AGENDA
IRVINE RANCH WATER DISTRICT
WATER RESOURCES POLICY AND COMMUNICATIONS COMMITTEE
THURSDAY, DECEMBER 10, 2015

CALL TO ORDER 3:00 p.m. Committee Room, Second Floor, District Office
15600 Sand Canyon Avenue, Irvine, California

ATTENDANCE
Committee Chair: Mary Aileen Matheis _____
Member: Steve LaMar _____

ALSO PRESENT

Paul Cook	_____	Cheryl Clary	_____
Beth Beeman	_____	Patrick Sheilds	_____
Mark Tettemer	_____	Christine Compton	_____
Fiona Sanchez	_____	Amy McNulty	_____
Paul Weghorst	_____	Kellie Welch	_____
Ray Bennett	_____	Jo Ann Corey	_____
_____	_____	_____	_____
_____	_____	_____	_____

COMMUNICATIONS

1. Notes: Weghorst
2. Public Comments
3. Determine the need to discuss and/or ftake action on item(s) introduced that came to the attention of the District subsequent to the agenda being posted.
4. Determine which items may be approved without discussion.

INFORMATION

5. DROUGHT OUTREACH PROGRAM UPDATE – BEEMAN/WEGHORST

   Recommendation: Receive and file.

6. STATE WATER RESOURCES CONTROL BOARD DROUGHT EMERGENCY REGULATION UPDATE – SANCHEZ/WEGHORST

   Recommendation: Receive and file.

INFORMATION - Continued

7. STATEWIDE DATA COLLABORATIVE PILOT PROGRAM – SANCHEZ/WEGHORST

   Recommendation: Receive and file.

ACTION

8. CONCEPTUAL TERMS FOR RECYCLED WATER CONVERSION OF UCI CENTRAL PLANT – TETTEMER/WEGHORST

   Recommendation: That the Committee provide input on the conceptual terms for recycled water conversion of the University of California, Irvine (UCI) Central Plant and authorize staff and legal counsel to work with UCI to finalize the terms and prepare an agreement for consideration by the Board.

9. SALT MANAGEMENT PLAN OVERVIEW AND RECOMMENDATIONS – BENNETT/WELCH/SANCHEZ/WEGHORST

   Recommendation: That the Committee provide input on the proposed actions related to implementing the recommendations of the Recycled Water Salt Management Plan.

OTHER BUSINESS

10. A. Directors' Comments

    B. Adjourn

****

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 above-named Committee in connection with a matter subject to discussion or consideration at an open meeting of the Committee 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 Committee 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 Committee Members, except that if such writings are distributed one hour prior to, or during, the meeting, they will be available at the entrance of the meeting room at the District Office.

The Irvine Ranch Water District Committee 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 an alternative format upon written request to the District Secretary at least seventy-two (72) hours prior to the scheduled meeting.

December 10, 2015
Prepared by: B. Beeman
Submitted by: P. Weghorst
Approved by: Paul Cook

WATER RESOURCES POLICY AND COMMUNICATIONS COMMITTEE

DROUGHT OUTREACH PROGRAM UPDATE

SUMMARY:

In response to the statewide drought as well as the Governor's mandate for IRWD to reduce potable water use by 16 percent by February 2016, staff continues to develop and implement a multi-pronged drought outreach plan. A draft of this plan was presented to the Board at its meeting on May 11, 2015. The purpose of this report is to update the Committee on these efforts.

BACKGROUND:

Color Your World Outreach Program:

At the Committee meeting, staff will present the new "Color Your World with Drought Tolerant Landscaping" video. This 30-second video will be placed in theaters throughout IRWD's service area and will be seen by the District's customers throughout the holiday season. The video will also be shown on local city-owned television networks and Cox television public access channels.

Drought Survival Guide II:

A newly-developed customer letter and *Drought Survival Guide II* will be mailed to single family residents in December. The letter and guide will present new ways customers can reduce water use and provide assistance with changing their gardens to drought tolerant landscapes. Copies of the letter and guide will be distributed at the Committee meeting.

Niagara Stealth Toilet Outreach:

The focus of November's customer outreach postcard was the Niagara Stealth Toilet parking lot events that were held at the Home Depot in Tustin on November 7 and Irvine on November 14. The outreach postcard that announced the events was mailed to over 5,000 customers and included information on available rebates. Staff also implemented an extensive social media outreach campaign using Facebook and Twitter. As a result, local groups and individuals carried the District's message via social media. Niagara also posted photos of the events that were then used by others to continue the promotion. These outreach efforts amplified the reach of the message and culminated in extremely successful events with over 500 toilets purchased by IRWD's customers.

FISCAL IMPACTS:

None.

ENVIRONMENTAL COMPLIANCE:

Not applicable.

RECOMMENDATION:

Receive and file.

LIST OF EXHIBITS:

None.

December 10, 2015
Prepared by: F. Sanchez
Submitted by: P. Weghorst
Approved by: Paul Cook

WATER RESOURCES POLICY AND COMMUNICATIONS COMMITTEE

STATE WATER RESOURCES CONTROL BOARD
DROUGHT EMERGENCY REGULATION UPDATE

SUMMARY:

In May 2015, the State Water Resources Control Board (State Board) adopted an Emergency Regulation to implement the provisions of Governor Brown's April 2015 Executive Order which mandated a statewide 25% reduction in potable water use. The Emergency Regulation requires each urban water agency to reduce its potable water use to a conservation standard ranging from 8% to 36% of 2013 levels. The agencies' standards are based solely upon an evaluation of residential per capita use. On November 13, 2015, Governor Brown issued another Executive Order directing the State Board to extend the emergency regulation until October 31, 2016, if the state continues to experience drought conditions through January 2016. The State Board convened a Water Conservation Workgroup, which included IRWD, to seek input on potential refinements that could be incorporated into an extension of the emergency regulation. A public workshop was held on December 7, 2015 to obtain broader stakeholder input. At the Committee meeting, staff will provide an update on the various proposals to refine the regulations that are being considered by the State Board. In addition, staff will provide an overview of feedback provided by agencies at the workshop and next steps.

BACKGROUND:

In response to a four-year statewide drought, Governor Brown issued Executive Order B-29-15 on April 1, 2015 mandating a 25% reduction in statewide potable water use between June 2015 and February 2016. On May 5, 2015, the State Board adopted an Emergency Regulation to implement the provisions of the Executive Order. Each urban water agency was assigned a conservation standard based upon its residential gallons per capita per day potable water use, ranging from 8% to 36%. A conservation standard is the required reduction in potable water use each agency is required to achieve as compared to 2013 levels. IRWD was assigned a conservation standard of 16% and is on track to meet its reduction target in February 2016.

Due to the emergency nature of the regulation, the conservation standards were put in place based on limited data, and did not take into consideration many factors that can affect water use throughout the state. During the process, water agencies provided input to the State Board on potential refinements to the regulation and proposed that workgroups be formed to address some of the key issues.

Water Conservation Workgroup:

In August 2015, the State Board convened an informal Water Conservation Workgroup, which included IRWD, to discuss potential refinements to the emergency regulation in the event of an extension, as well as a possible implementation of a long-term regulation. After the first

meeting, the focus was shifted to the potential extension of the regulation and discussions regarding a long-term regulation were deferred. Water agency stakeholders submitted proposals to the workgroup and State Board staff that would modify the conservation standards relative to the following:

- Climate equity adjustments;
- Growth equity adjustments;
- Recycled water equity adjustments;
- Use of stored emergency supplies;
- Credits for conjunctive use of groundwater;
- Credits for sustainable supplies including potable reuse and desalination;
- Credits for long-term conserved water transfer agreements;
- Consideration of availability of local supplies;
- Regional compliance options; and
- Alternative compliance using a water budget-based performance standard.

Extension of Emergency Regulation:

On November 13, 2015, Governor Brown issued Executive Order B-36-15, stating that if drought conditions persist through January 2016, the State Board shall extend the Emergency Regulation until October 31, 2016. He further directed that the State Board shall consider modifying the existing restrictions to address uses of potable and non-potable water, as well as incorporate insights gained from the implementation of the existing regulation.

The State Board held a public workshop on December 7, 2015 to seek broader input on potential modifications, additional data collection needs and how the regulation should account for precipitation after January 2016. The State Board has indicated that it intends to adopt an extension to the Emergency Regulation in either January or February 2016. At the Committee meeting, staff will provide an update on the public workshop proceedings, the status of the various proposals, feedback from the workshop and next steps.

FISCAL IMPACTS:

None.

ENVIRONMENTAL COMPLIANCE:

Not applicable.

RECOMMENDATION:

Receive and file.

LIST OF EXHIBITS:

None.

December 10, 2015
Prepared by: F. Sanchez
Submitted by: P. Weghorst
Approved by: Paul Cook

WATER RESOURCES POLICY AND COMMUNICATIONS COMMITTEE

STATEWIDE DATA COLLABORATIVE PILOT PROGRAM

SUMMARY:

As a statewide leader in water demand management, IRWD will participate in the first phase of an effort to implement a water agency-based Statewide Collaborative Data Project (Collaborative Project). The purpose of the project is to collect and share data among utilities to identify opportunities to refine demand management strategies and to promote long-term sustainable solutions that build upon the water-energy nexus. A phase one pilot program (Pilot Program) to be implemented as part of the project is designed to demonstrate the value of the overall Collaborative Project. It is envisioned that a subsequent phase will effectively demonstrate the use of a cloud-based data sharing platform. The long-term goal is to implement a Collaborative Project that can be used to inform local and statewide strategic demand management decisions.

BACKGROUND:

Currently there is no single source in California for validated water agency data for use in conducting analytics to inform strategic demand management decisions. This became apparent during the spring of 2015, when the State Water Resources Control Board developed statewide water conservation targets without the benefit of good data. Good data is extremely valuable to identify opportunities for future demand management programs, as well as help identify whether programs are effective.

IRWD has always been a leader in water demand management, and building upon that tradition, staff has executed an agreement, in collaboration with five other agencies, to participate in and provide $25,000 of funding for a Pilot Program to be implemented as part of the Collaborative Project. The agreement, which is attached as Exhibit "A", includes a detailed description of the Collaborative Project. The goals of the Pilot Program are as follows:

- Demonstrate the benefits of establishing a Collaborative Project;
- Use agency and customer level data sets to perform analyses, evaluate data gaps and determine data needs in order to illustrate the value and effectiveness of local and statewide demand management programs;
- Learn from the success and challenges of different demand management programs; and
- Conduct a preliminary statistical analysis on the effectiveness of turf replacement programs.

Pilot Program Administration:

The Pilot Program will be administered by the Moulton Niguel Water District. Other participating and co-funding agencies in the Pilot Program include Eastern Municipal Water District, East Bay Municipal Utility District, Inland Empire Utilities Agency, Las Virgenes

Municipal Water District and Santa Margarita Water District. Use of any agency's data in the pilot will be subject to a non-disclosure agreement and may only be accessed for specific purposes subject to approval of the participating agency.

Patrick Atwater will serve as the project manager for the Pilot Program. He will be supported by Professor Frank Loge of the University of California, Davis (UC Davis), who has already developed a similar concept to support long-term water-energy management strategies.

Future Phases:

It is envisioned that the data and lessons learned from the Pilot Program will be used in a phase two program that will demonstrate the effectiveness of a secure, cloud-based platform developed by Professor Loge for sharing water utility data and performing analytics. The phase two program will be conducted by CAWaterData.org, a not-for-profit company formed with the intention of scaling the data sharing platform statewide. Participation in the second phase is expected to include the Pilot Program agencies as well as other agencies with which UC Davis has been working.

Phase three will be the full implementation of the Collaborative Project that will be implemented through a scope of work that will be developed based on the results of the Pilot Program and the phase two work. The scope of work will be developed in coordination with water utilities and state agencies. As work progresses, staff will provide updates to the Committee on the status of the Collaborative Project and the results of the Pilot Program which is expected to be completed in October 2016.

FISCAL IMPACTS:

Funding for this project is included in the adopted FY 2015-16 Operating Budget and will be funded from over allocation revenues.

ENVIRONMENTAL COMPLIANCE:

Not applicable.

RECOMMENDATION:

Receive and file.

LIST OF EXHIBITS:

Exhibit "A" - California Data Collaborative Project: Phase One Pilot Agreement.

Moulton Niguel Water
Leading the Way in Service

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www.mnwd.com

EXHIBIT "A"

November 20, 2015

Moulton Niguel Water District
27500 La Paz Road
Laguna Niguel, CA 92677

Re: California Data Collaborative Project: Phase One Pilot

To: California Water Agencies:

This Letter of Agreement ("Agreement") documents the understanding between the California Water Agencies (individually referred to as "Agency" and collectively as "Agencies") that have executed this Agreement as indicated by the signatures below of their duly authorized representatives.

Project Description

A statewide data collaborative effort is currently underway involving water agencies throughout California, working in partnership with UC Davis, to collect and share data among utilities to improve efficiencies, refine demand management strategies and promote long-term sustainable solutions that build on the water/energy nexus. A cloud-based, secure infrastructure will be built through a non-profit mechanism to house data from agencies and facilitate statewide analysis. The envisioned effort is a three-phase, "bottom-up" approach to providing meaningful input and recommendations that will help shape future water management decisions that have statewide impacts.

- **Phase One Pilot:**

Phase One Pilot will conduct statewide conservation analytics to illustrate the value proposition of this data collaborative approach. A group of retail agencies as identified in this Agreement will work with Patrick Atwater, Project Manager of the Phase One Pilot and a signatory to this Agreement, to share utility and consumption level data. Using various utility and customer level data sets, the pilot group will perform analysis, evaluate data gaps, and determine data needs in an effort to demonstrate the value and effectiveness of demand management programs at the local and statewide level. Participating wholesale agencies may elect to have one retail water utility in their service area provide data and participate in the Pilot Project.

The agencies will participate in monthly meetings, which will be scheduled and facilitated by the Moulton Niguel Water District (MNWD) as part of its In-Kind Contribution as set forth below. It is anticipated that said meetings will commence on or about the January, 2016 and will continue through the

completion of the Phase One Pilot which is estimated to be completed on or about October 2016. The purpose is to better understand the unique characteristics of communities, impact of various demand management strategies, and develop tools to assist agencies collect/analyze data. A report of the pilot and samples of work will be generated during the pilot.

- **Phase Two Pilot:**

Phase Two Pilot will demonstrate a secure, cloud-based platform for sharing water utility data and performing analytics. The cloud-based platform was developed by Professor Frank Loge at UC Davis, who is also a signatory to this Agreement. The Phase Two Pilot will be conducted by CAWaterData.org, a not-for-profit company incorporated with the intent of scaling the platform statewide at the completion of the Phase Two Pilot.

Phase Two will focus on (1) uploading participating agency data into the cloud-based platform; (2) defining agency specific policies for data access, sharing, security, and privacy; (3) customizing the cloud architecture to reflect the specified policies; (4) finalizing a trust framework, a document that describes the laws, regulations, policies, and best practices associated with the cloud-based platform; (5) educating utilities and other stakeholders on the functionality and operation of the platform; and (6) defining the long-term funding model for CAWaterData.org.

The participants for the Phase Two Pilot are expected to include the agencies involved in the Phase One Pilot as well as additional California water agencies that UC Davis has been working with in collecting and analyzing water utility data. Once the value of the data collaborative and the integrity of the platform have been established, the goal is to make the data collaborative available to all water agencies in California in coordination with various State agencies.

- **Phase Three:**

Phase Three is the full implementation of the statewide data collaborative. The terms of participation and the detailed scope of the effort remains to be developed based on the results of Phase One and Two Pilots as well as coordination with water utilities and state agencies.

Scope of the Agreement

This Agreement and the terms contained within as agreed upon by the signatories only pertain to the Phase One Pilot of the overall statewide data collaborative. Signing onto this Agreement does not bind any of the signatories to further pursue Phase Two Pilot or Phase Three. Further participation beyond Phase One Pilot will be established through a separate agreement.

Phase One Pilot Team

The Phase One Pilot team is led by Patrick Atwater, who will serve as the Project Manager. Christopher Tull will serve as the Civic Data Scientist and Eric Schmitt will be the Consulting Statistician, working under Patrick Atwater's direction.

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Frank Loge of UC Davis will support the efforts of the Phase One Pilot group to assist in the development of the value proposition.

Participating agencies include East Bay Municipal Utility District, Eastern Municipal Water District, Inland Empire Utilities Agency, Irvine Ranch Water District, Las Virgenes Municipal Water District, Moulton Niguel Water District, and Santa Margarita Water District.

Separate Non-Disclosure Agreement

Participation by each Agency shall be contingent upon a separate non-disclosure agreement or similar arrangement by and between each participating Agency and each Phase One Pilot team member, which provides for the security, privacy, and nondisclosure of the data provided by the Agency. The terms and conditions upon which the data will be provided by each Agency, and the content and extent of such data, shall be determined in the sole discretion of each Agency.

Level of Participation

Financial Contribution - Each Agency that wishes to take part in this Phase One Pilot is required to execute this Agreement and provide financial contributions as set forth below.

Eastern Municipal Water District - $25,000

Inland Empire Utilities Agency - $25,000

Irvine Ranch Water District - $25,000

Las Virgenes Municipal Water District - $25,000

Moulton Niguel Water District - $25,000

Santa Margarita Water District - $25,000

MNWD will be the repository of funds contributed by the Agencies and will then facilitate the applicable payments to the Phase One Pilot team and provide the Agencies with copies of any written receipts or acknowledgements to the Agencies on a timely basis. MNWD will be the general administrative liaison on behalf of the Agencies in regard to funding as well as for communications and other purposes as determined by all the Agencies.

In-Kind Contribution – Each Agency that wishes to participate via in-kind services in the Phase One Pilot is required to execute this Agreement as set forth below:

Frank Loge, UC Davis - will work closely with the Phase One Pilot team and participating agencies to support the development of the value proposition.

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East Bay Municipal Utility District (EBMUD) - Richard Harris, Water Conservation Manager will provide project guidance and support. Working with project staff, EBMUD may provide customer-level usage along with other customer characteristic and turf rebate data to facilitate a statewide study of turf market transformation dynamics expanding on the MNWD turf rebate study published by Bloomberg Data for Good in October this year.

Electing To Engage In the Second Phase Pilot and Larger Statewide Project (Phase Two and Phase Three)

The results of the Phase One Pilot will help the Agencies determine the potential benefits of a statewide data collaborative and how best to leverage available data and analyses in future project phases.

Nothing in this Letter shall be deemed to be a binding obligation of any Agency to provide any further financial contribution, in-kind services, data or otherwise take part in any activities beyond this Phase One Pilot. Each Agency may decide whether to participate further, and those Agencies that elect to engage in the next phase will enter into a separate agreement. This document can be signed in counterparts, each of which shall constitute an original. It is anticipated that upon full execution, copies of each signature page will be circulated to all parties.

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Eastern Municipal Water District

By: _____

Title: _____

East Bay Municipal Utility District

By: _____

Title: _____

Inland Empire Utilities Agency

By: _____

Title: _____

Irvine Ranch Water District

Approved as to form

By: _____

Title: General Manager

Las Virgenes Municipal Water District

By: _____

Title: _____

Moulton Niguel Water District

By: _____

Title: _____

Santa Margarita Water District

By: _____

Title: _____

University of California, Davis

By: _____

Title: _____

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Exhibit "A" – Scope of Work

Title: Measuring the effectiveness of various conservation programs through a new inter-utility, customer-level water usage dataset

Overall Project Objectives

A statewide data collaborative is currently underway involving water agencies throughout California, working in partnership with UC Davis, to collect and share data among utilities to improve efficiencies, refine demand management strategies and promote long-term sustainable solutions that build on the water/energy nexus. A secure, cloud-based platform will be built through a non-profit mechanism (CAWaterData.org) to house water utility data statewide and to facilitate analyses. This effort is a three-phased, "bottom-up" approach to providing meaningful input and recommendations that will help shape future water management decisions that have statewide impact. The goal is to facilitate informed decisions and aid agencies in meeting the State's goal of demand management through improved understanding of unique characteristics of our communities.

The Phase One Pilot of the project brings together water retailers to consolidate customer level water usage data to proactively share information, ideas, tools, solutions and challenges in an effort to provide a collective input that can showcase how California can achieve water efficiency statewide through smart, bottom up collaborative mechanisms. The purpose is to demonstrate the benefits of a statewide data collaborative in assisting the agencies and decision makers statewide. The Phase Two Pilot of the project will demonstrate a secure, cloud-based platform for sharing water utility data and performing analytics. Upon completion of Phase One and Two Pilot, the Phase Three will be ready for launch, offering a positive, proactive approach to work collaboratively together as a water community across California to achieve water efficiency smartly statewide.

California's worst drought in recorded history demands visionary leadership. Throughout our state's history, water utilities have come together to pioneer new physical infrastructure to ensure a safe and reliable supply for the people of California. This project will honor that tradition and California's world renowned "pioneering spirit" by boldly building the world's first data utility to manage cutting edge data infrastructure. Climate change, demographics, and thousand year hydrological records suggest water scarcity will be the new normal in twenty first century. Yet while the future is ultimately uncertain, by working smartly and collaboratively, we can prepare to adapt to whatever the future holds.

Project Task 1: Statewide analysis of conservation program effectiveness

The goals of this component of the project include:

1.1 Analyze unique characteristics of different parts of California and its diverse communities

1.1.1 Collect, organize, clean, and generate a statistical dataset from the sources listed below this task specification.

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1.1.2 Develop analyses of various conservation programs effectiveness on reducing water usage. Aggregate impact of individual water conservation programs on agency water demand and revenues

1.1.3 District-level averages as well as results for various socio-economic and demographic groupings, environmental characteristics, and neighborhood characteristics.

1.2 Learn from successes and challenges of different demand management programs

1.2.1 Write a summary report and present results to agency personnel and board members. Report articulating statewide water efficiency benefits and succinct value proposition of robust granular water data. This report is anticipated to include the following key sections incorporating analyses developed in project task one:

- Baselining water usage trends and patterns:
- Water usage trajectory quantiles by customer segment for each participating utility from as long as is feasibly available and including at least 2013 – 2015.
- Those trajectories will be overlaid with conservation actions taken by utilities (dates of public education campaigns, rate shifts, etc.) to better understand "what works" to achieve water efficiency.
- Those trajectories will be compared that with what the state "sees" in residential gallons per capita per day and other statewide metrics.
- Scope how smart "bottom up" water efficiency projects enabled by this data infrastructure can scale statewide.
- Discuss lessons learned for future demand management and potential statewide water efficiency targets.

1.3 Conducting preliminary statistical analysis into the effectiveness of turf rebates by expanding the MNWD Turf Rebate Study published by Bloomberg Data for Good.

Each financially contributing retail water agency will be responsible for providing customer-level water usage data. Participating wholesale water agencies may provide this conservation analytics service at no charge to up to one retail agencies in their service area. Further wholesale agencies with parcel-level irrigable area will provide said data along with as granular water usage data as is available.

Contingency: In the event that the State Water Resources Control Board elects to provide statewide Clean Drinking Water metered usage data at the customer class level, the Phase One Pilot team will include said data in their analysis of statewide conservation programs.

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In addition, Phase One Pilot staff will work with the analytical point persons on the technical working group to provide contextual data sources with clear spatial, temporal and quantitative characteristics to inform inter-utility, customer-level water usage data when available:

- Agency-level factors (Data Sources: participating water agencies)
  - Water pricing policy (i.e., structure and level)
  - Rebate levels
  - Conservation program participation
  - Outreach / media efforts
  - Conservation BMP Reporting (Data Sources:
- Household-level factors (Data Sources: Participating utilities and US Census)
  - Socio-economic factors (e.g., income, education)
  - Demographic factors (e.g., ethnicity, household size)
  - Property characteristics (e.g., lot size, age of house, irrigated area)
  - Customer awareness (through identifying district-level awareness campaigns)
- Community / Environmental Factors (Data Sources: Participating utilities, CIMIS)
  - Neighborhood program participation levels, if available
  - Outreach efforts from other agencies (wholesale and neighboring), if available
  - Methods of community outreach and engagement (e.g., newspapers, agency website, social media, community newsletters, HOA meetings, Chamber of Commerce events, etc.)
  - Biophysical factors (e.g., precipitation, temperature, evapotranspiration)

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Exhibit B – Project Schedule

It is anticipated the proposed project will require nine months to complete. The Gantt chart below is intended to be illustrative of the timing of deliverables and events.

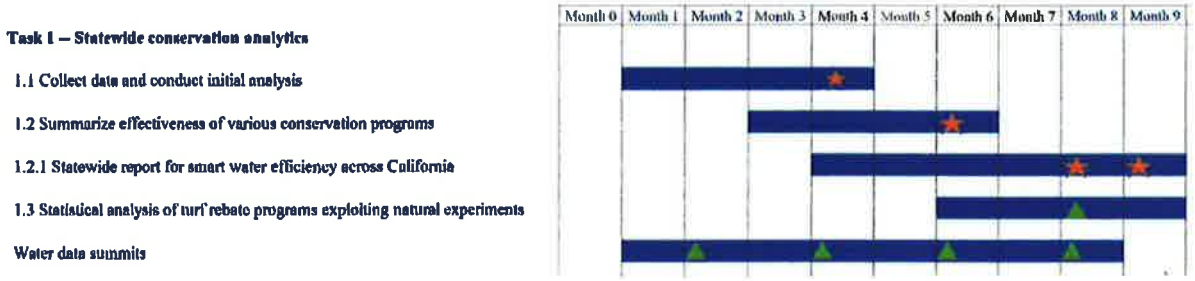

Exhibit C – Phase One Pilot: 9-Month Budget

The total estimated budget for the nine month project is $125,000. In the event that more than five agencies participate, the additional resources will be used to conduct additional turf rebate impact evaluation research (Task 1.3).

Title	Name	Hourly Rate
Project Manager	Patrick Atwater	$80
Civic Data Scientist	Christopher Tull	$60
Consulting Statistician	Eric Schmitt	$150

The project team will conduct work at the above rates. Phase One Pilot team work hours will be conducted on project tasks at the below not to exceed hours.

Title	Task	Hourly Rate	Estimated Budget
Project Manager	1.1 Data collection and organization	$80	$10,000
	1.2 Report on achieving water efficiency smartly statewide		$40,000
	1.3 Statistical Analysis of turf rebate effectiveness exploiting natural experiments		$12,000
Civic Data Scientist	1.1 Data collection and organization	$60	$15,000
	1.2 Report on achieving water efficiency smartly statewide		$25,000
	1.3 Statistical Analysis of turf rebate effectiveness exploiting natural experiments		$14,000
Consulting Statistician	1.3 Statistical Analysis of turf rebate effectiveness exploiting natural experiments	$150	$4,500

The Phase One budget also includes travel (auto mileage and six flights to Sacramento) and office expenses (including for example printing, draft memos, reports, other presentation materials, and co-working space) estimated at approximately $4,500.

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Exhibit D – Data Collaborative Phase One Pilot Team Bios and Qualifications

Project Manager

Patrick Atwater has over five years of experience in data intensive roles in the water and information technology industries. He ran the numbers for the State Water Contractors on Governor Brown's $13 billion Bay Delta fix and co-authored the feature June 2015 American Water Works Association article on how data science can help water utilities adapt to climate change. Projects include: developing the financial model for the proposed Claremont Colleges 300,000 gallons per day MBR recycled water plant; generating financial analysis at 14 local government agencies with combined budget of over $5 billion; CFO level analysis for a first-of-its-kind securitization structure for a $700 million groundwater treatment facility; and presenting California's first 2010 redistricting GIS analysis to an audience of over 100 municipal managers.

Civic Data Scientist

Christopher Tull recently graduated with a Masters from the Center for Urban Science and Progress, the nation's leading civic data science program founded by ex-Cal Tech provost Steven Koonin and launched as part of the Bloomberg applied sciences initiative. He has worked as a research assistant at the Max Planck Institute for Biological Cybernetics as well as NYU CUSP, where his work on energy-water usage intensity in NY won best paper at the Bloomberg Data for Good Exchange. He is highly proficient in the following programming languages: Python, R, Java, Javascript, C++, C, SQL. In addition, Chris has experience working with the following technologies: ArcGIS, CartoDB, Git, Eclipse, RStudio, IPython Notebook, Excel, Mysql, Postgresql/PostGIS.

Consulting Statistician

Eric Schmitt co-authored the MNWD turf rebate study published by Bloomberg Data for Good in September 2015. Previously, Eric has worked as an economic consultant at NERA Economic Consulting for two years performing econometric analyses on topics ranging from anti-trust to consumer behavior in the tobacco industry. He is completing a PhD in statistics from KU Leuven University and currently works as a statistician at Protix Biosystems, a pioneering technology company creating efficiencies in the water-food nexus through high volume insect products. He has provided statistical consulting services for and spoken before leading companies, such as Mars, Inc. and Tableau Technologies, and is the author of peer-reviewed articles in theoretical and industrial statistics, education, and medicine.

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Exhibit E – Phase One Pilot Team Roles and Responsibilities

Phase One Project Team Name	Title	Role
Patrick Atwater	Project Manager	Management / Analysis
Christopher Tull	Civic Data Scientist	Analysis / IT
Eric Schmitt	Consulting Statistician	Research / Analysis

In addition, to the extent available, each participating California water agency will be responsible for providing the following staff to participate in the Technical Working Group (Note, agency staff may fill more than one role):

- Senior Management: attend technical working group meetings and provide feedback on analytical work products.
- Analytical Point Person: respond to questions about water usage data provided and conservation program context (programs implemented, timing, levels, neighboring district programs, etc.).
- IT Staff: ensure timely transfer of data required by the project.

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December 10, 2015
Prepared by: M. Tettemer
Submitted by: P. Weghorst
Approved by: Paul Cook

WATER RESOURCES POLICY AND COMMUNICATIONS COMMITTEE

CONCEPTUAL TERMS FOR RECYCLED WATER
CONVERSION OF UCI CENTRAL PLANT

SUMMARY:

Staff has been working with the University of California, Irvine (UCI) to convert its Central Plant cooling towers to recycled water. Staff will review with the Committee conceptual terms for an agreement between IRWD and UCI which describe the proposed roles and responsibilities for the design, construction, operation, and maintenance of the facilities needed to deliver recycled water to the cooling towers. Staff recommends that the Committee provide input on the conceptual terms and authorize staff and legal counsel to work with UCI to finalize the terms and prepare an agreement for consideration by the Board.

BACKGROUND:

Over the past year, staff has been working with UCI to convert its Central Plant cooling towers to recycled water. UCI has chosen to convert the Central Plant cooling towers to recycled water to help UCI meet its potable water conservation goals. Once completed, the conversion would result in a savings of approximately 150 acre-feet (AF) per year of potable water.

Use of recycled water in the cooling towers will require a new metered recycled water service connection and a dedicated pipeline from IRWD's distribution system to the Central Plant. The conversion will also require improvements within the Central Plant including the installation of pre-treatment facilities. Staff has worked with UCI in the development of conceptual terms for an agreement to facilitate the design, construction, operation and maintenance of the facilities necessary for the recycled water conversion project. At the Committee meeting, staff will provide an overview of the conceptual terms for the project, which is attached as Exhibit "A".

Proposed Pipeline:

Staff has retained a consultant to study several alignments to locate the approximately 3,000 feet of recycled water pipeline that will be required for the project. Attached is Exhibit "B" which depicts IRWD's existing recycled water distribution system and the preferred pipeline alignment which is located in Academy Way and West Peltason Drive. The pipeline will terminate behind the Central Plant with the ability to provide recycled water to the plant cooling towers and the co-generation facility cooling towers. A six-inch meter will be located at the intersection of Academy Way and California Avenue. It is expected that the pipeline will be designed to deliver up to 1,500 gallons per minute of recycled water.

Staff is analyzing the hydraulic impact of the proposed UCI project and preliminary results indicate that additional infrastructure improvements will be needed to the local recycled water system to ensure adequate pressure to the UCI cooling towers and other customers in the area. The current engineer's estimate for the construction of the UCI pipeline including the additional

infrastructure improvements is $742,600. The total cost of the project is estimated to be $1,025,000 considering planning, design, construction administration, inspection and IRWD staff time costs. The UCI pipeline is expected to be serviceable for at least 50 years.

FISCAL IMPACTS:

Funding for design and construction of recycled water pipeline to the UCI Central Plant is included in the FY 2015-15 capital budget for Project 30560 (6242) for Offsite Recycled Water Improvements. The cost of the project would be offset over an 11-year period by Local Resource Program subsidies in the amount of $117 per AF that will be received from Metropolitan Water District of Southern California and by $472 per AF in costs that will be avoided by IRWD not needing to purchase treated water from Metropolitan for use at the UCI cooling towers.

ENVIRONMENTAL COMPLIANCE:

The construction and operation of a pipeline to the UCI Central Plant will be subject to 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. UCI will be the lead agency for completing any required CEQA related documents. IRWD will rely upon the UCI environmental documents as a responsible agency.

RECOMMENDATION:

That the Committee provide input on the conceptual terms for recycled water conversion of the University of California, Irvine (UCI) Central Plant and authorize staff and legal counsel to work with UCI to finalize the terms and prepare an agreement for consideration by the Board.

LIST OF EXHIBITS:

Exhibit "A" – Draft Conceptual Terms Regarding Recycled Water Conversion of UCI Central Plant
Exhibit "B" – Map of Proposed Recycled Water Service to UCI Central Plant

EXHIBIT "A"

DRAFT
CONCEPTUAL TERMS

Irvine Ranch Water District and the
University of California at Irvine
Regarding Recycled Water Conversion of Central Plant

December 10, 2015

GENERAL TERMS

Parties:	Irvine Ranch Water District ("IRWD") and University of California, Irvine ("UCI")
Project Description:	The Parties will collaborate on a Project to provide recycled water to the UCI Central Plant through the construction of a new recycled water main ("Water Line") on the UCI campus, the establishment of a metered recycled water service connection ("Service Connection") to the Water Line and construction of facility improvements at the UCI Central Plant including pre-treatment facilities to allow the use of recycled water ("Plant Improvements"). Implementation of the Project is estimated to reduce UCI's potable water use by approximately 50 million gallons per year.
Approximate Effective Date:	Winter 2015
UCI Central Plant:	The UCI Central Plant is the heart of the utility infrastructure on campus. The plant produces and distributes chilled water for cooling, dehumidification, and process cooling.
Non-Binding Effect	This Term Sheet in intended to be a non-binding statement of the terms for the proposed Project. It is subject to the negotiation, execution and delivery of an Agreement between IRWD and UCI consistent with basic terms and conditions set forth herein ("Project Agreement").
Representations and Insurances:	IRWD and UCI shall provide usual and customary representations, warranties, insurances and indemnifications.

General Expenses:	Each party shall be responsible for its own fees and expenses arising out of the negotiation and execution of the Project Agreement.
CEQA Compliance:	UCI shall serve as lead agency for the Project and will prepare the appropriate environmental documentation in conformance with the California Environmental Quality Act (CEQA). UCI will consult with IRWD in the development of the CEQA documents. IRWD shall serve as a responsible agency and may rely on the UCI CEQA documentation to make findings regarding project approval. Both parties shall cooperate with one another with respect to CEQA compliance for the Project. UCI shall be solely responsible for all fees and costs associated with the preparation CEQA documents regarding the Project. The Parties shall share equally in the cost of defending against legal challenges to the CEQA documents.
Permit and Other Costs:	IRWD shall be responsible for any and all regulatory and permitting fees and costs associated with the construction of the Water Line and Service Connection. UCI shall be responsible for any and all regulatory and permitting fees and costs associated with the construction of the Plant Improvements. Each Party will be responsible for its own cost of design, review and construction oversight of the Project.

PROJECT TERMS

Project Coordination	UCI and IRWD shall coordinate the award of construction contracts to ensure that the facilities will be available for use at approximately the same time.
Water Line and Service Connection:	IRWD shall fund and oversee the design and construction of the Water Line. A new Service Connection shall be installed by IRWD in accordance with IRWD standards. The Water Line shall be designed and constructed to meet IRWD standards or as otherwise agreed upon by the Parties. The IRWD design for the Water Line will provide UCI the mutually agreed upon flow and

	pressure. UCI shall pay for any increased cost associated with upsizing the Water Line above the IRWD determined size requirements needed to meet the agreed upon flow and pressure. IRWD shall work collaboratively with UCI on the route and design of the Water Line and allow UCI to review and comment on concept plans, preliminary plans, and final construction documents prior to construction. Upon completion of the Water Line, IRWD shall restore all surfaces to mutually agreed upon extents and standards. UCI shall provide IRWD and its contractors construction license agreements, construction access, and construction staging areas to construct the Water Line on the UCI campus at no cost.
Conveyance of Water Line:	Following construction, testing and startup of the Water Line, IRWD shall convey these improvements to UCI and IRWD shall provide record drawings compatible with UCI's archiving and retrieval systems. UCI shall accept the Water Line improvements from IRWD.
Plant Improvements:	UCI shall fund and oversee the design and construction of Plant Improvements required to accept and use recycled water provided by IRWD through the Water Line. UCI shall maintain potable water service to the Central Plant in the case of interruption of recycled water service to the plant.
Operations and Maintenance:	UCI shall be responsible for the operation and maintenance of the Water Line and Plant Improvements throughout the life of the facilities including any associated future improvements, rehabilitations and replacement work. IRWD shall be responsible for the operation and maintenance of the Service Connection as well as conducting inspections and testing of the Project facilities for cross connections and unapproved uses consistent with regulatory requirements.
Use of Recycled Water:	UCI shall use IRWD provided recycled water for Central Plant cooling tower operations over the life of the existing cooling towers and any related replacements or expansions except for periods of IRWD recycled water service interruption.

	If the water quality of IRWD-provided recycled water declines to the point where it is no longer compatible with UCI Central Plant pre-treatment facilities, or has deleterious effects on plant equipment, UCI may temporarily revert to potable water use until such time as UCI and IRWD can remedy pre-treatment and water quality deficiencies.
External Funding:	UCI and IRWD shall collaborate to apply for external funding to offset UCI and IRWD costs for constructing the Project including grants and/or low-interest financing. UCI shall prepare, with IRWD's assistance, an application for On-Site Retrofit Program funding as may be available from Metropolitan Water District of Southern California ("Metropolitan") for the Plant Improvements.
IRWD Financing:	At UCI's option, IRWD shall provide financing for the cost of the Plant Improvements not covered by grants, Metropolitan funding or low-interest financing, which would be repaid by UCI by continuing to pay IRWD's potable water rate for recycled water until the full costs are recovered by IRWD.
Cost of Water:	UCI will pay IRWD for the use of recycled water through Project facilities in accordance with IRWD rates and charges in effect at the time of use.

EXHIBIT "B"

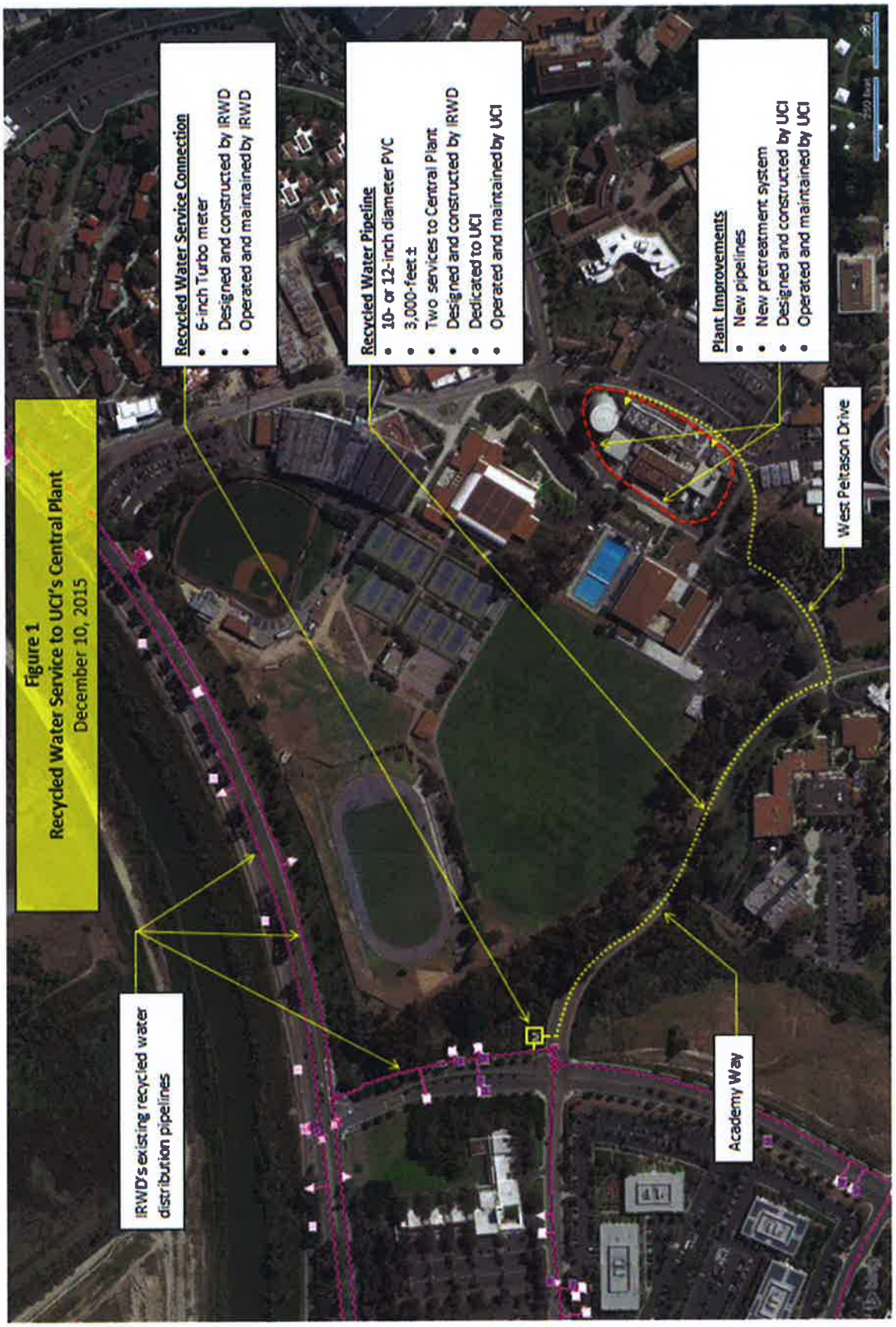


Figure 1
Recycled Water Service to UCI's Central Plant
December 10, 2015
Recycled Water Service Connection
• 6-inch Turbo meter
• Designed and constructed by IRWD
• Operated and maintained by IRWD
Recycled Water Pipeline
• 10- or 12-inch diameter PVC
• 3,000-feet ±
• Two services to Central Plant
• Designed and constructed by IRWD
• Dedicated to UCI
• Operated and maintained by UCI
Plant Improvements
• New pipelines
• New pretreatment system
• Designed and constructed by UCI
• Operated and maintained by UCI
IRWD's existing recycled water distribution pipelines
Academy Way
West Peltason Drive

December 10, 2015
Prepared by: R. Bennett/K.Welch
Submitted by: F. Sanchez/P. Weghorst
Approved by: Paul Cook

WATER RESOURCES POLICY AND COMMUNICATIONS COMMITTEE

SALT MANAGEMENT PLAN
OVERVIEW AND RECOMMENDATIONS

SUMMARY:

In September 2013, the Board approved a Professional Services Agreement with HDR, Inc. to develop a Recycled Water Salt Management Plan. HDR has completed the development of the plan which provides a comprehensive Salt Balance Model and an analysis of historic and future salt concentration trends throughout the District. The plan also provides recommendations for operational strategies and identifies policy issues to consider relative to managing salt concentrations in IRWD's recycled water. At the Committee meeting, staff will present an overview of the plan, its findings and recommendations. Staff will also provide a list of proposed actions related to implementing the recommendations from the Salt Management Plan. Staff recommends that the Committee provide input on the proposed actions.

BACKGROUND:

Concentrations of total dissolved solids (TDS) in recycled water from the Michelson Water Recycling Plant (MWRP) have fluctuated over time. From March 2011 to February 2012, TDS concentrations exceeded the 12-month running average discharge limit of 720 milligrams per liter (mg/l) set by the Regional Water Quality Control Board (Regional Board). In the future, the quality of recycled water is expected to change as a result of changes in imported water quality, sewer inflows and the use of water from new water supply projects.

The Board approved a Professional Services Agreement with HDR on September 9, 2013 to facilitate the development of a Recycled Water Salt Management Plan to manage salt concentrations in IRWD's recycled water system. HDR has completed the development of the plan which provides a comprehensive Salt Balance Model and an analysis of historic and future salt concentration trends in IRWD's recycled water. The plan also provides recommendations for operational strategies and identifies policy issues to consider relative to managing salt concentrations in IRWD's recycled water. A copy of the Executive Summary of the plan is provided in Exhibit "A".

Salt Balance Model Overview:

A comprehensive Salt Balance Model was developed by HDR to account for sources of salt throughout the District that contribute to the salinity of IRWD's recycled water. The Salt Balance Model was calibrated to monthly historic data over a five-year study period. Calibration results indicate that the model is capable of reproducing historic conditions and is appropriate for evaluating future trends. The model contains four main components as follows:

1. The Source Water Component accounts for the salt loads associated with both imported and local water supplies;

2. The Sewersheds Component accounts for the addition of salt from residential, commercial and industrial uses. In addition, it tracks salt accretions from water softeners and salt losses associated with outdoor water use that does not result in returns to the sewer system;

3. The Treatment Plant Component accounts for the addition of salt associated with water treatment and the loss of salt associated with sludge production and disposal. A key output of the treatment plant component is the TDS concentrations in recycled water that can be compared with the Regional Board discharge limit; and

4. The Non-Potable Component accounts for the effects of recycled water storage and the blending of recycled water with other non-potable supplies to provide an estimate of salt concentrations in recycled water delivered to IRWD's end users.

Historic Simulation Findings:

Historic modeling results indicate that IRWD's participation in the Orange County Water District (OCWD) In-Lieu Program, when the use of relatively low TDS groundwater was replaced with use of relatively high TDS imported water, was the primary reason MWRP's product water exceeded the Regional Board's TDS discharge limit from March 2011 to February 2012. For the 2008 to 2012 historic study period, 41% of the total salt load contributions to IRWD's recycled water system were from the District's imported and groundwater supplies. Residential uses contributed 33% and industrial uses contributed 14% of the total salt load. The remaining relatively minor salt contributions were from commercial use at 7% and water softeners at 5%.

Future Simulation Findings:

The Salt Balance Model was used to make predictions of future TDS concentrations in IRWD's recycled water. The future simulations assumed the following IRWD's projects being online after 2014:

- MWRP Phase 2 Expansion;
- MWRP Biosolids Project;
- Wells 21 and 22 Treatment Plant;
- Baker Water Treatment Plant; and
- Syphon Reservoir expansion.

The future simulations indicate that IRWD should have a future TDS buffer of between 50 mg/l to 60 mg/l before exceeding the Regional Board's 12-month running average discharge limit of 720 mg/l. However, the future scenario analyses indicate that this 50 mg/l to 60 mg/l buffer could quickly erode if contributions to IRWD's recycled water are not managed effectively. The

plan provides recommendations for operational strategies and identifies policy issues to consider in the management of TDS concentrations in recycled water produced and delivered throughout IRWD's service area.

Recommended Operational Strategies:

The Salt Management Plan recommends the following operational strategies for IRWD to consider in managing TDS concentrations in its recycled water such that the Regional Board's requirements are not exceeded in the future:

Monitoring Imported Water:

IRWD should monitor TDS levels in its imported water and minimize the use of imported supplies where possible when blended TDS concentrations in imports supplies are high. The TDS of imported water obtained from the State Water Project is typically below 400 mg/l and is significantly less than the TDS delivered from the Colorado River which is typically higher than 650 mg/l. The blend of these two imported water supplies can have a significant impact on TDS throughout the District.

In-lieu Program Participation:

Participation in the OCWD In-Lieu Program was identified as the primary reason IRWD exceeded the Regional Board's TDS discharge limit of 720 mg/l in 2011 and 2012. Greater dependence on other supplies as well as measured participation or alternating monthly participation in future In-Lieu Programs may help reduce salt loads that can impact IRWD's ability to meet the Regional Board's permit requirements.

Sand Canyon Reservoir Operations:

When water is released from Sand Canyon Reservoir, the dechlorinated water can add an additional salt load to the MWRP product water. This is because the reservoir releases enter the MWRP distribution system upstream of the Regional Board's compliance measuring point. The District should consider its 12-month running average TDS concentration from MWRP when making releases from Sand Canyon Reservoir and make adjustments where needed to help meet Regional Board discharge requirements.

New Salt Loads:

High TDS sewer discharges and projects that would increase TDS concentrations in IRWD's recycled water could erode the currently projected 50 mg/l to 60 mg/l TDS buffer and could result in the need for additional treatment at MWRP to meet Regional Board discharge limits. The District should use the Salt Balance Model to evaluate the impacts of future high TDS sewer discharges and projects prior to acceptance or implementation. Consideration should also be given to using the model to identify hypothetical local thresholds for such discharges.

Policy Issues:

The Salt Management Plan results indicate that consideration should be given to the following policy-related issues that could affect IRWD's ability to manage TDS concentrations in its recycled water:

Evaluating Brine Disposal Surcharges:

To assess the ability to accept high TDS sewer discharges, such as brine from golf course desalting treatment systems, the District should evaluate the implications of adopting a policy to accept brine discharges. The evaluation should consider the implications of establishing brine disposal thresholds and surcharges to fund the design and construction of a Reverse Osmosis project to treat a portion of the recycled water produced at MWRP. The evaluation should take into consideration precedents that have been established from the acceptance of existing discharges and potential legal issues associated with implementing brine disposal thresholds and surcharges while being required to meet Regional Board requirements.

Accepting Ocean Desalination Water:

IRWD's current plan is to voluntarily purchase and accept 100 acre-feet annually of product water from the proposed Poseidon Huntington Beach Desalination Plant (HBDP). If IRWD is required to participate in involuntary programs to accept significant quantities of desalinated water from the HBDP, then the District could see significant increases in TDS concentrations in its recycled water. Such involuntary programs could offset IRWD's use of high-quality groundwater and/or better quality import water through in-lieu recharge of HBDP product water into the Orange County groundwater basin or through exchanges that facilitate the delivery of water to South Orange County. Both programs could force participation through the control of the Basin Pumping Percentage and/or restrictions on the use of import water from the Metropolitan Water District of Southern California.

Salt Balance Model simulation results contained in the plan indicate that increases in the salinity of IRWD's recycled water that could occur as a result of involuntary HBDP programs could restrict IRWD's ability to manage the quality of its recycled water, result in the District needing to construct Reverse Osmosis treatment facilities at MWRP, and result in IRWD being out of compliance with Regional Board recycled water discharge requirements. Based on these significant impacts, IRWD should update its policies associated with accepting desalinated seawater and reaffirm its objection to involuntary deliveries of water from the HBDP into IRWD's service area.

Proposed Actions:

In order to effectively implement the recommended operational strategies and to consider the above policy issues, staff proposes the following actions:

1. Evaluate the implication of establishing local thresholds and surcharges for the discharge of brine and other high TDS concentration flows into IRWD's sewer system;

2. Perform a conceptual cost of service analysis related to accepting high TDS discharges into IRWD's sewer system;

3. Update IRWD's Policy Paper on Desalination Projects to reflect the significant impacts that would be expected associated with the delivery of involuntary HBDP flows into IRWD's service area;

4. Present to OCWD the expected impacts on IRWD's recycled water system of significant involuntary deliveries of desalinated water from the HBDP into IRWD's service area and reaffirm IRWD's objection to involuntary deliveries from the project into IRWD's service area; and

5. Train staff in the operation, enhancement and interpretation of IRWD's Salt Balance Model to assist in implementing the operational strategies described above and the evaluation of additional projects and brine discharges as may be considered by IRWD in the future.

FISCAL IMPACTS:

None.

ENVIRONMENTAL COMPLIANCE:

This development of the Recycled Water Salt Management Plan is exempt from the California Environmental Quality Act (CEQA) as authorized under the California Code of Regulations, Title 14, Chapter 3, Section 15262 which provides exemption for planning studies.

RECOMMENDATION:

That the Committee provide input on the proposed actions related to implementing the recommendations of the Recycled Water Salt Management Plan.

LIST OF EXHIBITS:

Exhibit "A" – Recycled Water Salt Management Plan – Executive Summary

Executive Summary

The salt content in the Irvine Ranch Water District's (IRWD or District) recycled water was exhibiting an increase over time. In fact, from March to September 2011, the Michelson Water Recycling Plant (MWRP) exceeded its Regional Water Quality Control Board (RWQCB) permit limit of 720 mg/L for total dissolved solids (TDS) in the recycled water produced. In this Recycled Water Salt Management Plan (RWSMP), IRWD seeks to understand the cause of this trend and identify opportunities to manage the salt loadings that may: 1) negatively impact recycled water customer satisfaction and 2) jeopardize the District's ability to consistently meet its permitted water quality requirements.

Domestic, commercial, and industrial uses of water contribute additional salinity or TDS that is subsequently discharged to the sewage collection and treatment system. The conventional sewage treatment system is not designed to remove dissolved salts, thus almost no reduction in TDS takes place. In fact, chemicals that are used to treat sewage and produce recycled water can also add to the salinity of the effluent. The TDS concentration in IRWD's potable water drinking sources typically ranges from 270 to 570 mg/L. Domestic use and treatment generally adds about 350 mg/L of TDS, thus the District is constantly challenged to consistently meet its recycled water quality requirement of 720 mg/L TDS as a running annual average (RAA). In addition, for IRWD to continue to serve non-potable water customers who have strict salinity requirements, managing salinity in the non-potable water system is essential.

IRWD's Salt Balance Model

To trace the source of salinity and identify mitigation measures to manage potentially increasing salinity concentrations, IRWD's Salt Balance Model was developed to perform a mass balance of flow and salinity loads (measured in pounds (lbs) of TDS) throughout the IRWD service area. IRWD's Salt Balance Model works in four stages to identify salt sources (Figure ES-1):

1. **Source Water**

   The Source Water Stage accounts for the salinity in imported water and local groundwater that enters IRWD's potable water system. Future water supply sources and a projected mix of supplies were incorporated into the analysis.

2. **Sewersheds**

   The Sewershed Stage accounts for the addition of salt loads from domestic residential use, water softeners, commercial/institutional use, and industrial use. Salinity that is lost to irrigation demands and do not return to the sewage collection system is also included.

3. **Treatment Plants**

   The Treatment Plant Stage accounts for influent and effluent flows, removed organic salts, chemical addition, and sludge production. This results in a salinity

loading of the recycled water produced at the Michelson and Los Alisos Water Recycling Plants (MWRP and LAWRP). Salinity that is lost to sludge disposal is also included.

4. **Non-Potable Water System**

   The Non-Potable Water System Stage accounts for the blending of other non-potable water (including native runoff, untreated groundwater, and imported untreated water) to the recycled water effluent and any additional chemicals that are introduced to maintain water quality of the end product.

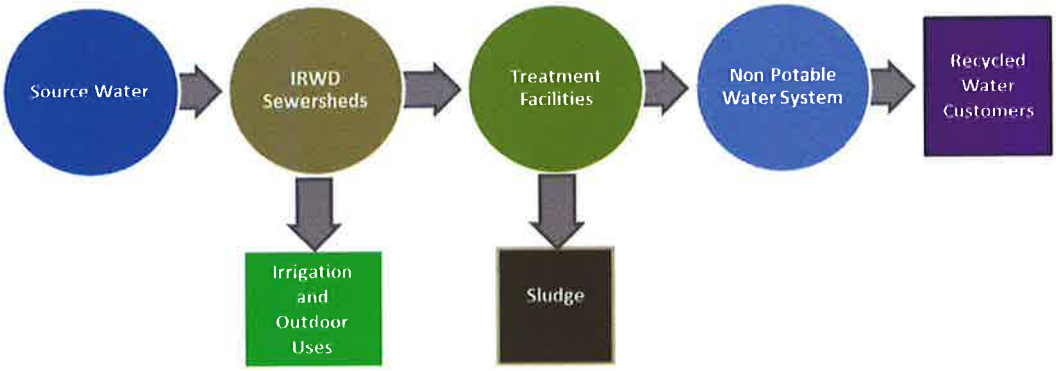


Figure ES-1. Contributing Sources and Losses of Salinity in Recycled Water

Model Operating Modes

The model was constructed to operate in three different modes: Historical Measured, Historical Predictive, and Future Predictive, each of which is described below.

Historical Measured: The Historical Measured mode was the first mode developed to balance the salts in the system using historical flow and water quality data. The data from this mode was also used to develop parameters such as seasonal variation of water use, consumptive losses, and salt exports via outdoor use and sludge production. This mode was used to correlate measured influent and effluent TDS values with model results.

Historical Predictive: The Historical Predictive mode tested IRWD's Salt Balance Model using historical flow and projected water quality parameters rather than measured parameters. By comparing the results of the Historical Measured mode with the Historical Predictive mode, the accuracy of approach and methodology of the model could be assessed. This mode provided a quality assurance review of the model's capability of predicting future salt loads.

Future Predictive: The Future Predictive mode calculated future salt loads based on the parameters determined from the Historical Measured Mode. The Future Predictive period assessed salt loads and TDS from 2013 through 2035.

Model Calibration

Calibration of IRWD's Salt Balance Model was performed in two steps: Historical Measured and Historical Predictive. Both calibration steps compare monthly model estimates to observed data into and out of MWRP. The Historical Measured calibration used observed measurements and an iterative process to estimate key parameters for every month of the study period within a range of reasonable values and demonstrated the model's ability to simulate historic flow and concentrations into and out of MWRP over the five-year study period when key unmeasured data is estimated from observations.

The Historical Predictive calibration used a single or monthly estimate of these same key parameters for every month of the study period. The Historical Predicted calibration demonstrated the uncertainty to expect when these key parameters are estimated. Because these same key parameters will be unknown in the future, the Historical Predicted results provided a qualitative assessment for how the model should be used for Future Predictive application. These results, in combination with the quality of the Historical Measured calibration indicate that **IRWD's Salt Balance Model should not be used to forecast exact salt loadings in the future; however, it can be used to forecast future TDS trends.**

Historical Data

Based on an average of the 5 years (60 months) of historical data, IRWD's Salt Balance Model identified the sources of salinity in the District's sewage, as represented in Figure ES-2. The salt load in the IRWD sewer collection system during this time period is estimated to be 5,520,000 lbs per month. The largest contributor (41%) is source water, with imported water and local groundwater sources contributing equivalent salt loads, although imported water has a much greater TDS concentration. Residential use is generally considered an uncontrollable load and contributes approximately 33% of the salt that flows to the sewer system. Commercial and Industrial uses contribute 21% of the salt load and self regenerating water softeners contribute an estimated 5% of the salt load.

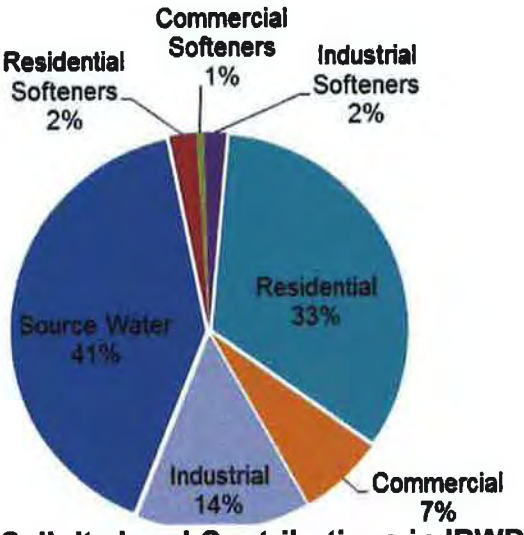


Figure ES-2. Salinity Load Contributions in IRWD Sewage (2008-2012 Average)

From 2008 to 2012, MWRP processed approximately 60% of the salt load in the District's sewer collection system, or 3,241,000 lbs per month. Figure ES-3 illustrates the contributing salinity sources specific to recycled water produced at MWRP. The largest salt loads to IRWD's recycled water system are from the source water and residential use. As shown, the chemical addition at the treatment plant contributes approximately 4% of the salt load in the effluent. The remaining 3% that is not called out on the graphic is attributed to water softeners. Note that most of IRWD's industrial customers are located in sewersheds that do not contribute flow to the MWRP, thus the industrial-based salinity load has less of an impact on the quality of the MWRP recycled water product.

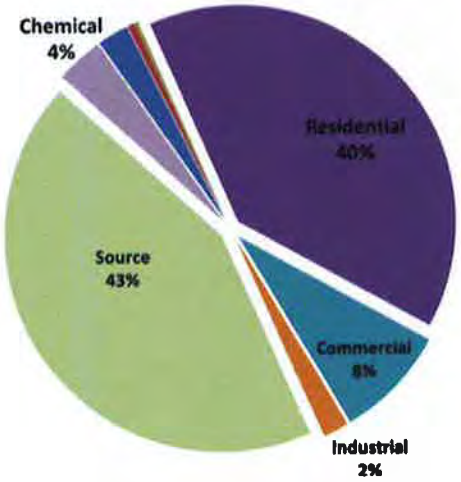


Figure ES-3. Salinity Load Contributions to MWRP Recycled Water (2008-2012 Average)

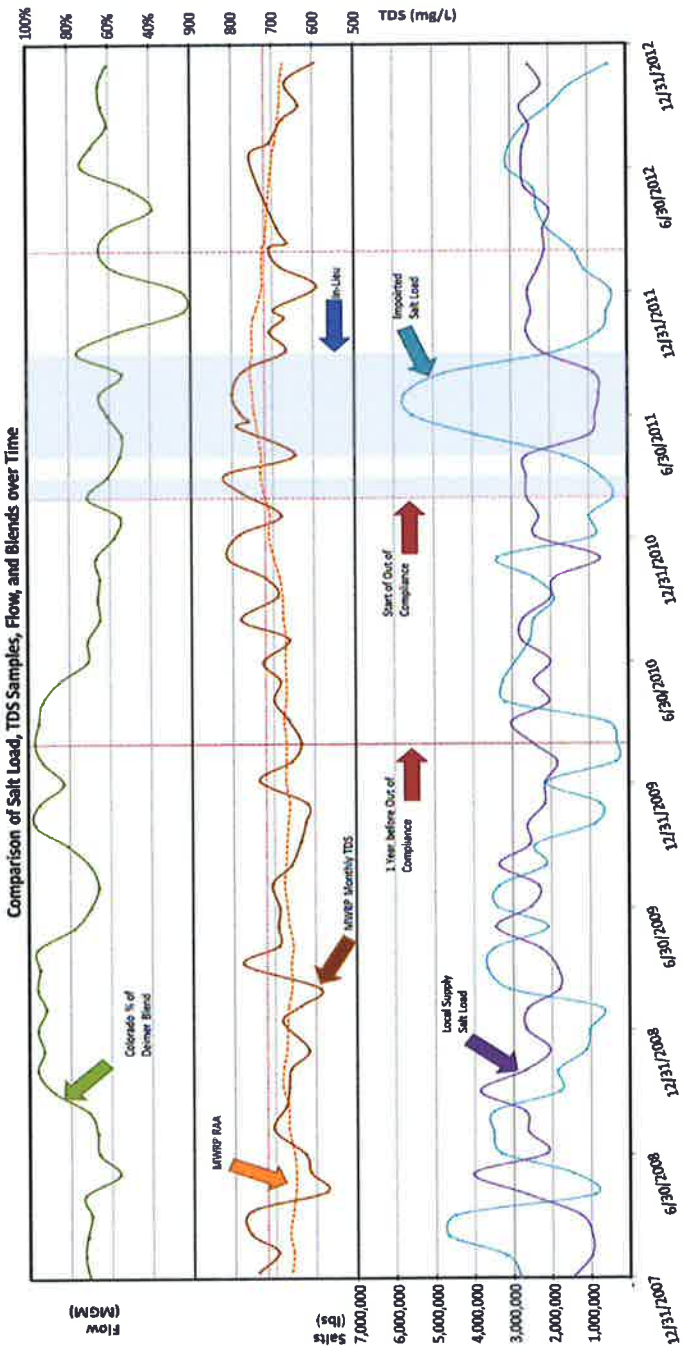
Model Results

The significant impact of source water on IRWD recycled water TDS is exemplified during the time period when MWRP effluent TDS was out of compliance with the RWQCB 720 mg/L limit. The three panels shown in Figure ES-4 are historical 2008 to 2012 data. The first panel shows the percent makeup of Colorado River water in imported water from Diemer Water Treatment Plant; the second panel shows the measured monthly MWRP effluent TDS and the running annual average; and the third panel shows the salt load in pounds from imported water and local groundwater sources.

As shown, the RAA was out of compliance from March 2011 to February 2012. This figure also shows that the monthly MWRP effluent TDS was increasing for one year prior to the out of compliance period. Leading up to and during this out of compliance period, several factors contributed to MWRP exceeding the TDS limit:

1. The source water blend at Diemer was over 50% Colorado River, which has more salt than State Water Project (SWP) water.
2. Salt load from imported water was abnormally high due to IRWD's participation in Orange County Water District's (OCWD) In-Lieu program.
3. MWRP received return flow from Sand Canyon reservoir in July and August 2011. Reservoir return contributes an additional salt load to MWRP that increases effluent TDS by about 15 mg/L.

Figure ES-4. Historical Imported Salt Load Impact on MWRP Recycled Water (2008-2012)



Future Baselines

The Future Predictive mode calculated recycled water TDS with the same methodology as the Historical Predictive mode. The differences between the modes are the inputs for the calculations. The inputs are classified into three major categories; user defined parameters, model predictive data, and statistical trends. Each category has a wide array of probable and relevant settings which would change the results of the calculations. Two Baselines were developed to simulate possible futures. These baselines are labeled "Baseline A" and "Baseline B" and the parameters are listed in Table ES-1, below. In general, Baseline A represents a best case that will produce relatively low future TDS levels while Baseline B is a more conservative case that will produce relatively high TDS levels.

Table ES-1. Future Baseline Scenarios

No.	Parameter	Baseline A	Baseline B
1	Basin Pumping Percentage (BPP)	70% until 2024 75% after 2024	65%
2	In-Lieu Period	None	Every 7 years
3	Recycled Water (RW) Penalty	Expires in 2016	Never Expires
4	Diemer WTP Effluent TDS Concentration	Historical median by month	Conservative estimate: 85% Colorado River Water at 723 mg/L 15% State Water Project at 324 mg/L

MWRP

Figure ES-5 shows the estimated historic and future MWRP effluent TDS RAA projected into the future with Baseline A and Baseline B.

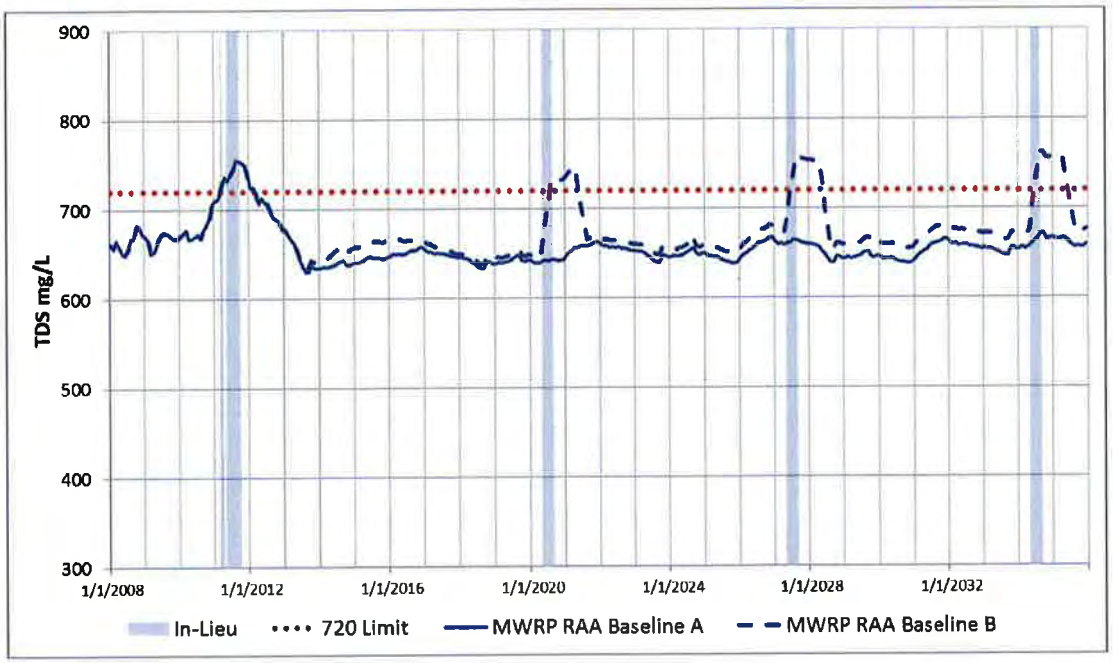


Figure ES-5. Future MWRP Effluent TDS RAA for Baseline A and Baseline B

California RWQCB, Santa Ana Region, Order No. R8-2008-0072 limits the MWRP recycled water TDS RAA to 720 mg/L. Based on the previously described parameters, the RAA for Baseline A does not exceed 720 mg/L TDS through 2035. On the other hand, the RAA for Baseline B exceeds 720 mg/L on several occasions through 2035 with the largest predicted TDS being approximately 40 mg/L over the limit in 2034 and 2035. In the future, Baseline B is generally below the TDS limit except during in-lieu periods, which the model estimates to occur every 7 years from May through September.

Both baselines show a gradual increase in TDS over time; however, the rate of TDS increase in Baseline B is about twice the rate of increase in Baseline A. This increase in Baseline A is the combined effect of the other parameters (BPP, RW Penalty, Colorado River, SWP, and Diemer blend) on the RAA, which are not as recognizable as in-lieu periods but have a steady impact on TDS.

Through 2035, both Baselines A and B would not exceed the TDS limit of 720 mg/L RAA if IRWD did not participate in the in-lieu program. However, the in-lieu program benefits IRWD by reducing groundwater pumping and allowing the groundwater basin to recharge faster. For Baseline A, the RAA is about 660 mg/L in 2035, which gives IRWD a TDS buffer of 60 mg/L before they exceed their permit limit of 720 mg/L. For Baseline B, the RAA is about 670 mg/L in 2035 during a non in-lieu period, which gives IRWD a TDS buffer of 50 mg/L before they would exceed their permit limit. Changes to or within IRWD's system that increase or decrease TDS would likewise affect the District's available buffer.

LAWRP

Based on these operational conditions and future demand-supply projections, the model predicts that LAWRP will typically produce recycled water for one or two summer months of the year. From 2013 to 2035, the Baseline A predicts that 11 of the 23 years will not require LAWRP to produce recycled water. When LAWRP does produce recycled water it results in relatively little difference in the recycled water concentration. Due to these reasons and the fact that MWRP has a greater impact on TDS in the non-potable system than LAWRP, the goal to mitigate TDS and develop scenarios focused on compliance with MWRP effluent discharge requirements.

Future Scenarios

IRWD identified five future scenarios that could impact the District's TDS concentrations in the non-potable water system and are not included in the baseline, as shown in Table ES-2. The future non-potable TDS concentrations were evaluated for these scenarios. Note that because these future scenarios reflect different conditions, they should not be compared against each other. Table ES-3 is a summary of the five scenarios including scenario criteria, TDS impact, and cost opinion. The following paragraphs briefly describe each of the five scenarios. A more detailed description of the development and evaluation of each scenario is provided in Chapter 4.

Table ES-2. Future Scenarios

Scenario No.	Name	Description
1	Salt Removal at MWRP	IRWD incorporates salt removal through reverse osmosis (RO) into the MWRP treatment process
2	Brine Disposal to MWRP	IRWD customers dispose of brine into IRWD sewers
3	Poseidon HBDP	Poseidon Huntington Beach Desalination Plant comes online
4	Poseidon HBDP Max	Poseidon HBDP comes online and IRWD receives maximum available capacity
5	MBI	Mid-Basin Injection online

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Table ES-3. Summary of Future Scenarios and Cost

Name [a]	Scenario 1 [c]	Scenario 2 [c]	Scenario 3 [c]	Scenario 4 [c]	Scenario 5 [c]
	Salt Removal at MWRP	**Brine Disposal to MWRP**	**Poseidon HBDP**	**Poseidon HBDP Max**	**Mid-Basin Injection**
Basis of Scenario [b]					
Salt Removal System Design Criteria	50 mg/L TDS MWRP Effluent	450 mg/L TDS Target 1 Sensitive User 640 AFY Each User 0.57 MGD Demand for 1 User	500 mg/L High TDS Expected Poseidon 1,500 AFY Poseidon enters IRWD (Average) 100 - 2,000 AFY Poseidon enters IRWD 0.09 - 1.8 MGD Poseidon enters IRWD	500 mg/L High TDS Expected Poseidon 48,350 AFY Poseidon enters IRWD (Average) 100 - 48,500 AFY Poseidon enters IRWD 0.09 - 43.3 MGD Poseidon enters IRWD	43 mg/L TDS 1.5 MGD MBI-1 Well Injection 3 MGD/Future Well Injection 8-10 Anticipated Future Wells
Total User Treatment System					
Influent		0.31 MGD 720 mg/L TDS			
Effluent		0.25 MGD 100 mg/L TDS			
Brine		0.06 MGD 3,200 mg/L TDS			
User Brine Discharge To		MWRP			
MWRP Treatment System					
Influent	2.6 MGD 735 mg/L TDS	0.37 MGD 772 mg/L TDS			
Effluent	2.0 MGD 100 mg/L TDS	0.30 MGD 100 mg/L TDS			
Brine	0.5 MGD 3,280 mg/L TDS	0.07 MGD 3,325 mg/L TDS			
MWRP Brine Discharge To	OCSD	OCSD			
Water Quality (in 2034-2035)					
MWRP Effluent					
Δ TDS	(50) mg/L TDS	(7) mg/L TDS	0 mg/L TDS	160 mg/L TDS	Expected reduction in TDS
Improved Water Quality for:	All Non-Potable Users	Sensitive User Only	No Effect	All Non-Potable Users	All Non-Potable Users
Sensitive User Water Quality					
Δ TDS		(270) mg/L TDS			
Life Cycle (2015-2035) [c]					
Net Present Value (2015 dollars)	$ 27,700,000 [d]	$ 4,600,000	$ -	$ -	$ -
Capital Cost (2015 dollars)	$ 3,400,000	$ 1,000,000	$ -	$ -	$ -
Total Salt (20 years)	102,100,000 lbs Removed	15,100,000 lbs Added for 1 User	0 lbs	- lbs	- lbs
Total Salt per Year [e]	5,105,000 lbs Removed	800,000 lbs Added for 1 User	0 lbs	- lbs	- lbs
Unit Cost	$ 0.27 per lb Salt	$ 0.30 per lb Salt	$ -	$ -	$ -
Annual Cost	$ 1,385,000 per year	$ 244,000 per year for 1 User	$ -	$ -	$ -

NOTES:

a Scenarios should not be compared to each other. Each scenario represents a different situation.

b All scenarios are based on projected future Baseline B during worst out of compliance period (2034-2035), where MWRP Effluent TDS RAA is 780 mg/L at 28 MGD.

c Scenario 1 estimates unit cost for IRWD to construct and operate salt removal (RO) system at MWRP.
Scenario 2 estimates unit cost to generate revenue for IRWD to construct and operate a future salt treatment system (RO) at MWRP to remove the additional brine discharged from 1 User Treatment System(s).
Scenario 3 estimates unit cost to IRWD to receive 100 - 2,000 AFY Poseidon HBDP water to supply Newport Coast. Newport Coast sewershed discharges to OCSD. IRWD does not plan to purchase Poseidon water.
Scenario 4 estimates TDS changes to IRWD if they receive the max 48,500 AFY of Poseidon HBDP water as part of the purchase and exchange program with other agencies. Unit costs could not be determined.
Scenario 5 was evaluated qualitatively and a reduction in total Salts is anticipated at no direct cost to IRWD. This scenario was not modeled.

d Assumes unit cost to discharge brine to OCSD is $1,290 per MG.

e Assumes even distribution of salt load per year.

f Average local and imported chloride concentration are 25 and 90 mg/L, respectively. Per Poseidon HBDP WQ specifications the mean and maximum chloride concentration are 75 and 100 mg/L, respectively.

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Scenario 1 - Salt Removal at MWRP

Scenario 1 – Salt Removal at MWRP evaluates the facilities required to reduce TDS concentrations of recycled water by installing a reverse osmosis (RO) process to treat a portion of the membrane bioreactor (MBR) permeate to be mixed with the conventional treatment plant stream and discharged as the plant's recycled water effluent.

As shown in Figure ES-5, Baseline B is projected to exceed the 720 mg/L limit by approximately 50 mg/L TDS in 2034 and 2035 during an in-lieu period. The RO process was sized to treat and reduce the Baseline B projection to consistently meet the RAA TDS limit of 720 mg/L with an additional buffer, which increases the total TDS buffer to 90 mg/L. Table Es-3 includes a summary of the design criteria, net TDS effect, and cost for Scenario 1 – Salt Removal at MWRP.

Scenario 2 – Brine Disposal to MWRP

Scenario 2 – Brine Disposal to MWRP takes into account the possibility of a customer installing an RO system onsite to reduce the TDS in their non-potable water to 450 mg/L and disposing of brine to the sewer system upstream of MWRP. This disposal of brine would have a direct impact on the salinity of water entering the MWRP, and thus the salinity of the recycled water produced at MWRP.

The TDS concentration of the MWRP recycled water product would increase by 7 mg/L for a single customer discharging brine with the understanding that non-potable water TDS would not exceed the permitted 720 mg/L. The TDS buffer would likewise be reduced by 7 mg/L, which does not prevent Baseline A or B from meeting the permit limit. However, several brine discharges of similar volume and quality would proportionally multiply the impact and create a situation where the TDS permit limit was exceeded. Table ES-3 includes a summary of the design criteria, net TDS effect, and cost for Scenario 2 – Brine Disposal to MWRP.

This scenario determined the TDS impact on MWRP effluent if the non-potable water quality to the customer did not exceed 720 mg/L TDS, which would otherwise instigate action to lower TDS back to 720 mg/L. Additional analysis is required to determine the potential for a cumulative impact on recycled water salinity as the non-potable water user begins to receive a product with escalating salinity over time. This potential for a cumulative impact may be dampened if the use and subsequent brine disposal is seasonal with peak flows and corresponds with periods when the District's potable water quality has a lower salinity content.

Scenarios 3 – Poseidon Huntington Beach Desalination Plant

This scenario evaluates Poseidon Huntington Beach Desalination Plant (HBDP) providing potable water to IRWD as part of a purchase and exchange program. IRWD may purchase up to 100 AFY of the project's yield and may be required to accept HBDP supplies instead of MWD imports. Under Scenario 3 – Poseidon HBDP, potable water produced from HBDP would be conveyed to the IRWD service area via the OC-44 and East Orange County Feeder #2 (EOCF #2) to serve the Newport Coast sewershed will inherently receive HBDP water because its potable supply is from an EOCF #2 turnout. The quality of potable water supplied by the HBDP must be the same or better than

imported water supplied by Metropolitan Water District of Southern California (MWD). According to the water quality specifications provided by Poseidon, HBDP water will have less TDS than MWD water.

Scenario 3 – Poseidon HBDP analyzes the offset of MWD water with HBDP water to meet the Newport Coast sewershed demand, where delivery is anticipated to occur. If Poseidon does meet IRWD's requirements to be of the same water quality as the current MWD imported water source, then there will be no net impact of HBDP water on recycled water TDS. HBDP water will only replace MWD water, which has the same water quality levels. In addition, the sewage from the Newport Coast sewershed is conveyed to OCSD, not to MWRP or LAWRP; therefore, this would not impact IRWD's recycled water quality or the TDS buffer regardless of the quality of the HBDP desalinated water. Table ES-3 includes a summary of the design criteria, net TDS effect, and cost for Scenario 3 – Poseidon HBDP.

Scenario 4 – Poseidon HBDP Maximum Available Capacity

Similar to the previous scenario, this scenario evaluates the TDS impact of Poseidon Huntington Beach Desalination Plant providing potable water to IRWD. The difference is that in Scenario 4 – Poseidon HBDP Maximum, IRWD accepts as much Poseidon HBDP water as possible (43.2 MGD or 48,390 AFY). This scenario evaluates the maximum potential impact on the District's recycled water salinity due to offsetting imported MWD and local potable supplies with HBDP water. HBDP water will be distributed in IRWD's potable water system in several sewersheds and on average meet at least half of IRWD's potable water demand. This changes the source water allocation within each sewershed and affects the TDS in MWRP recycled water effluent and IRWD's non-potable system.

The potable water quality supplied by the HBDP must be the same or better than imported water supplied by MWD. Poseidon's water quality specifications indicate a 12-month average of 350 mg/L TDS in HBDP, which is slightly higher than local groundwater that averages about 280 mg/L. For Baseline B, this results in an initial TDS increase by about 40 mg/L and a TDS increase of 10 mg/L in 2035. IRWD may exceed the 720 mg/L TDS limit during in-lieu periods. If HBDP water TDS approaches their maximum 500 mg/L, which is significantly greater than local groundwater and slightly lower than imported MWD water, then IRWD would consistently be out of compliance with recycled water TDS increases ranging from 100 to 150 mg/L for Baseline B. This is because HBDP water is supplying several IRWD sewersheds that were formerly using local groundwater supplies.

Note that during in-lieu periods, MWRP recycled water salinity will be reduced with Poseidon HBDP water regardless of HBDP meeting the 350 mg/L (average) or 500 mg/L (maximum) TDS concentration as specified. This is because both of these water qualities still have a lower salinity than imported MWD water.

Table ES-3 includes a summary of the design criteria and net TDS effect for Scenario 4 – Poseidon HBDP Maximum. A cost opinion could not be developed for this scenario due to unknown cost impacts; however, several factors should be considered when evaluating cost and are described further in Chapter 5.

Scenario 5 – Mid-Basin Injection

This scenario evaluates the impact of OCWD's Mid-Basin Injection (MBI) project on IRWD TDS. Mid-Basin Injection consists of one injection well able to sustainably inject 1.5 MGD (1,680 AFY) of Groundwater Recharge System (GWRS) product water into the groundwater basin in the Principal aquifer. Design injection capacity of the well is 3 MGD (3,360 AFY). Mid-Basin Injection is located about a mile away from two wells associated with the Dyer Road Well Field (DRWF), which is IRWD's major local groundwater supply. OCWD is seeking approval to expand the Mid-Basin Injection project to construct four more injection wells (3-MGD capacity each) in Centennial Regional Park, which is closer to DRWF. OCWD's 2014 Long-Term Facilities Plan describes a potential for developing 8 to 10 MBI injection wells, but the ultimate MBI injection capacity has not yet been determined.

Regardless of the number of injection wells or the ultimate capacity, the Mid-Basin Injection project is expected to improve the salt content in IRWD's system and increase IRWD's TDS compliance buffer because GWRS product water has a TDS concentration of 43 mg/L, which is much lower than the local groundwater and imported water. Injecting GWRS product water into the Principal aquifer will improve the local groundwater quality for TDS, which will eventually reach the DRWF wells and be withdrawn and used as potable water in the IRWD service area.

This scenario was not modeled because the Mid-Basin Injection project will improve IRWD recycled water TDS and has no direct cost to IRWD.

Operational Strategies and Policy Considerations

IRWD's Salt Balance Model allows the District to evaluate operational strategies and consider policy recommendations associated with salinity management by projecting potential trends of TDS under different operating scenarios. Future TDS concentrations from MWRP were estimated to range from 50 to 60 mg/L less than the permitted RAA value of 720 mg/L. However, future TDS concentrations can have significant variability over time and this buffer can quickly erode if not managed with care and foresight. Several critical issues were identified during this study that are listed below and discussed in more detail in Section 6.3:

1. Monitor imported water TDS
2. Management of In-lieu periods
3. Management of return flows from Sand Canyon Reservoir to MWRP
4. Understand the TDS impact and associated cost to mitigate the introduction of new salt loads, including:
    a. Accepting brine disposal to IRWD's sewer and water recycling facilities
    b. Accepting desalinated water from HBDP and monitoring water quality requirements

IRWD's Salt Balance Model may also be used to determine the TDS impact from additional changes to IRWD's system. Some previously identified scenarios that may be considered for future analysis and evaluation include:

- Brine disposal to MWRP cumulative TDS impact
- Discharge of Irvine Desalter Project – Shallow Groundwater Unit to MWRP
- Discharge of Irvine Desalter Project – Potable Treatment Plant brine to MWRP
- Diversion of Irvine Business Complex sewershed to MWRP