recommend that the funds be managed by the regional joint power authorities established to implement Integrated Regional Water Management Plans.

The Public Policy Institute report, *Managing California's Water: from Conflict to Reconciliation,* recommends that a statewide volumetric public goods charge on water use be established to provide an alternative funding source for the types of regional water projects that have been funded through general obligation bonds in recent years. The report recommends that fees collected through a public goods charge be made available for regional water supply reliability and infrastructure projects, ecosystem reconciliation, research and development and statewide and regional administration.

SB 34 (Simitian) was introduced as a placeholder vehicle for potential public goods charge legislation. Recognizing many of the concerns raised by various members of the water community in response to the idea of a statewide public goods charge on water, Senator Simitian is considering holding SB 34 stakeholder workshops to develop a viable public goods charge program proposal. A stakeholder group has not yet been established. Additionally, in the wake of the passage of Proposition 26 in November, Senator Simitian's office has requested an opinion from the Legislative Counsel's Office as to whether public goods charge legislation would require a two-thirds vote or if it could be adopted with a simple majority vote.

During December 6, 2010 legislative planning workshop with the Water Resources Policy and Communications Committee, the Committee discussed advocating for an exemption for water

providers that have implemented a rate structure which includes a mechanism for collecting revenue dedicated to water conservation projects and programs, in the event a public goods charge proposal gains traction in the 2011 session. Examples of qualified rate structures would include IRWD's allocation-based, conservation rate structure.

In the interim another conceptual public goods charge alternative has emerged. This concept would provide exclusive authority to water agencies to develop and implement a locally-controlled public goods charge to fund local water and energy efficiency and sustainability programs. Such an approach would provide local agencies with the option for developing a dedicated revenue stream for energy and water sustainability projects without being subject to a statewide public goods charge requirement. This approach would allow local agencies to make the revenues collected at the local level available for local projects and/or regional projects if partnerships are developed.

It is not clear whether Senator Simitian will move SB 34 forward during the 2011 legislative session, nor is it clear in what form this bill could appear. In the absence of any developed legislative proposals on a public goods charge to date, staff will continue to monitor this topic. Should a public goods charge proposal begin to gain traction in the current legislative session, alternative concepts to consider for advocacy may include:

- An exemption for water providers that use allocation-based, conservation rate structures, as defined by AB 2882 (Wolk), from a statewide public goods charge on water; and/or

- Exclusively authorizing water agencies to develop and implement a locally-controlled public goods charge for water to fund local water and energy conservation and sustainability programs and projects.

Staff will provide the Board with updates and recommendations if a developed public goods charge legislative proposal is amended into SB 34 or another legislative vehicle.

FISCAL IMPACTS:

Not applicable.

ENVIRONMENTAL COMPLIANCE:

Not applicable.

COMMITTEE STATUS:

This item was reviewed at the Water Resources Policy and Communications Committee meeting on March 7, 2011.

RECOMMENDATION:

Receive and file.

LIST OF EXHIBITS:

Exhibit "A" – UC Berkeley Public Goods Charge Report – Executive Summary

# UC Berkeley, Goldman School of Public Policy
# Implementing a Public Goods Charge for Water
# July 12, 2010

## Executive Summary

Our client asked for recommendations on how to implement a public goods charge (PGC) on water, as per the "Water Energy" section of the Assembly Bill 32 (AB 32) Scoping Plan.

Before considering "how," we considered whether a public goods charge for water is the right tool. The problem we wanted to address is the negative externalities of high water consumption, including greenhouse gas emissions from the energy used to pump, transport, treat, and heat water. We gave serious consideration to two alternate strategies but ultimately decided the public goods charge for water is the best tool.

We recommend a public goods charge for water because:

- A public goods charge for water creates a price signal for water conservation.
- A public goods charge for water would provide a stable, sustainable funding mechanism to support the full list of conservation and efficiency activities specified in Assembly Bill 32.
- The dual energy and water conservation programs specified in AB 32, which could not be fully funded through the other mechanisms we considered, will be effective to both mitigate and adapt to climate change.
- Our proposed implementation strategy will help institutionalize regional water agencies, which are necessary for the state's long-term water-planning effectiveness.

We then make specific recommendations about the design of the public goods charge:

- We recommend passing state legislation requiring all water providers to assess volumetric surcharges on each water bill where metered, or by alternate means in the short-term for areas not metered.
- We recommend that the funds be managed by regional joint power authorities to implement Integrated Regional Water Management Plans (IRWMPs), which must institutionalize their operating structure before this can be put in place. This will provide the necessary regional organization for effective project choices, and will reduce the number of water agencies that need oversight from thousands to 50.
- We recommend that the Department of Water Resources (DWR), which already has jurisdiction over the IRWMPS, provide direction and oversight to ensure that specified state goals are met and that funds are well-managed, with assistance from the WETCAT members.
- We recommend that the fees initially be set to raise $680 Million per year. That level of funding can be used to meet the water supply targets of Senate Bill X7-7, and to exceed the greenhouse gas emissions goals of Assembly Bill 32. We recommend that the legislation be structured with maximum flexibility to allow for future rate changes.

March 14, 2011
Prepared by: K. McLaughlin
Submitted by: B. Beeman
Approved by: Paul Jones

CONSENT CALENDAR

## 2011 STATE LEGISLATIVE UPDATE

### SUMMARY:

This report provides an update on state legislation of interest to IRWD including IRWD-sponsored legislation. A copy of the 2011 State Legislative Matrix is attached as Exhibit "A".

Staff recommends that the Board consider the following positions:

- AB 262 (Harkey): Regional Board Boundaries – WATCH
- AB 403 (Campos): Public Drinking Water Standards: Hexavalent Chromium – WATCH
- AB 741 (Huffman): Sewer Improvement Financing – SUPPORT
- AB 964 (Huffman): Sewer – WATCH
- SB 215 (Huff): Quagga Mussels – SUPPORT

### BACKGROUND:

More than 2,400 bills were introduced in the State Legislature prior to the bill introduction deadline on February 18. A wide variety of bills have been introduced on issues of interest to IRWD including public finance, contracting, and statewide water supplies. There are also a number of bills related to the Sacramento–San Joaquin Delta, pension reform, governance proposals in the wake of the City of Bell and Vernon scandals and, bills related to streamlining of government to address ongoing budget shortfalls. Many of these bills are expected to have significant amendments prior to their first policy committee hearings. As such, staff will monitor proposals and bring updates and recommendations to the Water Resources Policy and Communications Committee as appropriate.

### State Budget Update:

The Budget Conference Committee began hearings on February 22. Governor Brown testified in front of the Conference Committee and fielded questions from the Committee members. During that hearing, the Governor announced that this year's budget solution must address the entire $25 billion shortfall and he will not sign a budget that punts the problem forward to future years. He went on to say that this can only be accomplished through either his proposal to place a measure on the June ballot to extend current tax levels plus approximately $12 billion in cuts or through a budget proposal that provides for $25 billion in cuts.

The Legislative Counsel's office released an opinion at the end of February stating that a tax measure could be put on the ballot with a majority vote under narrow circumstances; however, the opinion did not specifically address Governor Brown's proposal to extend current tax levels. Despite the option, the Governor and Legislative Democrats insist they are committed to placing the measure on the ballot with a two-thirds vote in both houses, which would require votes from

two Republicans in each house. The Legislature must pass a budget including the tax extension proposal by March 10 in order for it to be placed on the June ballot.

On February 23, 30 Republican senators and assembly members announced the formation of the "Taxpayers Caucus" committed to blocking Governor Brown's attempts to send tax extensions to the June ballot unless they are accompanied by tax reduction proposals. The Caucus has not yet provided specific proposals. The fact that 12 Republicans did not join the Caucus gives some Democrats hope that compromise on a budget proposal is still possible.

IRWD-sponsored Legislation:

*AB 741 (Huffman): Sewer Improvement Financing*

IRWD-sponsored AB 741 (Huffman), which would expand existing law to allow property owners to voluntarily enter into agreements with local wastewater agencies to finance needed sewer improvements, was introduced on February 17. As introduced, AB 741 only applies to financing for septic to sewer conversions. However, once Huffman's office receives language back from the Legislative Counsel's Office, the bill will be amended to also apply to financing for lateral replacement projects. AB 741 is not expected to be set for a policy committee hearing until April.

As the bill sponsor, staff recommends that the Board consider taking a formal support position on AB 741 (Huffman). The AB 741 (Huffman) fact sheet from Assembly Member Huffman's office is attached as Exhibit "B."

Other 2011 Legislative Introductions:

*AB 262 (Harkey): Regional Board Boundaries*

AB 262 (Harkey) would re-draw the Santa Ana and San Diego Regional Water Quality Control Board boundaries to include South Orange County in the Santa Ana Region. This bill is a reintroduction of AB 2407 (Harkey) introduced in 2010. AB 2407 was referred to the Assembly Committee on Environmental Safety and Toxic Materials and was never acted upon by that committee.

A portion of IRWD falls within the San Diego Region. The District has had good relations with both Boards and the current boundaries allow the District to compete for funding in both regions. However, many of our South County colleagues have experienced significant challenges in dealing with the San Diego Board, particularly in relation to storm water regulations and groundwater discharge violations. Given the sensitivity of these issues and the uncertainty as to whether this bill will move forward this year, staff recommends that the Board consider a WATCH position on AB 262 (Harkey).

*AB 403 (Campos): Public Drinking Water Standards: Hexavalent Chromium*

As introduced, AB 403 (Campos) would require the Department of Public Health (DPH) to establish a primary drinking water standard for hexavalent chromium, also known as Chromium

6, by January 1, 2013 and provides that if a standard is not adopted by that date, the public health goal set by the Office of Environmental Health Hazard Assessment shall be the applicable standard. Currently OEHHA is considering a public health goal of 0.2 parts per billion which is considerably lower than the current state reporting limit of one part per billion. The average Chromium-6 concentration for all IRWD groundwater wells is 0.28 parts per billion.

Assembly Member Campos has introduced this bill in an effort to compel DPH to adopt a drinking water standard for Chromium-6, which the Department has failed to do by the existing deadline of January 2004. However, in response to the concerns that have been raised by water agencies across the state, Assembly Member Campos has indicated she will not move AB 403 forward as currently written and will be conducting stakeholder meetings to develop a proposal that can be supported by the water community. As such, staff recommends that the Board consider taking a WATCH position on AB 403 (Campos).

*AB 964 (Huffman): Sewer: Environmental Protection*

AB 964 (Huffman) includes the other sewer related legislation Assembly Member Huffman plans to address this year. As introduced, the bill would:

- Require the state DPH to adopt and implement a 10-year plan for sewer upgrades, including, but not limited to, onsite septic and sewer lateral upgrades;
- Provide contractual assessment authority for sewer improvements (language from IRWD-sponsored AB 2182, introduced in 2010); and
- Expand spill reporting requirements for hazardous materials.

Assembly Member Huffman's staff is working on amendments to refine AB 964 and it is not expected to move forward in its current form. As such, staff recommends that the Board consider taking a WATCH position on AB 964 while amendments are developed.

*SB 215 (Huff): Quagga Mussels*

SB 215 (Huff), sponsored by the Association of California Water Agencies, would remove the sunset date on the existing Quagga mussel control program authorized in 2007. Current law, established in 2007 by AB 1683 (Wolk), required operators of water supply systems to cooperate with the CA Department of Fish and Game to control dreissenid mussels, including Quagga mussels, and made it a crime to cause the mussels to be introduced into any waters of the state. Current law is scheduled to sunset on December 31, 2011. SB 215 will remove that sunset clause.

Maintaining the current mussel inspection programs is vital to ongoing efforts across the state to control Quagga mussel infestation in California's water supply. As such, staff recommends that the Board consider taking a SUPPORT position on SB 215 (Huff).

FISCAL IMPACTS:

Not applicable.

ENVIRONMENTAL COMPLIANCE:

Not applicable.

COMMITTEE STATUS:

This item was reviewed at the Water Resources Policy and Communications Committee on March 7, 2011.

RECOMMENDATION:

THAT THE BOARD TAKE A SUPPORT POSITION ON AB 741 (HUFFMAN) AND SB 215 (HUFF) AND A WATCH POSITION ON AB 262 (HARKEY), AB 403 (CAMPOS) AND AB 964 (HUFFMAN).

LIST OF EXHIBITS:

Exhibit "A" – 2011 IRWD Legislative Matrix
Exhibit "B" – AB 741 (Huffman) Fact Sheet

**EXHIBIT "A"**

**IRWD 2011 LEGISLATIVE MATRIX**
**March 7, 2011**

| Bill No. Author | Title | IRWD Position | Summary/Effects | Status |
|---|---|---|---|---|
| **AB 19** Fong (D) | Building Standards: Water Meters: Multiunit Structures | | Requires a water purveyor that provides water service to a multiunit residential structure or mixed-use residential and commercial structure to require the installation of a water meter or a submeter. Requires the Department of Housing and Community Development to develop and submit to the commission building standards that require the installation of water meters or submeters in individual dwelling units within a newly constructed multiunit residential structure. | 01/24/2011 - To ASSEMBLY Committees on WATER, PARKS AND WILDLIFE and HOUSING AND COMMUNITY DEVELOPMENT. |
| **AB 23** Smyth (R) | Local Agency Meetings: Prohibition | | Amends the Ralph M. Brown Act which requires each legislative body of a local agency to provide the time and place for holding regular meetings. Prohibits the members of a legislative body, during a meeting of that legislative body, from convening simultaneous or serial order meetings of any other legislative body for which the members of the convened legislative body constitute at least a quorum. | 01/24/2011 - To ASSEMBLY Committee on LOCAL GOVERNMENT. |
| **AB 54** Solorio (D) | Drinking Water | | Allows the Department of Public Health to issue a letter of no prejudice to a public water system that is a lead applicant for a project that may be funded by the Safe Drinking Water Revolving Fund, makes expenditures related to the project reimbursable in specified circumstances. Authorizes a local agency formation commission to review and approve or disapprove the consolidation of territory within a mutual water company into the jurisdiction of a city as a special district that operates a water system. | 01/24/2011 - To ASSEMBLY Committees on LOCAL GOVERNMENT and ENVIRONMENTAL SAFETY AND TOXIC MATERIALS. |
| **AB 83** Jeffries (R) | Environment: CEQA Exemption: Recycled Water Pipeline | | Amends existing law regarding California Environmental Quality Act environmental impact reports. Exempts a project for the installation of a new pipeline for the distribution of recycled water within an improved public street, highway, or right-of-way. | 01/27/2011 - To ASSEMBLY Committee on NATURAL RESOURCES. |
| **AB 134** Dickinson (D) | Sacramento Regional County Sanitation District | Oppose | Authorizes the Sacramento Regional County Sanitation District to file an application for a permit to appropriate a specified amount of water that is based on the volume of treated wastewater that the district discharges into the Sacramento River and recovers for reuse. Requires the State Water Resources Control Board to grant a permit to appropriate that treated wastewater upon terms and conditions determined by the board. | 02/03/2011 - To ASSEMBLY Committee on WATER, PARKS AND WILDLIFE. |

# IRWD 2011 LEGISLATIVE MATRIX
## March 7, 2011

| Bill No. Author | Title | IRWD Position | Summary/Effects | Status |
|---|---|---|---|---|
| **AB 148** Smyth (R) | Local Government: Ethics Training: Disclosure | | Defines the term ethics laws, for purposes of training for officers and employees of a local government, to include compensation setting guidelines as established by specified organizations. Requires the local agency to post the ethics training record on the local agency's Internet Web site, if any, and to submit a copy of the record to the Attorney General. Requires a local agency that has adopted a written attendance compensation policy to post the policy on the local agency's Web site. | 02/03/2011 - To ASSEMBLY Committee on LOCAL GOVERNMENT. |
| **AB 157** Jeffries (R) | Safe, Clean and Reliable Drinking Water Supply Act | Oppose | Reduces the total amount of bonds authorized to be issued pursuant to the Safe, Clean and Reliable Drinking Water Supply Act of 2012. Makes conforming reductions to amounts specified to be allocated from these bond funds for certain purposes. | 02/24/2011 - To ASSEMBLY Committees on WATER, PARKS AND WILDLIFE and ENVIRONMENTAL SAFETY AND TOXIC MATERIALS. |
| **AB 262** Harkey (R) | California Regional Water Quality Control Boards | | Revises the description of the boundaries of the Santa Ana Regional Water Quality Control Board and the San Diego Regional Water Quality Control Board. | 02/18/2011 - To ASSEMBLY Committee on ENVIRONMENTAL SAFETY AND TOXIC MATERIALS. |
| **AB 275** Solorio (D) | Rainwater Capture Act of 2011 | | Enacts the Rainwater Capture Act of 2011, which authorizes landowners to install, maintain, and operate rain barrel systems and rainwater capture systems for specified purposes, provided that the systems comply with specified requirements. Authorizes a landscape contractor to enter into a prime contract for the construction of a rainwater capture system if the system is used for landscape irrigation. | 02/18/2011 - To ASSEMBLY Committees on BUS, PROFESSIONS & CONS PROTECTION and WATER, PARKS AND WILDLIFE. |
| **AB 403** Campos (D) | Public Drinking Water Standards: Hexavalent Chromium | | Requires the Department of Public Health to establish a primary drinking water standard for hexavalent chromium on or before a specified date. Provides that if a standard is not adopted by that date, the public health goal set by the Office of Environmental Health Hazard Assessment shall be the applicable standard. | 02/24/2011 - To ASSEMBLY Committee on ENVIRONMENTAL SAFETY AND TOXIC MATERIALS. |
| **AB 457** Wagner (R) | Public Works Contracts: Relief for Bidders | | Entitles a bidder who successfully challenges the award of a public works contract determined to be invalid due to errors or omissions of the public entity to recover costs and attorney's fees incurred in pursuing the challenge. | 02/15/2011 - INTRODUCED. |

# IRWD 2011 LEGISLATIVE MATRIX
## March 7, 2011

| Bill No. Author | Title | IRWD Position | Summary/Effects | Status |
|---|---|---|---|---|
| **AB 741** Huffman (D) | Onsite Wastewater Disposal Conversion | Sponsor | Amends an existing law authorizing an owner of property included within an assessment district for construction of a main trunkline or collector sewer lines to request the governing board to construct plumbing to connect his or her property to the adjoining public sewer system. Authorize specified entities, to use this provision for the purpose of converting properties from onsite septic systems and connecting them to the sewer system. | 02/17/2011 - INTRODUCED. |
| **AB 964** Huffman (D) | Environmental Protection: Contamination | | Requires the State Department of Public Health to adopt and implement a 10-year plan for sewer upgrades, including, but not limited to, onsite septic and sewer lateral upgrades. Relates to contractual assessments to finance onsite sewer and septic improvements. Permits onsite septic and sewer improvements to be installed to convert residential, commercial, industrial, agricultural, or other real property from an onsite septic system to community sewer collection service. | 02/18/2011 - INTRODUCED. |
| **SB 27** Simitian (D) | Public Retirement: Final Compensation: Computation | | Provides for public employee and teacher retirement. Provides that member and employer contributions credited to the Defined Benefit Supplemental Program would include remuneration earnable within a 5-year period in excess of 125% of that member's compensation earnable in the year prior to that 5-year period. | 01/20/2011 - To SENATE Committee on PUBLIC EMPLOYMENT AND RETIREMENT. |
| **SB 31** Correa (D) | Local Government: Lobbyist Registration | | States the intent of the legislature to enact legislation that will require each local government to create a lobbyist registration program as a condition of the local government being eligible to apply for any discretionary grant from any state agency or department. | 01/20/2011 - To SENATE Committee on RULES. |
| **SB 34** Simitian (D) | Water Infrastructure Projects: Fees | | Declares the intent of the Legislature to enact legislation to develop a fee-based system to pay for costs associated with updating and modernizing water infrastructure projects. Expresses legislative intent with respect to the imposition of the fees and use of the fee revenues. | 01/20/2011 - To SENATE Committee on RULES. |
| **SB 46** Correa (D) | Local Government: Compensation Disclosure | | Requires local government filers to annually file a compensation disclosure form. Requires the Secretary of State to develop the form. Requires a county, city, city and county, school district, special district, or joint powers agency that maintains an internet web site to post the information contained on the filed form on that web site. Authorizes a district attorney or any interested person to commence an action by mandamus to enforce these provisions. | 01/20/2011 - To SENATE Committee on GOVERNANCE AND FINANCE. |

# IRWD 2011 LEGISLATIVE MATRIX
## March 7, 2011

| Bill No. Author | Title | IRWD Position | Summary/Effects | Status |
|---|---|---|---|---|
| **SB 52** Steinberg (D) | Water Quality: Sacramento Regional Sanitation District | | Appropriates funds to the Department of Water Resources from the Safe Drinking Water, Water Quality and Supply, Flood Control, River and Coastal Protection Bond Act of 2006 to provide financial assistance to the Sacramento Regional County Sanitation District to offset rate increases associated with the costs of capital improvements to the district's regional sewage treatment plant. | 01/20/2011 - To SENATE Committee on ENVIRONMENTAL QUALITY. |
| **SB 215** Huff (R) | Invasive Aquatic Species: Mussels | | Deletes that repeal of existing law that generally prohibits a person from possessing, importing, shipping, or transporting in the state, or from placing, planting, or causing to be placed or planted in any water within the state, dreissenid mussels, and authorizes the Director of Fish and Game or his or her designee to engage in various enforcement activities. Provides that a person who violates or resists, delays, obstructs, or interferes with the implementation of these provision is subject to a penalty. | 02/17/2011 - To SENATE Committee on NATURAL RESOURCES AND WATER. |
| **SB 607** Walters (R) | Water Resources Board: Brackish Groundwater Sources | | Requires the Water Resources Control Board on a specified date after consultation and collaboration with the Department of Water Resources, to submit a report to the Legislature on impediments to the development of potable water from local brackish groundwater sources. | 02/17/2011 - INTRODUCED. |

# AB 741 – SEPTIC & SEWER IMPROVEMENT FINANCING

## Assemblymember Jared Huffman

## IN BRIEF

AB 741 would expand existing law to allow property owners to voluntarily enter into agreements with local wastewater agencies to finance needed sewer improvements. This bill would:

- Help private property owners finance the cost of converting from a septic system to a community sewer system and the replacement of damaged sewer laterals.

- Protect water quality, the environment and public health from contamination caused by leaking septic tanks, eroding pipes and other aging sewer infrastructure.

Many communities in California face threats from aging infrastructure. The conversion of septic systems to community sewer systems and the replacement of damaged sewer laterals are needed to protect water quality, the environment, and public health and safety. AB 741 (Huffman) would provide additional flexibility to wastewater agencies and voluntary options for willing property owners for financing of sewer improvements.

## Sewer Lateral Improvements

A sewer lateral is the pipe that transports wastewater from a building to the public sewer main in the street. Over time, laterals can become cracked, disjointed, or damaged by tree roots, earth settlement, and blockages caused by fats, oil, and grease, allowing wastewater to leak into the ground. Damaged laterals can also contribute to sewage blockages and backups and storm water overflows into the public system, as well as create harm to the environment and threaten public health.

The California State Water Resources Control Board requires wastewater agencies to maintain the public sewer systems, and agencies invest hundreds of millions of dollars in repair and improvements to publicly owned sewer mains and treatment facilities. However, the problem cannot be resolved solely by upgrading the community sewer system. Repair or replacement of sewer laterals is typically the responsibility of the homeowner, but there is no mandate requiring this maintenance. Private property owners must be given the tools to maintain private sewer laterals.

The costs of sewer lateral replacements for private property owners are high. A typical sewer lateral replacement can range from $1,500 to $4,000. Costs can increase significantly if there are obstructions such as landscaping, driveways, or structures built above the lateral.

Providing financing options to encourage private property owners to replace their damaged sewer laterals is essential to ensuring that public infrastructure, public health and the environment are protected.

## Septic Conversions

Currently, there are a number of California communities that operate on septic systems. Septic systems can be operated safely, but when they age or exceed the treatment capacity of regional soils, they can leak and contaminate surface waters, groundwater and sensitive coastal waters with disease-causing pathogens and nitrates.

Converting from a septic to sewer system protects water quality, the environment and public health by ensuring that wastewater is collected and conveyed to treatment and disposal facilities with minimal risk and increases water quality benefits.

The cost to convert a septic system to a sewer system can be expensive, including the clean up and removal or abandonment of the septic system as well as the costs of building the facilities needed to connect to the community sewer system. According to the Irvine Ranch Water District, the costs of conversion can range from $2,000 to $14,000 and if new or replacement pumps are needed, this can add an additional $10,000.

## EXISTING LAW

Health & Safety Code sections 5460-5464 authorize a property owner included within an assessment district to enter into an agreement with the local wastewater agency for the financing of sewer improvements needed to connect to a community sewer system when a Regional Water Quality Control Board has issued an abatement order.

## THIS BILL

AB 741 would authorize public wastewater agencies to offer voluntary liens to private property owners to finance lateral replacements and conversions from septic to sewer systems to prevent groundwater contamination and protect water quality, the environment, public health and safety.

## SUPPORT

Irvine Ranch Water District – Sponsor

## FOR MORE INFORMATION

Paige Brokaw, (916) 319-2715
Paige.Brokaw@asm.ca.gov

Maureen O'Haren, (916) 498-1900
maureen@oharen.com

March 14, 2011
Prepared, Submitted and
Approved by: P. Jones

CONSENT CALENDAR

PARTICIPATION IN UNIVERSITY OF CALIFORNIA IRVINE (UCI) GROUNDWATER RESOURCES MANAGEMENT INTERNATIONAL CONFERENCE

SUMMARY:

IRWD has received a request to contribute funding, participate in presentations and conduct a tour of certain District facilities for a conference entitled: *Groundwater Resources Management: Adaptation Measures to Water Scarcity – Science and Policy Response.* This conference is being organized by UCI and the United Nations Educational, Scientific and Cultural Organization (UNESCO), and is scheduled for late fall of 2011. Because of the District's expertise in the subject areas and our desire to continue to build our partnership with UCI on educational support, staff is recommending that IRWD:

1. Provide a $5,000 sponsorship for the conference;
2. Agree to prepare papers and participate in panel presentations in the areas of impaired groundwater treatment and groundwater storage and recovery (banking); and
3. Conduct an on-site lecture and tour of IRWD's Irvine Desalter and/or Deep Aquifer Treatment System project (DATS).

Participation in the conference as described above was reviewed and recommended by the Water Resources Policy and Communications Committee. The $5,000 conference sponsorship is within the General Manager's expenditure authority.

BACKGROUND:

The UCI School of Civil and Environmental Engineering with support from UNESCO's International Hydrological Programme office is conducting a conference on the UCI campus from November 30 through December 3, 2011, entitled: *Groundwater Resources Management: Adaptation Measures to Water Scarcity – Science and Policy Responses.* The conference is intended to attract a national and international audience and will focus on groundwater resources management and technology; including impaired groundwater treatment, groundwater storage and recovery (banking), indirect potable reuse of recycled water, and groundwater policy and governance strategies. UCI is seeking the support and participation of IRWD and Orange County Water District (OCWD) because of our expertise and successful practice in these areas. A similar conference, which was organized by the UCI Urban Water Research Center and UNESCO in 2008, attracted over 350 registrants from 51 countries. The first announcement of the conference is provided as Exhibit "A."

The conference is specifically being organized to include the exemplary groundwater management practices, projects and programs of Orange County and its water agencies. The program will also include broader policy topics regarding sustainable groundwater resource development, adapting groundwater management to global climate change, and models of effective groundwater governance. UCI has requested that IRWD and OCWD directly

participate in portions of the conference relating to innovative projects and programs for managing groundwater resources. This participation would include preparation of technical papers and participation in panel discussion sessions regarding IRWD's impaired water treatment projects (Irvine Desalter Project and DATS) and the District's integrated groundwater banking program in Kern County. OCWD has been asked to focus on the topics of indirect potable reuse and groundwater supply augmentation, with particular emphasis on the Groundwater Replenishment System project. IRWD and OCWD have also been asked to conduct on-site lectures and host tours of their respective facilities. A draft outline of the conference program is provided as Exhibit "B."

UCI has also requested that IRWD and OCWD each provide financial support for the conference. This support would help defray direct conference expenses for UCI and for some of the international conference participants. UCI has requested $10,000 from both IRWD and OCWD. However, in deference to the budget and given IRWD's proposed participation in the conference proceedings and hosting of a tour, staff believes a $5,000 financial participation level is more appropriate.

From a scheduling perspective, it should be noted that the event does partially overlap with the ACWA fall conference, which runs from Tuesday, November 28 through Friday, December 2, 2011. UCI has planned its conference from Thursday, November 30 through Saturday December 3, 2011, with IRWD's participation being on panels on Friday and a tour on Saturday.

FISCAL IMPACTS:

Staff recommends a sponsorship level for the conference of $5,000, plus staff time to prepare and give presentations and conduct tours of IRWD's facilities. Sufficient funds are available in the fiscal year 2010-11 budget for memberships and sponsorships through the General Manager's office. The amount of recommended funding is within the General Manager's expenditure authority.

ENVIRONMENTAL COMPLIANCE:

Not applicable.

COMMITTEE STATUS:

This item was reviewed at the Water Resources Policy and Communications Committee meeting on March 7, 2011.

RECOMMENDATION:

THAT THE BOARD SUPPORT IRWD'S PARTICIPATION IN THE UCI GROUNDWATER RESOURCES MANAGEMENT CONFERENCE.

LIST OF EXHIBITS:

Exhibit "A" – First announcement for: *Groundwater Resources Management: Adaptation Measures to Water Scarcity – Science and Policy Response*
Exhibit "B" – Draft conference program

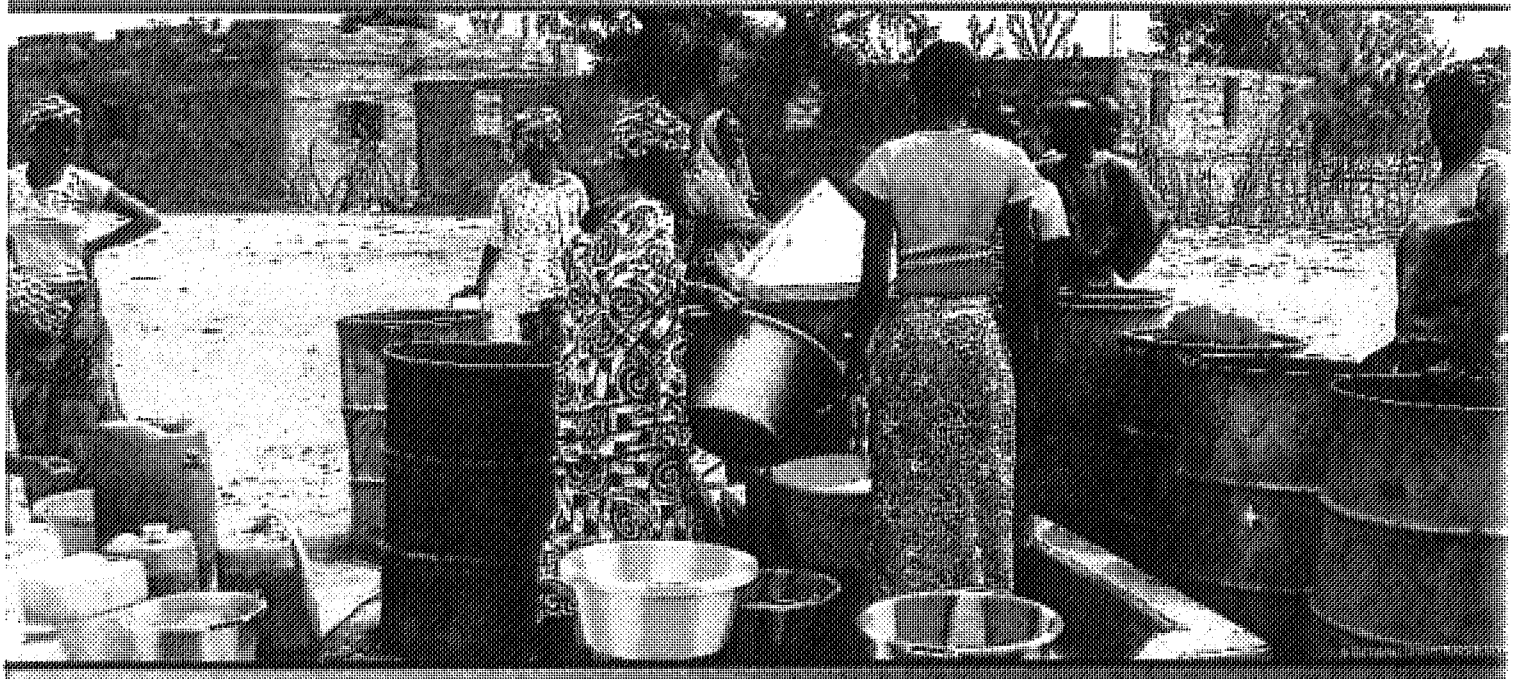
*Second International Conference*

# GROUNDWATER RESOURCES MANAGEMENT: ADAPTATION MEASURES to WATER SCARCITY

## Science and Policy Responses

30 November – 3 December 2011, Irvine, California, USA

First announcement

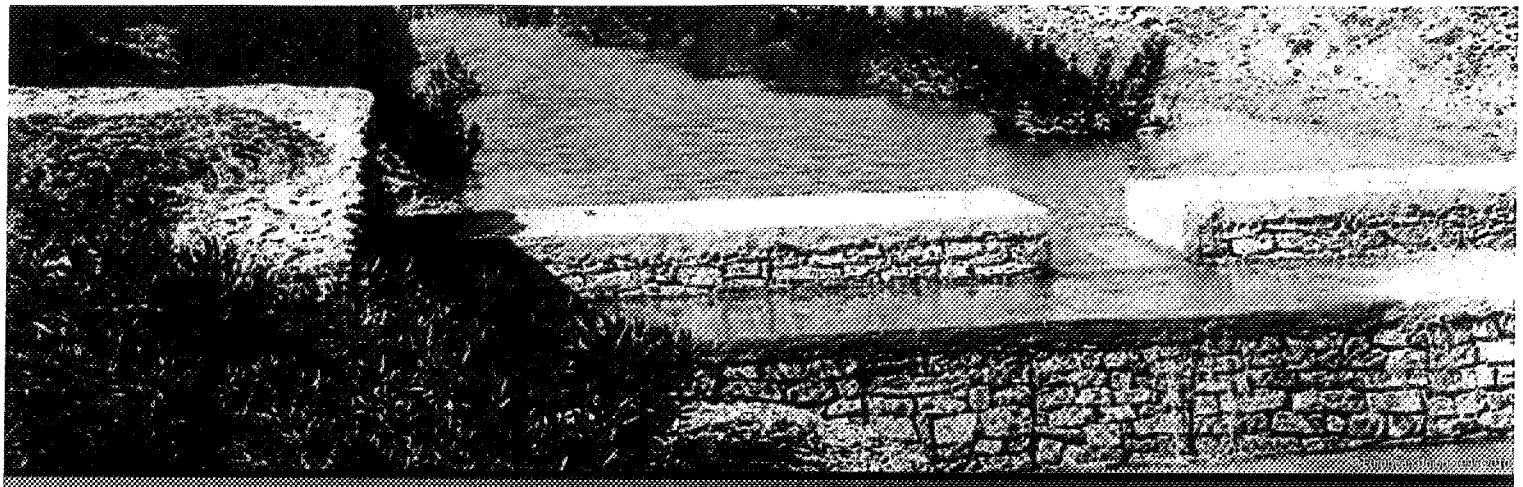


## Rationale

Groundwater resources play a unique role in responding to the challenges posed by water scarcity and climate change. The sustainable management of these resources provides essential adaptation solutions based on innovative methodologies and new technological approaches.

The Second UNESCO IHP 2011 Conference on 'Groundwater Resources Management: Adaptation Measures to Water Scarcity – Science and Policy Responses' will evaluate the progress made in groundwater management since the First Conference in 2008. It will also explore the areas where further progress can and should be made as well as identify the needs for legal, institutional and policy instruments and their links to science.

The Conference results will be presented at the 6th World Water Forum (March 2012, Marseille, France) and the Earth Summit Rio+20 (May 2012, Rio de Janeiro, Brazil).



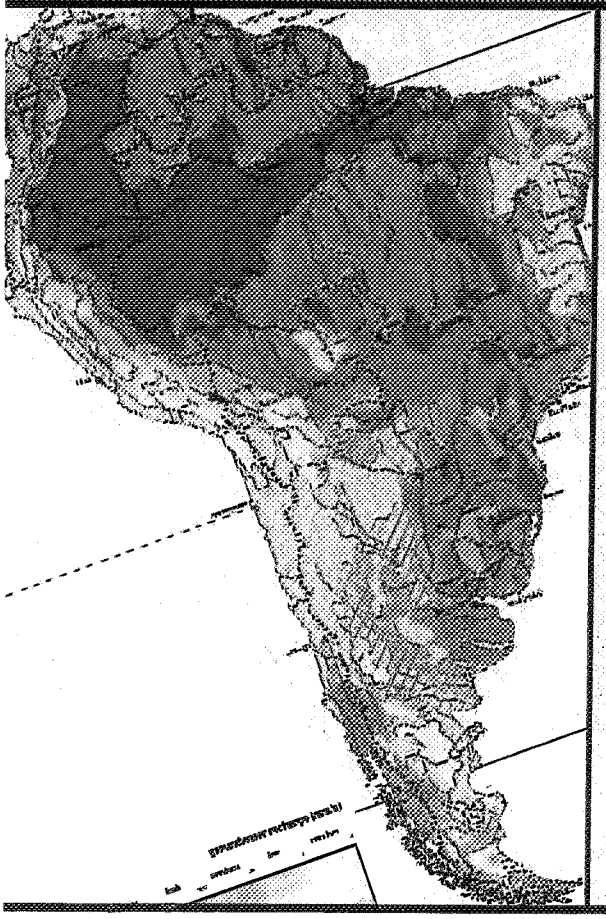
## Themes

I. Role of groundwater in adapting to the impacts of global and climate changes

II. Strengthening groundwater management for sustainable development

III. Innovative methods and technologies for groundwater management

IV. Groundwater education, cooperation and governance



## Objectives

- Share innovative methods and technologies to help alleviate clean-water scarcity and improve treated water supply and groundwater storage in arid and semi arid areas
- Explore mechanisms to develop and foster international cooperation for the rapid dissemination and implementation of best practices on groundwater management
- Promote the use of guidelines and methodologies for groundwater resources management to cope with climate change, natural disasters, water-related hazards and groundwater dependent ecosystems at risk
- Formulate relevant scientific and policy recommendations for sustainable groundwater management and governance
- Present the Conference main findings at the 6th World Water Forum (March 2012, Marseille, France) and the Earth Summit Rio +20 (May 2012, Rio de Janeiro, Brazil)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***Lucilla Minelli***
International Hydrological Programme (IHP)




United Nations Educational, Scientific and Cultural Organization · International Hydrological Programme

UNIVERSITY of CALIFORNIA · IRVINE

**EXHIBIT "B"**

| 2011 | CONFERENCE SESSIONS | | | 22 JAN 11 |
|---|---|---|---|---|
| **WED 30** | | | | |
| 6:00pm | **OPENING SESSION (with four speakers max)** | | | |
| 7:00pm | **Reception at Hotel** | | | |
| **TH 1 DEC** | **THEME I: Role of groundwater in adapting to the impacts of population and climate changes** | | | |
| 8:30-10:15 | Session I-1<br>**Elevate the role of groundwater at local, national, and international levels** | Session I-2<br>**Risk management including weather extermes and natural hazards** | Session I-3<br>**Coastal aquifers and small island** | Session I-4<br>**Groundwater and public health** |
| SC<br>Rap | | | | |
| 10:45-Noon | **Plenary Session I** | | | |
| Lunch | Hopefully, if budget allows - Keynote speakers from IHP and from CA on GW issues | | | |
| | **THEME II: Strenghening groundwater governance and management for sustainability** | | | |
| 1:30-3:15 | Session II-1<br>**Institutions for collective actions** | Session II-2<br>**Economic and financial responses** | Session II-3<br>**Point and non-point polution prevention and remediation** | Session II-4<br>**Groundwater dependent ecosystems** |
| Sc<br>Rap | | | **Feldman** | |
| 3:45-5:00 | **Plenary Session II** | | | |
| 6:30-9 | Dinner at hotel if funded | | | |
| **FRI 2 DEC** | **THEME III: Inovative methods and technologies** | | | |
| 8:30-10:15 | Session III-1<br>**Monitoring and satelite based techniques** | Session III-2<br>**Modelling and forecasting** | Session III-3<br>**Wastewater reuse and groundwater rechearge** | Session III-4<br>**Seasonal multi-year storage** * Groundwater Banking |
| SC<br>Rap | **Sorooshian** | | | |
| 10:45-Noon | **Plenary Session III** | | | |
| Lunch | | | | |
| | **THEME IV: Groundwater education for sustainable development** | | | |
| 1:30-3:15 | Session IV-1<br>**Public acceptability** | Session I V-2<br>**Irvine implementation Plan and the GW Regional Knowledge Transfer Centers** | Session IV-3<br>**international, and non-government organizations for GW development** | Session IV-4 |
| SC<br>Rap | | | | |
| 3:45-5:00 | **Plenary Session IV** | | | |
| **SAT 3** | | | | |
| 8:30-12:00 | **V: Workshops - Separate registration required (include bus fares)** | | | |
| | Workshop V-I<br>**Design and operation of seawater intrution barriers at Orange County Water District** | Workshop V-2<br>**Using sattelite date to manage groundwater basins** | Workshop V-3 *<br>**Integrating four different contaminated GW basins into a reclaimed water supply system** | Workshop V-4<br>**Design and 80 years of operation of river recharge of a groundwater basin** |
| Chair | | Famigletti | IMPAIRED GROUNDWATER TREATMENT PROJECTS | |
| 1:30-3:30 | **VI: Closing Session** | | | |

March 14, 2011
Prepared and
submitted by: P. Cook
Approved by: Paul Jones

CONSENT CALENDAR

## MEMBERSHIP IN CALDESAL

### SUMMARY:

Staff recommends IRWD become a member of CalDesal, effective Fiscal Year 2010/2011 at a cost of $5,000. Participation in CalDesal was reviewed and recommended by the Water Resources Policy and Communications Committee. The $5,000 membership cost is within the General Manager's expenditure authority.

### BACKGROUND:

CalDesal is a non-profit advocacy group recently established to advance the use of desalination of both ocean water and groundwater to help California meet its growing demands for water. The CalDesal Membership Flier and Application are attached as Exhibit "A".

CalDesal recently announced that it had hired Mr. Ron Davis as its Executive Director. Mr. Davis comes to this position after five successful years as the State Legislative Director for the Association of California Water Agencies. He brings to CalDesal a vast experience with water issues at the local, state and federal level, previous water agency experience and extensive legislative and water industry relationships. With Mr. Davis as its Executive Director, staff believes that CalDesal will become an effective organization for advocating the use of desalinated water.

For the reasons stated above, and because IRWD has and will continue to serve as a leader in the use of desalinated water, staff recommends that the Board approve IRWD joining CalDesal as a Founding Member.

### FISCAL IMPACTS:

The fiscal impact associated with joining CalDesal at this time is $5,000. Sufficient funds are available in the Fiscal Year 2010-11 budget for memberships and sponsorships through the General Manager's office. The cost of the membership is within the General Manager's expenditure authority.

### ENVIRONMENTAL COMPLIANCE:

Not applicable.

### COMMITTEE STATUS:

This item was reviewed at the Water Resources Policy and Communications Committee meeting on March 7, 2011.

RECOMMENDATION:

THAT THE BOARD SUPPORT IRWD'S MEMBERSHIP IN CALDESAL.

LIST OF EXHIBITS:

Exhibit "A" – CalDesal Membership Flier and Application

# CalDesal

# A Unified Voice for Water Desalination in the Golden State

Because desalination needs a strong and unified voice, there is now CalDesal. Ocean-water and groundwater desalination can play a major role in meeting California's future water needs, but this plentiful resource faces increasing challenges on a variety of fronts. Now is the time for California's water industry and water advocates to step up and be heard. CalDesal is where your voice will join with others, unified to affect real change for California's future.

## *How CalDesal Works for You*

As a non-profit managed by its members, CalDesal advocates in Sacramento and throughout the state for legislation and regulatory action to facilitate the use of desalination to help meet California's water-supply challenges. By joining together behind a singular, common cause, CalDesal members benefit from:

- Focused legislative and regulatory advocacy
- Grassroots organizing
- Insider news and information
- An opportunity to become part of the solution

**Special Founding Member Offer**

**For 2010/2011 Fiscal Year, public agency and associate memberships are both offered at just $5,000. Act now!**

**CalDesal Members Include:**

- Regional water utilities
- Special district water providers
- Cities and counties
- Water industry advocates
- Consultants

## *Why CalDesal?*

CalDesal is the only advocacy group in California solely dedicated to advancing the use of desalination. Other organizations choose not to engage, or address desalination as part of broader policy platforms. CalDesal's narrow focus allows for the most targeted, credible and persistent support for this important technology.

## *Now is the Time!*

With California in a declared "Water-Supply Emergency" and proposed solutions hinging upon increased precipitation or voter approval, there has never been a more important time to commit to locally produced desalinated water. Opponents of desalination are better funded and better organized than the water industry. But not for long! Help us engage, level the playing field and make desalination a reality.

**For more information or to join CalDesal contact**
**Paul Shoenberger at (949) 631-1206 or pauls@caldesal.org**

www.caldesal.org

CalDesal

| MEMBERSHIP APPLICATION | | |
|---|---|---|
| **MEMBER INFORMATION** | | |
| Agency Name: | | |
| Address: | | |
| City: | State: | ZIP Code: |
| ❑ Mr. ❑ Ms. ❑ Mrs. ❑ Dr. | | |
| Name: | | |
| Title: | | |
| Email: | | Phone: |
| Website: | | Fax: |
| **DUES BILLING INFORMATION** | | |
| Name of person to whom all dues-related materials should be sent: ❑ if same as member information | | |
| Name: | | |
| Title: | | |
| Address: | | |
| City: | State: | ZIP Code: |
| Email: | | Phone: |
| **MEMBERSHIP INFORMATION** | | |
| Name of person to whom all membership-related materials should be sent: ❑ if same as member information | | |
| Name: | | |
| Title: | | |
| Email: | | Phone: |
| **PAYMENT INFORMATION** | | |
| Mail completed application and $5,000 (voting) or $1,000 (non-voting) check payable to: CalDesal 1965 Placentia Avenue ♦ Costa Mesa ♦ CA ♦ 92627 | | |
| Questions? Contact Paul Shoenberger at (949) 631-1206 or pauls@caldesal.org | | |

March 14, 2011
Prepared by: G. Maswadeh
Submitted by: J. Wells
Approved by: P. Jones

CONSENT CALENDAR

REVISED PERSONNEL POLICIES AND PROCEDURES

SUMMARY:

Staff has developed the Personnel Policies and Procedures to consistently address personnel-related issues at the Irvine Ranch Water District. Revisions to any of these policies must be approved by the IRWD Board of Directors from time-to-time to keep current with state and federal law, to adopt best practices in administering Human Resource policy, and to correctly reflect practices adopted in conducting District business.

Staff has reviewed the policies and identified a need for revisions to the policies and recommends that the Board:

- Adopt a resolution rescinding Resolution No. 2008-60 revising Appendix A-1 to its Conflict of Interest code and readopting Conflict of Interest Code and Appendix A-2; and
- Adopt a resolution rescinding Resolution No. 2008-61 and establishing revised Personnel Policies (for Policy No. 45)

BACKGROUND:

The regulations of the FPPC contained in the California Administrative Code Title 2, Section 18730, require that the Board of Directors adopt and amend from time to time its Conflict of Interest Code, Appendix "A-1", containing the list of designated persons who must disclose certain categories of economic interest under the Code, and Appendix "A-2" to the Conflict of Interest Code, containing the economic interest that must be reported in the various reporting categories specified for designated persons under the Code. At the direction of the County of Orange, the District's appendices are being amended to conform to the new format required by the State and County to provide ease of retrieval of information by the general public as provided in Exhibit "C".

Policy No. 45 – Conflict of Interest: Policy has been revised to reflect recent position title changes. Policy has been changed to comply with Regulation 18944.1 of Title 2 of the Fair Political Practices Commission, establishing a policy for the distribution of tickets and/or passes as provided in Exhibit "C".

All policy revisions have been reviewed and approved by appropriate legal counsel as to form and content.

FISCAL IMPACTS:

None.

ENVIRONMENTAL COMPLIANCE:

Not applicable.

COMMITTEE STATUS:

This item was reviewed by the Finance and Personnel Committee on March 9, 2011.

RECOMMENDATION:

THAT THE BOARD APPROVE REVISIONS TO POLICIES AS LISTED ABOVE AND ADOPT THE FOLLOWING RESOLUTIONS BY TITLE:

RESOLUTION NO. 2011 -

RESOLUTION OF THE BOARD OF DIRECTORS OF
IRVINE RANCH WATER DISTRICT RESCINDING
RESOLUTION NO. 2008-60, ADOPTING REVISED APPENDIX "A-1"
TO ITS CONFLICT OF INTEREST CODE AND READOPTING
CONFLICT OF INTEREST CODE AND APPENDIX "A-2"

RESOLUTION NO. 2011 -

RESOLUTION OF THE BOARD OF DIRECTORS OF
IRVINE RANCH WATER DISTRICT,
RESCINDING RESOLUTION NO. 2008-61 AND
ESTABLISHING REVISED PERSONNEL POLICY 45

LIST OF EXHIBITS:

Exhibit "A" – Resolution establishing revised Conflict of Interest code, including Appendices "A-1", "A-2" and rescinding Resolution No. 2008-60 dated October 13, 2008
Exhibit "B" – Resolution establishing revised personnel policies and rescinding Resolution No. 2008-61 dated October 13, 2008
Exhibit "C" – Proposed revisions to Personnel Policy No. 45 – Conflict of Interest

Exhibit "A"

RESOLUTION NO. 2011 -

RESOLUTION OF THE BOARD OF DIRECTORS OF
IRVINE RANCH WATER DISTRICT RESCINDING
RESOLUTION NO. 2008-60, ADOPTING REVISED APPENDIX "A-1"
TO ITS CONFLICT OF INTEREST CODE AND READOPTING
CONFLICT OF INTEREST CODE AND APPENDIX "A-2"

WHEREAS; in accordance with the provisions of Section 18730 of the regulations of the Fair Political Practices Commission, contained in California Administrative Code Title 2, Section 18109, et. seq. (the "FPPC Regulations"), the Board of Directors of the Irvine Ranch Water District ("IRWD") has adopted and amended from time to time its Conflict of Interest Code, Appendix "A-1" to the Conflict of Interest Code, containing the list of designated persons who must disclose certain categories of economic interests under the Code, and Appendix "A-2" to the Conflict of Interest Code that must be reported in the various reporting categories specified for designated persons under the Code; and

WHEREAS, by adoption of Resolution No. 2008-60 on October 13, 2008, this Board readopted its Conflict of Interest Code and Appendix "A-2" (without change), and revised the list of designated persons who must disclose certain categories of economic interests under the Code; and

WHEREAS, the Board desire to readopt its Conflict of Interest Code for the purpose of further revising the Appendix "A-1" list of designated persons who must disclose certain categories of economic interests under the Code, and making certain other changes.

NOW, THEREFORE, the Board of Directors of the Irvine Ranch Water District DOES HEREBY RESOLVE, DETERMINE AND ORDER AS FOLLOWS:

Section 1. Resolution No. 2008-60 be and hereby is rescinded in its entirety, effective upon approval of the IRWD Conflict of Interest Code, including amended Appendix "A-1", by the Board of Supervisors of the County of Orange.

Section 2. The terms of Section 18730 of the FPPC Regulations, as such section may be amended from time to time, which terms are by this reference incorporated herein, shall continue to constitute, and are readopted as, the IRWD Conflict of Interest Code.

Section 3. Appendix "A-1" to the IRWD Conflict of Interest Code be and the same is hereby amended and adopted to read as set forth in Exhibit 1 to this resolution. Appendix "A-2" set forth in Exhibit 2 to this resolution, is readopted without change. Such exhibits are attached hereto and by this reference incorporated herein.

Section 4. The Secretary of IRWD is hereby authorized and directed to file this resolution and the attached exhibits with the Board of Supervisors of Orange County and to request approval thereof.

ADOPTED, SIGNED and APPROVED this 14th day of March, 2011.

_____

President, IRVINE RANCH WATER DISTRICT
and of the Board of Directors thereof

_____

Secretary, IRVINE RANCH WATER DISTRICT
and of the Board of Directors thereof

APPROVED AS TO FORM:
BOWIE, ARNESON, WILES & GIANNONE
IRWD Legal Counsel

By _____

Exhibit "B"

RESOLUTION NO. 2011 -

RESOLUTION OF THE BOARD OF DIRECTORS OF
IRVINE RANCH WATER DISTRICT, RESCINDING
RESOLUTION NO. 2008-61 AND
ESTABLISHING REVISED PERSONNEL POLICIES
(FOR POLICY NO. 45)

WHEREAS, the Irvine Ranch Water District (IRWD) is a California Water District formed pursuant to Division 13 of the Water Code of the State of California; and

WHEREAS, Section 34900 of said Code provides that the Board of Directors shall employ and appoint such agents, officers and employees as may be required and prescribe their duties and fix their salaries; and

WHEREAS, by adoption of Resolution No. 2008-61 dated October 13, 2008, the Board established revised Personnel Policies; and

WHEREAS, the Board of Directors of Irvine Ranch Water District deem it advisable and in the best interest of said District to revise Personnel Policies as follows:

> Policy No. 45 – Conflict of Interest has been revised to update Appendix A-1 of the Conflict of Interest Code listing designated persons. Additionally, Appendices "B-1" and "B-2" have been added to conform with Section 18944.1 of Title 2 of the California Code of Regulations, as amended by the Fair Political Practices Commission.

NOW, THEREFORE, the Board of Directors of Irvine Ranch Water District hereby resolve, determine and order as follows:

Section 1. That Resolution No. 2008-61 be and hereby are rescinded in their entirety.

Section 2. That the Finance and Personnel Committee be authorized to approve exceptions to the District's Personnel Policies and procedures as long as those exceptions do not violate the general intent of the policy and/or procedure and are made in the best interest of the overall operations of the District. Any changes made by Committee are to be reported to the Board of Directors.

Section 3. That the Personnel Policies for Irvine Ranch Water District be, and hereby are, approved and adopted as more specifically set forth in Exhibit "A" of this Resolution, attached hereto and by this reference made a part hereof.

ADOPTED, SIGNED AND APPROVED this 14th day of March, 2011.

_____

President, IRVINE RANCH WATER DISTRICT
and of the Board of Directors thereof

_____

District Secretary, IRVINE RANCH WATER DISTRICT
and of the Board of Directors thereof

APPROVED AS TO FORM;
BOWIE, ARNESON, WILES AND GIANNONE
Legal Counsel - IRWD

By _____

Exhibit "C"

# IRVINE RANCH WATER DISTRICT

# PERSONNEL POLICIES AND PROCEDURES MANUAL

## POLICY NO. 45 - CONFLICT OF INTEREST

### 1. Purpose of Policy

The purpose of this Conflict of Interest Policy is to ensure that all District personnel comply with all applicable statutory and administrative requirements pertaining to their actions, duties and responsibilities on behalf of or in relation to the District. These matters are not limited to, but include, "conflicts of interests," "potential conflicts of interest," "incompatible offices" and other activities which might reflect adversely on the District or District personnel.

District personnel shall conduct themselves in a manner so as not to give rise to improprieties or situations inconsistent with this Policy. Procedures, policies and records shall be established and maintained to verify that the Policy has been adhered to by all District personnel. District personnel shall recognize that this Policy and applicable laws are concerned with not only actual conflict or wrongdoing but the potential or appearance of conflict. District employees shall not use the prestige or influence of their positions for personal gain or advantage.

Unless otherwise expressly defined, the terms used in this Policy shall have the same meanings as in the Political Reform Act (Title 9 of the California Government Code) and the regulations issued by the Fair Political Practices Commission (FPPC) pursuant to the Political Reform Act.

### 2. Employee Responsibility

#### A. Compliance with Applicable Laws and Regulations

All District personnel shall comply with all applicable provisions of the Political Reform Act, the FPPC Regulations issued under the Political Reform Act, Section 1090 *et seq.* of the California Government Code (prohibitions on self-interest in contracts), and all other laws and regulations pertaining to conflicts of interest and incompatible public offices. These include, but are not limited, to the following requirements:

(1) **Reporting** of economic interests required annually, and upon assuming office and leaving office, by employees who are "Designated Persons" (as defined in the District's Conflict of Interest Code, Appendix A-1) on FPPC Form 700];

(2) Compliance with **prohibitions on acceptance of gifts and honoraria** above the dollar limit per source set pursuant to state law;

(3) **Disqualification** from participation in District decisions in which the employee knows or has reason to know the employee has a financial interest.

**NOTE: The following requirements established by the District in this Policy are *in addition to* the requirements of state laws and regulations:**

**B. Gifts to the District**

Unless a gift qualifies as a gift to the District under this section, it will be treated as a gift to the employee. A gift of passes or tickets (not including travel or lodging) may be considered a gift to the District and not to an individual employee only under the following circumstances: (1) the General Manager receives and distributes the tickets or passes to employees, spouses and immediate families, and the donor does not earmark them for any specific employee(s), and the General Manager retains a record of the terms under which the tickets or passes were accepted by the District and the terms under which they were distributed and to whom they were distributed; (2) the tickets or passes are ~~for an event in a public facility under the District's jurisdiction and the General Manager distributes them only to employees, spouses and immediate families; or (3) the tickets or passes are for the use of a District employee, spouse and immediate family because the employee has an official or ceremonial role or function to perform on behalf of the District at the event in question~~distributed in accordance with the written policy adopted by the District setting forth the District purpose in distributing passes and tickets and prohibiting the subsequent transfer except to the official's immediate family for their personal use (see Appendix "B-1"). .

~~A payment~~ A payment (a gift other than passes or tickets, including a monetary payment, loan, gift, and a payment for or provision of goods or services, as long as it is not in excess of an applicable District reimbursement rate for travel, meals, lodging or other expenses) may be considered a gift to the District and not to an individual employee only under the circumstances allowed in the FPPC regulations. These include the following: the General Manager or his/her designee receives and controls the payment, the payment is used only for official District business, the General Manager determines which employee(s) shall use the payment, the donor does not earmark them for any specific employee(s), and a record of all of the foregoing is filed and maintained with the District Secretary within 30 days of receipt of the payment and is posted by the District Secretary on the District's website. A payment to the District cannot include travel expenses for an elected official or any official who manages public investments (these officials are designated by the District in the District's Conflict of Interest Code), or any travel that the General Manager or his/her designee has not preapproved in writing before the date of the trip.

All gifts to the District must be submitted with either the "Gift of Tickets or Passes to Irvine Ranch Water District" or "Gift to Irvine Ranch Water District (Other Than Tickets or Passes)" form to the General Manager's Office for approval and distribution. These forms can be obtained from the District Secretary and must be approved by the General Manager or his/her designee.

## C. Entertaining

District personnel who, for District business purposes, must dine and/or entertain vendors, contractors or consultants, shall do so at their own expense. Reimbursement of such expenses shall be subject to approval and shall be limited by the District's policy with respect to allowance of expenses. [Resolution No. 1993-35, as amended from time to time.]

## D. Outside Consulting, Business Activity or Employment

All outside business, enterprise, consulting work or employment must be pre-approved by the General Manager or, in the case of the General Manager, by the President of the Board of Directors.

District personnel are prohibited from performing consulting work for or providing any other services or goods to any persons or firms doing business with the District.

District personnel shall not engage in any employment, activity, or enterprise which is inconsistent, incompatible or in conflict with their duties as District employees or with the duties, functions, or responsibilities of the District. District personnel shall not perform any business, enterprise, work, service, or counsel outside of their District employment where any part of their efforts will be subject to approval by any other officer, employee or board of the District, unless otherwise approved in the manner prescribed by this Policy.

An employee's outside employment, activity, business or enterprise may be prohibited if it: (1) involves the use for private gain or advantage of his or her District time, facilities, equipment and supplies; or the badge, uniform, prestige, or influence of his or her District office or employment or, (2) involves receipt or acceptance by the employee of any money or other consideration from anyone other than the District for the performance of an act which the employee, if not performing such act, would be required or expected to render in the regular course or hours of his or her District employment or as a part of his or her duties as a District employee or, (3) involves the performance of an act in other than his or her capacity as a District employee which act may later be subject directly or indirectly to the control, inspection, review, audit, or enforcement of any other District employee or the District, or (4) involves efforts or time demands as would render performance of his or her duties as a District employee less efficient. The General Manager (or the President, in the case of the General Manager) will notify the employee whether any outside employment, consulting work, activity, business or enterprise is approved or disapproved. Appeal from such determination may be made to the Board of Directors.

Nothing in this Section shall relieve employees from the requirement to report and other requirements applicable to outside employment, consulting work, activity, business or enterprise under Sections 2A of this Policy.

## 3. Disciplinary Actions for Non-Compliance

Non-compliance with this Policy shall subject the employee to disciplinary actions commensurate with the violation, up to and including termination.

## 4. Administration

The District Secretary shall be responsible for administration of this Policy, under the direction of the Board of Directors, the General Manager and, if necessary, the Director of Human Resources.

**APPROVED:**

| | |
|---|---|
| _____ | ~~October 13, 2008~~March 14, 2011 |
| **Director of Human Resources** | **Date** |
| _____ | ~~October 13, 2008~~March 14, 2011 |
| **General Manager** | **Date** |

~~**Archived 5/12/08**~~

**NOTE: APPENDIX "A-1" set forth below is contained in the District's Conflict of Interest Code, as amended from time to time. Any amendment to APPENDIX "A-1" will automatically be included in this Policy No. 45.**

## Irvine Ranch Water District

APPENDIX "A-1"

DESIGNATED PERSONS FOR DISCLOSURE PURPOSES
PURSUANT TO CONFLICT OF INTEREST CODE [1]

The persons occupying the following positions are designated persons and must disclose the economic interests defined in the disclosure categories of Appendix "A-2," using the Form 700 schedules listed in the table below:

| **Designated Persons** | **Disclosure Categories** | **Schedules Associated** |
|---|---|---|
| Group I<br><br>District Secretary<br>Assistant Secretary of the District<br>Director of Engineering and ~~Planning~~Construction<br>Director of Water Operations<br>Director of Wastewater Operations<br><br>Director of Water Quality<br>Director of Planning & Water Resources ~~& Environmental Quality~~<br>General Legal Counsel | 1, 2 and 3 | All |
| Group II<br><br>Director of Public Affairs<br>Director of Human Resources<br>Director of Administrative Services<br>Manager of Contracts Administration and Risk<br>Customer Service Manager<br>Environmental Quality Manager<br>Process Automation Manager<br>Purchasing Manager<br>Purchasing Supervisor<br>Principal Engineer<br>Senior Engineer<br>Assistant Director of ~~Public Affairs~~Water Operations<br>Electrical Maintenance Manager<br>Mechanical Maintenance Manager<br>Facilities ~~Services~~& Fleet Manager<br>Principal Water Resources Manager | 2 and 3 | A-1, A-2, C, D and E |
| **Designated Persons** | **Disclosure Categories** | **Schedules Associated** |
| Group III<br><br>Assistant Controller<br>Analyst<br>Administrative Assistant<br>Assistant Construction & Repair Manager<br>Assistant Engineer/ Planner<br>Assistant Facilities & Fleet Manager | 6 | D, E |

[1] The persons holding the following positions are "public officials who manage public investments" within the meaning of that term as used in Government Code Section 87200 and are required to make full disclosure of all economic interests as required in Form 700: members of the Board of Directors, General Manager, Assistant General Manager, Director of Finance/Controller, Treasurer, Assistant Treasurer and Investment Manager.

| | | |
|---|---|---|
| Assistant Water Operations Manager<br>Associate Engineer/ Planner<br>Buyer<br>Collection Systems Manager<br>Conservation Analyst<br>Conservation Specialist<br>Conservation Manager<br>Construction & Repair Manager<br>Construction Inspection Manager<br>Construction Inspector I, II, III<br>Cross Connection Supervisor<br>Customer Service Supervisor<br>District Safety & Security Manager<br>Electrical and Controls Project Manager<br>Engineer/Planner<br>Engineering Technician II, III<br>Environmental Compliance Specialist<br>Environmental Project Coordinator<br>Facilities Services Supervisor<br>Fleet Supervisor<br>Human Resources Manager<br>Laboratory Manager<br>Laboratory Supervisor<br>~~Legislative Affairs Specialist~~<br>Material Control Clerk I/II<br>Operations Manager<br>Operations Supervisor<br>Principal Analyst<br>Public Affairs Manager<br>Purchasing Coordinator<br>Recycled Water Development Manager<br>Recycled Water Project Specialist<br>Recycled Water Systems Specialist<br>Regulatory Compliance Manager<br>Right-of-Way Agent<br>Senior Analyst<br>Senior Buyer<br>Senior Conservation Specialist<br>Senior Debt/Investment Analyst<br>Senior Government Affairs Specialist<br>Senior Programmer/Analyst<br>Senior Vehicle/Equipment Maintenance Mechanic<br>Senior Recycled Water Systems Specialist<br>Water Maintenance Supervisor<br>Water Maintenance Manager<br>Water Resources Supervisor<br>Water Resources Manager | | |
| **Designated Persons** | **Disclosure Categories** | **Schedules Associated** |
| Group IV<br>Engineering Consultants[2]<br>Special Legal Counsel[2] | 1, 4 and 5 | All |
| Group V<br>Financial Consultants[2] | 4 and 5 | A-1, A-2, C, D and E |

[2] Consultants shall be included in the list of DESIGNATED PERSONS and shall disclose pursuant to the disclosure categories specified, subject to the following limitation:

The General Manager may determine in writing that a particular consultant, although a "designated person," is hired to perform a range of duties that is limited in scope and thus is not required to fully comply with the disclosure requirements described in the Code. Such written determination shall include a description of the consultant's duties and, based upon that description, a statement of the extent of disclosure requirements. The General Manager's determination is a public record and shall be retained for public inspection in the same manner and location as this Conflict of Interest Code.

**NOTE: APPENDIX "A-2" set forth below is contained in the District's Conflict of Interest Code, as amended from time to time. Any amendment to APPENDIX "A-2" will automatically be included in this Policy No. 45.**

## Irvine Ranch Water District

APPENDIX "A-2"

ECONOMIC INTERESTS THAT MUST BE REPORTED
PURSUANT TO CONFLICT OF INTEREST CODE

Category 1:

Interests in real property

Category 2:

Investments in or income (including loans, gifts and travel payments) from business entities which manufacture, distribute, lease, retail, or sell items which are, or which have been or foreseeably could be, utilized or procured by IRWD, including, but not limited to, any of the following:

1. Office equipment and supplies
2. Computer hardware and software
3. Printing, reproduction or photographic equipment and supplies
4. Periodicals, books, newspapers
5. Chemicals
6. Petroleum products
7. Motor vehicles and specialty vehicles, parts and supplies
8. Construction and maintenance equipment and supplies
9. Safety equipment and supplies
10. Food supplies
11. Water quality equipment and supplies
12. Cathodic protection equipment and supplies
13. Educational equipment and supplies
14. Medical supplies and informational materials
15. Landscape supplies
16. Pipes, valves, fittings, pumps, meters and similar items

Category 3:

Investments in or income (including loans, gifts and travel payments) from business entities which contract or subcontract for, or consult in, the performance of work or services which are, or which have been or foreseeably could be, utilized or procured by IRWD, including, but not limited to, any of the following:

1. Public utilities
2. Financial audit and accounting services
3. Insurance services
4. Construction and maintenance services
5. Transportation and lodging services
6. Security services
7. Banking, savings and loan services
8. Food services
9. Communication services
10. Water quality testing
11. Cathodic protection services
12. Engineering, architectural and construction inspection services
13. Employment and temporary help services
14. Educational and medical services
15. Landscape and topographical services
16. Equipment rentals
17. Real estate, appraisal and investment services
18. Consulting services in: legal, energy and power, soils testing, water treatment, data processing, computers, labor relations, employee training, advertising, design, audio visual, movie production, planning, water pricing and demand, economics, desalting, environmental analysis
19. Printing and reproduction services

Category 4:

Investments in or income (including loans, gifts and travel payments) from business entities which manufacture, distribute, lease, retail, or sell items which are recommended or suggested by you in your capacity as a consultant to IRWD, including, but not limited to, the items listed under Category 2.

Category 5:

Investments in or income (including loans, gifts and travel payments) from business entities which contract or subcontract for, or consult in, the performance of work or services which are recommended or suggested by you in your capacity as a consultant to IRWD, including, but not limited to, the items listed under Category 3.

Category 6:

Gifts and travel payments from

(A) business entities which manufacture, distribute, lease, retail, or sell items which are, or which have been or foreseeably could be, utilized or procured by IRWD, including, but not limited to, the items listed under Category 2, and

(B) business entities which contract or subcontract for, or consult in, the performance of work or services which are, or which have been or foreseeably could be, utilized or procured by IRWD, including, but not limited to, the items listed under Category 3.

APPENDIX "B-1"

Policy for Distribution of Tickets or Passes in accordance with
Fair Political Practices Commission (FPPC)
Regulation 18944.1 of Title 2 of the California Code of Regulations

## 1. Purpose of Policy

To ensure that tickets provided to and distributed by the Irvine Ranch Water District (IRWD) are in furtherance of a governmental and/or public purpose as required under Regulation 18944.1 and this policy.

To ensure that tickets distributed by IRWD under Regulation 18944.1 and this policy are disclosed on FPPC Form 802 (see Appendix "B-2") and posted to IRWD's website within 30 days of distribution as required by Regulation 18944.1.

## 2. Application of Policy

### A. Types of Tickets

This policy applies to tickets that provide admission to a facility, event, show, or performance for an entertainment, amusement, recreational, or similar purpose and are either:

(1) gratuitously provided to IRWD by an outside source:
(2) acquired by IRWD by purchase;
(3) acquired by IRWD as consideration pursuant to the terms of a contract for the use of an IRWD venue; or
(4) acquired and distributed by IRWD in any other manner.

### B. Policy Applicable to Tickets Only

This policy shall only apply to IRWD's distribution of tickets to, or at the behest of, a District Official. This policy does not apply to other items of value provided to the District or any District Official, regardless of whether received gratuitously or for which consideration is provided. This includes food, beverage, or a gift provided to a District Official at an event that is not included in the fair market value of the ticket.

## 3. Definitions

Unless otherwise expressly provided herein, words and terms used in this policy shall have the same meaning as that ascribed to such words and terms in the California Political Reform Act of 1974 (Government Code Section 81000 et seq., as the same may from time to time be amended) and the FPPC Regulations (Title 2, Division 6 of the California Code of Regulation, Section 18110 et seq., as the same may from time to time be amended).

A. "IRWD" or "District" shall mean and include the Irvine Ranch Water District and any other affiliated agency created or activated by the District, and any departments, boards, and commissions thereof.

B. "District Official" shall mean and refer to every member, officer, employee, or consultant of the Irvine Ranch Water District, as defined by Government Code Section 82048 and FPPC Regulation 18701. Such terms shall include, without limitation, any District boardor committee member or other appointed official or employee required to file an annual Statement of Economic Interest (FPPC Form 700).

C. "Immediate family" shall mean and refer to spouse and dependent children.

D. "Policy" shall mean and refer to this Policy for Distribution of Tickets and/or Passes.

E. "Ticket" shall mean and refer to a "ticket or pass" for admission privilege to a facility, event, show, or performance for an entertainment, amusement, recreational, or similar purpose.

**4. General Provisions**

**A. No Right to Tickets**

The use of tickets is a privilege extended by the District and not the right of any person to which the privilege may from time to time be extended.

**B. Limitation on Transfer of Tickets**

Tickets distributed to a District Official pursuant to this policy shall not be transferred to any other person except to members of such District Official's immediate family solely for their personal use.

**C. Prohibition Against Sale of or Receiving Reimbursement for Tickets**

No person who receives a ticket pursuant to this policy shall sell or receive reimbursement for the value of the ticket.

**D. No Earmarking of Ticket Given to District**

No ticket gratuitously provided to the District by an outside source and distributed by the District to, or at the behest of, a District Official pursuant to this policy shall be earmarked by the original source for provision to a particular District Official.

**5. Ticket Administrator**

A. The General Manager or his/her designee shall be the ticket administrator for purposes of implementing the provisions of this policy.

B. The General Manager or his/her designee shall have the authority, in his or her discretion, to establish procedures for the purchase and/or distribution of tickets in accordance with this policy. All requests for tickets that fall within the scope of this policy shall be made in accordance with the procedures established by the General Manager or his/her designee.

C. The General Manager or his/her designee shall determine the face value of tickets distributed by the District for the purposes of sections 6.A., 6.B., and 8.D.(1) of this policy.

D. The General Manager or his/her designee, in his or her discretion, may revoke or suspend the ticket privileges of any person who violates any provision of this policy.

**6. Conditions Under Which Tickets May be Purchased and/or Distributed**

Subject to the provisions of this policy, complimentary tickets may be distributed to District Officials under the following conditions:

A. The District Official reimburses the District for the face value of the ticket(s).

1. Reimbursement shall be made at the time the ticket(s) is/are distributed to the District Official.

2. The General Manager or his/her designee shall, in his or her discretion, determine which event tickets, if any, shall be available under this section.

B. The District Official treats the ticket(s) as income consistent with applicable federal and state income tax laws.

C. The District Official uses, or behests, such ticket(s) for one or more of the following governmental and/or public purposes:

(1) Facilitating the attendance of a District Official at an event where the job duties of the District Official require his or her attendance at the event.
(2) Promotion of intergovernmental relations and/or cooperation and coordination of resources with other governmental agencies, including, but not limited to, attendance at an event with or by elected or appointed public officials from other jurisdictions, their staff members and their guests.
(3) Promotion of District resources and/or facilities available to the public.
(4) Promotion of District-run, sponsored, or supported community programs or events.
(5) Promoting, supporting, and/or showing appreciation for programs or services rendered by charitable and non-profit organization benefiting District customers.
(6) Promotion of business or economic activity, development, and/or redevelopment within the District's service area.
(7) Exchange programs with foreign officials and dignitaries.
(8) Promotion of District recognition, visibility, and/or profile on a local, state, national, or international level.
(9) Promotion of open government by District Official appearances, participation, and/or availability at business and/or community events.
(10) Increasing public exposure to, and awareness of, the various educational venues and facilities available to the public through the District.
(11) Attracting or rewarding volunteer service.
(12) Encouraging or rewarding significant academic, athletic, or public service achievements by students, residents, or businesses within the District service area.
(13) Attracting and retaining highly qualified employees in District service; recognizing or rewarding meritous service by a District employee; and/or promoting enhanced District employee performance or morale.
(14) Recognizing contributions made to the District by former District Board Members, District Employees, or other District Officials.

**7. Tickets Distributed at the Behest of a District Officials**

A. Only the following District Officials shall have the authority to behest tickets: Elected or Appointed Board of Directors Members, the General Manager, and his/her designee.

B. Tickets shall be distributed at the behest of a District Official only for one or more public purposes set forth in section 6.C.

**8. Disclosure Requirements**

A. This policy shall be posted on the District website in a prominent manner.

B. Tickets provided to District Officials as part of their official duties, or tickets provided so that the District Official may perform a ceremonial role or function on behalf of the

District are not to be subject to this policy and are exempt from any disclosure requirements under section 8. A ceremonial role or function includes, but is not limited to, making a speech, participating in a panel or seminar, presenting an award or proclamation, or cutting a ribbon.

C. Tickets distributed by the District for which the District receives reimbursement from the District Official as provided under Section 6.A. shall not be subject to the disclosure provisions of Section 8.

D. Tickets distributed by the District to any District Official either 1) which the District Official treats as income pursuant to Section 6.B. or 2) for one or more public purposes described in section 6.C., shall be disclosed on Form 802 provided by the FPPC in a prominent fashion on the District's website within 30 days after distribution. Such posting shall include the following information:

(1) The name of the recipient, except that if the recipient is an organization, the District may post the name, address, description of the organization, and number of tickets provided to the organization in lieu of posting the names of each recipient;
(2) a description of the event;
(3) the date of the event;
(4) the face value of the ticket;
(5) the number of tickets provided to each person;
(6) if the ticket is distributed at the behest of a District Official, the name of the District Official who made such behest; and
(7) a description of the public purpose(s) under which the distribution was made, or, alternatively, the District Official is treating the ticket as income.

# Tickets Provided by Agency Report

California Form 802

A Public Document

This form is for use by all state and local government agencies to disclose the distribution of tickets or passes that allow admission to facilities, events, shows, or performances for entertainment, amusement, recreational, or similar purposes. The agency must complete Form 802 identifying agency officials who receive tickets or passes from the agency as well as other individuals and organizations that receive tickets or passes at the behest of agency officials. Form 802 must be posted in a prominent fashion on the agency's website.

**Gifts of Tickets or Passes to Public Officials**
FPPC Regulation 18944.1 sets out the circumstances under which an agency's distribution of tickets or passes to or at the behest of an official in the agency does not result in a gift to the official. (Regulation 18944.1 is available on the FPPC website at www.fppc.ca.gov.) Even though the distribution of tickets or passes to a public official under the regulation is not a gift to the official, the agency must disclose the distribution on Form 802. The official does not have to disclose tickets or passes received or distributed under the regulation on his or her Statement of Economic Interests (Form 700), but tickets or passes received or distributed by the official that do not fall under the regulation may be subject to disclosure on the official's Form 700 and subject to gift limits.

**Posting Form 802**
The Form 802 must be posted on the agency's website within 30 days after the distribution. If the agency does not maintain a website, the form must be maintained by the agency as a public record, be available for public inspection and copying, and be forwarded to the FPPC for posting on its website.

**Part 1. Agency Identification**
List the agency's name, address and the name of an agency contact. Mark the amendment box if changing any information on a previously filed form and include the date of the original filing.

**Part 2. Event For Which Tickets Were Distributed**
Provide the date(s) of the event, a description of the event, and the face value (i.e. the cost to the public) of the ticket or pass. Check the box indicating whether the event was an "agency event" (such as a county fair, or an event for which the agency purchased tickets). If the agency received the tickets from an outside source, identify the source, the number of tickets received, and check the box to identify whether the tickets or passes were provided to the agency:

- Gratuitously; or
- Pursuant to a contract.

**Part 3. Agency Official(s) Receiving Ticket(s)**
Disclose the name of each agency official that received a ticket or pass and the number of tickets or passes the official received. Also state whether the distribution is income to the official or describe the public purpose for which the official received the tickets or passes.

**Part 4. Individual or Organization Receiving Ticket(s)**
If tickets or passes were distributed to an individual or organization outside the agency, at the behest of an official of the agency, provide the name of the official. Disclose the name(s) of the individuals(s) who received the tickets or passes and the number of tickets or passes provided. If the tickets or passes were provided to an organization, the agency may post the name, address, a description of the organization, and the number of tickets or passes provided to the organization in lieu of posting the name of each individual that received a ticket or pass. Also, describe the public purpose for the distribution to the individual or organization.

**Part 5. Verification**
The agency head or his or her designee must sign the form.

**Privacy Information Notice**
Information requested on all FPPC forms is used by the FPPC to administer and enforce the Political Reform Act (Government Code Sections 81000-91014 and California Code of Regulations Sections 18109-18997). All information required by these forms is mandated by the Political Reform Act. Failure to provide all of the information required by the Act is a violation subject to administrative, criminal, or civil prosecution. All reports and statements provided are public records open for public inspection and reproduction.

If you have any questions regarding this Privacy Act Notice, please contact the FPPC.

General Counsel
Fair Political Practices Commission
428 J Street, Suite 620
Sacramento, CA 95814
(916) 322-5660

FPPC Form 802 (Feb/09)
FPPC Toll-Free Helpline: 866/ASK-FPPC (866/275-3772)

**Tickets Provided by Agency Report**

**A Public Document**

TICKETS PROVIDED BY AGENCY REPORT

**1. Agency Name**

Date Stamp

California Form **802**

For Official Use Only

Division, Department, or Region (if applicable)

Street Address

Area Code/Phone Number | E-mail

Agency Contact (name and title)

☐ Amendment (Also complete Part 5.)

Date of Original Filing: _____ (month, day, year)

**2. Event For Which Tickets Were Distributed**

Date(s) of Event: ____/____/____ Description of Event: _____

____/____/____ Face Value of Ticket: $ _____

Agency Event ☐ Yes ☐ No (Identify source of tickets below.)

Name of Outside Source of Ticket(s) Provided to Agency: _____

Number of Tickets Received: _____ Ticket(s) Provided to Agency: ☐ Gratuitously ☐ Pursuant to Contract

**3. Agency Official(s) Receiving Ticket(s)** (use a continuation sheet for additional names)

| Name of Official (Last, First) | Number of Tickets | State Whether the Distribution is Income to the Official or Describe the Public Purpose for the Distribution |
|---|---|---|
| | | |
| | | |
| | | |

**4. Individual or Organization Receiving Ticket(s)** (Provided at the behest of an agency official.)

Name of Behesting Agency Official: _____

Name of Individual or Organization: _____ Number of Tickets: _____

Description of Organization: _____

Address of Organization: _____ (Number and Street) _____ (City) _____ (State) _____ (Zip Code)

Purpose for Distribution: (Describe the public purpose for the distribution to the organization.)

_____

**5. Verification**

*I have determined that the distribution of tickets set forth above is in accordance with the provisions of FPPC Regulation 18944.1.*

_____ (Signature of Agency Head or Designee) _____ (Print Name) _____ (Title) _____ (month, day, year)

Comment: *(Use this space or an attachment for any additional information including amendment explanation.)*

_____

FPPC Form 802 (Feb/09)

FPPC Toll-Free Helpline: 866/ASK-FPPC (866/275-3772)

March 14, 2011
Prepared and
Submitted by: Debby Cherney
Approved by: Paul Jones

ACTION CALENDAR

# ADDITIONAL CONTRIBUTIONS FOR FISCAL YEAR 2010-11 TO THE CALIFORNIA PUBLIC EMPLOYEES RETIREMENT SYSTEM

## SUMMARY:

Since Fiscal Year (FY) 2008-09, the District has made payments totaling $5,282,000 in excess of its annual required contributions in order to reduce the District's unfunded actuarial pension liability (UAL) to the California Public Employees Retirement System (CalPERS). The most recent valuation from CalPERS reflects a UAL as of June 30, 2009 of $38.9 million, prior to the application of the $482,000 payments in excess of required contributions in FY 2010-11. This valuation was presented and discussed at the Special Finance and Personnel Committee meeting on February 17, 2011, at which time the Committee requested that staff make an additional payment of $6 million to CalPERS during FY 2010-11 to reduce the unfunded liability.

## BACKGROUND:

In or about the late fall of each year, the District receives an updated actuarial valuation report from CalPERS, which typically runs approximately 16-18 months in arrears. In late November 2010, the District received its actuarial valuation as of June 30, 2009 from CalPERS (the CalPERS Report) as of June 30, 2009. As of that date, the District's UAL is $38.9 million, which grew from $20.5 million as of the end of the prior fiscal year. This growth in the liability reflects not only the deep losses incurred by CalPERS during the previous 12-month period, but also significant changes in the assumptions CalPERS had been making about mortality, years of service credit, and age at retirement, among other factors.

The table below provides a six-year history of pertinent information about the District's plan:

| Valuation Date | Accrued Liability | Actuarial Value of Assets (AVA) | Unfunded Liability (UAL) | Funded Ratios | | Annual Covered Payroll |
|---|---|---|---|---|---|---|
| | | | | AVA | Market Value | |
| 6/30/04 | $71,814,764 | $64,384,006 | $7,430.758 | 89.7% | 88.1% | $18,214,652 |
| 6/30/05 | 85,213,814 | 72,995,819 | 12,217,995 | 85.7% | 87.8% | 19,237,200 |
| 6/30/06 | 96,470,362 | 81,299,826 | 15,170,536 | 84.3% | 88.7% | 20,862,370 |
| 6/30/07 | 110,713,003 | 90,674,790 | 20,038,213 | 81.9% | 93.9% | 22,261,543 |
| 6/30/08 | 120,777,919 | 100,240,701 | 20,537,218 | 83.0% | 83.7% | 23,449,933 |
| 6/30/09 | 149,825,048 | 110,922.659 | 38,902.389 | 74.0% | 54.3% | 24,306,551 |

The unfunded liability is a "soft" liability; it is not recorded in the District's financial statements, except as a note disclosure. The best reflection of the financial health of the District's plan is the "Funded Ratios". Two such ratios are reported in the CalPERS Report: the Actuarial Valuation Funded Ratio and the Market Value Funded Ratio. The latter provides a more current

of the funding status of the plan because it reflects the market returns through the year of the CalPERS Report.

Change in Employer Contribution Rate:

The increase in the UAL has a companion increase in the employer contribution rate from the projected 14.2% for FY 2011-12 to 17.757%. Of the 17.757% contribution, 10.61% relates to the paydown of our UAL, with the balance being the "normal cost" contribution to the defined benefit program.

Out of the 10.61% paydown of the UAL, there are a number of key contributors:

- 0.6% is for the partial recognition of the 2009 CalPERS portfolio losses. Without the "smoothing on smoothing" approach taken by CalPERS, the District would have seen an increase of over 4% additional required employer rate.
- 1.4% is for demographic changes, which is partially offset by 0.5% in contributions from employees primarily from purchasing additional service credits. These purchases occurred prior to the "assumption change" adjustments which are discussed below, so the full impact of the assumption changes is borne by the District's employer rate in future years.
- 2.6% relates to the two benefits changes effected by the District in 2005 and 2007 setting the employer pension rate using one-year final comp and increasing from a 2% at 55 formula to a 2.5% at 55 formula.
- 4.3% relates to the updated experience study that CalPERS just implemented for 2009 valuations. In their experience studies, CalPERS updates its assumptions about mortality rates and age at retirement, among other factors. These changes are referenced in the CalPERS reports as "assumption changes".
- 2.0% relates to changes from CalPERS' 2003 experience study.

Notably, had the District not made the $4.8 million excess contributions, our rate would be 1.3% higher than the 17.757% established for FY 2011-12. The Committee provided guidance for the FY 2010-11 budget year that the District should continue to set its contribution rate as if the additional contributions in excess of the annual required contribution had not been made. If this is the case for FY 2011-12, the employer contribution rate would be 19.1%, or approximately $4.9 million, which is an increase of approximately $1.5 million over the budgeted contribution for FY 2010-11. The Committee has provided guidance for the FY 2011-12 budget year to not only continue to set its contribution rates as if the additional contributions had not occurred, but to also include a contribution to repay the advances made by the Replacement Funds.

The District's employee contribution rate is a contractual 8% under the 2.5% at 55 pension formula, and at present 1% of that is paid by employees with the 7% paid by the District. The employee contribution rate does not fluctuate with changes in market conditions, funding ratios, assumption changes, or other factors.

Additional Contribution of $6 million during FY 2010-11:

Based upon the discussion of the most recent actuarial report and the unfunded liability, the Committee recommended that the District advance an additional $6 million from its Replacement Funds to further reduce the UAL. This additional contribution is consistent with the District's policy principles to strategically reduce the District's actuarially-determined unfunded pension liability. For FY 2008-09, the District made additional contributions in excess of its annual required contribution to CalPERS of $3 million; in FY 2009-10, the District made additional contributions in the total amount of $1.8 million; and in FY 2010-11 to date, the District has made additional contributions of $482,000.

FISCAL IMPACTS:

The $6 million payment to CalPERS would be advanced as a loan from the Replacement Funds to the Operating Funds. Staff anticipates including an incremental amount in each future year's operating budget to repay the loan from the Replacement Funds. That amount can be set on a discretionary basis in the context of each operating budget.

ENVIRONMENTAL COMPLIANCE:

This item is not a project as defined in the California Environmental Quality Act Code of Regulations, Title 14, Chapter 3, Section 15378.

COMMITTEE STATUS:

This item was discussed by the Finance and Personnel Committee on February 17, 2011.

RECOMMENDATION:

THAT THE BOARD APPROVE AN ADDITIONAL CONTRIBUTION OF $6 MILLION AS AN ADVANCE FROM THE DISTRICT'S REPLACEMENT FUNDS TO REDUCE THE DISTRICT'S ACTUARIALLY-DETERMINED UNFUNDED PENSION LIABILITY.

LIST OF EXHIBITS:

None.

March 14, 2011
Prepared by: K. Welch/M. Hoolihan
Submitted by: G. Heiertz
Approved by: Paul Jones

ACTION CALENDAR

WATER SUPPLY ASSESSMENT FOR
UPTOWN NEWPORT VILLAGE SPECIFIC PLAN PROJECT

SUMMARY:

In October 2010, staff approved a request by the City of Newport Beach to complete a Water Supply Assessment (WSA) for the Uptown Newport Village in IRWD Planning Area NB-01 (Newport Beach PA 2010-133). Staff has completed the WSA for the project and is recommending Board approval of this document.

BACKGROUND:

The City of Newport Beach's proposed Uptown Newport Village project in Planning Area NB-01 includes redevelopment of a 25-acre site from industrial/office complex to a residential village. The project location is the current Conexant site located between Jamboree Road and Von Karman Avenue. The plan includes of a total of 1,244 units, consisting of 632 units replacing existing industrial and offices slated for demolition, 290 units added to the project, along with up to 322 density bonus unit. In addition, the project will allow up to 11,500 square feet of retail and commercial uses.

Staff has completed a WSA, which is provided as Exhibit "A", for the proposed project based on information from the IRWD Water Resources Master Plan (WRMP), which was last updated in January 2003. Specific tables in the WRMP will be updated to include new demand projections for this project. Currently, Conexant is one of the District's largest potable water users with an average annual use of 1,450 acre-feet per year. As a result of the planned redevelopment of this site to a lower overall water use, preliminary estimates show a net decrease in potable water demands for this project of 1,145 acre-feet per year of potable water and no net increase of non-potable water demands associated with this redevelopment land use.

FISCAL IMPACTS:

None.

ENVIRONMENTAL COMPLIANCE:

None.

COMMITTEE STATUS:

This item was reviewed by the Water Resources Policy and Communications Committee on March 7, 2011.

RECOMMENDATION:

THAT THE BOARD APPROVE THE WATER SUPPLY ASSESSMENT FOR CITY OF NEWPORT BEACH UPTOWN NEWPORT VILLAGE SPECIFIC PLAN PROJECT (PA 2010-133).

LIST OF EXHIBITS:

Exhibit "A" – Water Supply Assessment for the Uptown Newport Village Specific Plan Project (PA 2010-133)

# Exhibit "A"

## IRVINE RANCH WATER DISTRICT
## ASSESSMENT OF WATER SUPPLY
Water Code §10910 *et seq.*

To: (*Lead Agency*)
City of Newport Beach
P.O. Box 1768
Newport Beach, CA 92658-8915

(*Applicant*)
The Shopoff Group
8951 Research Drive
Irvine, CA 92618

**Project Information**
Project Title: Uptown Newport Village Specific Plan Project (PA 2010-133) (Exhibit A)

☐ *Residential*: No. of dwelling units: _____
☐ *Shopping center or business*: No. of employees_____ Sq. ft. of floor space _____
☐ *Commercial office*: No. of employees_____ Sq. ft. of floor space _____
☐ *Hotel or motel*: No. of rooms _____
☐ *Industrial, manufacturing or processing*: No. of employees_____ No. of acres _____
Sq. ft. of floor space _____
☒ *Mixed use* (check and complete all above that apply) (see Exhibit B)
☐ *Other*: _____

**Assessment of Availability of Water Supply**

On _____, 2011 the Board of Directors of the Irvine Ranch Water District (IRWD) approved the within assessment and made the following determination regarding the above-described Project:

☒ The projected water demand for the Project ☐ was ☒ was not included in IRWD's most recently adopted urban water management plan.

☐ A sufficient water supply is available for the Project.
The total water supplies available to IRWD during normal, single-dry and multiple-dry years within a 20-year projection will meet the projected water demand of the Project in addition to the demand of existing and other planned future uses, including, but not limited to, agricultural and manufacturing uses.

☐ A sufficient water supply is not available for the Project. *[Plan for acquiring and developing sufficient supply attached. Water Code § 10911(a)]*

The foregoing determination is based on the following Water Supply Assessment Information and supporting information in the records of IRWD.

*Signature* *Date* *Title*

## Water Supply Assessment Information

Purpose of Assessment

Irvine Ranch Water District ("IRWD") has been identified by the City as a public water system that will supply water service (both potable and nonpotable) to the project identified on the cover page of this assessment (the "Project"). As the public water system, IRWD is required by Section 10910 *et seq.* of the Water Code to provide the City with an assessment of water supply availability ("assessment") for defined types of projects. The Project has been found by the City to be a project requiring an assessment. The City is required to include this assessment in the environmental document for the Project, and, based on the record, make a determination whether projected water supplies are sufficient for the Project and existing and planned uses.

Water Code Section 10910 (the "Assessment Law") contains the requirements for the information to be set forth in the assessment.

Prior Water Supply Assessments

IRWD does not allocate particular supplies to any project, but identifies total supplies for its service area. Because of IRWD's aggregation of demands and supplies, each assessment completed by IRWD is expected to be generally similar to the most recent assessment, with changes as needed to take into account changes, if any, in demands and supplies, and any updated and corrected information obtained by IRWD. Previously assessed projects' water demands will be included in the baseline. A newly assessed project's water demand will have been included in previous water supply assessments for other projects (as part of IRWD's "full build-out" demand) to the extent of any land use planning or other water demand information for the project that was available to IRWD.

The Project's water demand was included (as part of IRWD's "full build-out" demand) in previous water supply assessments performed by IRWD, based on land use planning information then available to IRWD. In this water supply assessment, the Project demand will be revised in accordance with updated information provided by the applicant and included in the "with project" demand.

Supporting Documentation

IRWD prepares two planning documents to guide water supply decision-making. IRWD's principal planning document is IRWD's "Water Resources Master Plan" ("WRMP"). The WRMP is a comprehensive document compiling data and analyses that IRWD considers necessary for its planning needs. IRWD also prepares an Urban Water Management Plan ("UWMP"), a document required by statute. The UWMP is based on the WRMP, but contains defined elements as listed in the statute (Water Code Section 10631, *et seq.*), and as a result, is more limited than the WRMP in the treatment of supply and demand issues. Therefore, IRWD primarily relies on its most recent WRMP. (The UWMP is required to be updated in years ending with "five" and "zero," and IRWD's next update of that document is anticipated in June 2011.)

In addition to the WRMP and the 2005 UWMP mentioned above, other supporting documentation referenced herein is found in Section 6 of this assessment.

Due to the number of contracts, statutes and other documents comprising IRWD's written proof of entitlement to its water supplies, in lieu of attachment of such items, they are identified by title and summarized in Section 2(b) of this assessment (written contracts/proof of entitlement). Copies of the summarized items can be obtained from IRWD.

Assessment Methodology

***Water use factors; dry-year increases.*** IRWD employs water use factors to enable it to assign water demands to the various land use types and aggregate the demands. The water use factors are based on average water use and incorporate the effect of IRWD's tiered-rate conservation pricing and its other water conservation programs. The factors are derived from historical usage (billing data) and a detailed review of water use factors within the IRWD service areas conducted as a part of the WRMP. Water demands also reflect normal hydrologic conditions (precipitation). Lower levels of precipitation and higher temperatures will result in higher water demands, due primarily to the need for additional water for irrigation. To reflect this, base (normal) WRMP water demands have been increased 7% in the assessment during both "single-dry" and "multiple-dry" years. This is consistent with IRWD's 2005 UWMP and historical regional demand variation as documented in the Metropolitan Water District of Southern California's ("MWD's") Integrated Resources Plan (1996) (Volume 1, page 2-10).

***Planning horizon.*** For consistency with IRWD's WRMP, the assessment reviews demands and supplies through the year 2031, which is considered to represent build-out or "ultimate development".

***Assessment of demands.*** Water demands are reviewed in this assessment for three development projections (to 2031):

- Existing and committed demand (without the Project) ("baseline"). This provides a baseline condition as of the date of this assessment, consisting of demand from existing development, plus demand from development that has both approved zoning and (if required by the Assessment Law) an adopted water supply assessment.

- Existing and committed demand, plus the Project ("with-project"). This projection adds the Project water demands to the baseline demands.

- Full WRMP build-out ("full build-out"). In addition to the Project, this projection adds potential demands for all presently undeveloped areas of IRWD based on current general plan information, modified by more specific information available to IRWD, as more fully described in Chapter 2 of the WRMP.

***Assessment of supplies.*** For comparison with demands, water supplies are classified as *currently available* or *under development*:

- *Currently available* supplies include those that are presently operational, and those that will be operational within the next several years. Supplies expected to be operational in the next several years are those having completed or substantially completed the environmental and regulatory review process, as well as having necessary contracts (if any) in place to move forward. These supplies are in various stages of planning, design, or construction.

- In general, supplies *under development* may necessitate the preparation and completion of environmental documents, regulatory approvals, and/or contracts prior to full construction and implementation.

IRWD is also evaluating the development of additional supplies that are not included in either *currently available* or *under-development* supplies for purposes of this assessment. As outlined in the WRMP, prudent water supply and financial planning dictates that development of supplies be phased over time consistent with the growth in demand.

Water supplies available to IRWD include several sources: groundwater pumped from the Orange County groundwater basin (including the Irvine Subbasin); captured local (native) surface water; reclaimed wastewater, and supplemental imported water supplied by MWD through the Municipal Water District of Orange County ("MWDOC"). The supply-demand comparisons in this assessment are broken down among the various sources, and are further separated into potable and nonpotable water sources.

***Comparison of demand and supply.*** The three demand projections noted above (baseline, with-project and full build-out) are compared with supplies in the following ways:

- On a total *annual* quantity basis (stated in acre-feet per year (AFY)).

- On a *peak-flow* (maximum day) basis (stated in cubic feet per second (cfs)).

- Under three climate conditions: base (normal) conditions and single-dry and multiple-dry year conditions. (Note: These conditions are compared for *annual* demands and not for *peak-flow* demands. *Peak-flow* is a measure of a water delivery system's ability to meet the highest day's demand of the fluctuating demands that will be experienced in a year's time. Peak demands occur during the hot, dry season and as a result are not appreciably changed by dry-year conditions; dry-year conditions do affect *annual* demand by increasing the quantity of water needed to supplement normal wet-season precipitation.)

Summary of Results of Demand-Supply Comparisons

Listed below are Figures provided in this assessment, comparing projected potable and nonpotable water supplies and demands under the three development projections:

Figure 1: Normal Year Supply and Demand – Potable Water
Figure 2: Single Dry-Year Supply and Demand – Potable Water
Figure 3: Multiple Dry-Year Supply and Demand – Potable Water
Figure 4: Maximum-Day Supply and Demand – Potable Water
Figure 5: Normal Year Supply and Demand – Nonpotable Water
Figure 6: Single Dry-Year Supply and Demand – Nonpotable Water
Figure 7: Multiple Dry-Year Supply and Demand – Nonpotable Water
Figure 8: Maximum-Day Supply and Demand – Nonpotable Water

It can be observed in the Figures that IRWD's *supplies* remain essentially constant between normal, single-dry and multiple-dry years. This result is due to the fact that groundwater and MWD imported water account for all of IRWD's potable supply, and reclaimed water, groundwater and imported water comprise most of IRWD's nonpotable supply. Groundwater production typically remains constant or increases in cycles of dry years, even if

overdraft of the basin temporarily increases, as groundwater producers reduce their demand on imported supplies to secure reliability. (See Section 4 herein.) As to imported water, MWD's 2010 Regional Urban Water Management Plan (RUWMP) shows that MWD can maintain reliable supplies under the conditions that have existed in past dry periods through 2035, including a repeat of the 1990-1992 multiple dry-year hydrology and the 1977 single dry-year hydrology. (See Section 2(b) (1) "IMPORTED SUPPLY - ADDITIONAL INFORMATION," below, for a summary of information provided by MWD.) Reclaimed water production also remains constant, and is considered "drought-proof" as a result of the fact that sewage flows remain virtually unaffected by dry years. Only a small portion of IRWD's nonpotable supply, native water captured in Irvine Lake, is reduced in single-dry and multiple-dry years. The foregoing factors also serve to explain why there is no difference in IRWD's supplies between single-dry and multiple-dry years.

A review of the Figures indicates the following:

- *Currently available* supplies of potable water are adequate to meet projected annual demands for both the *baseline* and *with-project* demand projections under the normal and both dry-year conditions through the year 2015. (Figures 1, 2 and 3.)

- Meeting both single- and multiple-dry-year annual demands for *full build-out* will require the completion of *under-development* supplies. (Figures 2 and 3.)

- Adequate *currently available* potable water supply capacity is available to meet *peak-flow* (maximum day) demands for all demand projections through the year 2031. (Figure 4.)

- With respect to nonpotable water, *currently available* supplies are adequate to meet projected annual demands for both the *baseline* and *with-project* demand projections under both dry-year conditions through the year 2020. (Figures 5, 6, 7 and 8). IRWD is proceeding with the implementation of *under-development* nonpotable supplies, as shown in the Figures, to improve local reliability during dry-year conditions.

The foregoing Figures provide an overview of IRWD potable and nonpotable water supply capabilities. More detailed information on the anticipated development and use of supplies, which incorporates source costs and reliability issues, is provided in the WRMP.

***Margins of safety.*** The Figures and other information described in this assessment show that IRWD's assessment of supply availability contains several margins of safety or buffers:

- "Reserve" water supplies (excess of supplies over demands) will be available to serve as a buffer against inaccuracies in demand projections, future changes in land use, or alterations in supply availability.

- The potential exists for the treatment and conversion of some reserve nonpotable supplies to potable water.

- Conservative estimates of annual potable and nonpotable *imported* supplies have been made based on connected delivery capacity (by application of peaking factors as described below in Section 2, footnote 1); additional supplies are expected to be available from these sources, based on legal entitlements, historical uses and

information provided by MWD. In addition to MWD's existing regional supply assessments, this assessment has considered MWD information concerning recent events. See ***"Recent Actions on Delta Pumping,"*** below.

- Information provided by MWD, as the imported water supplier, concerning the adequacy of its regional supplies, summarized herein, demonstrates MWD's inclusion of reserves in its regional supply assessments. In addition to MWD's existing regional supply assessments, this assessment has considered MWD information concerning recent events. See ***"Recent Actions on Delta Pumping,"*** below.

- Although groundwater supply amounts shown in this assessment assume production levels within applicable basin production percentages described herein, production of groundwater can exceed applicable basin production percentages on a short-term basis, providing additional reliability during dry years or emergencies.

**Recent Actions on Delta Pumping.** The Sacramento/San Joaquin Delta (Delta) is a vulnerable component in both the State and Federal systems to convey water from northern portions of California to areas south of the Delta. Issues associated with the Delta have generally been known for years; however, most recently, the continuing decline in the number of endangered Delta smelt resulted in the filing of litigation challenging permits for the operation of the Delta pumping facilities. On August 31, 2007, a Federal court ordered interim protective measures for the endangered Delta smelt, including operational limits on Delta pumping, which will have an effect on State Water Project (SWP) operations and supplies in 2008 and subsequent years. On June 4, 2009, a federal biological opinion imposed rules that will further restrict water diversions from the Delta to protect endangered salmon and other endangered fish species. At present, several proceedings concerning Delta operations are ongoing to evaluate options to address Delta smelt impacts and other environmental concerns. In addition to the regulatory and judicial proceedings to address immediate environmental concerns, the Delta Vision process and Bay-Delta Conservation Plan process are defining long-term solutions for the Delta (MWD 2010 IRP Update). Prior to the 2007 court decision, MWD's Board approved a Delta Action Plan in May 2007 that described short, mid and long-term conditions and the actions to mitigate potential supply shortages and to develop and implement long-term solutions. To comprehensively address the impacts of the SWP cutback on MWD's water supply development targets, MWD brought to its Board a strategy and work plan to update the long-term Integrated Resources Plan (IRP) in December 2007. As part of the IRP Update, MWD developed a region-wide collaborative process that included a broad-based stakeholder involvement. MWD held several stakeholder forums in 2008 and 2009 and the MWD Board adopted the 2010 IRP Update on October 12, 2010. In the 2010 IRP Update, MWD identified changes to the long-term plan and established direction to address the range of potential changes in water supply planning. The IRP also discusses dealing with uncertainties related to impacts of climate change (see additional discussion of this below) as well as actions to protect endangered fisheries. Based on MWD's Findings and Conclusions as stated in the MWD 2010 IRP Update, MWD's reliability goal that full-service demands at the retail level will be satisfied for all foreseeable hydrologic conditions remains unchanged in the 2010 IRP Update, and MWD will accomplish this through its core resources strategies. The 2010 IRP Update emphasizes an evolving approach and suite of actions to address the water supply challenges that are posed by uncertain weather patterns, regulatory and environmental restrictions, water quality impacts and changes in the state and the region. MWD's Adaptive Resource Management Strategy includes three components: Core Resources Strategy, Supply Buffer Implementation and Foundational Actions which together provides the basis for the 2010 IRP Update. The 2010 IRP Update expands the concept of developing a planning buffer from the 2004 IRP Update by

implementing a supply buffer equal to 10 percent of the total retail demand. MWD will collaborate with the member agencies to implement this buffer through complying with Senate Bill 7 which calls for the state to reduce per capita water use 20 percent by the year 2020.

IRWD's Evaluation of Effect of Reduced MWD Supplies to IRWD: MWD states it is sufficiently reliable to meet full-service demands at the retail level for all foreseeable hydrologic conditions. For purposes of ensuring a conservative analysis, IRWD has compiled information from the prior "MWD IRP Implementation Report" (October 2010) and MWD's RUWMP (November 2010), to provide information in this assessment relative to how reduced SWP supplies could potentially affect IRWD's supplies from MWD.

Based on IRWD's evaluation of MWD's SWP supplies, IRWD estimates that the 22% used by MWD's October 2007 IRP Implementation Report as a potential reduction of MWD's SWP supplies conservatively translates to approximately 16% reduction in all of MWD's imported supplies over the years 2010 through 2028.[1] For this purpose it is assumed that MWD's total supplies consist only of imported SWP and Colorado deliveries. As shown in MWD's RUWMP (Tables A.3-7), SWP deliveries on average over the 20-year period are 1,752,000 acre-feet and Colorado average supplies are 656,000 acre-feet. A 22% reduction of SWP supplies equates to 385,400 acre-feet which is 16% of MWD's total imported supplies. Based on this estimate, this assessment projects a 16% reduction in MWD supplies available to IRWD for the years 2010 through 2028, using IRWD's connected capacity without any water supply allocation imposed by MWD. This reduction in MWD supplies is reflected in Figures 1, 2, 3, 5, 6, and 7.

As an alternative means of analyzing the 22% stated reduction, Figures 1a, 2a, and 3a show IRWD estimated supplies in all of the 5-year increments (average and single and multiple dry years) under a short-term MWD allocation scenario whereby MWD declares Shortage Stage 2 and a 10% cutback is applied to IRWD's actual usage rather than its connected capacity. In February 2009, MWD adopted a Water Supply Allocation Plan based on its declared level of shortage. In response to potential water shortages and a request by MWD to have water service providers within its service area adopt a water conservation ordinance, in February 2009, IRWD updated Section 15 of its Rules and Regulations – Water Conservation and Water Supply Shortage Program and also updated its Water Shortage Contingency Plan which is a supporting document for Section 15. Section 15 of the Rules and Regulations serves as IRWD's "conservation ordinance". As stated in IRWD's Water Shortage Contingency Plan, use of local supplies, storage and other supply augmentation measures can mitigate shortages, and are assumed to be in use to the maximum extent possible during declared shortage levels.

[1] MWD's 2010 RUWMP cites to DWR's Water Allocation Analysis dated March 22, 2010, which incorporated the Delta smelt biological opinion's effect on SWP operations, export restrictions could reduce deliveries to MWD by 150 to 200 thousand acre-feet for 2010. Assuming this estimated SWP reduction amount is included in the final RUWMP adopted by MWD, that amount in acre feet would be equivalent to about 12% reduction in SWP supplies, a smaller percentage reduction than MWD's 2007 figure of 22% that was used by IRWD for purposes of this analysis.

Under shortage scenarios, IRWD may need to supplement supplies with production of groundwater, which can exceed the applicable basin production percentage on a short-term basis, providing additional reliability during dry years or emergencies.[2] In addition, if needed resultant net shortage levels can be addressed by demand reduction programs as described in IRWD's Water Shortage Contingency Plan.

Listed below are Figures provided comparing projected potable water supplies and demands in all of the five year increments, under a temporary MWD allocation scenario:

Figure 1a: Normal Year Supply and Demand (MWD Allocated) – Potable Water
Figure 2a: Single Dry-Year Supply and Demand (MWD Allocated) – Potable Water
Figure 3a: Multiple Dry-Year Supply and Demand (MWD Allocated) – Potable Water

It can be noted that IRWD's above approach is conservative, in that IRWD evaluates the effect of the 16% reduction through 2031 and shows the effect of current allocation scenarios in all of the five-year increments but MWD reports that it has made significant progress in other water resource categories such as transfers, groundwater storage and developing other local resources, and supplies will be available from these resources over the long-term.

**Climate Change.** The California Department of Water Resources ("DWR") released a report "Progress on Incorporating Climate Change into Management of California's Water Resources" (July 2006), considering the impacts of climate change on the State's water supply. DWR emphasizes that "the report represents an example of an impacts assessment based on four scenarios defining an expected range of potential climate change impacts." DWR's major goal is to extend the analysis for long-term water resource planning from "assessing impacts" to "assessing risk." The report presents directions for further work in incorporating climate change into the management of California's water resources. Emphasis is placed on associating probability estimates with potential climate change scenarios in order to provide policymakers with both ranges of impacts and the likelihoods associated with those impacts. DWR's report acknowledges "that all results presented in this report are preliminary, incorporate several assumptions, reflect a limited number of climate change scenarios, and do not address the likelihood of each scenario. Therefore, these results are not sufficient by themselves to make policy decisions."

In MWD's 2010 IRP Update, MWD recognizes there is a significant uncertainty in the impact of climate change on water supply and changes in weather patterns could significantly affect water supply reliability. MWD plans to hedge against supply and environmental uncertainties by implementing a supply buffer equivalent to 10 percent of total retail demand. This buffer will be implemented through meeting the SB7 water use efficiency goals,

[2] In these scenarios, it is anticipated that other water suppliers who produce water from the Orange County Basin will also experience cutbacks of imported supplies and will increase groundwater production and that Orange County Water District (OCWD) imported replenishment water may also be cutback. The OCWD's "2008-2009 Engineer's Report on the groundwater conditions, water supply and basin utilization" references a report which recommends a basin management strategy that provides general guidelines for annual basin refill or storage decrease based on the level of accumulated overdraft. It states, "an accumulated overdraft of 500,000 AF is only acceptable for short durations due to drought conditions...and an optimal basin management target of 100,000 AF of accumulated overdraft provides sufficient storage space to accommodate increased supplies from one wet year while also providing enough water in storage to offset decreased supplies during a two- to three-year drought." MWD replenishment water is a supplemental source of recharge water and OCWD estimates other main supply sources for recharge are available.

implementing aggressive adaptive actions, development of local supplies and transfers.

Per MWD's RUWMP, MWD continues to incorporate current climate change science into its planning efforts. As stated in MWD's RUWMP, the 2010 IRP Update supports the MWD Board adopted principles on climate change by: 1) Supporting reasonable, economically viable, and technologically feasible management strategies for reducing impacts on water supply and 2) Supporting flexible "no regret" solutions that provide water supply and quality benefits while increasing the ability to manage future climate change impacts, and 3) Evaluating staff recommendations regarding climate change and water resources against the California Environmental Quality Act to avoid adverse effects on the environment. Potential climate change impacts on state, regional and local water supplies and relevant information for the Orange County hydrologic basin and Santa Ana Watershed have not been sufficiently developed at this time to permit IRWD to assess and quantify the effect of any such impact on its conclusions in the Assessment.

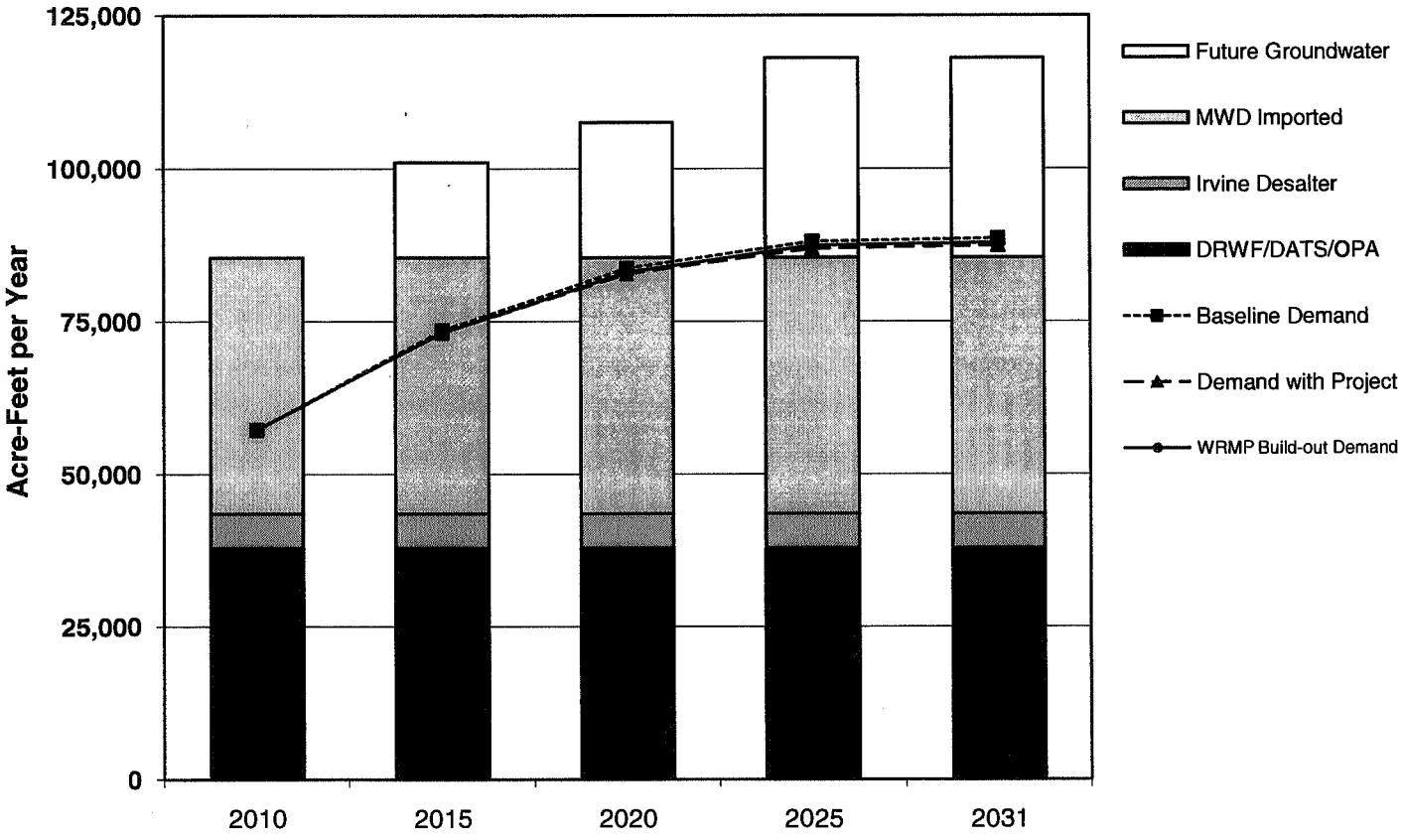
***Catastrophic Supply Interruption Planning.*** MWD has developed Emergency Storage Requirements (2010 RUWMP) to safeguard the region from catastrophic loss of water supply. MWD has made substantial investments in emergency storage and MWD has based its planning on a 100% reduction in its supplies for a period of six months. The emergency plan outlines that under such a catastrophe, non-firm service deliveries would be suspended, and firm supplies would be restricted by a mandatory cutback of 25 percent from normal year demand deliveries. In addition, MWD discusses the long term Delta plan in its 2010 RUWMP (pages 3-18 to 3-21). IRWD has addressed supply interruption planning in its WRMP and UWMP.

## Detailed Assessment

### 1. Supply and demand comparison

Comparisons of IRWD's average annual and peak (maximum day) demands and supplies, under *baseline* (existing and committed demand, without the Project), *with-project* (baseline plus Project), and *full build-out* development projections, are shown in the following Figures 1-4 (potable water), Figures 5-8 (nonpotable water) and Figures 1a, 2a, and 3a (short term MWD allocation potable water). See also the Assessment, Section 1, incorporated herein by reference and "Recent Actions on Delta Pumping" above.

## Figure 1
## IRWD Normal-Year Supply & Demand - Potable Water

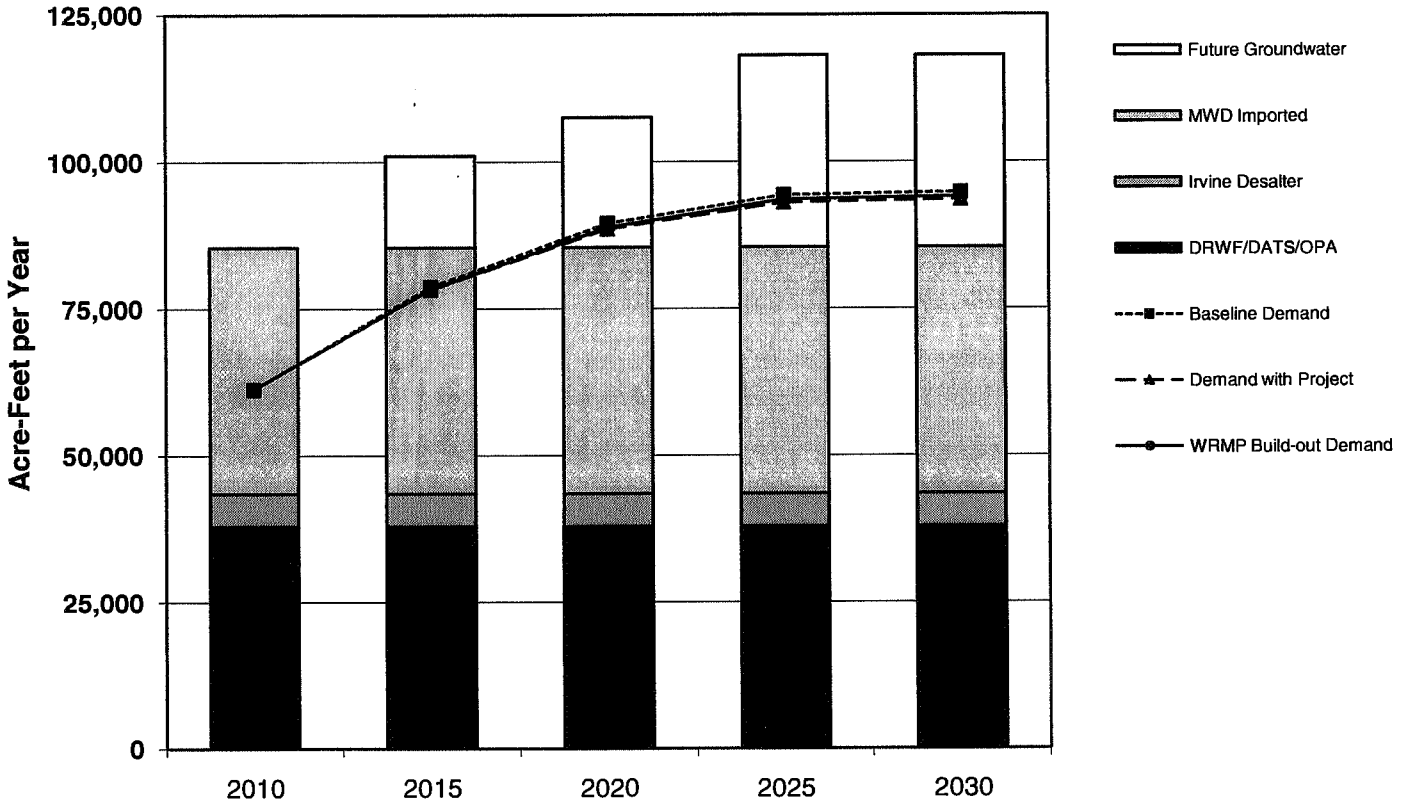



| (in acre-feet per year) | 2010 | 2015 | 2020 | 2025 | 2031 |
|---|---|---|---|---|---|
| Current Potable Supplies | | | | | |
| MWD Imported (EOCF#2, AMP, OCF) | 41,929 | 41,929 | 41,929 | 41,929 | 41,929 |
| DRWF/DATS/OPA | 37,900 | 37,900 | 37,900 | 37,900 | 37,900 |
| Irvine Desalter | 5,640 | 5,640 | 5,640 | 5,640 | 5,640 |
| Supplies Under Development | | | | | |
| Future Groundwater | - | 15,600 | 22,100 | 32,600 | 32,600 |
| Maximum Supply Capability | 85,469 | 101,069 | 107,569 | 118,069 | 118,069 |
| Baseline Demand | 57,286 | 73,571 | 83,696 | 88,086 | 88,579 |
| Demand with Project | 57,286 | 73,137 | 82,784 | 86,947 | 87,434 |
| WRMP Build-out Demand | 57,286 | 73,161 | 83,042 | 87,432 | 87,922 |
| Reserve Supply with Project | 28,183 | 27,933 | 24,785 | 31,122 | 30,636 |

Notes: By agreement, IRWD is required to count the production from the Irvine Subbasin in calculating available supplies for TIC developments (see Potable Supply-Groundwater).

MWD Imported Supplies are shown at 16% reduction off of average connected capacity.

## Figure 2
## IRWD Single Dry-Year Supply & Demand - Potable Water

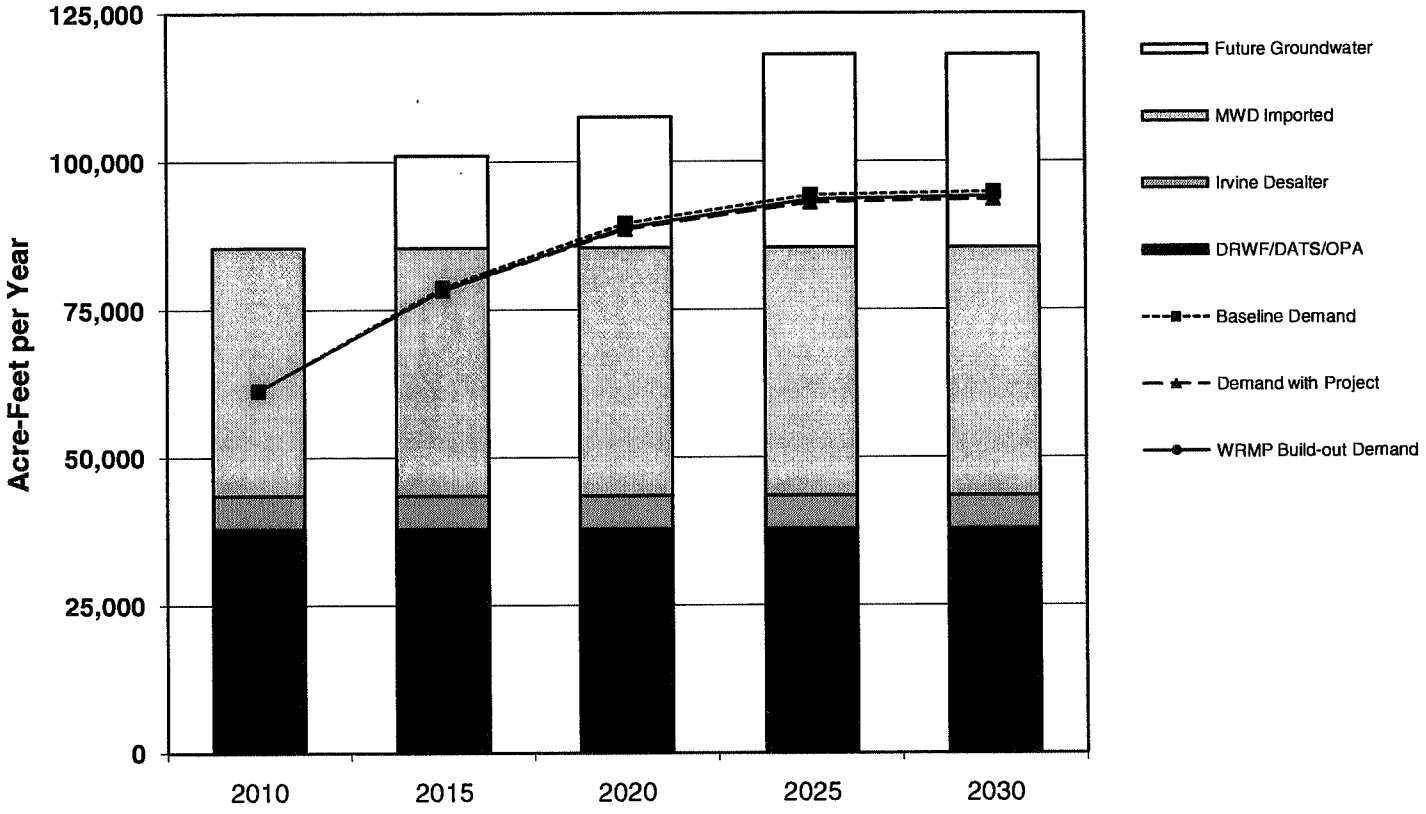



| (in acre-feet per year) | 2010 | 2015 | 2020 | 2025 | 2030 |
|---|---|---|---|---|---|
| Current Potable Supplies | | | | | |
| MWD Imported (EOCF#2, AMP, OCF) | 41,929 | 41,929 | 41,929 | 41,929 | 41,929 |
| DRWF/DATS/OPA | 37,900 | 37,900 | 37,900 | 37,900 | 37,900 |
| Irvine Desalter | 5,640 | 5,640 | 5,640 | 5,640 | 5,640 |
| Supplies Under Development | | | | | |
| Future Groundwater | - | 15,600 | 22,100 | 32,600 | 32,600 |
| Maximum Supply Capability | 85,469 | 101,069 | 107,569 | 118,069 | 118,069 |
| Baseline Demand | 61,296 | 78,721 | 89,555 | 94,252 | 94,780 |
| Demand with Project | 61,296 | 78,256 | 88,579 | 93,033 | 93,554 |
| WRMP Build-out Demand | 61,296 | 78,282 | 88,855 | 93,552 | 94,076 |
| Reserve Supply with Project | 24,174 | 22,787 | 18,714 | 24,517 | 23,993 |

Notes: Supplies identical to Normal-Year based on Metropolitan's Regional Urban Water Management Plan (11/8/05) and usage of groundwater under drought conditions (OCWD Master Plan). Demands increased 7% from Normal-Year. By agreement, IRWD is required to count the production from the Irvine Subbasin in calculating available supplies for TIC developments (see Potable Supply-Groundwater).

MWD Imported Supplies are shown at 16% reduction off of average connected capacity.

## Figure 3
## IRWD Multiple Dry-Year Supply & Demand - Potable Water

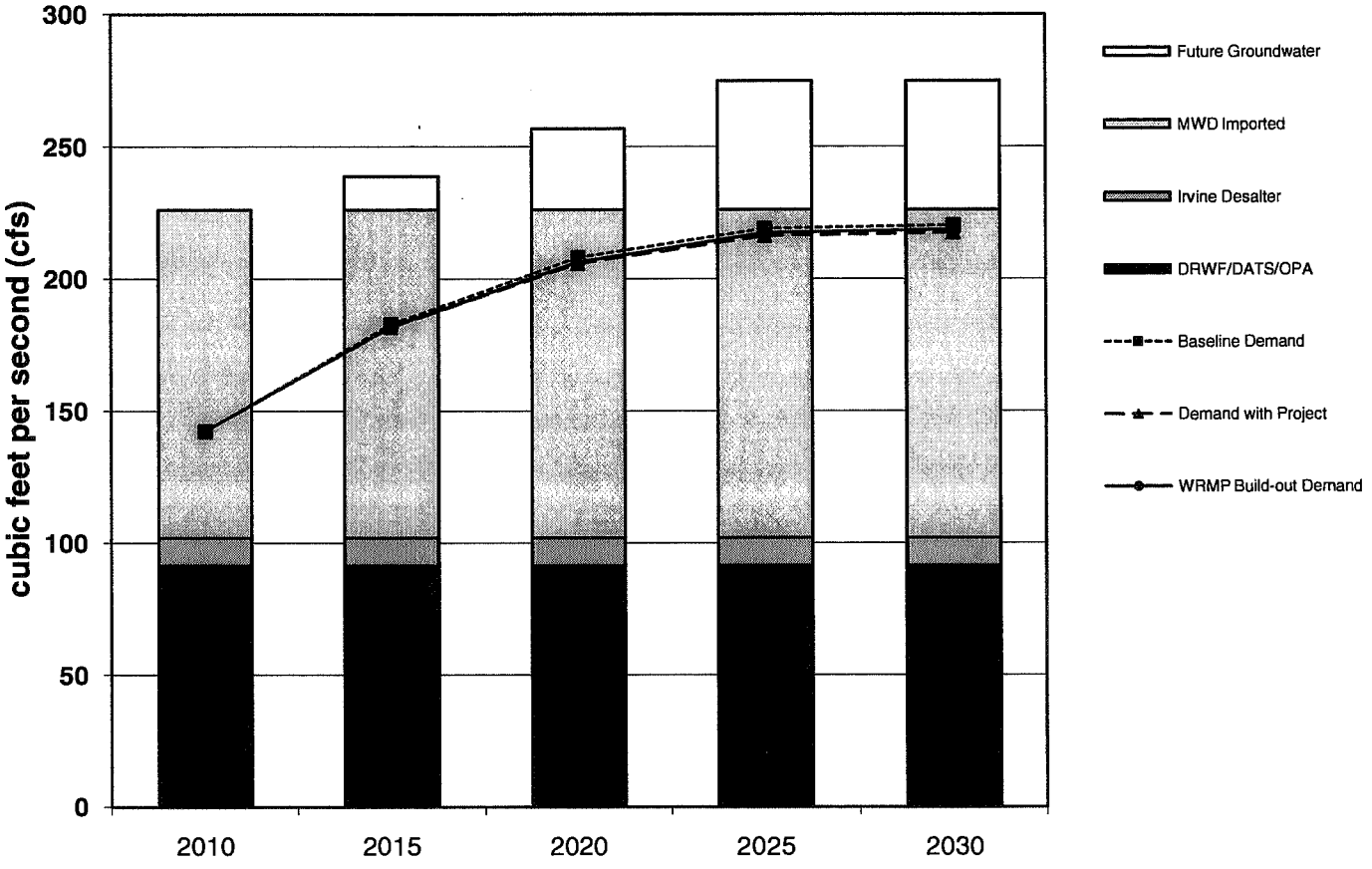



| (in acre-feet per year) | 2010 | 2015 | 2020 | 2025 | 2030 |
|---|---|---|---|---|---|
| Current Potable Supplies | | | | | |
| MWD Imported (EOCF#2, AMP, OCF) | 41,929 | 41,929 | 41,929 | 41,929 | 41,929 |
| DRWF/DATS/OPA | 37,900 | 37,900 | 37,900 | 37,900 | 37,900 |
| Irvine Desalter | 5,640 | 5,640 | 5,640 | 5,640 | 5,640 |
| Supplies Under Development | | | | | |
| Future Groundwater | - | 15,600 | 22,100 | 32,600 | 32,600 |
| Maximum Supply Capability | 85,469 | 101,069 | 107,569 | 118,069 | 118,069 |
| Baseline Demand | 61,296 | 78,721 | 89,555 | 94,252 | 94,780 |
| Demand with Project | 61,296 | 78,256 | 88,579 | 93,033 | 93,554 |
| WRMP Build-out Demand | 61,296 | 78,282 | 88,855 | 93,552 | 94,076 |
| Reserve Supply with Project | 24,173 | 22,813 | 18,990 | 25,036 | 24,515 |

Notes: Supplies identical to Normal-Year based on Metropolitan's Regional Urban Water Management Plan (11/8/05) and usage of groundwater under drought conditions (OCWD Master Plan). Demands increased 7% from Normal-Year. By agreement, IRWD is required to count the production from the Irvine Subbasin in calculating available supplies for TIC developments (see Potable Supply-Groundwater).

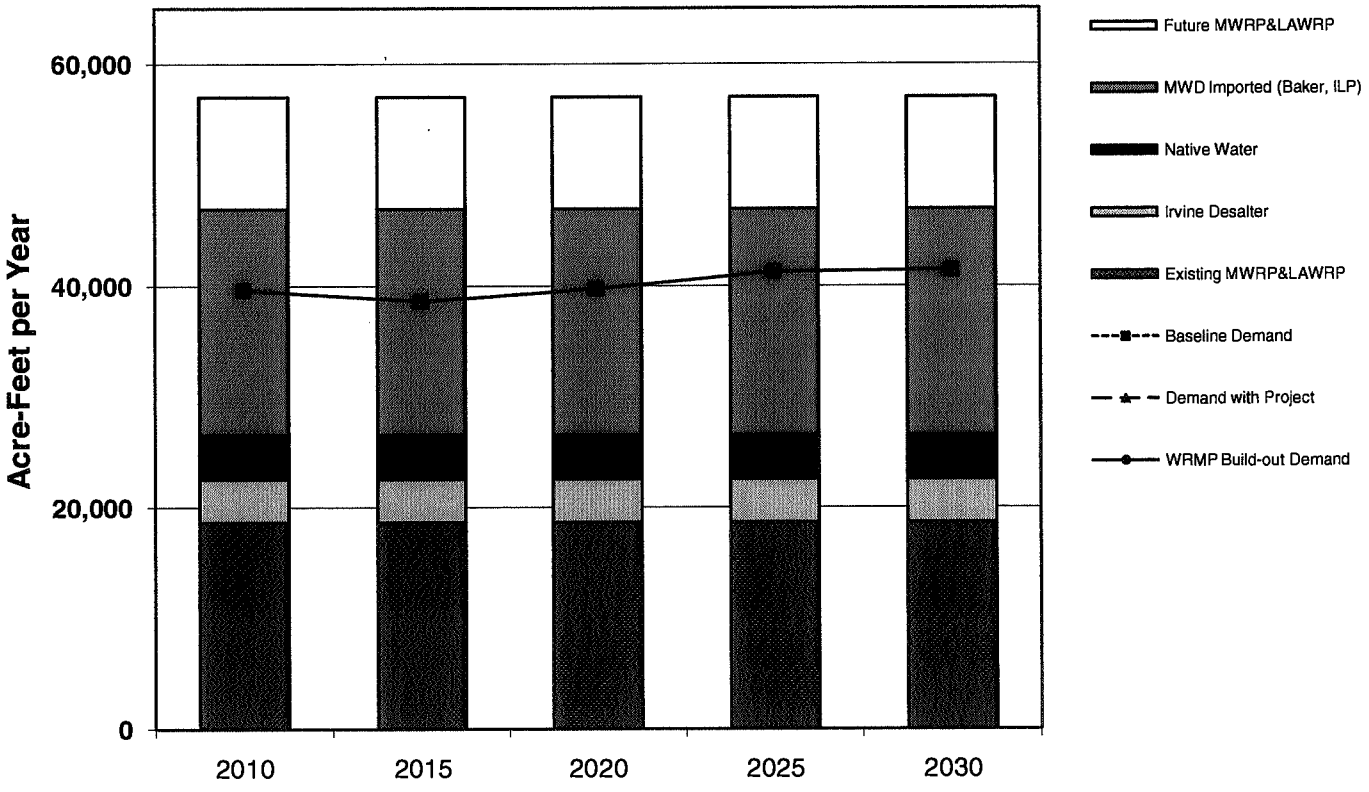
MWD Imported Supplies are shown at 16% reduction off of average connected capacity.

## Figure 4
## IRWD Maximum-Day Supply & Demand - Potable Water




| (in cfs) | 2010 | 2015 | 2020 | 2025 | 2030 |
|---|---|---|---|---|---|
| Current Potable Supplies | | | | | |
| MWD Imported (EOCF#2, AMP, OCF) | 124.1 | 124.1 | 124.1 | 124.1 | 124.1 |
| DRWF/DATS/OPA | 91.4 | 91.4 | 91.4 | 91.4 | 91.4 |
| Irvine Desalter | 10.6 | 10.6 | 10.6 | 10.6 | 10.6 |
| Supplies Under Development | | | | | |
| Future Groundwater | - | 12.7 | 30.7 | 48.7 | 48.7 |
| Maximum Supply Capability | 226.1 | 238.8 | 256.8 | 274.8 | 274.8 |
| Baseline Demand | 142.4 | 182.9 | 208.1 | 219.0 | 220.2 |
| Demand with Project | 142.4 | 181.8 | 205.8 | 216.2 | 217.4 |
| WRMP Build-out Demand | 142.4 | 181.9 | 206.5 | 217.4 | 218.6 |
| Reserve Supply with Project | 83.7 | 56.9 | 50.4 | 57.4 | 56.2 |

## Figure 5
## IRWD Normal-Year Supply & Demand - Nonpotable Water

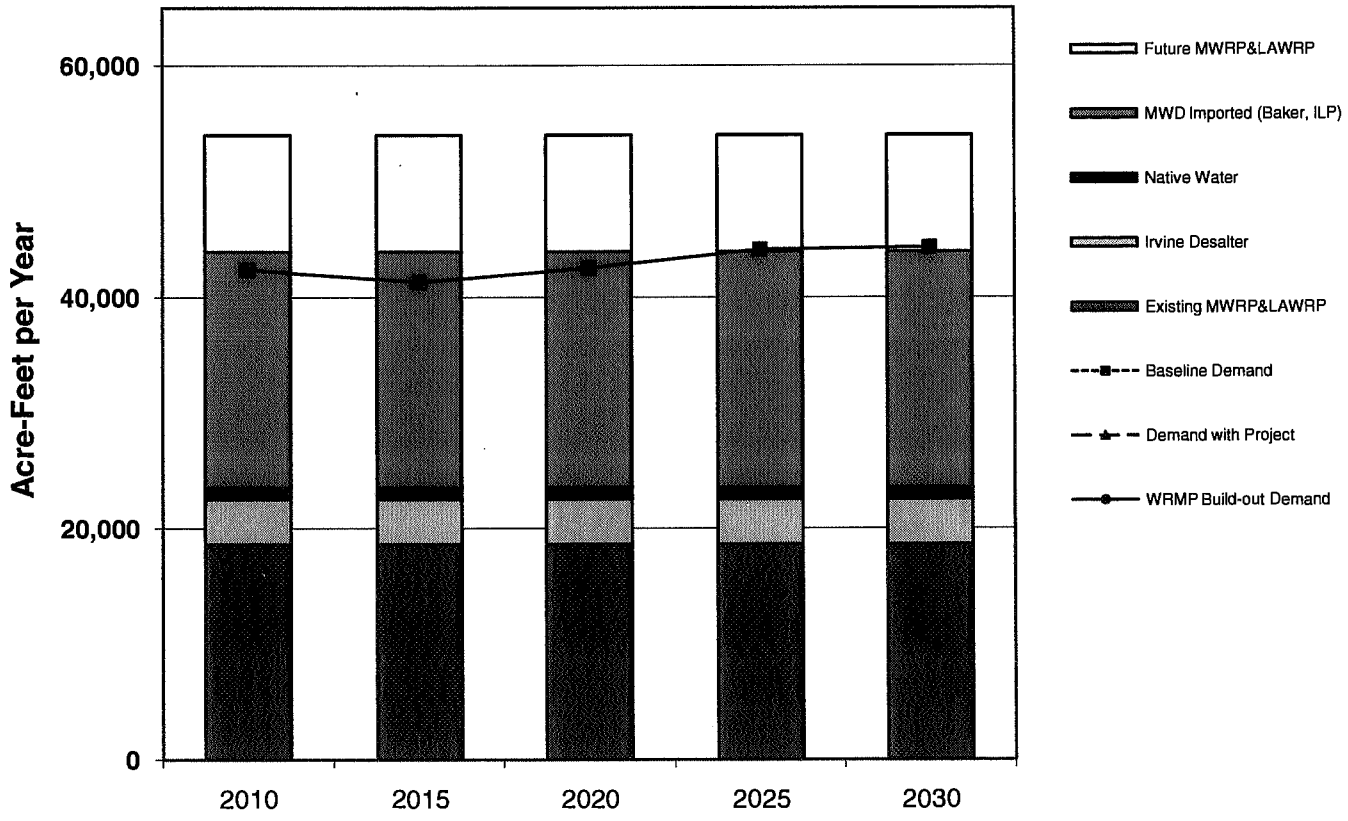



| (in acre-feet per year) | 2010 | 2015 | 2020 | 2025 | 2030 |
|---|---|---|---|---|---|
| Current Nonpotable Supplies | | | | | |
| Existing MWRP&LAWRP | 18,657 | 18,657 | 18,657 | 18,657 | 18,657 |
| MWD Imported (Baker, ILP) | 20,380 | 20,380 | 20,380 | 20,380 | 20,380 |
| Irvine Desalter | 3,898 | 3,898 | 3,898 | 3,898 | 3,898 |
| Native Water | 4,000 | 4,000 | 4,000 | 4,000 | 4,000 |
| Supplies Under Development | | | | | |
| Future MWRP&LAWRP | 10,100 | 10,100 | 10,100 | 10,100 | 10,100 |
| Maximum Supply Capability | 57,035 | 57,035 | 57,035 | 57,035 | 57,035 |
| Baseline Demand | 39,603 | 38,591 | 39,730 | 41,241 | 41,418 |
| Demand with Project | 39,600 | 38,591 | 39,730 | 41,241 | 41,419 |
| WRMP Build-out Demand | 39,603 | 38,592 | 39,731 | 41,242 | 41,419 |
| Reserve Supply with Project | 17,432 | 17,432 | 18,443 | 17,304 | 15,616 |

Note: Downward trend reflects reduction in agricultural use over time.

MWD Imported Supplies are shown at 16% reduction off of average connected capacity.

## Figure 6
## IRWD Single Dry-Year Supply & Demand - Nonpotable Water

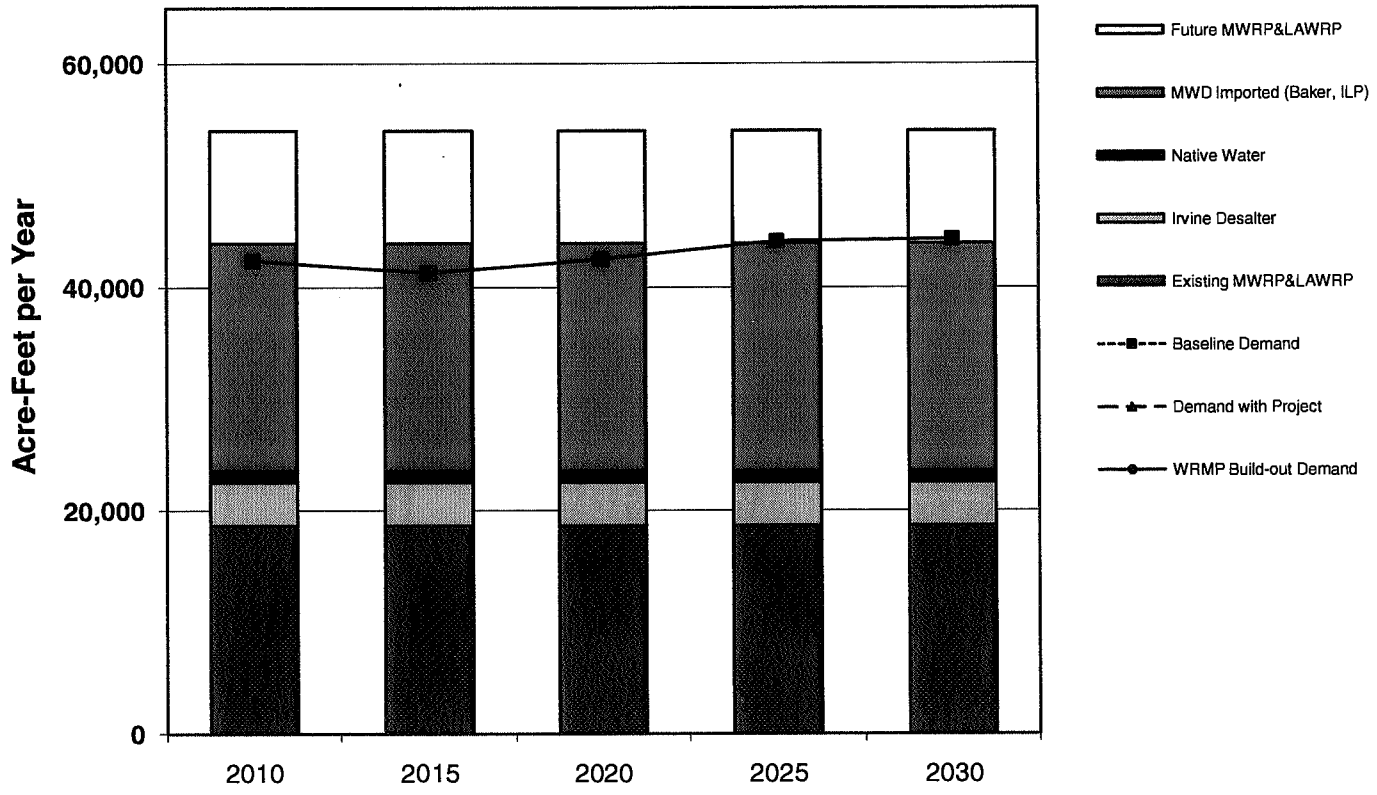



| (in acre-feet per year) | 2010 | 2015 | 2020 | 2025 | 2030 |
|---|---|---|---|---|---|
| Current Nonpotable Supplies | | | | | |
| Existing MWRP&LAWRP | 18,657 | 18,657 | 18,657 | 18,657 | 18,657 |
| MWD Imported (Baker, ILP) | 20,380 | 20,380 | 20,380 | 20,380 | 20,380 |
| Irvine Desalter | 3,898 | 3,898 | 3,898 | 3,898 | 3,898 |
| Native Water | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 |
| Supplies Under Development | | | | | |
| Future MWRP&LAWRP | 10,100 | 10,100 | 10,100 | 10,100 | 10,100 |
| Maximum Supply Capability | 54,035 | 54,035 | 54,035 | 54,035 | 54,035 |
| Baseline Demand | 42,375 | 41,293 | 42,511 | 44,128 | 44,317 |
| Demand with Project | 42,372 | 41,293 | 42,511 | 44,128 | 44,318 |
| WRMP Build-out Demand | 42,375 | 41,293 | 42,512 | 44,129 | 44,318 |
| Reserve Supply with Project | 11,663 | 12,742 | 11,524 | 9,907 | 9,717 |

Note: Downward trend reflects reduction in agricultural use over time.

MWD Imported Supplies are shown at 16% reduction off of average connected capacity.

## Figure 7
## IRWD Multiple Dry-Year Supply & Demand - Nonpotable Water

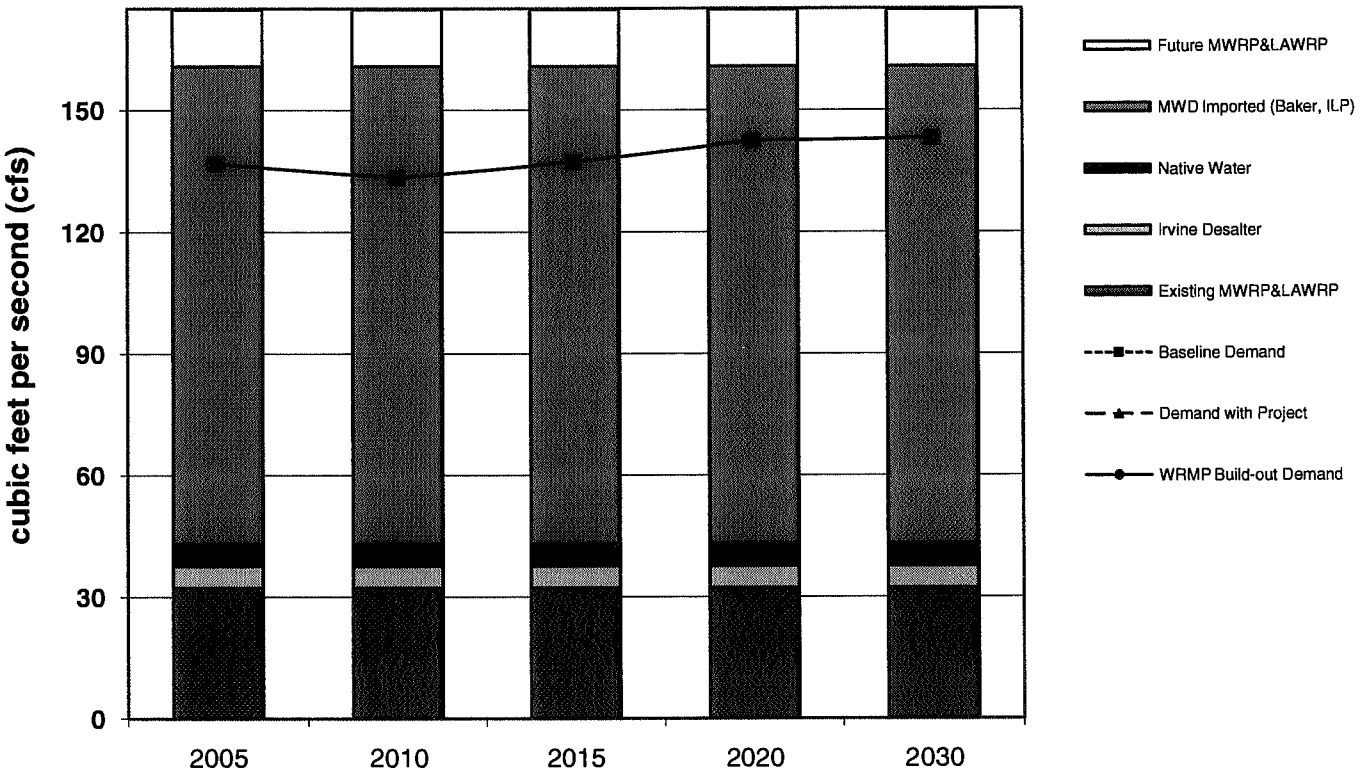



| (in acre-feet per year) | 2010 | 2015 | 2020 | 2025 | 2030 |
|---|---|---|---|---|---|
| Current Nonpotable Supplies | | | | | |
| Existing MWRP&LAWRP | 18,657 | 18,657 | 18,657 | 18,657 | 18,657 |
| MWD Imported (Baker, ILP) | 20,380 | 20,380 | 20,380 | 20,380 | 20,380 |
| Irvine Desalter | 3,898 | 3,898 | 3,898 | 3,898 | 3,898 |
| Native Water | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 |
| Supplies Under Development | | | | | |
| Future MWRP&LAWRP | 10,100 | 10,100 | 10,100 | 10,100 | 10,100 |
| Maximum Supply Capability | 54,035 | 54,035 | 54,035 | 54,035 | 54,035 |
| Baseline Demand | 42,375 | 41,293 | 42,511 | 44,128 | 44,317 |
| Demand with Project | 42,372 | 41,293 | 42,511 | 44,128 | 44,318 |
| WRMP Build-out Demand | 42,375 | 41,293 | 42,512 | 44,129 | 44,318 |
| Reserve Supply with Project | 11,663 | 12,742 | 11,524 | 9,907 | 9,717 |

Note: Downward trend reflects reduction in agricultural use over time.

MWD Imported Supplies are shown at 16% reduction off of average connected capacity.

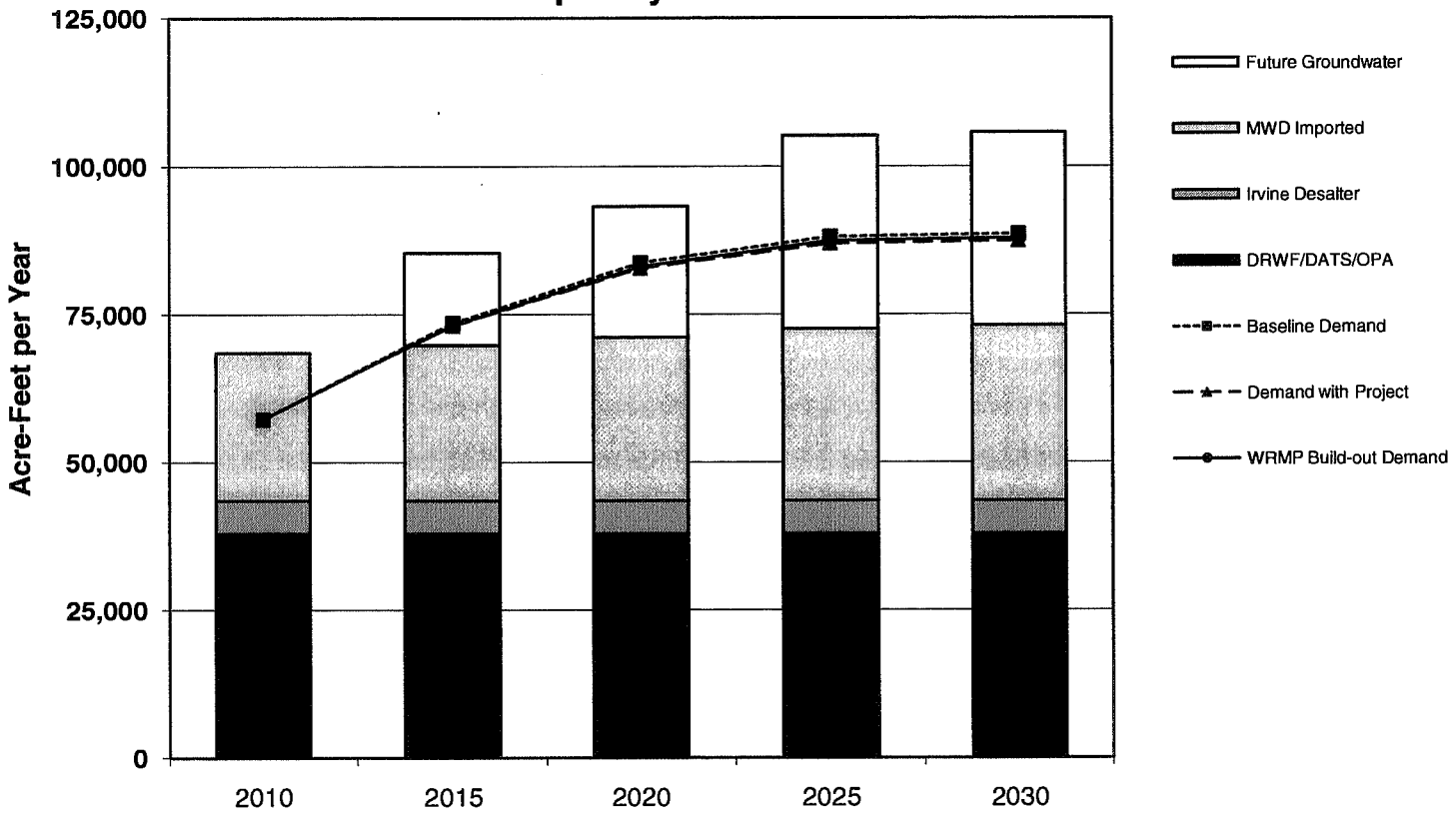
## Figure 8
## IRWD Maximum-Dry Supply & Demand - Nonpotable Water




| (in cfs) | 2005 | 2010 | 2015 | 2020 | 2030 |
|---|---|---|---|---|---|
| Current Nonpotable Supplies | | | | | |
| Existing MWRP&LAWRP | 32.2 | 32.2 | 32.2 | 32.2 | 32.2 |
| Irvine Desalter | 5.4 | 5.4 | 5.4 | 5.4 | 5.4 |
| Native Water | 5.5 | 5.5 | 5.5 | 5.5 | 5.5 |
| MWD Imported (Baker, ILP) | 117.7 | 117.7 | 117.7 | 117.7 | 117.7 |
| Supplies Under Development | | | | | |
| Future MWRP&LAWRP | 14.0 | 14.0 | 14.0 | 14.0 | 14.0 |
| Maximum Supply Capability | 174.7 | 174.7 | 174.7 | 174.7 | 174.7 |
| Baseline Demand | 136.8 | 133.3 | 137.2 | 142.4 | 143.0 |
| Demand with Project | 136.7 | 133.3 | 137.2 | 142.4 | 143.0 |
| WRMP Build-out Demand | 136.8 | 133.3 | 137.2 | 142.4 | 143.0 |
| Reserve Supply with Project | 38.0 | 41.5 | 37.5 | 32.3 | 31.7 |

Note: Downward trend reflects reduction in agricultural use over time.

## Figure 1a
## IRWD Normal-Year Supply & Demand - Potable Water Under Temporary MWD Allocation*



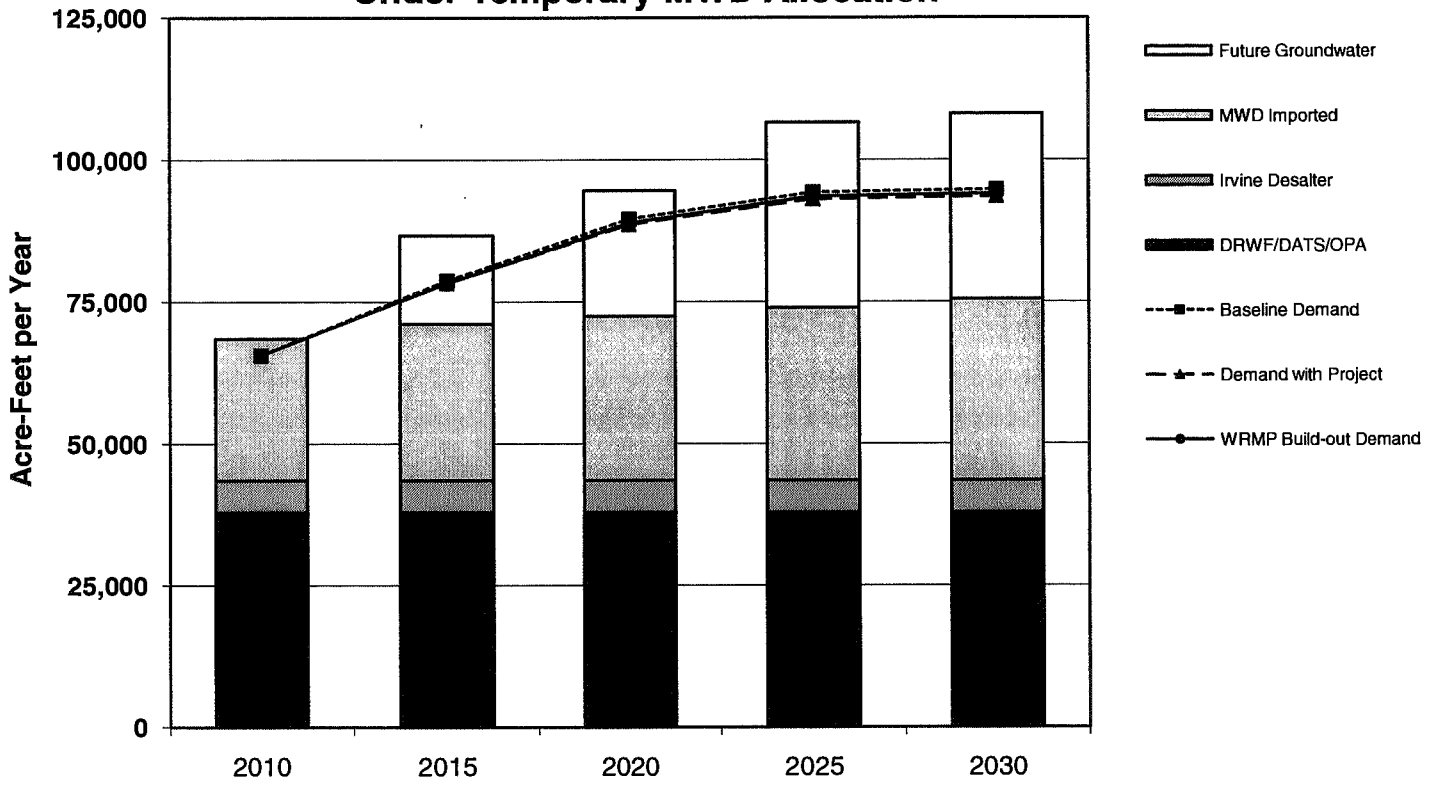

| (in acre-feet per year) | 2010 | 2015 | 2020 | 2025 | 2030 |
|---|---|---|---|---|---|
| Current Potable Supplies | | | | | |
| MWD Imported (EOCF#2, AMP, OCF) | 25,000 | 26,275 | 27,616 | 29,024 | 29,608 |
| DRWF/DATS/OPA | 37,900 | 37,900 | 37,900 | 37,900 | 37,900 |
| Irvine Desalter | 5,640 | 5,640 | 5,640 | 5,640 | 5,640 |
| Supplies Under Development | | | | | |
| Future Groundwater | - | 15,600 | 22,100 | 32,600 | 32,600 |
| Maximum Supply Capability | 68,540 | 85,415 | 93,256 | 105,164 | 105,748 |
| Baseline Demand | 57,286 | 73,571 | 83,696 | 88,086 | 88,579 |
| Demand with Project | 57,286 | 73,137 | 82,784 | 86,947 | 87,434 |
| WRMP Build-out Demand | 57,286 | 73,161 | 83,042 | 87,432 | 87,922 |
| Reserve Supply with Project | 11,254 | 12,279 | 10,472 | 18,217 | 18,314 |

Notes: By agreement, IRWD is required to count the production from the Irvine Subbasin in calculating available supplies for TIC developments (see Potable Supply-Groundwater).

*For illustration purposes, IRWD has shown MWD Imported Supplies as estimated under a short-term 10% allocation, Shortage Stage 2 in all of the 5-year increments. However, it is likely that such a scenario would only be temporary. Under a MWD Allocation, IRWD could supplement supplies with groundwater production which can exceed applicable basin percentages on a short-term basis. IRWD may also reduce demands by implementing shortage contingency measures as described in the UWMP.

**Figure 2a**

## IRWD Single Dry-Year Supply & Demand - Potable Water Under Temporary MWD Allocation*

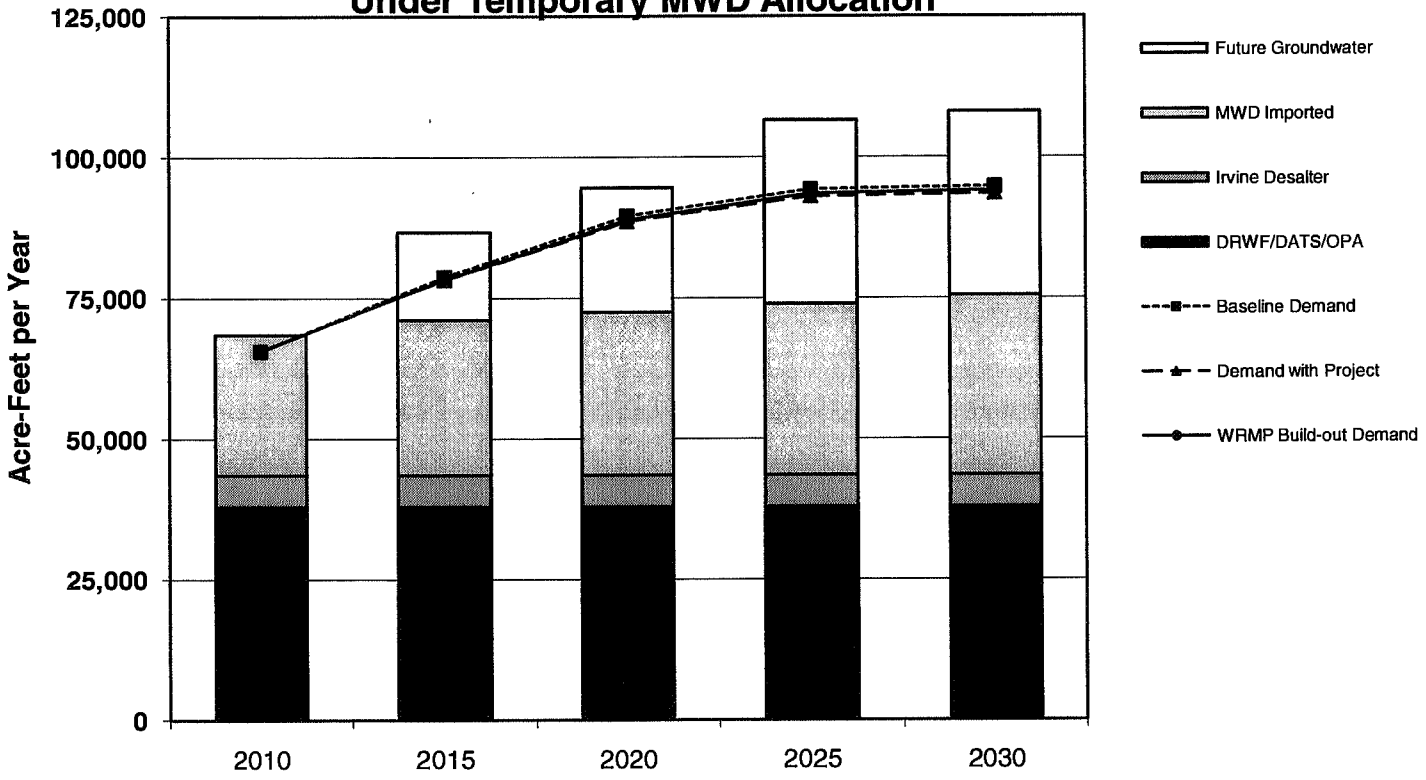



| (in acre-feet per year) | 2010 | 2015 | 2020 | 2025 | 2030 |
|---|---|---|---|---|---|
| Current Potable Supplies | | | | | |
| MWD Imported (EOCF#2, AMP, OCF) | 25,000 | 27,589 | 28,968 | 30,417 | 31,938 |
| DRWF/DATS/OPA | 37,900 | 37,900 | 37,900 | 37,900 | 37,900 |
| Irvine Desalter | 5,640 | 5,640 | 5,640 | 5,640 | 5,640 |
| Supplies Under Development | | | | | |
| Future Groundwater | - | 15,600 | 22,100 | 32,600 | 32,600 |
| Maximum Supply Capability | 68,540 | 86,729 | 94,608 | 106,557 | 108,078 |
| Baseline Demand | 65,586 | 78,721 | 89,555 | 94,252 | 94,780 |
| Demand with Project | 65,587 | 78,256 | 88,579 | 93,033 | 93,554 |
| WRMP Build-out Demand | 65,586 | 78,282 | 88,855 | 93,552 | 94,076 |
| Reserve Supply with Project | 2,954 | 8,447 | 5,753 | 13,004 | 14,002 |

Notes: Supplies identical to Normal-Year based on Metropolitan's Regional Urban Water Management Plan (11/8/05) and usage of groundwater under drought conditions (OCWD Master Plan). Demands increased 7% from Normal-Year. By agreement, IRWD is required to count the production from the Irvine Subbasin in calculating available supplies for TIC developments (see Potable Supply-Groundwater).

*For illustration purposes, IRWD has shown MWD Imported Supplies as estimated under a short-term 10% allocation, Shortage Stage 2 in all of the 5-year increments. However, it is likely that such a scenario would only be temporary. Under a MWD Allocation, IRWD could supplement supplies with groundwater production which can exceed applicable basin percentages on a short-term basis. IRWD may also reduce demands by implementing shortage contingency measures as described in the UWMP.

## Figure 3a
## IRWD Multiple Dry-Year Supply & Demand - Potable Water Under Temporary MWD Allocation*




| (in acre-feet per year) | 2010 | 2015 | 2020 | 2025 | 2030 |
|---|---|---|---|---|---|
| Current Potable Supplies | | | | | |
| MWD Imported (EOCF#2, AMP, OCF) | 25,000 | 27,589 | 28,968 | 30,417 | 31,938 |
| DRWF/DATS/OPA | 37,900 | 37,900 | 37,900 | 37,900 | 37,900 |
| Irvine Desalter | 5,640 | 5,640 | 5,640 | 5,640 | 5,640 |
| Supplies Under Development | | | | | |
| Future Groundwater | - | 15,600 | 22,100 | 32,600 | 32,600 |
| Maximum Supply Capability | 68,540 | 86,729 | 94,608 | 106,557 | 108,078 |
| Baseline Demand | 65,586 | 78,721 | 89,555 | 94,252 | 94,780 |
| Demand with Project | 65,587 | 78,256 | 88,579 | 93,033 | 93,554 |
| WRMP Build-out Demand | 65,586 | 78,282 | 88,855 | 93,552 | 94,076 |
| Reserve Supply with Project | 2,954 | 8,473 | 6,030 | 13,524 | 14,524 |

Notes: Supplies identical to Normal-Year based on Metropolitan's Regional Urban Water Management Plan (11/8/05) and usage of groundwater under drought conditions (OCWD Master Plan). Demands increased 7% from Normal-Year. By agreement, IRWD is required to count the production from the Irvine Subbasin in calculating available supplies for TIC developments (see Potable Supply-Groundwater).

*For illustration purposes, IRWD has shown MWD Imported Supplies as estimated under a short-term 10% allocation, Shortage Stage 2 in all of the 5-year increments. However, it is likely that such a scenario would only be temporary. Under a MWD Allocation, IRWD could supplement supplies with groundwater production which can exceed applicable basin percentages on a short-term basis. IRWD may also reduce demands by implementing shortage contingency measures as described in the UWMP.

## 2. Information concerning supplies

(a)(1) Existing sources of identified water supply for the proposed project: IRWD does not allocate particular supplies to any project, but identifies total supplies for its service area, as shown in the following table:

| | Max Day (cfs) | Avg. Annual (AFY) | | Annual by Category (AFY) |
|---|---|---|---|---|
| **Current Supplies** | | | | |
| **Potable - Imported** | | | | |
| East Orange County Feeder No. 2 | 41.4 | 16,652 | 1 | |
| Allen-McColloch Pipeline* | 64.7 | 26,024 | 1 | |
| Orange County Feeder | 18.0 | 7,240 | 1 | 49,916 |
| **Potable - Groundwater** | | | | |
| Dyer Road Wellfield | 80.0 | 28,000 | 2 | |
| OPA Well | 1.4 | 1,000 | | |
| Deep Aquifer Treatment System-DATS | 10.0 | 8,900 | 2 | |
| Irvine Desalter | 10.6 | 5,640 | 3 | 43,540 |
| Total Potable Current Supplies | 226.1 | | | 93,456 |
| **Nonpotable - Reclaimed Water** | | | | |
| MWRP (18 mgd) | 23.9 | 17,340 | 4 | |
| LAWRP (5.5 mgd) | 8.3 | 5,975 | 4 | 23,315 |
| **Nonpotable - Imported** | | | | |
| Baker Aqueduct | 52.7 | 15,262 | 5 | |
| Irvine Lake Pipeline | 65.0 | 9,000 | 6 | 24,262 |
| **Nonpotable - Groundwater** | | | | |
| Irvine Desalter-Nonpotable | 5.4 | 3,898 | 7 | 3,898 |
| **Nonpotable Native** | | | | |
| Irvine Lake | 5.5 | 4,000 | 8 | 4,000 |
| Total Nonpotable Current Supplies | 160.8 | | | 55,475 |
| Total Combined Current Supplies | 386.9 | | | 148,931 |
| **Supplies Under Development** | | | | |
| Potable Supplies | | | | |
| Wells 21 & 22 | 6.0 | 6,300 | | |
| Well 106 | 2.2 | 1,300 | | |
| Well 53 | 4.5 | 3,000 | | |
| Future OPA Wells | 8.0 | 5,000 | | |
| Anaheim wellfield | 10.0 | 6,500 | | |
| Wells 51 & 52 | 9.0 | 5,500 | | |
| Tustin Legacy wells | 9.0 | 5,000 | 9 | |
| Total Potable Under Development Supplies | 48.7 | 32,600 | | 32,600 |
| Nonpotable Supplies: Future MWRP&LAWRP Reclaimed | 20.0 | 14,450 | 10 | 14,450 |
| Total Under Development | 117.4 | | | 47,050 |
| Total Supplies | | | | |
| Potable Supplies | 274.8 | | | 126,056 |
| Nonpotable Supplies | 180.7 | | | 69,925 |
| Total Supplies (Current and Under Development) | 455.6 | | | 195,981 |

1 Based on converting maximum day capacity to average by dividing the capacity by a peaking factor of 1.8 (see Footnote 3, page 22).

2 Contract amount - See Potable Supply-Groundwater(iii).

3 Contract amount - See Potable Supply-Groundwater (iv) and (v). Maximum day well capacity is compatible with contract amount.

4 MWRP 18.0 mgd treatment capacity (17,400 AFY RW production) and LAWRP 5.5 mgd tertiary treatment capacity (5,975 AFY)

5 Based on converting maximum day capacity to average by dividing the capacity by a peaking factor of 2.5 (see Footnote 3, page 22).

6 Based on IRWD's proportion of Irvine Lake imported water storage; Actual ILP capacity would allow the use of additional imported water from MWD through the Santiago Lateral.

7 Contract amount - See Nonpotable Supply-Groundwater (i) and (ii). Maximum day well capacity (cfs) is compatible with contract amount.

8 Based on 70 years historical average of Santiago Creek Inflow into Irvine Lake.

9 Estimated combined capacity of wells.

10 Future estimated MWRP & LAWRP reclaimed water production.

*64.7 cfs is current assigned capacity; based on increased peak flow, IRWD can purchase 10 cfs more (see page 23 (b)(1)(iii))

(b) Required information concerning currently available and under-development water supply entitlements, water rights and water service contracts:

(1) Written contracts or other proof of entitlement.[3] [4]

•POTABLE SUPPLY - IMPORTED[5]

***Potable imported water service connections (currently available).***

***(i)*** Potable imported water is delivered to IRWD at various service connections to the imported water delivery system of The Metropolitan Water District of Southern California ("MWD"): service connections CM-01A and OC-7 (Orange County Feeder); CM-10, CM-12, OC-38, OC-39, OC-57, OC-58, OC-63 (East Orange County Feeder No. 2); and OC-68, OC-71, OC-72, OC-73/73A, OC-74, OC-75, OC-83, OC-84, OC-87 (Allen-McColloch Pipeline). IRWD's entitlements regarding service from the MWD delivery system facilities are described in the following paragraphs and summarized in the above Table ((2)(a)(1)). IRWD receives imported water service through Municipal Water District of Orange County ("MWDOC"), a member agency of MWD.

***Allen-McColloch Pipeline ("AMP") (currently available).***

***(ii)*** Agreement For Sale and Purchase of Allen-McColloch Pipeline, dated as of July 1, 1994 (Metropolitan Water District Agreement No. 4623) ("AMP Sale Agreement"). Under the AMP Sale Agreement, MWD purchased the Allen-McColloch Pipeline (formerly known as the "Diemer Intertie") from MWDOC, the MWDOC Water Facilities Corporation and certain agencies, including IRWD and Los Alisos Water District ("LAWD"),[6] identified as "Participants" therein. Section 5.02 of the AMP Sale Agreement obligates MWD to meet IRWD's and the other Participants' requests for deliveries and specified minimum hydraulic grade lines at each connection serving a Participant, subject to availability of water. MWD

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[3] In some instances, the contractual and other legal entitlements referred to in the following descriptions are stated in terms of flow capacities, in cubic feet per second ("cfs"). In such instances, the cfs flows are converted to volumes of AFY for purposes of analyzing supply sufficiency in this assessment, by dividing the capacity by a peaking factor of 1.8 (potable) or 2.5 (nonpotable), consistent with maximum day peaking factors used in the WRMP. The resulting reduction in assumed available annual AFY volumes through the application of these factors recognizes that connected capacity is provided to meet peak demands and that seasonal variation in demand and limitations in local storage prevent these capacities from being utilized at peak capacity on a year-round basis. However, the application of these factors produces a conservatively low estimate of annual AFY volumes from these connections; additional volumes of water are expected to be available from these sources.

[4] In the following discussion, contractual and other legal entitlements are characterized as either potable or nonpotable, according to the characterization of the source of supply. Some of the nonpotable supplies surplus to nonpotable demand could potentially be rendered potable by the addition of treatment facilities; however, IRWD has no current plans to do so.

[5] See Imported Supply - Additional Information, below, for information concerning the availability of the MWD supply.

[6] IRWD has succeeded to LAWD's interests in the AMP and other LAWD water supply facilities and rights mentioned in this assessment, by virtue of the consolidation of IRWD and LAWD on December 31, 2000.

agrees to operate the AMP as any other MWD pipeline. MWD has the right to operate the AMP on a "utility basis," meaning that MWD need not observe capacity allocations of the Participants but may use available capacity to meet demand at any service connection.

The AMP Sale Agreement obligates MWD to monitor and project AMP demands and to construct specified pump facilities or make other provision for augmenting MWD's capacity along the AMP, at MWD's expense, should that be necessary to meet demands of all of the Participants (Section 5.08).

***(iii)*** Agreement For Allocation of Proceeds of Sale of Allen-McColloch Pipeline, dated as of July 1, 1994 ("AMP Allocation Agreement"). This agreement, entered into concurrently with the AMP Sale Agreement, provided each Participant, including IRWD, with a capacity allocation in the AMP, for the purpose of allocating the sale proceeds among the Participants in accordance with their prior contractual capacities adjusted to conform to their respective future demands. IRWD's capacity under the AMP Allocation Agreement (including its capacity as legal successor agency to LAWD) is 64.69 cfs at IRWD's first four AMP connections, 49.69 cfs at IRWD's next five downstream AMP connections and 35.01 and 10.00 cfs, respectively at IRWD's remaining two downstream connections. The AMP Allocation Agreement further provides that if a Participant's peak flow exceeds its capacity, the Participant shall "purchase" additional capacity from the other Participants who are using less than their capacity, until such time as MWD augments the capacity of the AMP. The foregoing notwithstanding, as mentioned in the preceding paragraph, the allocated capacities do not alter MWD's obligation under the AMP Sale Agreement to meet all Participants' demands along the AMP, and to augment the capacity of the AMP if necessary. Accordingly, under these agreements, IRWD can legally increase its use of the AMP beyond the above-stated capacities, but would be required to reimburse other Participants from a portion of the proceeds IRWD received from the sale of the AMP.

***(iv)*** Improvement Subleases (or "FAP" Subleases) [MWDOC and LAWD; MWDOC and IRWD], dated August 1, 1989; 1996 Amended and Restated Allen-McColloch Pipeline Subleases [MWDOC and LAWD; MWDOC and IRWD], dated March 1, 1996. IRWD subleases its AMP capacity, including the capacity it acquired as successor to LAWD. To facilitate bond financing for the construction of the AMP, it was provided that the MWDOC Water Facilities Corporation, and subsequently MWDOC, would have ownership of the pipeline, and the Participants would be sublessees. As is the case with the AMP Sale Agreement, the subleases similarly provide that water is subject to availability.

***East Orange County Feeder No. 2 ("EOCF#2") (currently available).***

***(v)*** Agreement For Joint Exercise of Powers For Construction, Operation and Maintenance of East Orange County Feeder No. 2, dated July 11, 1961, as amended on July 25, 1962 and April 26, 1965; Agreement Re Capacity Rights In Proposed Water Line, dated September 11, 1961 ("IRWD MWDOC Assignment Agreement"); Agreement Regarding Capacity Rights In the East Orange County Feeder No. 2, dated August 28, 2000 ("IRWD Coastal Assignment Agreement"). East Orange County Feeder No. 2 ("EOCF#2"), a feeder linking Orange County

with MWD's feeder system, was constructed pursuant to a joint powers agreement among MWDOC (then called Orange County Municipal Water District), MWD, Coastal Municipal Water District ("Coastal"), Anaheim and Santa Ana. A portion of IRWD's territory is within MWDOC and the remainder is within the former Coastal (which was consolidated with MWDOC in 2001). Under the IRWD MWDOC Assignment Agreement, MWDOC assigned 41 cfs of capacity to IRWD in the reaches of EOCF#2 upstream of the point known as Coastal Junction (reaches 1 through 3), and 27 cfs in reach 4, downstream of Coastal Junction. Similarly, under the IRWD Coastal Assignment Agreement, prior to Coastal's consolidation with MWDOC, Coastal assigned to IRWD 0.4 cfs of capacity in reaches 1 through 3 and 0.6 cfs in reach 4 of EOCF#2. Delivery of water through EOCF#2 is subject to the rules and regulations of MWD and MWDOC, and is further subject to application and agreement of IRWD respecting turnouts.

***Orange County Feeder (currently available)***

***(vi)*** Agreement, dated March 13, 1956. This 1956 Agreement between MWDOC's predecessor district and the Santa Ana Heights Water Company ("SAHWC") provides for delivery of MWD imported supply to the former SAHWC service area. SAHWC's interests were acquired on behalf of IRWD through a stock purchase and IRWD annexation of the SAHWC service area in 1997. The supply is delivered through a connection to MWD's Orange County Feeder designated as OC-7.

***(vii)*** Agreement For Transfer of Interest In Pacific Coast Highway Water Transmission and Storage Facilities From The Irvine Company To the Irvine Ranch Water District, dated April 23, 1984; Joint Powers Agreement For the Construction, Operation and Maintenance of Sections 1a, 1b and 2 of the Coast Supply Line, dated June 9, 1989; Agreement, dated January 13, 1955 ("1955 Agreement"). The jointly constructed facility known as the Coast Supply Line ("CSL"), extending southward from a connection with MWD's Orange County Feeder at Fernleaf Street in Newport Beach, was originally constructed pursuant to a 1952 agreement among Laguna Beach County Water District ("LBCWD"), The Irvine Company (TIC) and South Coast County Water District. Portions were later reconstructed. Under the above-referenced transfer agreement in 1984, IRWD succeeded to TIC's interests in the CSL. The CSL is presently operated under the above-referenced 1989 joint powers agreement, which reflects IRWD's ownership of 10 cfs of capacity. The 1989 agreement obligates LBCWD, as the managing agent and trustee for the CSL, to purchase water and deliver it into the CSL for IRWD. LBCWD purchases such supply, delivered by MWD to the Fernleaf connection, pursuant to the 1955 Agreement with Coastal (now MWDOC).

•<u>POTABLE SUPPLY - GROUNDWATER</u>

***(i)*** Orange County Water District Act, Water Code App., Ch. 40 ("Act"). IRWD is an operator of groundwater-producing facilities in the Orange County Groundwater Basin (the "Basin"). Although the rights of the producers within the Basin vis a vis one another have not been adjudicated, they nevertheless exist and have not been abrogated by the Act (§40-77). The rights consist of

municipal appropriators' rights and may include overlying and riparian rights. The Basin is managed by OCWD under the Act, which functions as a statutorily-imposed physical solution. The Act empowers OCWD to impose replenishment assessments and basin equity assessments on production and to require registration of water-producing facilities and the filing of certain reports; however, OCWD is expressly prohibited from limiting extraction unless a producer agrees (§ 40-2(6) (c)) and from impairing vested rights to the use of water (§ 40-77). Thus, producers may install and operate production facilities under the Act; OCWD approval is not required. OCWD is required to annually investigate the condition of the Basin, assess overdraft and accumulated overdraft, and determine the amount of water necessary for replenishment (§40-26). OCWD has studied the Basin replenishment needs and potential projects to address growth in demand until 2020. This is described in detail in the OCWD Master Plan Report, dated April, 1999. OCWD's analysis has been expanded and updated through 2025 in its Final Draft Long-Term Facilities Plan (January, 2006), which is expected to be received and filed by its Board in July 2009.

***(ii)*** *Irvine Ranch Water District v. Orange County Water District*, OCSC No. 795827. A portion of IRWD is outside the jurisdictional boundary of OCWD. IRWD is eligible to annex the Santa Ana River Watershed portion of this territory to OCWD, under OCWD's current annexation policy (Resolution No. 86-2-15, adopted on February 19, 1986 and reaffirmed on June 2, 1999), and anticipates doing so. However, this September 29, 1998, Superior Court ruling indicates that IRWD is entitled to deliver groundwater from the Basin to the IRWD service area irrespective of whether such area is also within OCWD.

***Dyer Road Wellfield (DWRF) / Deep Aquifer Treatment System (DATS) (currently available)***

***(iii)*** Agreement For Water Production and Transmission Facilities, dated March 18, 1981, as amended May 2, 1984, September 19, 1990 and November 3, 1999 (the "DRWF Agreement"). The DRWF Agreement, among IRWD, OCWD and Santa Ana, concerns the development of IRWD's Dyer Road Wellfield ("DRWF"), within the Basin. The DRWF consists of 16 wells pumping from the non-colored water zone of the Basin and 2 wells (with colored-water treatment facilities) pumping from the deep, colored-water zone of the Basin (the colored-water portion of the DRWF is sometimes referred to as the Deep Aquifer Treatment System or "DATS".) Under the DRWF Agreement, an "equivalent" basin production percentage (BPP) has been established for the DRWF, currently 28,000 AFY of non-colored water and 8,000 AFY of colored water, provided any amount of the latter 8,000 AFY not produced results in a matching reduction of the 28,000 AFY BPP. Although typically IRWD production from the DRWF does not materially exceed the equivalent BPP, the equivalent BPP is not an extraction limitation; it results in imposition of monetary assessments on the excess production. The DRWF Agreement also establishes monthly pumping amounts for the DRWF. With the addition of the Concentrated Treatment System (CATS), IRWD has increased the yield of DATS.

***Irvine Subbasin / Irvine Desalter (currently available)***

***(iv)*** First Amended and Restated Agreement, dated March 11, 2002, as

amended June 15, 2006, restating May 5, 1988 agreement ("Irvine Subbasin Agreement"). TIC has historically pumped agricultural water from the Irvine Subbasin. (As in the rest of the Basin of which this subbasin is a part, the groundwater rights have not been adjudicated, and OCWD provides governance and management under the Act.) The 1988 agreement between IRWD and TIC provided for the joint use and management of the Irvine Subbasin. The 1988 agreement further provided that the 13,000 AFY annual yield of the Irvine Subbasin would be allocated 1,000 AFY to IRWD and 12,000 AFY to TIC. Under the restated Irvine Subbasin Agreement, the foregoing allocations were superseded as a result of TIC's commencement of the building its Northern Sphere Area project, with the effect that the Subbasin production capability, wells and other facilities, and associated rights have been transferred from TIC to IRWD, and IRWD has assumed the production from the Subbasin. In consideration of the transfer, IRWD is required to count the supplies attributable to the transferred Subbasin production in calculating available supplies for the Northern Sphere Area project and other TIC development and has agreed that they will not be counted toward non-TIC development.

A portion of the existing Subbasin water production facilities produce water which is of potable quality. IRWD could treat some of the water produced from the Subbasin for potable use, by means of the Desalter and other projects. Although, as noted above, the Subbasin has not been adjudicated and is managed by OCWD, TIC reserved water rights from conveyances of its lands as development over the Subbasin has occurred, and under the Irvine Subbasin Agreement TIC has transferred its rights to IRWD.

*(v)* Second Amended and Restated Agreement Between Orange County Water District and Irvine Ranch Water District Regarding the Irvine Desalter Project, dated June 11, 2001, and other agreements referenced therein. This agreement provides for the extraction and treatment of subpotable groundwater from the Irvine Subbasin, a portion of the Basin. As is the case with the remainder of the Basin, IRWD's entitlement to extract this water is not adjudicated, but the use of the entitlement is governed by the OCWD Act. (See also, discussion of Irvine Subbasin in the preceding paragraph.) A portion of the product water has been delivered into the IRWD potable system, and the remainder has been delivered into the IRWD nonpotable system.

***Orange Park Acres (currently available)***

On June 1, 2008, through annexation and merger, IRWD acquired the water system of the former Orange Park Acres Mutual Water company, including well [OPA Well]. The well is operated within the Orange County Groundwater Basin.

***Irvine Wells (under development)***

*(vi)* IRWD is pursuing the installation of production facilities in the west Irvine, Anaheim, Tustin Legacy and Tustin Ranch portions of the Basin. These groundwater supplies are considered to be under development; however, four wells have been drilled and have previously produced groundwater, three wells have been drilled but have not been used as production wells to date, a site for an additional well and treatment facility has been acquired by IRWD. The

production facilities can be constructed and operated under the Act; no statutory or contractual approval is required to do so. An agreement with the City of Anaheim would be developed for production within Anaheim. Appropriate environmental review would be conducted for each facility. See discussion of the Act under Potable Supply - Groundwater, paragraph (i), above.

•NONPOTABLE SUPPLY - RECLAIMED

***Water Reclamation Plants (currently available)***

Water Code Section 1210. IRWD supplies its own reclaimed water from wastewater collected by IRWD and delivered to IRWD's Michelson Water Reclamation Plant (MWRP) and Los Alisos Water Reclamation Plant (LAWRP). MWRP currently has a permitted capacity of 18 million gallons per day (MGD) and LAWRP currently has a permitted capacity of 5.5 MGD. Water Code Section 1210 provides that the owner of a wastewater treatment plant operated for the purposes of treating wastes from a sanitary sewer system holds the exclusive right to the treated effluent as against anyone who has supplied the water discharged into the sewer system. IRWD's permits for the operation of MWRP and LAWRP allow only irrigation and other customer uses of reclaimed water, and do not permit stream discharge of reclaimed water; thus, no issue of downstream appropriation arises, and IRWD is entitled to deliver all of the effluent to meet contractual and customer demands.

***Water Reclamation Plant Expansion (under development)***

IRWD has prepared a Final Environmental Impact Report for the Michelson Water Reclamation Plant Phase 2 and 3 Capacity Expansion Project (February, 2006) and the expansion project is under construction. With this expansion, IRWD plans to increase its capacity on the existing MWRP site to produce sufficient reclaimed water to meet the projected demand in the year 2031. (Initial upgrades that are within existing permit authorizations and CEQA compliance are completed) Additional reclamation capacity will augment local nonpotable supplies and improve reliability.

•NONPOTABLE SUPPLY - IMPORTED[7]

***Baker Pipeline (currently available)***

Santiago Aqueduct Commission Joint Powers Agreement, dated September 11, 1961, as amended December 20, 1974, January 13, 1978, November 1, 1978, September 1, 1981, October 22, 1986, and July 8, 1999 (the "SAC Agreement"); Agreement Between Irvine Ranch Water District and Carma-Whiting Joint Venture Relative to Proposed Annexation of Certain Property to Irvine Ranch Water District, dated May 26, 1981 (the "Whiting Annexation Agreement"). Service connections OC-13/13A, OC-33/33A. The imported untreated water pipeline initially known as the Santiago Aqueduct and now known as the Baker

[7] See Imported Supply - Additional Information, below, for information concerning the availability of the MWD supply.

Pipeline was constructed under the SAC Agreement, a joint powers agreement. The Baker Pipeline is connected to MWD's Santiago Lateral. IRWD's capacity in the Baker Pipeline includes the capacity it subleases as successor to LAWD, as well as capacity rights IRWD acquired through the Whiting Annexation Agreement. (To finance the construction of AMP parallel untreated reaches which were incorporated into the Baker Pipeline, replacing original SAC untreated reaches that were made a part of the AMP potable system, it was provided that the MWDOC Water Facilities Corporation, and subsequently MWDOC, would have ownership, and the participants would be sublessees.) IRWD has 52.70 cfs in the first reach, 12.50 cfs in each of the second, third and fourth reaches and 7.51 cfs in the fifth reach of the Baker Pipeline. Water is subject to availability from MWD.

•NONPOTABLE SUPPLY - NATIVE

***Irvine Lake (currently available)***

***(i)*** Permit For Diversion and Use of Water (Permit No. 19306) issued pursuant to Application No. 27503; License For Diversion and Use of Water (License 2347) resulting from Application No. 4302 and Permit No. 3238; License For Diversion and Use of Water (License 2348) resulting from Application No. 9005 and Permit No. 5202. The foregoing permit and licenses, jointly held by IRWD (as successor to The Irvine Company (TIC) and Carpenter Irrigation District (CID)) and Serrano Water District (SWD), secure appropriative rights to the flows of Santiago Creek. Under Licenses 2347 and 2348, IRWD and SWD have the right to diversion by storage at Santiago Dam (Irvine Lake) and a submerged dam, of a total of 25,000 AFY. Under Permit No. 19306, IRWD and SWD have the right to diversion by storage of an additional 3,000 AFY by flashboards at Santiago Dam (Irvine Lake). (Rights under Permit No. 19306 may be junior to an OCWD permit to divert up to 35,000 AFY of Santiago Creek flows to spreading pits downstream of Santiago Dam.) The combined total of native water that may be diverted to storage under these licenses and permit is 28,000 AFY. A 1996 amendment to License Nos. 2347, 2348 and 2349 [replaced by Permit No. 19306 in 1984] limits the withdrawal of water from the Lake to 15,483 AFY under the licenses. This limitation specifically references the licenses and doesn't reference water stored pursuant to other legal entitlements. The use and allocation of the native water is governed by the agreements described in the next paragraph.

***(ii)*** Agreement, dated February 6, 1928 ("1928 Agreement"); Agreement, dated May 15, 1956, as amended November 12, 1973 ("1956 Agreement"); Agreement, dated as of December 21, 1970 ("1970 Agreement"); Agreement Between Irvine Ranch Water District and The Irvine Company Relative to Irvine Lake and the Acquisition of Water Rights In and To Santiago Creek, As Well As Additional Storage Capacity in Irvine Lake, dated as of May 31, 1974 ("1974 Agreement"). The 1928 Agreement was entered into among SWD, CID and TIC, providing for the use and allocation of native water in Irvine Lake. Through the 1970 Agreement and the 1974 Agreement, IRWD acquired the interests of CID and TIC, leaving IRWD and SWD as the two co-owners. TIC retains certain reserved rights. The 1928 Agreement divides the stored native water by a formula which allocates to IRWD one-half of the first 1,000 AF, plus increments that generally

yield three-fourths of the amount over 1,000 AF.[8] The agreements also provide for evaporation and spill losses and carryover water remaining in the Lake at the annual allocation dates. Given the dependence of native water on rainfall, for purposes of this assessment only a small portion of IRWD's share of the 28,000 AFY of native water rights (4,000 AFY in normal years and 1,000 AFY in single and multiple-dry years) is shown in currently available supplies, based on averaging of historical data. However, IRWD's ability to supplement Irvine Lake storage with its imported untreated water supplies, described herein, offsets the uncertainty associated with the native water supply.

•NONPOTABLE SUPPLY - GROUNDWATER

***Irvine Subbasin / Irvine Desalter (currently available)***

***(i)*** IRWD's entitlement to produce nonpotable water from the Irvine Subbasin is included within the Irvine Subbasin Agreement. See discussion of the Irvine Subbasin Agreement under Potable Supply - Groundwater; paragraph (iv), above.

***(ii)*** See discussion of the Irvine Desalter project under Potable Supply - Groundwater, paragraph (v), above. The Irvine Desalter project will produce nonpotable as well as potable water.

•IMPORTED SUPPLY - ADDITIONAL INFORMATION

As described above, the imported supply from MWD is contractually subject to availability. To assist local water providers in assessing the adequacy of local water supplies that are reliant in whole or in part on MWD's imported supply; MWD has provided information concerning the availability of the supplies to its entire service area. In its most recently adopted RUWMP, MWD has extended its planning timeframe out through 2035 to ensure that MWD's 2010 RUWMP may be used as a source document for meeting requirements for sufficient supplies. In addition, the RUWMP includes "Justifications for Supply Projections" (Appendix A-3) that details the planning, legal, financial, and regulatory basis for including each source of supply in the plan. The RUWMP summarizes MWD's planning initiatives over the past ten years, which includes the Integrated Resources Plan (IRP), the IRP Update, the Water Surplus and Drought Management Plan, Strategic Plan and Rate Structure. The reliability analysis in MWD's IRP Update (October 2010) showed that MWD can maintain reliable supplies under the conditions that have existed in past dry periods throughout the period 2015 through 2035. The RUWMP includes tables that show the region can provide reliable supplies under both the single driest year (1977) and multiple dry years (1990-92) through 2035. MWD has also identified buffer supplies, including additional State Water Project groundwater storage and transfers that could serve to supply the additional water needed.

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[8] The 1956 Agreement provides for facilities to deliver MWD imported water into the Lake, and grants storage capacity for the imported water. By succession, IRWD owns 9,000 AFY of this 12,000 AFY imported water storage capacity. This storage capacity does not affect availability of the imported supply, which can be either stored or delivered for direct use by customers.

It is anticipated that MWD will revise its regional supply availability analysis periodically to supplement its RUWMP in years when the RUWMP is not being updated.

IRWD is permitted by the statute to rely upon the water supply information provided by the wholesaler concerning a wholesale water supply source, for use in preparing its UWMPs. In turn, the statute provides for the use of UWMP information to support water supply assessments and verifications. In accordance with these provisions, IRWD is entitled to rely upon the conclusions of the MWD RUWMP. As referenced above under Summary of Results of Demand-Supply Comparisons - ***Recent Actions on Delta Pumping,*** MWD has provided additional information on its imported water supply.

MWD's reserve supplies, together with the fact that IRWD relies on MWD supplies as supplemental supplies that need not be used to the extent IRWD operates currently available and under-development local supplies, build a margin of safety into IRWD's supply availability.

(2) Adopted capital outlay program to finance delivery of the water supplies.

All necessary delivery facilities currently exist for the use of the *currently available* and *under-development* supplies assessed herein, with the exception of future groundwater wells, MWRP expansion and IRWD sub-regional and developer-dedicated conveyance facilities necessary to complete the local distribution systems for the Project. IRWD's turnout at each MWD connection and IRWD's regional delivery facilities are sufficiently sized to deliver all of the supply to the sub-regional and local distribution systems.

With respect to future groundwater wells (PR Nos. 10285, 15423, 15427, 15428, 15051 and 15052) and the MWRP Phase 2 expansion (PR. Nos. 20214 and 30214), IRWD adopted its fiscal year 2010/11 capital budget on June 14, 2010 (Resolution No. 2010-16), budgeting portions of the funds for such projects. (A copy is available from IRWD on request.) For these facilities, as well as unbuilt IRWD sub-regional conveyance facilities, the sources of funding are previously authorized general obligation bonds, revenue-supported certificates of participation and/or capital funds held by IRWD Improvement Districts. IRWD has maintained a successful program for the issuance of general obligation bonds and certificates of participation on favorable borrowing terms, and IRWD has received AAA public bond ratings. IRWD has approximately $673 million (water) and $867 million (wastewater) of unissued, voter-approved bond authorization. Certificates of participation do not require voter approval. Proceeds of bonds and available capital funds are expected to be sufficient to fund all IRWD facilities for delivery of the supplies under development. Tract-level conveyance facilities are required to be donated to IRWD by the Applicant or its successor(s) at time of development.

See also *MWD's RUWMP,* Appendix A.3 Justifications for Supply Projections with respect to capital outlay programs related to MWD's supplies.

(3) Federal, state and local permits for construction of delivery infrastructure.

Most IRWD delivery facilities are constructed in public right-of-way or future right-of-way. State statute confers on IRWD the right to construct works along, under or across any stream of water, watercourse, street, avenue, highway, railway, canal, ditch or flume (Water Code Section 35603). Although this right cannot be denied, local agencies may require encroachment permits when work is to be performed within a street. If easements are necessary for delivery infrastructure, IRWD requires the developer to provide them. The crossing of watercourses or areas with protected species requires federal and/or state permits as applicable.

See also *MWD's RUWMP,* Appendix A.3 Justifications for Supply Projections with respect to permits related to MWD's supplies.

(4) Regulatory approvals for conveyance or delivery of the supplies.

See response to preceding item (3). In addition, reclamation plant expansion will require approval of amendments to IRWD's permits issued by the Regional Water Quality Control Board.

See also *MWD's RUWMP,* Appendix A.3 Justifications for Supply Projections with respect to regulatory approvals related to MWD's supplies.

**3. Other users and contractholders (identified supply not previously used).**

For each of the water supply sources identified by IRWD, if no water has been received from that source(s), IRWD is required to identify other public water systems or water service contractholders that receive a water supply from, or have existing water supply entitlements, water rights and water service contracts to, that source(s):

Water has been received from all listed sources. A small quantity of Subbasin water is used by Woodbridge Village Association for the purpose of supplying its North and South Lakes. There are no other public water systems or water service contractholders that receive a water supply from, or have existing water supply entitlements, water rights and water service contracts to, the Irvine Subbasin.

## 4. Information concerning groundwater included in the supply identified for the Project:

(a) Relevant information in the Urban Water Management Plan (UWMP):

See Irvine Ranch Water District 2005 UWMP, section III-3.

(b) Description of the groundwater basin(s) from which the Project will be supplied:

The Orange County Groundwater Basin ("Basin") is described at pages 3-1 through 3-14 of the OCWD Master Plan Report, dated April, 1999 ("MPR") and in the more recent Groundwater Management Plan ("GMP") at pages 2-1 through 6-33[9]. The rights of the producers within the Basin vis a vis one another have not been adjudicated. The Basin is managed by the Orange County Water District (OCWD) for the benefit of municipal, agricultural and private groundwater producers. OCWD is responsible for the protection of water rights to the Santa Ana River in Orange County as well as the management and replenishment of the Basin. Current production from the Basin is approximately 366,000 AFY.

The Department of Water Resources has not identified the Basin as overdrafted in its most current bulletin that characterizes the condition of the Basin, Bulletin 118 (2003). The efforts being undertaken by OCWD to eliminate long-term overdraft in the Basin are described in the OCWD MPR, including in particular, Chapters 4, 5, 6, 14 and 15 of the MPR. In addition to Orange County Water District (OCWD) reports listed in the Assessment Reference List, OCWD has also prepared a Long Term Facilities Plan ("LTFP") which provides updated information and was received by the OCWD Board in July 2009. The LTFP Chapter 3 describes the efforts being undertaken by OCWD to eliminate long-term overdraft in the Basin.

Although the water supply assessment statute (Water Code Section 10910(f)) refers to elimination of "long-term overdraft," overdraft includes conditions which may be managed for optimum basin storage, rather than eliminated. OCWD's Act defines annual groundwater overdraft to be the quantity by which production exceeds the natural replenishment of the Basin. Accumulated overdraft is defined in the OCWD Act to be the quantity of water needed in the groundwater basin forebay to prevent landward movement of seawater into the fresh groundwater body. However, seawater intrusion control facilities have been constructed by OCWD since the Act was written, and have been effective in preventing landward movement of seawater. These facilities allow greater utilization of the storage capacity of the Basin.

OCWD has invested over $250 million in seawater intrusion control (injection barriers), recharge facilities, laboratories, and Basin monitoring to effectively manage the Basin. Consequently, although the Basin is defined to be in an "overdraft" condition, it is actually managed to allow utilization of up to 500,000 acre-feet of storage capacity of the basin during dry periods, acting as an underground reservoir and buffer against drought. OCWD has an optimal basin

[9] OCWD has also prepared a Long Term Facilities Plan which provides updated information and is expected to be received and filed by its Board in July 2009.

management target of 100,000 acre-feet of accumulated overdraft provides sufficient storage space to accommodate increased supplies from one wet year while also provide enough water in storage to offset decreased supplies during a two- to three year drought. If the Basin is too full, artesian conditions can occur along the coastal area, causing rising water and water logging, an adverse condition. Since the formation of OCWD in 1933, OCWD has made substantial investment in facilities, Basin management and water rights protection, resulting in the elimination and prevention of adverse long-term "mining" overdraft conditions. OCWD continues to develop new replenishment supplies, recharge capacity and basin protection measures to meet projected production from the basin during normal rainfall and drought periods. (Source: 2008-2009 Engineer's Report on Groundwater Conditions, Water Supply and Basin Utilization in the Orange County Water District; OCWD MPR, *supra.*)

OCWD's efforts include ongoing replenishment programs and planned capital improvements. It should be noted under OCWD's management of overdraft to maximize its use for annual production and recharge operations, overdraft varies over time as the Basin is managed to keep it in balance over the long term. The Basin is not operated on an annual safe-yield basis. (OCWD MPR, section 3.2 and LTFP, section 6)

(c) Description and analysis of the amount and location of groundwater pumped by IRWD from the Basin for the past five years:

The following table shows the amounts pumped, by groundwater source:

(In AFY)

| Year (ending 6/30) | DRWF/DATS/ OPA | Irvine Subbasin (IRWD) | Irvine Subbasin (TIC) | LAWD[10] |
|---|---|---|---|---|
| 2010 | 37,151 | 8695 | 0 | 3 |
| 2009 | 38,140 | 7,614 | 0 | 0 |
| 2008 | 36,741 | 4,539 | 0 | 16 |
| 2007 | 37,864 | 5,407 | 0 | 6 |
| 2006 | 37,046 | 2,825 | 0 | 268 |
| 2005 | 36,316 | 2,285 | 628 | 357 |
| 2004 | 30,265 | 1,938 | 3,079 | 101 |
| 2003 | 24,040 | 2,132 | 4,234 | 598 |
| 2002 | 25,855 | 2,533 | 5,075 | 744 |

(d) Description and analysis of the amount and location of groundwater projected to be

[10] The water produced from IRWD's Los Alisos wells is not included in this assessment. IRWD is presently evaluating the future use of these wells.

pumped by IRWD from the Basin:

> IRWD has a developed groundwater supply of 35,200 AFY from its Dyer Road Wellfield (including the Deep Aquifer Treatment System), in the main portion of the Basin.
>
> Although TIC's historical production from the Subbasin declined as its use of the Subbasin for agricultural water diminished, OCWD's and other historical production records for the Subbasin show that production has been as high as 13,000 AFY. Plans are also underway to expand IRWD's main Orange County Groundwater Basin supply (characterized as *under-development* supplies herein). (See Section 2 (a) (1) herein). IRWD anticipates the development of additional production facilities within both the main Basin and the Irvine Subbasin. However, such additional facilities have not been included or relied upon in this assessment. Additional groundwater development will provide an additional margin of safety as well as reduce future water supply costs to IRWD.

The following table summarizes future IRWD groundwater production from currently available and under-development supplies.

(In AFY)

| Year (ending 6/30) | DRWF[11] | Future GW[12] | IDP (Potable) | IDP (Nonpotable) |
|---|---|---|---|---|
| 2015 | 37,900 | 15,600 | 5,640 | 3,898 |
| 2020 | 37,900 | 22,100 | 5,640 | 3,898 |
| 2025 | 37,900 | 32,600 | 5,640 | 3,898 |
| 2031 | 37,900 | 32,600 | 5,640 | 3,898 |

(e) If not included in the UWMP, analysis of the sufficiency of groundwater projected to be pumped by IRWD from the Basin to meet to meet the projected water demand of the Project:

> See responses to 4(b) and 4(d).
>
> The OCWD MPR and LTFP examined future Basin conditions and capabilities, water supply and demand, and identified projects to meet increased replenishment needs of the basin. With the implementation of OCWD's preferred projects, the Basin yield in the year 2025 would be up to 500,000 AF. The amount that can be produced will be a function of which projects will be implemented by OCWD and how much increased recharge capacity is created by those projects, total demands by all producers, and the resulting Basin

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11 See Potable Supply - Groundwater, paragraph (iii), above. DRWF non-colored production above 28,000 AFY and colored water production above 8,000 AFY are subject to contractually-imposed assessments. In addition, seasonal production amounts apply. This also includes 1,000 AFY for the OPA well.

12 Under development.

Production Percentage ("BPP") that OCWD sets based on these factors.[13]

Sufficient replenishment supplies are projected by the OCWD MPR to be available to OCWD to meet the increasing demand on the Basin. These supplies include capture of increasing Santa Ana River flows, purchases of replenishment water from MWD, and development of new local supplies. OCWD is moving forward with a number of replenishment supply projects, including the Groundwater Replenishment System project ("GWRS"). The OCWD MPR indicates that the GWRS will produce over 100,000 afy of new replenishment supply from recycled water.

Production of groundwater can exceed applicable basin production percentages on a short-term basis, providing additional reliability during dry years or emergencies. Additional groundwater production is anticipated by OCWD in the Basin in dry years, as producers reduce their use of imported supplies, and the Basin is "mined" in anticipation of the eventual availability of replenishment water. (OCWD MPR, section 14.6.)

See also, Figures 1-8. IRWD assesses sufficiency of supplies on an aggregated basis, as neither groundwater nor other supply sources are allocated to particular projects or customers. Under the Irvine Subbasin Agreement, IRWD is contractually obligated to attribute the Subbasin supply only to TIC development projects for assessment purposes; however, the agreement does not allocate or assign rights in the Subbasin supply to any project.

**5. ☐ This Water Supply Assessment is being completed for a project included in a prior water supply assessment. Date of prior assessment: Check all of the following that apply:**

☐ Changes in the Project have substantially increased water demand.

☐ Changes in circumstances or conditions have substantially affected IRWD's ability to provide a sufficient water supply for the Project.

☐ Significant new information has become available which was not known and could not have been known at the date of the prior Water Supply Assessment.

## 6. References

*Water Resources Master Plan*, Irvine Ranch Water District, March, 2002 (supplemented January, 2004)

*2005 Urban Water Management Plan*, Irvine Ranch Water District, November, 2005

[13] OCWD has adopted a basin production percentage of 62% for 2010-11. In prior years OCWD has maintained a basin production percentage that is higher than the current percentage, and IRWD anticipates that such reductions may occur from time to time as a temporary measure employed by OCWD to encourage lower pumping levels as OCWD implements other measures to reduce the current accumulated overdraft in the Basin. Any such reductions are not expected to affect any of IRWD's currently available groundwater supplies listed in this assessment, which are subject to a contractually-set equivalent basin production percentage as described, or are exempt from the basin production percentage.

*Integrated Water Resources Plan Update,* Metropolitan Water District of Southern California, July, 2004

*Proposed Framework for Metropolitan Water District's Delta Action Plan,* Metropolitan Water District of Southern California, May 8, 2007

*Board Information Report,* Metropolitan Water District of Southern California, October 9, 2007

*2007 IRP Implementation Report,* Metropolitan Water District of Southern California, October, 2007

*Master Plan Report,* Orange County Water District, April, 1999

*Groundwater Management Plan,* Orange County Water District, March, 2004

*Final Draft Long-Term Facilities Plan,* Orange County Water District, January 2006

*2008-2009 Engineer's Report on Groundwater Conditions, Water Supply and Basin Utilization in the Orange County Water District,* Orange County Water District

*Progress on Incorporating Climate Change into Management of California's Water Resources,* California Department of Water Resources, July 2006

*Section 15 of the Rules and Regulations – Water Conservation and Water Supply Shortage Program,* Irvine Ranch Water District, February 2009

*Water Shortage Contingency Plan,* Irvine Ranch Water District, February 2009

*2010 Integrated Resources Plan Update,* Metropolitan Water District of Southern California, October 2010

*Regional Urban Water Management Plan,* Metropolitan Water District of Southern California, November 2010

**Exhibit A**

Depiction of Project Area

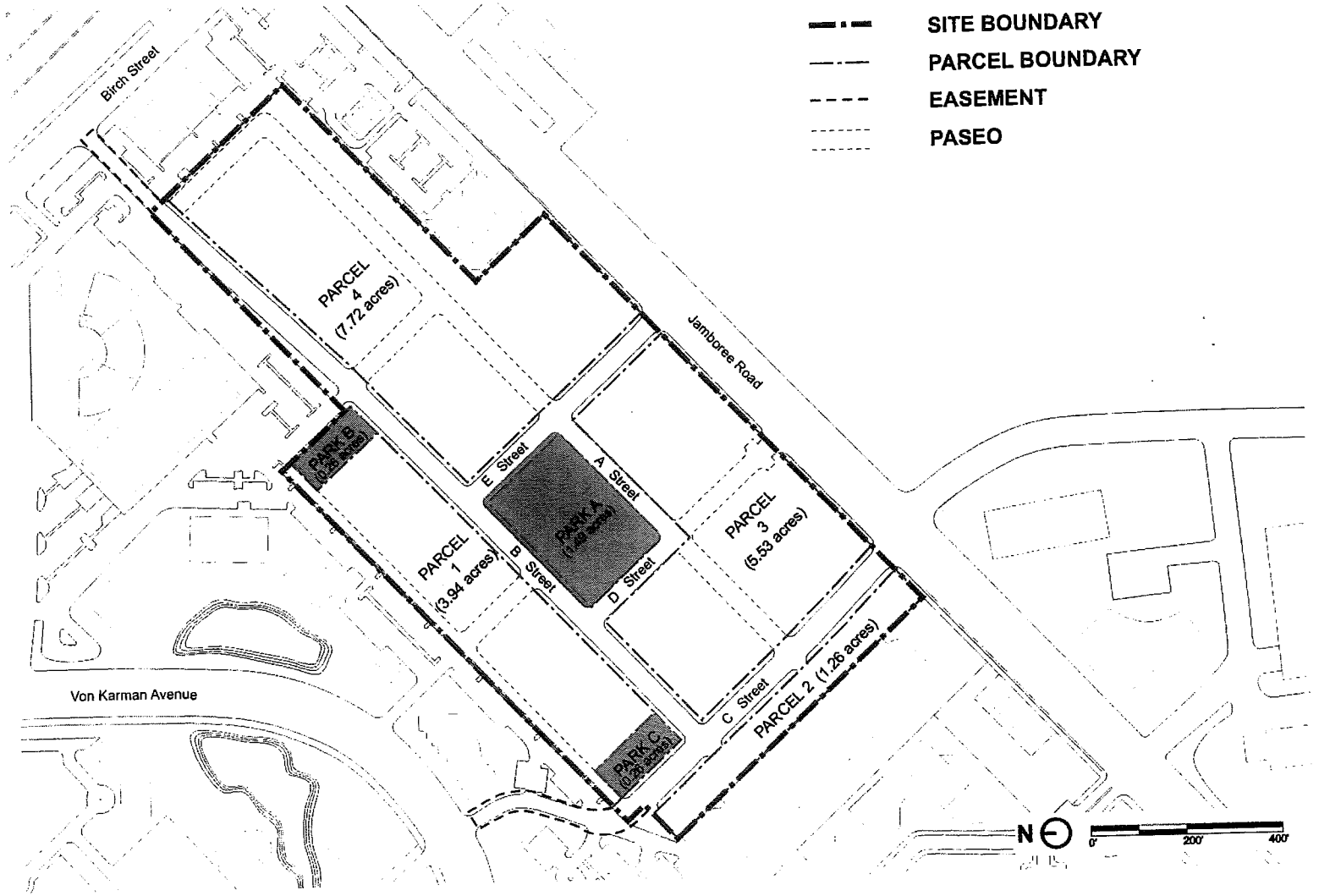



FIGURE 3: CONEXANT SITE FRAMEWORK

FIGURE 3: CONEXANT SITE FRAMEWORK PLAN

**Exhibit B**

Uses Included in Project

# CITY OF NEWPORT BEACH

## PLANNING DEPARTMENT

October 20, 2010

Irvine Ranch Water District
15600 Sand Canyon Avenue
P.O. Box 57000
Irvine, CA 92619-7000

Re: Request for Water Supply Availability Assessment for Uptown Newport Village Specific Plan Project (PA2010-133) located at 4311-4321 Jamboree Rd, Newport Beach CA

The City of Newport Beach hereby requests an assessment of water supply availability for the below-described project in accordance with Water Code §10910 *et seq.* The City has determined that the project is a "project" as defined in Water Code §10912, and has determined that an environmental impact report is required for the project.

**Proposed Project Information**

Project Title: Uptown Newport Village Specific Plan Project (PA2010-133)

Location of project: Airport Business Area, immediately east of John Wayne Airport. The subject site is generally bounded by Jamboree Road, Von Karman Avenue and Birch Street

☐ (For projects requiring a new assessment under Water Code §10910 (h).) Previous Water Supply Assessment including this project was prepared on:_____. This application requests a new Water Supply Assessment, due to the following (check all that apply):

☐ Changes in the project have substantially increased water demand

☐ Changes in circumstances or conditions have substantially affected IRWD's ability to provide a sufficient water supply for the project

☐ Significant new information has become available which was not known and could not have been known at the date of the prior Water Supply Assessment

(Enclose maps and exhibits of the project)

Type of Development:

☒ *Residential*: No. of dwelling units: Up to 1,244 units

☒ *Shopping center or business*: No. of employees N/A Sq. ft. of floor space 11,500

☐ *Commercial office*: No. of employees N/A Sq. ft. of floor space N/A

☐ *Hotel or motel*: No. of rooms N/A

☐ *Industrial, manufacturing, processing or industrial park:* No. of employees N/A
No. of acres N/A Sq. ft. of floor space N/A
☐ *Mixed use* (check and complete all above that apply)
☐ *Other:* N/A

Total acreage of project: approximately 25 acres

Acreage devoted to landscape:
Greenbelt N/A golf course N/A parks 3.03 acres
Agriculture N/A other landscaped areas

Number of schools None Number of public facilities

Other factors or uses that would affect the quantity of water needed, such as peak flow requirements or potential uses to be added to the project to reduce or mitigate environmental impacts:

None

What is the current land use of the area subject to a land use change under the project?

Industrial, Office and parking areas

Is the project included in the existing General Plan? Yes If no, describe the existing General Plan Designation

The City acknowledges that IRWD's assessment will be based on the information hereby provided to IRWD concerning the project. If it is necessary for corrected or additional information to be submitted to enable IRWD to complete the assessment, the request will be considered incomplete until IRWD's receipt of the corrected or additional information. If the project, circumstances or conditions change or new information becomes available after the issuance of a Water Supply Assessment, the Water Supply Assessment may no longer be valid. The City will request a new Water Supply Assessment if it determines that one is required.

The City acknowledges that the Water Supply Assessment shall not constitute a "will-serve" or in any way entitle the project applicant to service or to any right, priority or allocation in any supply, capacity or facility, and that the issuance of the Water Supply Assessment shall not affect IRWD's obligation to provide service to its existing customers or any potential future customers including the project applicant. In order to receive service, the project applicant shall be required to file a completed Application(s)

for Service and Agreement with the Irvine Ranch Water District on IRWD's forms, together with all fees and charges, plans and specifications, bonds and conveyance of necessary easements, and meet all other requirement as specified therein.

City of Newport Beach/COUNTY OF ORANGE

By: JW Campbell
Jim Campbell, Acting Planning Director

REQUEST RECEIVED:

Date: October 25, 2010

By: Kellie Welch
Irvine Ranch Water District

REQUEST COMPLETE:

Date: October 26, 2010

By: Kellie Welch
Irvine Ranch Water District

March 14, 2011
Prepared by: R. Bennett/P. Weghorst
Submitted by: G. Heiertz
Approved by: Paul Jones

ACTION CALENDAR

# PEER REVIEWS OF THE PILOT CARBON SEQUESTRATION PROJECT

## SUMMARY:

On July 26, 2010, the Board approved peer reviews of both a work plan for the development and operation of a Pilot Carbon Sequestration Project in the Sacramento-San Joaquin Delta (Delta) and an economic analysis of constructing and operating a farm and island-sized project. Peer reviews and recommendations for future activities have been performed by Kennedy/Jenks Consultants (KJC), Phillip Williams and Associates (PWA) and the University of California at Davis, and recommendations for future activities are provided below. Staff recommends that IRWD continue to monitor research of others relative to carbon sequestration wetland projects in the Delta, and that our interests in developing a pilot project be placed on hold until key conditions required to produce an economically viable project change significantly.

## BACKGROUND:

IRWD is considering a Pilot Carbon Sequestration Project that would demonstrate the viability of establishing Tule marsh wetlands in the Delta. The goal of the Pilot Project would be to provide scientific, operational and financial criteria for establishing a functioning carbon credit market in the Delta. A carbon credit market would become the primary funding source for wetland restoration while simultaneously assisting participants in meeting greenhouse gas (GHG) mitigation regulatory requirements. A work plan was prepared for implementing the Pilot Project, with the objective of seeking other water and wastewater agency funding partners to construct and operate the Pilot Project with IRWD. An overview of the work plan and economic analysis for the construction and operation of a 100-acre farm pilot project and a 3,500-acre island project is provided below.

### Work Plan Overview:

On May 26, 2009, the Board approved a scope of work for HydroFocus to prepare a work plan for construction, operation and scientific monitoring of a pilot project to develop a Tule marsh wetland in the Delta. Hydro Focus provided a work plan and an economic analysis in the spring of 2010. The work plan identified four key environmental issues that require investigation through a pilot project:

- Quantification of carbon sequestration versus methane emissions from the wetland;
- Study of water quality effects related to methyl mercury and dissolved organic carbon;
- Development of mosquito and other vector control methods; and
- Development of operational procedures and protocols for a full-scale project.

The work plan presented concepts for the construction and operation of a farm scale Pilot Project for a carbon sequestration non-tidal wetland in the Delta. It analyzed four potential sites: Dutch Slough-Emerson Parcel, Sherman Island-Mayberry Farm, the Sherman Island-South Mayberry Site, and Twitchell Island. A site location map is attached as Exhibit "A". The work plan identified the challenges, constraints and opportunities associated with each site, and recommended the Emerson Parcel as the most viable site for further consideration. Preliminary planning-level cost estimates indicated about $6.3 million would be required for construction and five years of operation of the 68-acre Dutch Slough-Emerson Parcel wetland. Preliminary costs for the other sites are similar.

Economic Analysis Overview and Peer Review Process:

On January 7, 2010, the Water Resources Policy and Communications Committee approved the preparation of an economic analysis comparing the cost of developing and maintaining a carbon sequestration wetland to other sources of carbon credits. Results indicated that both a farm and an island-scale carbon sequestration wetland project are sensitive to the expected rates of carbon sequestration, the expected value of carbon offset credits, and the number of years the wetland is in operation. Another important factor is whether or not the island-scale economic analysis should include the cost of avoided levee maintenance associated with reversing the subsidence of land in the Delta along with wetland habitat mitigation values, increased recreation and ecotourism and increased open space.

On July 26, 2010, the IRWD Board approved a peer review of both the work plan and an economic analysis of constructing and operating a farm and an island scale-sized project. Three separate entities were identified as being uniquely qualified to conduct peer reviews: KJC, PWA (Dr. Stephen Crooks), and the University of California at Davis (Dr. William Horwath). Staff executed agreements with each entity for peer review services and the results of these reviews have been provided to the District.

The purpose of the economic analysis and peer review efforts were to verify the science, GHG offset credit potential and the economics of the pilot project potential full-scale implementation. Staff believed this was a critical step to credibly market participation in the pilot project to other water and wastewater agencies. Following is a summary of the conclusions made by each of the reviewing entities.

Kennedy/Jenks' Conclusions:

KJC provided a review of the economic analysis. KJC's experience in the Delta, GHG assessments, Energy and GHG Master Plan development, and water resources provided a unique combination of skills in the assessment of the work plan's economic analysis. A document summarizing its review is provided as Exhibit "B". In this document, KJC provided valuable insight into whether the following will occur:

1. A GHG (carbon) market structure will exist that enables a sale of the carbon sequestration offsets credits created by this project;
2. An approved protocol will exist that would guide the methodology of determining the GHG reduction amounts from the project;

3. An offset credit sale price will be available that is sufficient to make the project cost-effective; and
4. The actual GHG reductions from the offset project will be sufficient to make the project cost-effective.

KJC concluded that there are carbon markets already in place on the East Coast and that a compliance market will come into existence in California with the implementation of the Cap and Trade system which should be available in 2012. KJC also stated that there is currently no existing approved protocol for determining GHG reduction amounts from the project. Without such a protocol there would be no way to verify the carbon credits that may be developed by a carbon sequestration wetland project.

The HydroFocus economic analysis assumed 2010 carbon prices of $12, $20, $25 and $30 per metric ton while applying a less than conservative assumption for GHG reduction potential of 24 metric tons of carbon being sequestered per year for each acre in the wetland. Their analysis concluded that the project would not have a positive present value unless the price was $30 or more per metric ton. KJC indicated that the analysis should be based on a 2010 price range of $12 to $20 per metric ton and that using values up to $30 is not reasonable. KJC also indicated the use of lower, less optimistic sequestration rates was more appropriate. Based on this information, KJC concluded that a large scale carbon sequestration wetland project would not be cost-effective in the short, medium, or even long term without assuming unrealistic carbon offset sale prices and GHG reduction potential.

KJC did recognize other co-benefits that may help increase the value of the project at an island scale such as avoided levee maintenance, potential wetland habitat mitigation values, increased recreation and ecotourism and increased open space. KJC's opinion was that these co-benefits were difficult to precisely quantify and insufficient in magnitude to overcome the economic disparity between the project's capital and operating costs and the probable price range for carbon offsets.

Phillip Williams and Associates' Conclusions:

PWA provided a technical review of the work plan, but not an economic analysis. Dr. Stephen Crooks was the primary reviewer. He serves as the Climate Change Director for PWA and is the Chair of Restore America's Blue Ribbon Panel on Development of a Greenhouse Gas Offset Protocol for Tidal Wetlands Restoration and Management Projects. A paper presenting the results of PWA's review is attached as Exhibit "C".

The PWA review concluded that the proposed project would represent a valuable demonstration to support the development of a GHG offset protocol for a wetland project. PWA recommended that the project be undertaken in coordination with national efforts to establish such a protocol. PWA concluded that the goals and objectives of the report are generally appropriate and that the report identified all the major scientific questions to be answered by the project. PWA also concluded that while the amount of scientific literature is limited, that delta carbon sequestration would most likely lead to a reduction in atmospheric greenhouse gases.

University of California at Davis' Conclusions:

Dr. William Horwath from the Department of Land, Air and Water Resources at the University of California at Davis provided another review of the work plan, and like PWA, did not evaluate the economics of the work plan. His expertise in soil chemistry and rice production in the Delta provided a unique combination of theoretical and practical experience in his review of the work plan. A paper summarizing the results of Dr. Horwath's review is presented as Exhibit "D".

Dr. Horwath's review concluded that previous and ongoing wetland demonstration projects in the Delta provided evidence that such facilities can capture carbon and address key issues such as subsidence and water quality. In his review, Dr. Horwath pointed out a weakness in the work plan where constant rates of carbon dioxide and methane emissions are assumed to estimate the global warming potential reduction from carbon sequestration. Dr. Horwath stated that emission rates will likely change over time as wetlands age, and this change should be included in the estimates. He also indicated that the work plan did not provide a clear synthesis of the effects of water management on the production and fate of methyl mercury. Dr. Horwath recommended that the work plan be revised to address these issues.

Staff Conclusions:

The U.S. Geological Survey, California Department of Water Resources and Nature Conservancy have on-going research activities in the Delta with similar objectives to the HydroFocus work plan that are in various stages of development. In addition, a protocol to standardize an approach to calculate carbon offsets generated by wetlands, similar to those recently adopted for forest lands, were estimated to be at least two years or more from adoption. Finally, the economic analysis indicated that project costs will exceed anticipated benefits when reasonable estimates of carbon sequestration and carbon prices are taken into consideration. This information will make the marketing of the Pilot Project concept difficult if not impossible. Based on these observations, staff recommends that IRWD continue to monitor research by others relative to carbon sequestration wetland projects in the Delta and that the District's interests in developing a Pilot Project be put on hold until such a time when conditions required to produce an economically viable project become favorable.

FISCAL IMPACTS:

None.

ENVIRONMENTAL COMPLIANCE:

The peer reviews are not subject to the California Environmental Quality Act (CEQA).

COMMITTEE STATUS:

This item was reviewed at the Engineering and Operations Committee meeting on February 15, 2011.

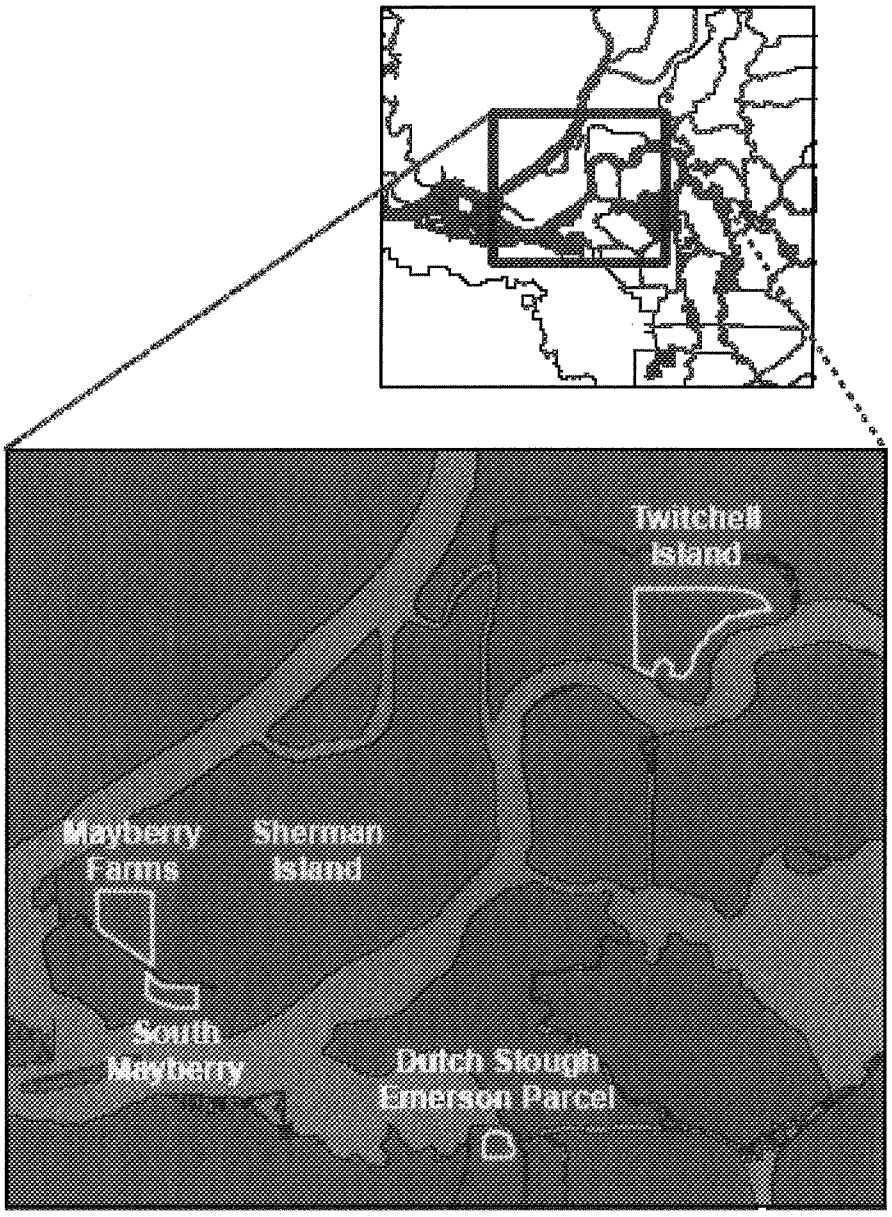
RECOMMENDATION:

THAT THE BOARD APPROVE STAFF'S RECOMMENDATION THAT THE DISTRICT'S INTERESTS IN DEVELOPING A PILOT CARBON SEQUESTRATION PROJECT BE PUT ON-HOLD UNTIL SUCH A TIME WHEN KEY CONDITIONS REQUIRED TO PRODUCE AN ECONOMICALLY VIABLE PROJECT BECOME FAVORABLE.

LIST OF EXHIBITS:

Exhibit "A" – Location Map
Exhibit "B" – Kennedy/Jenks Peer Review Memorandum
Exhibit "C" – Phillip Williams Associates Peer Review Memorandum
Exhibit "D" – Dr. William Horwath Peer Review

**Exhibit "A"**
Location Map



# Exhibit "B"

**Kennedy/Jenks Consultants**

7 February 2011

## Memorandum

To: Ray Bennett, Irvine Ranch Water District

From: Alan Zelenka, Kennedy/Jenks Energy Services Leader
Craig Lichty, Kennedy/Jenks Vice-President

Subject: Irvine Ranch Water District – Peer Review and Marketing Support Services for Proposed Pilot Carbon Sequestration Wetland in Sacramento-San Joaquin Delta

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This memorandum addresses the content required for Task 1 - Economic Peer Review of the Irvine Ranch Water District Carbon Sequestration Wetlands Offset Project (project) in accordance with the Scope of Work from our April 16, 2010 proposal that is included as Exhibit A to our contract.

### 1. Background Material Reviewed

To accomplish the economic peer review for this offset project we reviewed the following documents provided by Irvine Ranch Water District (IRWD):

- "Conceptual Workplan for a Pilot Carbon Sequestration Wetland in Sacramento-San Joaquin Delta", by MBK Engineers and HydroFocus Inc., March 17, 2010
- Conceptual Work Plan for a Pilot Carbon Sequestration Wetland, PowerPoint, April 6, 2010
- "Cost/Benefit Analysis of Delta Carbon Sequestration Wetlands", by HydroFocus, Inc., April 8, 2010
- Excel spreadsheet provide by Steve Deverel of HydroFocus, Inc., entitled: "c sequestration analysis"

In addition, we talked with IRWD staff and their consultant HydroFocus, Inc.; performed independent research on this topic area, and reviewed studies and notes from previous Kennedy/Jenks projects on the same topic.

### 2. Key Decision Factors

After completing our review of the materials we believe that there are four key decision factors for this offset project:

- Is there a market structure that enables a sale of the carbon sequestration offset created by this project?
- Is there an established and approved protocol that would guide the methodology of determining the carbon reduction amount from this project?

- Will there be an offset sale price sufficient to make the project cost-effective?
- Will the actual GHG reductions from the offset project be sufficient to make the project cost-effective?

We will analyze each of these key decision factors in detail below.

### 2.1. Market Structure Necessary for a Sale

#### 2.1.1. Three Types of Offsets and Markets

There are essentially three markets or three types of offset projects that exist or will be created in the future regulatory environment:

1. Compliance Offsets
2. Voluntary Offsets, and
3. Carbon Reduction Projects

A global compliance market place already exists since the establishment of the European system in 2005. In 2007 that market traded 2,918 million metric tons of offsets valued at over $66 billion dollars. The market for compliance offsets already exist in the eastern US through the Regional Greenhouse Gas Initiative (RGGI). In 2008 72 million MT of offsets were trades with a value of $263 million. The compliance market will come into existence in California with the implementation of California's cap & trade system (the basic rules for the cap & trade system were approved in December 2010). The system should be up and running by 2012. The market for voluntary offsets and carbon reduction projects exist now and in 2008 123 million metric tons were traded with a value of $705 million.

The standards that these types of offset projects will have to meet is different, with compliance offsets having to meet a rigorous standard, voluntary offsets usually having to meet the a slightly lower standard, and the carbon offset project an even lower standard.

Compliance offsets are meant to be able to be traded in the regulatory cap & trade environment and thus must meet a high standard in order to qualify. Voluntary offsets are outside the regulatory cap and trade system and are obligated through bi-lateral contracts. Most voluntary offsets will likely need to meet a similar standard to compliance offsets, but some can be sold at a less rigorous standard set forth in a bi-lateral contract. Carbon reduction projects are offsets that cannot meet the same standard of the compliance or voluntary offsets, but are projects that intuitively are known to cause reductions in GHGs. Like voluntary offsets, the standard for this type of offset project would be set-forth in a bi-lateral contract.

For an overview of the global marketplace see the presentation at:
http://www.green-markets.org/Downloads/vCarbon.pdf

**Is there a market structure that enables a sale of the carbon sequestration offset created by this project?** Yes, currently there is the voluntary market, and the California cap & trade system will be in place in the short-term creating a compliance market.

### 2.1.2. Certifying Entities

In order for most offsets to be traded in the compliance of voluntary markets they must be certified. There are numerous entities that have established processes to certify and facilitate the trading of offset projects:

- California Climate Action Reserve (CAR)
- Chicago Climate Exchange (CCX)
- Gold Standard (GS)
- Voluntary Carbon Standard (VCS)
- The Climate Trust (TCT)

There are numerous other participants in the voluntary marketplace that sell offsets such as NativeEnergy, and large brokers that pull together all aspects of an offset project such as 3Degrees and EcoSecurities.

### 2.1.3. Certification Process

The process that an offset project must go through in order to be certified by any one of these entities is similar. Every offset must be certified and verified by an independent third-party. The process typically includes these six steps:

1. Submittal of project application by the project developer
2. Initial eligibility screening by the certifying entity
3. Verification by an approved third-party verifier (paid for by the project developer)
4. Certifying entity review and approval of a Third-party verification report
5. Registration fee payment by the project developer
6. Project certification and registration

The submittal of a project application (Step 1 above) usually includes:

- A description of the project and the project developers qualifications
- Explanation of how the project meets the eligibility criteria such as the AB 32 six criteria: additional, real, permanent, quantifiable, verifiable, and enforceable

- Methodology/protocol for calculating the project emission reductions, including the quantification of the baseline and the project's incremental emission reductions
- Monitoring and verification plan

There are additional costs that were not included in the HydroFocus Cost/Benefit Study:

- Third-party verification ($15,000 to $40,000 depending on the complexity of the project – the IRWD project would be on the higher end of this range of costs)
- Registering the project with certifying entity
- Legal cost of creating all the necessary contracts ($10,000 to $50,000 depending on the complexity of the project – the IRWD project would be on the higher end of this range of costs)

**2.2. Protocols**

Most certifying entities have restrictions about what types of offsets they will accept and certify; and some like CAR limit their acceptance to only projects that have fully vetted, peer reviewed, and approved protocols and methodologies. For instance, CAR currently only has protocols for nine types of offset projects:

1. Forests
2. Urban Forests
3. Landfills
4. Livestock
5. Coal-Mine Methane
6. Organic Waste Composting
7. Organic Waste Digestion
8. Nitric Acid Production
9. Ozone Depleting Substances

An agricultural protocol is currently in the scoping process.

For projects that are new types of offsets and not covered under existing methodologies or protocols, such as the IRWD wetland carbon sequestration offset project, a new protocol and methodology must be established. This is a very rigorous, expensive and time consuming process. It often takes 2 years, and involves extensive scientific and peer reviews. IRWD's Carbon Sequestration Wetlands offset project, which would create GHG emissions reductions from $CO_2$ accumulation in restored wetland peat and $CO_2$ loss due to oxidation of organic soils from foregone agriculture, is not covered by any existing protocol.

However, VCS is currently finalizing an amendment to their existing Agriculture, Forestry and Other Land Use (AFOLU) protocol to include Peatland Rewetting and Conservation (PRC). IRWD's Carbon Sequestration Wetlands offset project would likely fall under this

new protocol. Kennedy/Jenks has already provided copies of the draft protocols to IRWD staff.

Upon finalization of this protocol, and certification by VCS, the IRWD Carbon Sequestration Wetlands Offset Project could be eligible to be traded in the voluntary international market with VCS certification. IRWD would not be allowed to trade the project within the new California Cap & Trade system, nor within CAR's system. Only projects based on one of their nine approved protocols are eligible for trading within the Climate Action Registry. However, CAR and VCS have worked cooperatively together for years, and have been working toward a mutual protocol agreement whereby they would accept each others' protocols. If this should happen, IRWD's project could then be traded within CAR and probably within the new California Cap &Trade system. While the exact timing of this action is not known it could happen as early as 2012 or 2013. This could align with the timing of the construction of the IRWD Carbon Sequestration Wetlands Offset Project.

**Is there an established and approved protocol that would guide the methodology of determining the carbon reduction amount from this project?** Not currently, but the VCS protocol finalization is imminent, and CAR could adopt the VCS protocol in the short-term.

**2.3. Sale Price**

If IRWD were to keep the GHG reductions from the project and use it to meet its own GHG reduction goal (like the one to be developed in the Energy and GHG Master Planning process) the sale price would become less important. In that case, this project would then compete with other GHG reduction projects identified in the master planning process. In that process this project may be viewed favorably and be approved as part of the package of offset project that get approved to meet IRWD GHG reduction goal.

Should IRWD want to sell the offsets from this project with the intent to create revenue for the District, the sale price becomes critically important. The sale price must be sufficient to make the project cost-effective, meaning the revenue exceeds the costs.

Various sale prices, or market prices, were analyzed by HydroFocus in the cost/benefit analysis. The 2010 starting prices they analyzed ranged from $12 to $30 per metric ton (MT). In the aftermath of the California Air Resources Board's (ARB) positive vote on a cap & trade system in December 2010; the price of pre-compliance offsets increased to $13/MT for the week of January 3-7, 2011. Compliance offset prices would likely command a higher price than this price for pre-compliance projects. For instance, in the well established and mature European Union's Emissions Trading Scheme (EU-ETS) the current trading price is about 14.38 Euros (about $18.70/MT at current exchange rates). The prices in the EU-ETS have dropped since the first half of 2008 when there were at 20 Euros/MT (about $27/MT). Prices reached 22 Euros/MT (about ($29/MT) at the end of the second half of 2008, and fell to 13 Euros/MT (about $17/MT) in the first half of 2009. The HydroFocus Cost/Benefit Study

relied on the recent studies done by the Congressional Budget Office (CBO) and the U.S. Environmental Protection Agency (EPA), both of which were completed in June 2009, estimating a system price for a national cap & trade system. These studies provide reasonable price estimates for IRWD even though they are estimate for a national system based on the Waxman/Markey bill and somewhat dated. There are to our knowledge no better price forecasts available. Both the CBO and EPA estimate 2015 starting price at around $12-$16/MT. They differ in their escalation rates (EPA at a flat 5% per year, and CBO starting at 17% per year in 2016 and dropping to 10% by 2020), and end up at different 2020 price estimates (EPA at just over $15/MT and CBO at over $22/MT). Estimates for the future 2020 price in the EU-ETS are in the range of 22-30 Euros/MT ($28/MT to $39/MT at today's exchange rates). Table 1 summarizes the current market prices and forecast for 2015 prices.

**Table 1 – Current Offset Market Prices**

| Market | Price |
|---|---|
| California Voluntary Market | $13/MT (2011) |
| EU-ETS | $18.70/MT (2011)<br>$28-$39/MT (2020) |
| EPA | $12/MT (2015)<br>$15.32/MT (2020) |
| CBO | $12/MT (2015)<br>$22.40/MT (2020) |

We believe that a 2010 price of about $12/MT, escalating at 5% per year, resulting in a 2015 price of $15.32 is reasonable, is consistent with the EPA and CBO studies, and consistent with recent California market prices. It is also reasonable to consider a 2010 starting price of $20/MT as the high end of the range, but we do not believe it is realistic to model prices above this rate for now.

### 2.4. Amount of GHG Reduction

The Cost/Benefit Study by HydroFocus analyzed various GHG reduction amounts for the project. They analyzed 24, 32, and 44 $MTCO_2$/acre-year. These reduction amounts are a combination of $CO_2$ accumulation (and therefore sequestration) in restored wetland peat and $CO_2$ loss due to oxidation of organic soils from forgone agriculture. The $CO_2$ loss amount is estimated to be about 7 $MTCO_2$/acre-year, and this is a reasonable assumption. The second part of the reduction from the sequestration held in the restored wetland varies considerably. From the research the average amount on Twitchell Island was 17 $MTCO_2$/acre-year, but the range was found to be 9-37 $MTCO_2$/acre-year. It would therefore seem to be reasonable to also model the lower range of GHG reduction in the amount of 16 $MTCO_2$/acre-year (7+ 9 = 16). From an investment perspective, and to be conservative, we would recommend analyzing this project at the lower range of GHG reduction amounts of 16-24 $MTCO_2$/acre-year.

## 3. Net Present Value Calculations and Cost-Effectiveness

The MBK/HydroFocus Conceptual Workplan and HydroFocus Cost/Benefit Study estimated capital costs and operations & maintenance (O&M) cost using reasonable methods and sources, and after review of these estimates we believe they are realistic and appropriate.

The analysis also reduced the price per MT by 20% to reflect the required risk buffer. A risk buffer will likely be required, as it is for forestry projects, to provide insurance that the project will not stop reducing GHG emissions because of a catastrophic failure. For a forestry project that could mean a forest fire, and for a wetlands project it could mean a catastrophic levee break that is not repaired or resumption of farming practices. The buffer can either be modeled by reducing the overall MT of GHG reduced or by reducing the price per MT. Reducing the price per MT is a reasonable way to account for the need for this risk buffer. However, it should be noted that there is a possibility to reconfigure the structure of a buffer so that it in the early years it starts with a slightly higher percentage and declines to a nominal amount over time. This significantly increases the medium and long-term value of the project, and decreases the short-term value.

### 3.1. Net Present Value (NPV) Formula

HydroFocus used a non-traditional method of doing its NPV calculation. It calculated the yearly present value of the cost and the revenue using the discount rate, and then subtracted the annual present value of the cost from the annual present value of the revenue to get a total annual present value. Then calculated a cumulative annual present value and used the total annual present value column to assess the NPV for a given period. For example, to report the NPV over 20 year period the cumulative present value at year 20 would be reported.

This differs from the preferred way Kennedy/Jenks would do this calculation and they way that Excel explains how to do this calculation. Kennedy/Jenks would calculate the annual nominal cost and revenue, and then calculate a nominal annual net cost (revenues minus costs). Using this net annual cost column and applying the NPV function in Excel [NPV (discount rate, range of cells for the period)] yields the NPV for a chosen period such as 20 years. The two different approaches result in different NPV amounts, but the differences are not substantial. The 20 year NPV for a model run using a 100 acres project, starting at $12/MT in 2010 was only 0.2% different, and about 1.0% different for the 50 year NPV calculation. While the NPV results are different for the two methodologies, it does not change the overall outcome of the analysis. An example of the Kennedy/Jenks preferred calculation is shown in the attached Excel file "HydroFocus C sequestration analysis - AZedits.xls" in tab "KJ NPV Calcs."

Our recommendation is to redo the calculation using the Kennedy/Jenks preferred calculation methodology using the Excel NPV function on the nominal annual cost net cost column to calculate the NPV over the selected time period.

### 3.2. Discount Rate

IRWD should reaffirm that the 5.25% discount rate is correct and up-to-date. Simply put, the usual definition for the discount rate is the weighted average cost of capital (WACC) or the average cost of debt. Recently, the cost of capital has dropped significantly and this merits a closer look and verification of the discount rate used by IRWD for this analysis. Using a lower discount rate can significantly increase the long-term benefits of the project and lower the short-term benefits.

## 4. Risks

This project presents several risk factors that can have a negative impact on the cost-effectiveness of the project, and they are:

- **Price** - The sale price of the GHG reductions ($/MT) will have a significant affect. While we concur with a 2015 starting price of about $15/MT, a lower price would negatively impact the cost-effectiveness of the project. For example, in 2007 the EU-ETS market price dropped to zero because of an over allocation mistake. As well, the price or the annual escalation rate could also be significantly higher. However, it would take an unrealistically high price to make this project cost-effective.

- **GHG Reduction Amount** - The amount of GHG reductions per acre is a key factor in the cost-effectiveness calculation. While we recommend being conservative in using the lower end of the $MTCO_2$/acre-year range, higher reduction levels may be possible and could increase the cost-effectiveness of the project. But as we noted

earlier even at the highest value in the range the project struggles to be cost-effective in the short-term.

- **Monitoring and Verification Costs** – given this is a relatively new area of science it is possible that the actual cost to monitor and verify the GHG reductions from the project could be substantially higher than what is assumed in the analysis.

- **Operation and Maintenance Cost** – given this is a relatively new type of project with little previous experience the O&M costs could also be substantially higher than what is assumed in the analysis. A good example is an unforeseen cost and impact on operations from a catastrophic levee break.

## 5. Conclusions

**Will there be an offset sale price sufficient to make the project cost-effective?**

Using the above mentioned conservative assumptions, and regardless of the NPV formula used, the project does not seem to be cost-effective in the short medium, or long-term. By this we mean that the resulting NPV calculation results in a negative value, or cost rather than benefit. Not until we assume a starting 2015 price of about \$107 $MTCO_2$/acre-year does the project become cost-effective.

**Will the actual GHG reductions from the offset project be sufficient to make the project cost-effective?**

Even if we assume a 2015 starting price of \$15/MT, using the high GHG reduction level of 44 $MTCO_2$/acre-year, the project does not become cost-effective.

However, there are other benefits that help increase the value of the project, such as: avoided levee maintenance, increased amount of quality habitat, increased recreation and ecotourism, and increased open space. These benefits should be analyzed further and quantified if possible. However, it is difficult to conclude that these co-benefits will increase the value of the project sufficiently. However, as stated previously if IRWD were to keep the GHG reductions from the project and use it to meet its own GHG reduction goal (like the one to be developed in the Energy and GHG Master Planning process) the sale price and GHG reduction amount becomes less important. In that case, this project would then compete with other GHG reduction projects identified in the master planning process. In that process, with the added co-benefits and potential revenue enhancements, this project may be viewed favorably in comparison; and be approved as part of the package of offset project that get approved to meet IRWD GHG reduction goal.

### 5.1. Options for Additional Revenue

There are options that IRWD can explore to add value and revenue to the project. Charging for ecotourism or duck hunting privileges can bring in a modest amount of revenue. Moreover, using a part of a project area that would be flooded for water storage, and then used like a water bank for sale during peak times or droughts, could add a significant amount of revenue to the project. However, there are numerous issues related to this option that should be investigated further. Issues such as: sale price for stored water, mercury levels, mosquitoes, and water quality degradation.

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# Memorandum

date December 7, 2010

to Ray Bennett, P.E., Irvine Ranch Water District

from Stephen Crooks, Ph.D.

subject Peer review of the Conceptual Workplan for a Pilot Carbon Sequestration Wetland in the Sacramento-San Joaquin Delta performed by HydroFocus

## Reviewed Report

Hydro Focus and MBK (2010) *Conceptual Workplan for a Pilot Carbon Sequestration Wetland in the Sacramento-San Joaquin Delta.* March 17, 2010.

## Reviewers

Stephen Crooks Ph.D. is primary author of this review. Dr Crooks is Climate Change Director with ESA PWA, and Chair of Restore America's Blue Ribbon Panel on Development of a Greenhouse Gas Offset Protocol for Tidal Wetlands Restoration and Management Projects.

Michelle Orr, P.E., provided technical input to the review. Ms. Orr is Wetlands and Estuaries Director, ESA PWA.

## Background

HydroFocus staff have developed a workplan to build a pilot carbon sequestration project in the Sacramento – San Joaquin Delta for Irvine Ranch Water District (IRWD). IRWD staff have requested that ESA PWA staff provide an independent peer-review of the workplan. ESA PWA work widely in the Sacramento – San Joaquin Delta (henceforth refereed to as the Delta) on wetland science and restoration design projects, as well as lead a team working to establish the science to support a national GHG offsets protocol for wetlands restoration projects.

## Review Summary

**Overall:** The report covers the appropriate elements and level of detail for a 5% design and cost estimate.

**GHG Offset development:** The proposed project would represent a valuable demonstration to support the development of a GHG offset protocol for wetlands projects. It is recommended that this project be undertaken in coordination with national efforts to establish a protocol.

**Goals and Objectives**: These are generally appropriate goals and objectives for the project. We advise caution in stating that a goal is to create habitat during the project unless habitat criteria are explicitly included in the design. Design criteria to guide the restoration of fully functioning wetlands at the end of a carbon sequestration project would be a useful outcome of a demonstration project.

**Scientific questions to be answered:** To support GHG offset development, there are a number of scientific questions to be addressed (e.g. GHG budget quantification, optimization of water management, water quality management, vector control, incorporation of habitat outcomes in to design). It may be more effective to tackle these questions over several sites rather than having several projects replicate similar questions. We recommend coordinating with other demonstration projects in the Delta and the national effort to focus monitoring activity.

**Next design steps**: The report would benefit from a clearer description of how the project goals and objective will be tested through site design. What are the conceptual models that underpin the site design? How will the site be graded to test these conceptual models? What will be the sampling methodology? Can all the questions posed be addressed on a single site?

## Review Questions

### *Is the work plan relevant to GHG offset protocol development for wetland projects?*

There is increasing awareness nationally and globally as to the value of wetlands in contributing to climate change regulation through sequestration of carbon, and as to the potential of wetland restoration and management projects to provide a potential mechanism to mitigate greenhouse gas emissions. In 2008, the California Climate Action Registry[1] contracted an issues paper review of the potential for tidal wetlands to be developed into a greenhouse gas (GHG) offsets quantification methodology (or protocol) for incorporation in to the carbon market. This review (PWA and SAIC, 2009[2]) concluded that potential existed for wetlands to be developed in to a protocol but that a number of scientific, economic and policy questions must be addressed. The Sacramento-San Joaquin Delta was recognized as a region of focus for scientific research and significant potential for carbon sequestration through managed processes of soil building and subsidence reversal. (Though subsidence reversal is a managed process it is recognized as a mechanism to raised soil surfaces back to elevations that will eventually support freshwater tidal wetlands, if the site is designed with reconnection in mind. Therefore, carbon sequestration through subsidence reversal is seen as a potential project activity that could fall under a GHG offset protocol for tidal wetlands restoration projects.)

Following the issues paper, Restore Americas Estuaries convened a National Blue Ribbon Panel to review the issues paper and set forth a 'road map' to guide the development of a GHG offset protocol for tidal wetlands projects. The Panel consisted of experts in wetland science and management, carbon sequestration, GHG accounting, and offset protocols and markets. The Panel convened in March 2010 and reported their Action Plan in August of this year (Crooks and others, 2010[3]).

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[1] now Climate Action Reserve

[2] PWA and SAIC, 2009. *Greenhouse Gas Mitigation Typology Issues Paper: Tidal Wetlands* Restoration. Report by PWA and SAIC to the California Climate Action Registry. PWA Reference 1957. February 4th 2009.

[3] Crooks, S., Emmett-Mattox, S. and Findsen, J. 2010. *Findings of the National Blue Ribbon Panel on the Development of a greenhouse Gas Offset Protocol for Tidal Wetlands Restoration and Management: Action Plan to Guide Protocol Development.* Restore America's

This Action Plan provides guidance on the information gaps, research and other steps needed to develop a GHG offset protocol and to inform wise carbon management in tidal wetlands. The Action Plan concluded that there is a critical need for a coordinated effort that combines an emphasis on central issues with site specific case studies. To accomplish this effort most effectively the Panel recommended focused actions to demonstrate proof of concept. The Action Plan outlines four sets of foundational questions to be addressed (i. Definition of eligible Project activities, ii. Eligibility, iii. Permanence and iv. Quantification), and three priority geographic case-studies (i. managed wetlands in Sacramento – San Joaquin Delta, ii. Coastal saltmarsh, and iii. The Mississippi Delta). The Action Plan emphasized the need for strong coordination between working groups addressing foundations questions and geographic case study working groups demonstrating proof of concept.

Further demonstration of carbon sequestration potential and operational approaches to assess and address any potential negative environmental impacts are needed to advance future GHG projects in the Sacramento- San Joaquin Delta. The proposed workplan would provide a useful component towards meeting this need.

### *Is the purpose of the report clear?*

Yes. The report describes the purpose of the document to present a conceptual workplan for construction, operation and monitoring of a pilot farm-field carbon sequestration non-tidal wetland project in the Delta. Such information would be very useful to groups and agencies seeking to advance a GHG offset protocol for managed wetlands such as those proposed.

### *Are workplan goals and objectives appropriate and clearly identified?*

Yes. The goals and objectives are appropriate for the project and are clearly identified (summarized below). We recommend clarifying the goal of creating habitat during the project. Unless habitat criteria and target species/ecosystem types are explicitly included in the design, this goal should be excluded.

The report describes the overarching goal of the report is to generate credible information for developing protocols for wetland carbon sequestration. The report describes the specific goals of the proposed workplan to be:

1) Undertake a pilot program that will demonstrate the viability of marsh restoration to create habitat in the Delta while sequestering carbon for purposes of reducing the global warming effect of GHGs.

2) Provide technical, operational, and financial information for developing protocols and establishing a functioning carbon credit market in the Delta that could provide a funding source for wetlands restoration while simultaneously assisting participants in meeting GHG mitigation regulatory requirements.

3) Cooperate in full with DWR in wetland development and management and information gathering.

4) Document best management practices for wetland construction, operation and monitoring for demonstration of carbon credits.

Objectives:

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Estuaries, Philip Williams and Associates, Ltd., and Science Applications International Corporation. August 2010. http://www.estuaries.org/climate-change.html

1) Present what is known for developing wetlands in the Delta and unanswered questions.

2) Present a conceptual design and estimated costs for construction of a farm-field scale carbon sequestration impoundment marsh that incorporates what is known for optimizing carbon accumulation and minimizing deleterious effects.

3) Present alternatives for testing management practices that may enhance carbon sequestration and minimize possible negative effects.

The report also explores the tradeoffs of four potential candidate sites for a farm-field scale demonstration project.

### *Does the workplan set a clear path to addressing the goals and objectives?*

Partially. The report provides a narrative description of an approach to tackle key scientific and engineering questions to test whether a carbon sequestration project is feasible concept. The authors are familiar with relevant regional science of carbon sequestration and subsidence reversal. The report appropriately recognizes many of the key questions that will need to be addressed before a GHG offset protocol can be developed for these wetland projects. Good discussion is made of methyl mercury, dissolved organic carbon (DOC) and vector control issues, which will be key challenges for permitting such projects.

The design aspect of the report concentrates on broad infrastructure aspects: general earthwork, pumps, siphons etc. However, the report would benefit from a clearer description of how the project goals and objective will be tested through site design. What are the conceptual models that underpin the site design? How will the site be graded to test these conceptual models? What will be the sampling methodology? Can all the questions posed be addressed on a single site? The answers to these questions were not clearly presented in the report.

### *Does the approach adequately address the relevant technical issues?*

Mostly yes. The description of approaches to address technical questions is based upon experience developed on a prior experimental subsidence reversal project in the Delta. The report calls out the broad monitoring requirements but does not specify activities and associated costs beyond general allowances. Specifics regarding how conceptual models and key hypotheses will be tested are not provided, presumably to be left to a later, more detailed design phase. The report should add this discussion, or at least identify that this step will be incorporated into the next phase.

For consideration:

1) The conceptual design includes water supply pipes and other infrastructure. Such infrastructure may be appropriate for a project focused on controlled conditions to test specific scientific questions. A question arises -if we were to explore the question of scaling up from the farm field scale to the island scale would anticipated outcomes be achieved without pipes?

2) We note that the provided design calls for connecting to the electricity grid. Perhaps the project could demonstrate low emissions by using onsite renewable energy resources – wind or solar? Have these been considered?

3) Can biochar be used as a filter for methyl mercury prior to release of discharge waters?

4) Would a population of swallows, swifts and / or bats be significant in lowering mosquito populations? Should roosting structures be included in the design?

### *Does the provided cost estimate accurately represent resources required?*

Included in the report are cost estimates for design, construction, and operations and maintenance. We would consider the level of project description to reflect a 5% design level. Overall, the presented costs estimates look broadly appropriate given the range of parameters to be monitored, though to be refined through preliminary and final design. For a 10% design we would recommend planning with a contingency of +50% and -35% range, a range broader than provided in the report.

We make the following additional comments on the cost estimate. This could be the first demonstration project to test science and engineering questions for carbon sequestration on replicate managed wetland plots. To maximize project success will require an appropriate level of design, consideration of scientific questions, conceptual models to be tested and optimization of site layout. These details have yet to be synthesized and translated into a grading plan. The provided cost estimate for design work likely underestimates the level of effort required to take full opportunity of this project. Similarly, the line item for project reporting perhaps under represents the information synthesis needed for this project.

### *Is the quality and completeness of the documentation and the reporting satisfactory?*

Yes. The provided workplan and documentation is appropriate for a 5% conceptual design and feasibility assessment. The report provides a good summary of the site selection trade-offs between potential alternative project locations. Further effort is required to incorporate scientific hypotheses and conceptual models within a more detailed site design.

### *Do data and literature used support the approach and conclusions by the contractor?*

Yes. The limited existing scientific literature support the conclusion that Delta carbon sequestration would most likely lead to a reduction in atmospheric greenhouse gases. Estimates based upon USGS monitoring find a net GHG sequestration of approximately 27 $tCO_2$ / acre/ year when considering both the avoided emissions from ongoing soil loss combined with the restoration potential. Net methane emissions carbon sequestration is of the order of 10 $tCO_2$ / acre/ year, a rate that is amongst the highest of biological systems. The pool of research is limited to a few studies, though these early results point to a need for further analysis. For this reason this project in coordination with other potential projects in the delta is an important step towards quantifying net GHG sequestration and optimizing approaches to maximize net GHG sequestration within a delta wetland restoration project.

A word of caution, it is not confirmed yet whether the Climate Action Reserve will adopt wetlands as a project type for a GHG offset protocol. However, this demonstration project and linked activities at the national level are building a case for such a protocol to be developed. There is good potential that a protocol will be developed for tidal wetlands in the Delta by the Reserve or another registry.

The report itself would benefit from greater inclusion of reference citations within the main text. The report also would have benefited from inclusion of the findings of the Climate Actions Reserves issue paper on tidal wetlands as a prospective project type for GHG offsets.

EXHIBIT "D"

# Review: Conceptual Workplan for a Pilot Carbon Sequestration Wetland in the Sacramento-San Joaquin Delta.



**William Horwath**

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**December 20, 2010**

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**Summary of review comments and recommendation**

Natural wetlands are unique features of the landscape that process and consume nutrients and carbon (C). Wetlands are large C sinks representing approximately 10% of global terrestrial soil C stocks despite only occupying 2% of the total land area. This makes them suitable for C sequestration projects. This review addresses whether wetlands are viable option for C sequestration projects in the Sacramento-San Joaquin Delta islands. Major comments of the review follow:

- Previous and ongoing wetland demonstration projects in the Delta provide evidence that they can capture C and address key issues such as subsidence and water quality.
- The ability of wetlands to capture C makes them candidates for C trading markets through providing C offsets.
- The assessment of GHG primary effects is similar to forestry projects in that living and dead biomass and soil C can be directly determined or estimated.
- The assessment of secondary effects is similar to currently accredited forestry projects in that both maintenance and operation activities associated with the management of wetlands will be insignificant compared to the fluxes of C and GHG. The question of "What the minimum size of a wetland is before secondary effects can be ignored?" is not specifically addressed in this workplan, but the data collected could be used to make this assessment.
- Quantifying GHG reductions is also analogous to forestry projects, however C sequestration is in the sediment not in standing biomass, a key difference between this proposed project and forest protocols.
- To estimate C sequestration, GHG must be measured directly since no biogeochemical models are suitable for long-term prediction at this time.
- The estimates of potential global warming potential reduction from C sequestration is reasonable, but assumes constant rates of carbon dioxide and methane emission overtime. Rates of carbon dioxide and methane emission overtime will likely change as wetlands age and a better estimate incorporating changes in GHG emissions (using a range of literature values) should be done.
- The workplan does not provide a clear synthesis of the effects of water management on the production and fate of methyl mercury. The present discussion in the workplan centers around the effect of organic matter, redox and sulfate or sulfide concentrations on methyl mercury production. The literature does not provide sufficient direction to predict the effect of these factors on methyl mercury production. The effort proposed in this proposal to monitor methyl mercury is modest and it should likely be increased.

- The criteria for site selection are well thought out, however it is not clear whether only one site will be selected for demonstration. I recommend comparing an older (>10 years) field scale wetland to a newly established one. This comparison would provide useful information on whether methane and carbon dioxide emission will change appreciably during wetland development and therefore influence the estimates of Carbon Offsets.

- It remains to be seen whether the current shallow water configuration in the USGS demonstration wetland is scalable to larger areas to achieve similar results. Maintaining a consistent shallow depth over a larger area is likely a challenge.

- The behavior of open areas meant for mosquito control may behave differently (C sequestration potential) in larger wetlands compared to the demonstration wetlands.

- The application of sediment to wetlands could increase soil C stabilization, but the effect on GHG emission is not predictable with current data and observations.

- Rice straw with a high C to N material could act to immobilize N and other nutrients leading to decreased wetland productivity under proposed water management.

- It is not clear how the chamber data will be used together with the eddy correlation total mass C balance approach to determine what conditions and management practices optimize C capture?

**Recommendation**

I recommend the workplan be implemented. Though lacking hypothesis based research, the workplan presents an adequate monitoring plan to determine the value of wetlands for restoring Delta islands. The proposed wetland(s) would also provide opportunities for others research groups to conduct studies that would provide information that could provide quicker answers as to the value of implementing wetlands for Delta restoration compared to monitoring alone.

***Summary Aspects of Recommendation***

The workplan presents a set of management practices that could optimize C capture and mitigate environmental impact. The optimization of these benefits would provide an alternative source of income to the Delta farming community through emerging C and environmental service markets. This however, is the Achilles heel of the workplan. If a viable C market does not develop rapidly or the concept of trading C credits is not long lived, there will be little incentive for Delta landowners to convert from agricultural activities to managing wetlands. Another shortcoming may arise from the length of time potentially needed to demonstrate net C sequestration, testing the patience of investors In addition, currently there is no compensation plan for additional benefits provided beyond C sequestration. From a market perspective this will likely never emerge because of the difficulty in assigning value to environmental services, such as addressing water quality or reversing subsidence. Subsidy payments through government programs would be required to provide incentives to convert from agriculture to wetlands in the event C and or environmental service trading are not viable long-term (century) solutions. However, a century long subsidy payment for environmental services would be a hard sell in the current climate of state and federal fiscal insolvency. There could possibly other nongovernment funding available from organizations and agencies that rely on the Delta for its water resources. Regardless of the monetary constraints, the Delta needs fixing and wetlands present a viable solution.

## Table of Contents

Thank you for the opportunity to review the workplan entitled "Conceptual Workplan for a Pilot Carbon Sequestration Wetland in the Sacramento-San Joaquin Delta." In reviewing this plan I will concentrate on the science of the proposed implementation plan and monitoring activities. The comments I provide follow the layout of the workplan to facilitate review of my comments in relation to the workplan.

## Specific comments on workplan background

### *Summary of major points and activities of the proposed workplan*

The conceptual workplan outlines an implementation, operation and monitoring plan for a pilot farm-field scale C sequestration non-tidal wetland. The goal of the proposed project is to develop and validate concepts and information for the development of protocols and best management practices for C sequestration wetlands for the San Joaquin and Sacramento Delta. The following goals justification and site selection criteria are proposed.

Specific project goals are:

1. Demonstrate the viability of marsh restoration to create wetland habitat in the Delta while sequestering C for purposes of reducing the global warming effect of GHGs.
2. Provide technical, operational, and financial information for establishing a functioning carbon credit market in the Delta that could provide a funding source for wetland restoration while simultaneously assisting participants in meeting GHG mitigation regulatory requirements.
3. Cooperate fully with the California Department of Water Resources (DWR) in wetland development and information gathering.
4. Document best management practices for wetland construction, operation, and monitoring for demonstration of carbon credits.

Project justification

This workplan presents the results from a scientific literature review consultations with key stakeholders and experts that presents the following:

1. the extent of knowledge and questions for developing carbon- sequestration wetlands in the Delta;
2. a conceptual design and estimated costs for construction of a farm-field scale carbon sequestration wetland that incorporates what is known for optimizing carbon accumulation and minimizing deleterious effects and;
3. alternatives for testing management practices that may enhance carbon sequestration and minimize effects.

Site selection criteria

The implementation plan includes selecting of a project location. The following criteria are proposed for site selection:

1. Location on DWR-owned lands (Dutch Slough and Twitchell and Sherman Islands) or on lands owned by cooperating landowners.
2. Presence of subsided organic soils. Because the project will serve as a pilot demonstration for carbon sequestration for subsided organic-soil islands throughout the Delta, processes and results require assessment on organic soils. Key water quality issues and a portion of methane fluxes are due to the presence of organic soils.
3. Required infrastructure for water delivery, drainage, and access.
4. Adequate sized demonstration pilot project, including alternative possible experimental marsh configurations.
5. Minimal requirement for infrastructure changes such as earthmoving and water delivery structure modification.
6. Minimal time required for project initiation.
7. Large distances from urban areas because of mosquito concerns.

The scope of the project as presented in the goals, justification and site selection plan is the minimum required to provide an answer to the complex problem of restoring Delta islands. This minimum effort should be adequate to assess the success of the proposed approach, but it must be done for 10 to 15 years or longer to establish whether carbon farming is a viable alternative to current management. The project as presented, is based on key aspects of the current state of knowledge on wetlands. It is basically a monitoring project that will test various options for management that will both sustain wetlands and potentially lead to C sequestration to reverse subsidence and address water quality issues as compared to business as usual. Being primarily a monitoring effort without hypothesis based scientific validation might lead to not completely understanding the outcome or direction of the proposed use of best management practices depending on the length of the monitoring effort.

### *CARB Carbon Offset Process comments*

I agree that a **permanent crediting period** of 50 to 100 years is required for a wetlands project that is analogous to currently accredited Forestry Projects.

The **assessment of GHG primary effects** is similar to forestry projects in that living and dead biomass and soil C can be both directly determined and estimated. However, since wetlands produce significant amounts of GHG, primarily $CH_4$, it must be measured directly since no biogeochemical models are suitable for long-term prediction of emissions at this time. This makes the GHG assessment of primary effects a more difficult proposition for wetlands assessment since it must be measured presumably for the life of the project or until there is confidence that an equilibrium emission rate has been obtain. Since these wetlands are being established, monitoring must occur until the equilibrium state is reached. This will require frequent monitoring during the first 10 years followed by less frequent monitoring in the following decades.

The **assessment of secondary effects** again is similar to currently accredited forestry projects. It is likely that both maintenance and operation activities associated with the long-term management of wetlands will be insignificant compared to the fluxes of C and GHG in the wetland. This of course assumes a working wetland that could potentially occupy the majority of the island area. The question of what the minimum size of a wetland is before secondary effects can be ignored is not specifically addressed in this workplan, but the data collected could be used to make this assessment.

**Quantifying GHG reductions** is also analogous to forestry projects, however in wetland systems since C sequestration is in the sediment not in standing biomass. The accumulation of plant litter can be measured over time. A more difficult task will be to measure new soil C accumulation versus loss from old soil C pools. Though models of plant biomass accumulation exist for plant production in wetlands, biogeochemical models for soil/sediment C sequestration are not currently useful to predict long-term C capture in wetlands. Though some of this information can be garnered from the proposed micrometeorological (eddy current) analysis, long-term (decadal to century) monitoring with this approach has not been validated for long-term soil C sequestration. The limitation of this approach is the cost of monitoring for multiple years and not being able to detect the loss of DOC through leaching and runoff, which could comprise a significant portion of total C in the system leading to an overestimation of C sequestration.

Assuming the voluntary C markets will reflect what official C markets look like in the future, this project would fit assuming that eventually soil C sequestration will overcome $CH_4$ emission overtime. The break-even point where soil C sequestration overcomes emission of GHG to create a net C gain will likely occur within 15 to 25 years of establishing the project. Therefore is it vital that to determine early which best management practices have a long-term impact on C capture. The long timeframe before C capture can be verified may not be appealing to emerging C markets.

### *Carbon Sequestration in the Delta Wetlands (review of the literature)*

The literature review presented is sparse in this section but adequate and touches on the most relevant aspect pertinent to the technical and scientific aspects of the proposal. A more comprehensive literature review on $CH_4$, $CO_2$, mercury and DOC is found in Appendix A.

The literature on wetlands is extensive and I would like to have seen a better discussion on factors affecting GHG production. Though many studies have been done in colder and wetter environments, they provide extensive discussions on factors affecting GHG emissions. Also lacking are studies in warmer climates, such as in the Florida Everglades, though a number of relevant studies were mentioned. The Everglades are likely the most comparable system to the Delta, though they lack ocean coastal influences. Overall, a more complete picture (review) of C sequestration versus GHG production would have benefited this proposal greatly. However, I understand the Delta system is unique being found in a Mediterranean climate and the PIs have done a good job in justifying the research. Overall the literature discussion presents an accurate picture of the hydrodynamics and biogeochemistry of the Delta system.

### *Carbon Sequestration in Wetlands*

The evidence presented from previous and ongoing wetland experiments in the Delta suggests appreciable biomass accretion and subsidence reversal is possible under continuous flooding. The main difference between natural wetlands and the demonstration projects mentioned is that water depth is maintained artificially. This was unlikely the case during the development of natural wetlands where fluctuating water levels and over washing from flood events brought in upstream sediments and nutrients to maintain wetland productivity. The episodic deposition of nutrients and sediments is typical of many wetland systems.

### *Key Environmental issues*

In most natural wetlands, $CO_2$ and $CH_4$ are the primary GHGs of interest. In stable natural wetlands, $CH_4$ is the most significant GHG. Most $CH_4$ emission is via standing live plants with root systems established in the sediments. Methanogenesis occurs primarily in the rhizosphere where the methane is consequently transported to the atmosphere via the aerenchyma tissue of plants. The majority up to 90% of the $CH_4$ emission in wetlands escapes to the atmosphere via plants. The remaining $CH_4$ escapes equally to the atmosphere via ebullition (bubbles) and diffusion. The workplan has documented this well.

The calculations of potential soil C sequestration are dependent on $CH_4$ flux, decomposition of original soil C and accumulation of new soil. A very important aspect of the influence of $CH_4$ on global warming potential (GWP) is that its persistence in the atmosphere declines overtime. Overtime, $CH_4$ will decompose in the atmosphere to $CO_2$ reducing its GHG effect. In the workplan the assumptions used to calculate the long-term effect of $CH_4$ flux is based on static

or constant estimates of $CH_4$ emission overtime. This is likely not the case for a number of reasons including:

1. As emergent vegetation establishes $CH_4$ emission rates will change.
2. Accumulation of biomass and litter will likely increase $CH_4$ emission.
3. Without addition of nutrients to sustain growth, $CH_4$ emission may increase.
4. Changes in the vegetation diversity overtime may change $CH_4$ emission.
5. Climate change effects (warming) will likely increase $CH_4$ emission rates

Therefore, though the estimates given in the workplan are reasonable they are likely to be substantially different in reality. The same reasoning can be applied to the persistence of $CO_2$ in the atmosphere. For the same reasons above, $CO_2$ emission will likely change overtime. The question to be asked here is "what direction will the change in emission of $CH_4$ and $CO_2$ take"? The mineralization of soil C present at the start of the wetlands should diminish overtime as biomass accumulation creates ever increasing anoxic conditions as water levels rise and bury the soil and litter to a deeper depth. The accumulation of biomass as litter under elevating water depths could increase methane emission (Bossio et al., 1999). It would be useful to see several different scenarios of changes in $CO_2$ and $CH_4$ emission to calculate the GWP of the proposed wetlands to understand the viability and uncertainty of the approach presented.

***Opportunities for addressing environmental issues***

**Mosquitoes**

The conundrum in the workplan is that management to mitigate GHG emissions may negatively impact others issues namely mosquitoes and water quality. Mosquitoes will no doubt remain an issue despite low observances in the Twitchell Island Demonstration Wetland. As habitat (wetland construction) implementation occurs, niches were mosquitoes can thrive could create sustaining populations. The creation of open water areas within wetlands has been mentioned as a solution to the mosquito problem. Areas devoid of vegetation may not sequester C at rates where vegetation exists. Data from the experimental wetlands suggests comparable or increased accretion rates of litter between vegetated and open areas. However, the experimental wetlands are small compared to planned wetlands, and therefore litter accretion rates in open areas could behave differently. It is likely less accretion would occur in large open areas.

**Water Quality**

I agree that the primary water quality concern in the Delta is mercury. Wetlands are areas where reductive conditions favor the formation of MeHg, which can

accumulate to toxic levels in food web of the Delta. Secondarily, DOC remains an issue affecting the disinfection of water for human consumption.

The main management practice to reduce MeHg is to restrict water movement off the island through practices such as constraining and recirculating outflows. This would also restrict DOC movement off the islands. Recirculating water may exacerbate MeHg production by recirculating reduced water depending on aeration potential during the recirculation process and size of the wetland. Similarly, constraining water could produce lower redox potential within the wetlands. Though these practices would prevent MeHg and DOC escape into Delta waters they may adversely create mercury hotspots inside the wetlands that may affect wildlife residing in them. The MeHg monitoring effort described in the workplan may not sufficient to determine its effect on long-term water quality.

## Criteria for site selection and potential project locations

The criteria are well thought out, however it is not clear whether only one site will be selected for demonstration. I presume so. It would be nice to see a comparison of an existing wetland to one that will be established. They should be on the same scale. For example, it would not be useful to compare the small experimental wetlands to the planned larger ones. I say this because as mention earlier, the rates of $CH_4$ and $CO_2$ emission are likely a function of wetland size due to changes in vegetation community and size of open areas. This comparison would provide useful information on whether $CH_4$ and $CO_2$ emission will change appreciably during wetland development and aging and therefore influence the calculations presented to address the CARB Carbon Offset process (GWP). This information would be used to fine tune potential C credits from the restoration of wetlands in the Delta and would address the following:

1. Does long-term in season water recirculation produce more MeHg?
2. If MeHg increases under recirculation management is wetland wildlife affected?
3. Does the accumulation of biomass and litter under reduced water recirculation lead to nutrient deficiency that negatively impacts potential productivity of the wetland?
4. Does vegetation change, density or productivity influence $CH_4$ and $CO_2$ emission?
5. Does the rate of new sediment (biomass and litter) deposition change overtime?

These are but a few questions that could be asked in making the comparison of an older wetland to a newer one. Of the sites offered' the Sherman Island-Mayberry Farms wetland developed by DWR, Ducks Unlimited and Hanson Engineering has been a wetland since the early 1990s, however it is seasonal.

More information would be needed to assess whether it would classify as an established wetland for comparison purposes.

## Alternate Marsh configurations

The workplan describes the following marsh configurations to provide information on mosquito breeding, $CH_4$ emissions and $CO_2$ sequestration.

- Shallow water, tule/cattail marsh similar to the Twitchell Island, shallow water west pond. This is the current Delta standard that has demonstrated C sequestration and net GHG benefit. However, there is spatial and temporal uncertainty in the methane fluxes and, therefore, the actual GHG reduction benefit.
- Reduced vegetation density and maintenance of open water areas or channels for mosquito control.
- Application of thin layers of sediments.
- Use of rice straw for increasing rates of accretion.

It remains to be seen whether the current shallow water configuration in the USGS demonstration wetland is scalable to larger areas and will achieve similar results. Maintaining a consistent shallow depth over a larger area would be a challenge to maintain. Recent observations in newly established rice paddies on Twitchell show the difficulties in maintaining consistent shallow water depths (Horwath, personnel observations). This occurred despite careful land leveling. The organic soils of the Delta undergo extensive shrink swell depending on organic matter content and depth to mineral soil. Since the intended sites are on highly oxidized soils I would anticipate some problems in maintaining shallow depths.

As mention above, open areas in larger wetlands intended for mosquito control will likely behave differently than within smaller experimental wetlands in regards to $CO_2$ sequestration and litter accretion. The present workplan does not address what the optimum size of open areas should be to optimize mosquito control and C sequestration.

Continuous application of thin layers of sediment is likely what happened in natural Delta wetlands overtime. Over thousands of years, multiyear flooding events likely deposited sediments in the undisturbed Delta wetlands. The workplan proposes to apply sediments to reduce $CH_4$ emission. It is not clear in the workplan what the depth of a thin layer of sediments is. I agree that it would create accelerated accretion and increase bulk density. A frequent deposition of sediment such as from channel dredging could provide a source of sediments. The sediment would also likely act to stabilize the decomposed biomass and litter and may accelerate C sequestration.

The use of rice straw is questionable. Rice straw with a high C to N material which would likely act to immobilize N and other nutrients leading to decreased wetland productivity. It could also increase $CH_4$ emission by providing labile C for methanothrophs. I also question where the rice straw would come from. If imported from the Sacramento Valley the transportation cost must be justified. If it came from Delta rice paddies it would defeat the purpose of growing rice in the Delta as an alternative C sequestration approach.

## Capital facilities conceptual design

The proposed conceptual designs are well thought out and the cost of implementation seems reasonable. As mentioned above, if considerable soil needs to be moved to create level areas for the facilitation of shallow wetlands, it will likely result highly variable soils with varying organic matter contents and depth to mineral soil. These conditions would make it difficult to manage shallow water depths long-term.

## Environmental compliance and permitting

This section of the workplan is well justified and need no further comment.

## Monitoring and scientific investigation

The statement that C sequestration wetlands are basically untested is true and that additional investigation is required to validate the approach. I have seen these wetlands and agree biomass and litter accretion is occurring. The accumulated material remains in a relatively undecomposed state.

### *Comments of GHG monitoring*

The goals of the GHG monitoring are well stated, but I have the following questions/comments concerning the monitoring approaches.

1. The undecomposed material may immobilize N and nutrients that would negatively impact long-term productivity.
2. The accumulated biomass material could act as a substrate for $CH_4$ production as its redox potentials lowers with increasing water levels required to capture C.
3. What level of monitoring is required with the chamber approach to determine what sections (open water, areas where plant density differs, areas of different plant types, etc.) of the wetland are sources or sinks for C?
4. How will the chamber data be used together with the total mass C balance determined by the eddy correlation technique to determine what conditions optimize C capture in the wetland?

I have concerns about accumulating dead biomass and litter in the proposed workplan as already mentioned. The observations of accretion from the demonstration wetlands were primarily done visually and not corrected bulk density measurements. It appears the accretion is loosely organized with low bulk density. However, this may be adequate to achieve lessening the hydrostatic pressure against the levees merely through raising the water level in the wetlands. However, the accumulated dead biomass and litter would be C poor. The addition of sediments could act to increase bulk density and provide additional opposing pressure against the levees from within the island. The sediments would also act to increase C density through stabilization with the mineral phase of the sediments. Finally, as mentioned earlier, accumulating dead biomass may immobilize nutrients, which may affect production potential, especially under constrained outflow and recirculated water conditions.

The accumulated dead biomass and litter could increase $CH_4$ emission as mentioned above. In a study in the Sacramento Valley, leaving rice straw on the paddies increased $CH_4$ production in following seasons (Bossio et al 1999). I see similar increases in $CH_4$ production in rice paddies in the delta where rice straw is left on the paddies (Horwath, personal observation).

The chamber method is an accepted approach to measuring GHG emission. I agree that diurnal measurements are variable and the chamber method not ideal to measure them. However, for the comparison of $CH_4$ emission in experimental cells, the chamber method is the only approach accepted in the literature. However, there is an insufficient detail in the workplan to tell how the approach would be used. For example, what is the frequency of measurements? What replication required? What events are important to monitor? Etc.

The workplan does not provide enough detail on how chamber measurements would be used in the experimental plots, such as sampling frequency, event sampling, location, etc. Will the monitoring in the experimental plots be done only to assess the value of best management practices? It is also vague in describing how the chamber approach will be used with the eddy current approach to distinguish areas in the wetland that are C sinks or sources. This may not have been proposed, but it would be useful since the behavior of best management practices at a larger scale may be substantially different than in the experimental cells. The use of the chamber method with the eddy current method in the larger wetland would provide information on wetland characteristics (i.e., area of open water, density of plants, type of plants) and management practices that maximize C sequestration.

See Appendix A for additional comments

### *Comments of Mosquito monitoring*

The mosquito monitoring is not well described. The workplan recommends Sharon Lawler from UC Davis to test the hypothesis that mature wetlands provide natural control of mosquito populations. I agree.

***Comments of Mercury monitoring***

See Appendix B comments

## Appendix A Greenhouse Gases, Carbon Sequestration, Accretion, and Related Issues

Many comments relevant to this section are already addressed in comments provided in the summary sections of the workplan.

*Relative Amounts of Methane Emitted and Carbon Dioxide Sequestered Determine the Net Effect on Greenhouse Gas Global Warming Potential*

As mentioned earlier, to calculate the net GHG effect, the workplan uses constant values for $CH_4$ and $CO_2$ emission. This is unlikely the case as the wetland matures. It would have been nice to see a number of scenarios with changing $CH_4$ and $CO_2$ emissions based on wetlands literature to gain a better understanding of what the potential outcomes are related to wetland maturity. This is essential since these wetlands are to remain in existence for more than 100 years or ideally indefinitely. Overall, the values used in the calculation are reasonable and likely predict well the balance between C sequestration and GHG emission. See previous discussion in the subsection "Key Environmental Issues"?

*Environmental Factors Affecting Methane Emissions*

This section provides a comprehensive literature review of factors affecting $CH_4$ emission. Though the literature is extensive on this subject, key literature is described to justify the project.

*Methane and Carbon Sequestration in the Sacramento- San Joaquin Delta*

This section presents literature to support the positive C sequestration potential of wetlands in the Delta. They have addressed my concerns of measuring bulk density as an aspect of C density in the accreted wetland. My main concern is that extrapolating data from small demonstration wetlands to larger field scale may not produce the same anticipated outcome. For example, open areas within the demonstration wetlands were shown to accrue C. Is this case for much larger areas proposed? This is probably not the case since water movement through the wetland will be slower in the larger wetland, which may impact nutrient inputs, redox gradients and litter deposition dynamics. These could potential alter wetland productivity and GHG emission in large wetlands compared to the smaller demonstration sites.

In general I agree that up to 50-year time span is needed to demonstrate a net GWP benefit.

## Appendix B. Key Processes and Factors Affecting Mercury in Delta Non-tidal Wetlands

The literature review on MeHg is sufficient and describes the salient details needed to justify the research. A comprehensive discussion of the regulatory environment surrounding MeHg production in wetlands provides the emphasis to monitor and understand MeHg dynamics in restored wetlands. I agree that the primary opportunities to reduce MeHg loads will be through hydrologic management. That said there are few options other than constraining water loss and recirculation. Unfortunately the literature does not provide enough information on the fate of MeHg under long-term wetland conditions. For the purposes of this project, continuous MeHg monitoring is required. The budget allocated to MeHg analysis is modest and additional funding and effort should likely be sought to address this critical issue.

**I have no comments on Appendices C and D**

## Background on Wetland Science

The following discussion covers the background section of the proposal

### *Background and comments on the science presented in the workplan*

Natural wetlands are unique features of the landscape that are intimately tied to upland biogeochemistry. One of their main functions is to process and consume nutrients and carbon (C). Wetlands are large C sinks representing approximately 10% of global terrestrial soil C stocks despite only occupying 2% of the total land area (Horwath 2007). Wetlands are an endangered land use with annual conversion to other purposes reducing substantial areas. Wetland removal or destruction negatively impacts their unique biogeochemical function by interrupting the continuum of nutrient and C cycles from upland to ocean systems. The removal of wetlands has impacted estuaries negatively and created "dead zones" in near offshore areas by causing hyperactive algal production from excessive nutrient loads that would normally have been sequestered or processed to nonreactive pollutants in wetlands.

The ability of wetlands to capture C and nutrients is an important aspect of the global C cycle. From a reactive nitrogen (N) perspective, wetlands complete the N cycle through the process of denitrification converting inorganic N to dinitrogen. Unfortunately, the inefficiency of the denitrification process leads to losses of nitrous oxide ($N_2O$) through the incomplete reduction of inorganic N. In continuous flooded wetlands the loss of $N_2O$ is minimized. Finally, the reductive environment of wetlands leads to methogenesis, the final step in the decay of organic matter that produces methane ($CH_4$). There in lies the challenge in preserving, creating and managing wetlands. Depending on the type of wetland or how they are managed, they can either be C sinks or produce sufficient greenhouse gases (GHG) such as $CH_4$ to offset C sequestration.

Wetland C fluxes are primarily controlled by climate, disturbance and changes in land use. The balance between C capture and loss by decomposition and GHG production controls the rate of C accumulation, and thus determines whether wetlands are C sinks or net sources of GHGs. Some of the highest accumulation of soil C is found in reduced wetland environments such as swamps and marshes (up to 723 t $ha^{-1}$) (Horwath 2007). The accumulation of C in wetlands is a result of slow decomposition or turnover rates under anoxic conditions, which are an order of magnitude slower than most ecosystems except tundra. Thus, wetlands have a high potential to store C via conversion of carbon dioxide ($CO_2$) through photosynthesis to soil organic matter (SOM). Net primary productivity (NPP) is one of the main factors that ultimately controls whether wetlands are sinks or sources of C and GHGs.

The production of GHG such as $CH_4$ and $N_2O$ can offset C capture because of their higher atmospheric radiative forcing compared to $CO_2$. Radiative forcing is defined as the change in net irradiance at the atmospheric boundary between the troposphere and the stratosphere (the tropopause) measured in watts per meter

squared. Different GHGs reflect irradiance within the tropopause dissimilarly. Compared to $CO_2$, $N_2O$ and $CH_4$ have 298 and 25 times the radiative forcing potential, respectively over a 100-year period. Methane has 75 times the global warming potential of $CO_2$ over a 25-year period because it slowly oxidizes to $CO_2$ over time. The production of these more potent GHG can negate the C capture potential in sediments of wetlands. For this reason, wetlands can either be solutions to or a source of GHG production that accelerates climate change.

The relationship between $CO_2$ and $CH_4$ emission is controlled by redox status raising the possibility of using management intervention to lower $CH_4$ emission. Changes in soil redox may also lead to differences in stabilization processes (e.g. humification pathways), thereby affecting the stability of soil C (Horwath 2007). The management of water regimes that incorporates intermittent flooding has been shown to significantly reduce $CH_4$ emission from rice paddies (Kirk 2004). However, this can elevate $N_2O$ production through the increase in nitrification during the dry down period in an intermittent flood regime. A recent result from Sacramento Valley rice paddies shows intermittent flooding significantly reduces $CH_4$ emission while not increasing $N_2O$ emission substantially (Horwath, unpublished results). The timing of the drain period when kept to a few days was shown to be optimum in reducing $CH_4$ while not significantly affecting $N_2O$ emission. The intermittent flood regime was likely more characteristic of the tidal wetlands of the San Joaquin-Sacramento Delta. These historical conditions may have served to reduce $CH_4$ emission.

Though wetlands are known to contain vast stores of organic C, there is a dearth of information on mechanisms controlling C capture under disturbance regimes such as those associated with climate change or reestablished wetlands. Factors controlling the rate and amount of C capture in wetlands include NPP rates, the quality of litter inputs, and disturbance (i.e changes in hydrology, climate, nutrient status, redox, etc.). Table 2 shows a range of decomposition rates (k) for Typha spp. a common Delta wetland plant. The decomposition rates are comparable to soils in general where approximately 30 to 50% of plant inputs are decomposed annually (Horwath et al., 2007). Though wetlands are typically thought to have slow C turnover rates, wetlands in warmer temperate climates likely have faster turnover rates -- analogous to upland systems. Decomposition rates listed in Table 2 for wetland plant species are typical of terrestrial systems and suggest that after 10 years less than 5% of initial plant C inputs remain. However, these studies rarely examine root input and decomposition. Typha spp. has a vigorous rooting habit and creates an extensive vegetative mat (Miller et al., 2008). Little information exists on the turnover of Typha spp. roots. The root to shoot ratio of Typha spp. ranges from 0.43 to 0.63, suggesting a significant portion of NPP is allocated belowground. The aboveground annual biomass of Typha spp. ranges from 1,177 to 3,500 g $m^{-2}$, with the Delta showing the highest accumulation rates. In the existing Twitchell Island USGS demonstration wetland mentioned in the workplan, Miller et al., (2008) found significant root biomass of 1,500 g $m^{-2}$. The C to N ratio of Typha spp. roots tends to be significantly higher than the aboveground material (Rothman and

Bouchard 2007). The large amount of root biomass and its' higher C to N ratio may suggest Typha spp. roots turnover more slowly than aboveground material. This may partly explain the large vegetative and litter dominated mat observed in the USGS demonstration wetland (Miller et al., 2008). However, this may also lead to N immobilization and negatively affect NPP as has been observed in tropical rice paddy systems (Olk et al. 1996).

Table 2. Literature values for biomass production and aboveground turnover rates of Typha spp. (Horwath 2007).

| Species | Aboveground ($g/m^{-2}$) | Belowground ($g/m^{-2}$) | Root/shoot ratio | k ($d^{-1}$) |
|---|---|---|---|---|
| *Typha Angustifolia* [1] | na | Na | na | 0.0022† |
| *Typha Angustifolia*[2] | na | Na | na | 0.0025† |
| *Typha spp.* | 1177 | 742 | 0.63 | 0.18¢ |
| *Typha spp.* | 3,000£ | Na | na | na |
| *Typha latifolia* | na | Na | na | 0.005§ |
| *Typha spp.* | 3,500¶ | 1,500 | 0.43 | na |

1 intermittent flooding
2 continuous flooding
† Su et al., (2007)
¢ Rothman and Bouchard (2007)
£ Hai et al. (2006)
§ Alvarez and Becares (2006)
¶ Miller and Fugii (2008, submitted)

Increases in temperature stimulate both $CO_2$ and $CH_4$ production in wetlands (Horwath 2007). Drainage (both intermittent and prolonged) of wetlands stimulates the production of dissolved organic C (DOC), nitrous oxide ($N_2O$) and $CO_2$ (Bossio et al. 1999). To estimate whether wetland production of GHGs outweighs its' C capture potential requires a detailed analysis of factors affecting these processes. For example, Christentian et al. (1996), showed that even though northern wetlands are net C sinks their substantial emission of $CH_4$ led them to contribute to global warming. Under warming temperatures, wetlands are likely to increase $CH_4$ emission due to lowered microbial substrate use efficiency and increased microbial activity (Devevre and Horwath 2000). The export of DOC is also likely to increase both as result of increased oxidation of soil C (both existing sediments and recently deposited materials) and higher equilibrium levels in the aqueous phase (Bossio et al. 1999). Higher temperatures will also increase plant respiration, which may negatively impact NPP. However, increasing atmospheric $CO_2$ may compensate for increasing temperature by maintaining or enhancing NPP.

It is also important to understand pathways of decomposition and the resulting stability of the captured C as the specific conditions may have dramatic effects. For example, Devevre and Horwath (2000) found that decomposition of rice straw under flooded and nonflooded conditions was comparable under many conditions, but rates of decomposition were strongly influences by temperature more in flooded soils. Higher temperatures tended to produce more stable soil C regardless of flooding treatment. Therefore, an understanding of the specific processes leading to C production and stabilization it is required to understand formation of soil especially those found in aggrading wetlands as is proposed in this workplan.

The cycling of C depends on N availability, and it is therefore important to understand the inputs and fate of N in wetland systems. The accumulation of high C to N rice residue has been shown to have a negative impact on N availability in tropical rice systems through the accumulation of phenolic compounds under continuously flooded conditions (Olk et al., 1996). The phenols incorporate N through condensation reactions making the N less plant available. This has happened despite increased fertilizer N additions. This raises the question of whether the Delta wetlands are sustainable in light of the large accumulation rates of plant residues observed under continuous flooding (Miller et al., 2008). In the current USGS pilot wetland, drain water used to maintain water levels is affected by agriculture and may contain elevated N to sustain growth. In the workplan, the premise is to recycle water to avoid potential water quality issues related to methyl mercury (MeHg) and DOC production. In this type of recirculation system, N may become limiting for reason described above and negatively impact potential NPP.

Typha spp. wetlands with up to 3,500 g $m^{-2}$ annual aboveground biomass production require up to 75 kg N $ha^{-1}$ (Rothman and Bouchard 2007). The root systems of Typha spp. with biomass up to 1,500 g $m^{-2}$, requires about 15 kg N $ha^{-1}$ to support production. The combined 90 kg N required to support annual growth in the Delta is a substantial amount of N similar to the needs of intensive agriculture operations. These observations on N requirements require that it be determined whether the accumulation of plant residues in Delta wetlands could negatively impact the cycling of N and lead to degrading wetland productivity over the long-term.

The ability of Delta wetlands to capture C would address a number of issues addressed in the workplan. The most important outcome of capturing C independent of emitting GHG would be to stop and or reverse island subsidence. Subsidence reversal would provide additive environmental services to the Delta including increasing levee stability, the potential to improve bay water quality through less pumping of water off the islands, creation of wetland habitat for waterfowl, provide insurance to minimize salt creep from the San Francisco Bay, and others. These additional benefits may outweigh the negative impact GHG production associated with wetland systems. The benefits of island restoration

using wetlands needs to be weighed against their potential negative impact on climate.

The workplan presents a set of potential management practices that could optimize C capture (carbon farming) and mitigate environmental impact. Carbon farming could provide an alternative source of income to the Delta agricultural community through emerging C and environmental service markets. This however, is the Achilles heel of the workplan. If a viable C market does not develop rapidly or the concept of trading C credits is not long lived, there will be no incentive for Delta landowners to convert from agricultural activities to managing wetlands. In addition, currently there is no compensation plan for the additional benefits provided beyond potential C trading markets. From a market perspective this will likely never emerge because of the difficulty in assigning value to environmental services. Subsidy payments through government programs would be required to provide incentives to convert from agriculture to wetlands in the event C and or environmental service trading are not a viable long-term solutions. However, a century long subsidy payment for environmental services would be a hard sell in the current climate of state and federal fiscal insolvency. Regardless of the monetary constraints, the Delta needs fixing and wetlands present a viable solution.

## References

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