

Imperial IRWMP Scoping and Review of DWR Resources Management Strategies

Increase Water Supply

Groundwater Development, Conjunctive Use, Storage and Banking

- Draft November 25, 2010
- Reviewed by Imperial Water Forum Projects Work Group 11/18/10
- Discussed at Forum 11/19/10
- Confirmed at PWG 1/19/11
- Forum 1/20/11 (Adopted)

Desalination

- Reviewed by Imperial Water Forum Projects Work Group 11/18/10 and 12/08/10
- Discussed at Water Forum 12/08/10
- Confirmed at PWG 1/19/11
- Forum discussion 1/20/11

Recycle Municipal Water

- Reviewed by Imperial Water Forum Projects Work Group 12/08/10
- Reviewed by PWG 1/19/11,
- Forum discussion 1/20/11
- Presented to Forum 1/20/11

Other RMS integrated with Increase Water Supply objective:

Conveyance (Regional/Local, CALFED)

Storage (Regional/Local, CALFED)

Precipitation Enhancement

- Reviewed by the Imperial Water Forum Projects Work Group 1/19/2011
- Discussed at Forum 1/20/11

Increase Water Supply

Resources management strategies (RMS) for increasing water supplies in the Imperial Region include:

- Groundwater Development, Conjunctive Use, and Groundwater Banking
- Desalination
- Recycled Municipal Water
- Conveyance- Regional/Local, CALFED
- Surface Storage - Regional/Local, /CALFED
- Precipitation Enhancement

This document presents findings and recommendations for how these strategies may be applied and integrated in the Imperial IRWMP.

1.1 Groundwater Development, Groundwater Banking and Conjunctive Use

Prior opportunities for groundwater development, banking and conjunctive use were evaluated in the *Draft IID Plan* (IID, 2009)^{1 2 3}. The groundwater banking and storage projects concepts would be developed further on the East Mesa and Coachella.

At the December 2010 Water Forum meeting there was a consensus that:

Groundwater banking and storage of Colorado River underruns should be the number one priority for the Imperial Region.

Findings

Findings related to the criteria used to screen the CDWR RMS include:

¹ Draft IID Plan, Appendix F. IID Groundwater Banking Opportunities. Technical Memorandum, September 1, 2009, From: Natural Resources Consulting Engineers, Inc. To: Matt Zidar.

² Draft IID Plan, Appendix B, Groundwater Development and Recharge Potential for the Imperial Valley Imperial Irrigation District (IID). (GEI).

³ IID Draft Plan 2009. Appendix N, Capital Project Alternatives (GEI).

- IRWMP Goals and Objectives- development of groundwater storage and banking of Colorado River Underruns would help to meet the goal to diversify the regional water supply portfolio and ensure a long-term, verifiable, reliable and sustainable supply to meet current and future agricultural, municipal, commercial, industrial and environmental demands. Groundwater banking and storage would help meet objectives by:
 - helping to avoid impacts to existing users;
 - providing a firm, verifiable, and sustainable supply;
 - supporting protection of surface water rights by putting the underrun water to beneficial use and by optimizing the Colorado River entitlements,
- Complexity.
 - Groundwater storage and banking locally in the East Mesa would require integration with the desalination strategy. Legal, political and technical issues remain to be addressed but no fatal flaws were identified. Facilities need to be consistent with U.S. Bureau of Land Management plans and policies if federal lands are used, which would also necessitate compliance with NEPA. Technical issues related to water quality, hydrogeology and operations need to be further addressed.
 - Interregional groundwater storage and banking in the Coachella Valley, either through use of CVWD facilities or development of IID facilities within the Coachella Region consistent with the existing QSA agreement, are technically feasible but require further study and analysis of specific site conditions. There are more political and legal complexities when compared to locally controlled facilities or groundwater storage areas.
- Resolve Conflicts, Colorado River- Groundwater banking and storage of underruns would be consistent with existing agreements, though junior appropriators currently able to use the underruns and would likely resist development of projects to bank this water.
- Resolve Conflicts, Imperial Region - Groundwater banking and storage of underruns could provide a firm, verifiable, and sustainable supply for new users in lieu of apportioning Colorado River supplies from current users to the new users. This would support land use agencies when making findings and determinations on available supplies and impacts to current users pursuant to state law. This will result in reducing the potential for local conflicts between the IID and the land use agencies; between current and future water users; and between the types of use.
- Regional Benefits- Groundwater storage and banking would provide regional benefits to all of Colorado River water users by increasing the reliability of the supply, protecting the local water rights and ensuring reasonable beneficial.
- Timeliness - Groundwater banking and storage projects need to be further defined through feasibility study and/or additional pilot and demonstration projects. Project alternatives are still being developed and compared, and a preferred alternative has not been selected. Further explorations, field work, or pilot and demonstration projects would fill data gaps, test and demonstrate the technologies and operational

- concepts, and support completion of alternatives evaluation and final design of full scale projects.
- Political Acceptability, Local – With the exceptions of the West Mesa, there is support for groundwater storage and banking of underruns. Such support is expected to increase with greater understanding and awareness of the need to protect Colorado River water rights. Ability to pay and willingness to pay, and cost benefits analysis, cost distribution and fiscal evaluation have not been fully determined and requires additional economic evaluation to gage acceptability and compare to other structural and non- structural alternatives.
 - Political Acceptability, Interregional.
 - Development of groundwater banking and storage of underruns would not be favorably regarded by other junior appropriators to the Colorado River who are currently able to take this water when it is not diverted by IID.
 - Alternately, these interests have a high ability and willingness to pay and seek partnership and subsidize local projects for a percentage of the project’s yield.
 - Groundwater storage and banking in Coachella Region could be favorably regarded by the interests in that region depending on the terms and conditions for use of the storage space in their basins.
 - Adapting to Climate Change- Groundwater banking and storage would allow the Imperial Region to make maximum use of the IID water rights and improve the ability for the Imperial Region to respond to variable climate conditions. Regardless of the long term effects of climate change to Colorado River Flows, whether increase or decrease to the flows, groundwater banking would help the Imperial Region respond to vulnerabilities, make maximum beneficial use of the current entitlements, and help meet Imperial IRWMP objectives.

Additional Specific Findings and Recommendations

- **Groundwater Development-** there are very limited opportunities for further groundwater development due to basins approaching or currently exceeding safe or sustainable yields (overdraft), basins low rates of natural recharge, and/or poor quality waters.
 - **West Mesa** is at or exceeding the sustainable yield and further development or use of these resources would need to be consistent with the Imperial County Groundwater Ordinance and existing policies to prevent overdraft.
 - **East Mesa** groundwater development would not be sustainable over the long term since there is no natural recharge or sustained yield, and water quality is limited
 - Groundwater in storage in the East Mesa is the result of the leakage from the historic operations of the irrigation canals.
 - East Mesa groundwater development coupled with desalination of the brackish groundwater would take advantage of water in storage, but would still result in depletion of groundwater over time unless integrated with strategies to recharge and store Colorado River water.

- **Blending East Mesa brackish groundwater** with Colorado River water to extend this supply would increase the salt content and impact agricultural uses, but such blended water could be matched to beneficial uses where a lower water quality may be acceptable.
- **Central Imperial Valley** development of brackish groundwater would require desalination.
- **Groundwater storage and banking.** Groundwater banking and storage of underruns should be the highest priority for the Water Forum and IRWMP.
 - Local areas for groundwater water management strategies that were carried forward and where reconnaissance level projects have been configured for purposes of comparison and feasibility analysis, include:
 - East Mesa Groundwater development and desalination with recharge;
 - East Mesa, Sand Hill, Pilot Knob groundwater storage;
 - IID groundwater bank development in Coachella Valley; and
 - Subscribe to Coachella Valley existing or expanded groundwater bank
 - Potential timely, near-term solution would be to bank IID water through agreements with the CVWD and subscribe to the existing and/or expanded groundwater banks. The Coachella Region has an existing groundwater management plan.
 - Groundwater storage and banking projects are mid- to long- term opportunities. Specific groundwater storage and banking projects require further feasibility study and site investigations to better define water quality, hydrogeology, design parameters; to optimize the recharge/extraction operations; and to compare local and interregional opportunities.
 - The following local and regional groundwater development and storage strategies have been eliminated from further consideration in the IRWMP based on technical feasibility or institutional constraints:
 - Central Imperial Valley Upper Aquifer
 - Central Imperial Valley “Deeper” Aquifer
 - West Mesa groundwater development and large scale banking
 - Arizona groundwater bank
- **West Mesa.** The concept of “in-lieu” groundwater recharge should include providing Colorado River water could to existing high volume industrial water users in- lieu of groundwater pumping to reduce the pressure on local groundwater supplies, and reduce or avoid overdraft.
- **Groundwater management plan** - The IRWMP will need to include groundwater management plan elements to meet requirements for state grant funding; support storage of Colorado River underruns in the Imperial Region; make best use of the Imperial County and IID authorities and responsibilities; and protect current overlying users.

Recommendations

- The number one priority for the Water Forum should be to develop groundwater storage and banking facilities to capture Colorado River underflows and protect local water rights.
- Develop groundwater management plan elements of the IRWMP to support groundwater storage and banking projects and meet requirements for state grant funding.
- Conduct needed feasibility studies and/or pilot and demonstration projects to obtain needed data, select a preferred groundwater banking alternative and develop final project designs and funding requirements.
- Seek state and federal grant funding to conduct the needed evaluations and pilot projects.

1.2 Recycle Municipal Water

- Recycling municipal wastewater could produce 'new water'; can be integrated with disadvantaged community support strategy; help meet a state goal of 20 percent conservation goal by 2020; and could support development of water exchange strategy. There are a number of projects that could be immediate (grant ready) or near-term. Recycling municipal wastewater should also be integrated with a regional mitigation banking strategy.

Findings related to the criteria used to screen the CDWR RMS include:

- Meeting IRWMP Goals and Objectives - Reclaimed municipal wastewater would help to meet the goal to diversify the regional water supply portfolio and ensure a long-term, verifiable, reliable and sustainable supply to meet current and future agricultural, municipal, commercial, industrial and environmental demands. Reclaimed wastewater would help meet objectives by:
 - Helping to avoid impacts to existing users by providing a new supply;
 - Supporting disadvantaged and other communities in meeting wastewater disposal and permit requirements when coupled with a regional strategy for use of this water and funding facilities;
 - Match water quality to appropriate uses and supply treated wastewater to extend use of Colorado River supplies;
 - Support meeting 20% conservation goals in the region.
- Complexity - Treatment technologies to reclaim municipal wastewater are well established. Complexity would be related to integrating funding strategies for upgrading existing plants or developing regional wastewater facilities to reclaim wastewater. There are some permitting issues that would need to be resolved and impacts to IID drains and Salton Sea present challenges.
- Resolve Conflicts, Colorado River - Reclaiming municipal wastewater would be relatively neutral. This practice would demonstrate the regional commitment to making use of this resource.
- Resolve Conflicts, Imperial Region - Reclaiming municipal wastewater could provide a firm, verifiable, and sustainable supply for new users in lieu of apportioning

- Colorado River supplies from current users to the new users. This would support land use agencies when making findings and determinations on available supplies and impacts to current users pursuant to state law. This would result in reducing the potential for local conflicts between the IID and the land use agencies; between current and future water users; and between the types of use.
- **Regional Benefits** - A regional strategy to reclaiming municipal wastewater could provide regional benefits by helping to meet the requirements to conserve 20% by 2020; increasing the reliability of the supply, and supporting economic development.
 - **Timeliness** - A number of potential reclaimed municipal wastewater facilities are currently in the planning and design stages, and a number of projects are near or ready to proceed. Regional strategies and policies to account for the conserved water and use of this source in lieu of Colorado River water, and a regional approach to mitigating impacts are needed. Development of regional plants to realize economies of scale and increase cost effectiveness will take more time.
 - **Political Acceptability, Local** - Upgrade to individual plants without subsidy by new water users would encounter political opposition due to increase in rates required to fund upgrades to existing plants. Regional plants could be resisted due to loss of control of individual facilities. Regional strategies for accounting for the conserved water also could face opposition. Grower resistance related to marketability of crops. Ability to use IID distribution systems. Stranded investment/sunk cost investment cycle.
 - **Political Acceptability, Interregional** - Reclaiming municipal wastewater is not expected to encounter resistance by other Lower Colorado River users or regions, and would likely be supported as a means of reducing Colorado River demands.
 - **Adaptability to Climate Change** - Reclaiming municipal wastewater would help to adapt to climate change by secondary uses and by providing flexibility in operations and increase ability to respond to changing conditions.

Additional Findings and Recommendations

- Reclaiming all forecasted future municipal wastewater flows would still only provide an estimated total of 36,000 acre-feet per year, which is a little more than one third of the future forecasted demand in the Imperial Region and is well in excess of 100,000 acre- feet. If all the wastewater available was reclaimed, it would only provide a percentage of the future demand.
- Support current wastewater facility plant upgrades that propose reclaiming municipal water for use in renewable energy projects that are planned for Niland, Brawley and Imperial and include as part of the near term strategy.
- Require mitigation for loss of flows to IID drains through development of a regional mitigation bank; seek to provide regional benefits, creating partnerships and meet multiple IRWMP goals by using reclaimed wastewater for this purpose where cost effective and timely.

- Consider regional municipal water reclamation projects to increase cost-effectiveness of project development and operation, provide benefits to multiple parties, and improve opportunities to reuse the water (reduce cost of purple pipe network).
- Provide policy and financial incentives for public/private partnerships to construct municipal recycling facilities and for crediting the produced water to sponsoring entities (public/private) to allow for exchange of produced water for delivery of Colorado River water (Water Exchange).
- Continue to evaluate the cost-effectiveness and political viability of regional municipal wastewater treatment facilities that include reclaiming wastewater as part of the mid- and long- term water management strategy.
- Imperial County and IID should coordinate and adopt appropriate policies to require use of recycled municipal water in-lieu of Colorado River water to mirror CEC and SWRCB policy.

1.3 Desalination

- Desalination of brackish groundwater could be a near- or mid- term project opportunity and could provide a new source of water to be used in place of imported Colorado River water.
- Desalination of brackish drain water has more constraints but could be an opportunity for long term development, but this is likely to require higher mitigation costs and environmental compliance.
- Large scale desalination, coupled with interregional conveyance could be a long term opportunity but is considered costly when compared to other water supply strategies, and is not considered a near- or mid- term opportunity for purposes of the IRWMP.

Findings related to the criteria used to screen the CDWR RMS include:

- IRWMP Goals and Objectives – Desalination of brackish groundwater, drain water, the New River or Alamo River, and other local saline water sources could help to meet the goals to diversifying the regional water supply portfolio and could help to ensure a long-term, verifiable, reliable and sustainable supply to meet current and future agricultural, municipal, commercial, industrial and environmental demands. Desalination would help meet objectives by providing a new water source to avoid impacts to existing users.
- Complexity
 - Desalination technologies for brackish water are relatively well defined, relatively cost effective as compared to other opportunities to develop new water supplies.
 - Constraints to be overcome include:
 - Access to sites in the East Mesa.
 - Mitigation requirements to potential impacts to drain habitat, riparian resources and Salton Sea.
- Resolve Conflicts, Colorado River – Desalination of the source water proposed would not be expected to increase conflicts with the Colorado River users.

- **Resolve Conflicts, Imperial Region**
 - Desalination could reduce conflicts over existing Colorado River water supplies by providing a firm supply for new users and projects in-lieu of Colorado River supplies.
 - Reduced flow from drains or river water could have impacts to the Salton Sea and increase conflicts related to responsibility and costs of mitigation.
- **Regional Benefits – Desalination would provide regional benefits by increasing the supply and by providing water for economic development while protecting current agricultural uses.**
- **Timeliness**
 - Projects to desalinate brackish groundwater could be developed in the near- to mid- term since IID and the County could work cooperatively with industry to develop and permit such projects.
 - Adding a groundwater recharge component could slow project development and implementation, but an integrated project could be developed in phases over the mid- to long- term.
 - Desalination projects to use drain or river water would likely require greater environmental review and a longer time period to design, permit and implement and could encounter significant regulatory compliance requirements.
- **Political Acceptability, Local.**
 - The method of financing and distribution of cost needs to be determined. Ability to pay and willingness to pay for desalination has not been fully determined and requires additional economic evaluation.
 - Desalination of drain and river water will likely have higher mitigation costs, greater potential impacts and potentially higher political resistance as compared to groundwater desalination.
- **Political Acceptability, Interregional.**
 - Drain and river water projects would face higher degree of scrutiny due to potential effects on the Salton Sea as compared to brackish groundwater and could create political controversy.
 - Interregional interests have a high ability and willingness to pay and may subsidize local projects for some of the project yield and help create political support.
 - Large scale desalination would likely be viewed favorably and could provide partnering opportunities that could reduce costs to local rate payers.
- **Adaptability to Climate Change –Desalination of brackish water sources would develop an untapped resource and improve the ability for the Imperial Region to respond to variable climate conditions.**

Additional Specific Findings and Recommendations

- Desalination of brackish groundwater in the East Mesa is a near- to mid- term propositions and could be sustainable when integrated with recharge projects elements.
 - Pilot and demonstration projects should be undertaken to provide a basis for design and to determine the feasibility of large scale projects.
 - Federal or state funding opportunities for development of pilot projects should be pursued if local funding match can be developed.
- Imperial County and IID should coordinate and adopt appropriate policies to allow for and promote development and desalination of East Mesa groundwater resources. Such policies could be targeted to requiring use of desalination or recycled water in- lieu of Colorado River water to mirror CEC and SWRCB policy.
- Operational concept- Consider and further evaluate economic and political feasibility for including desalinated water in a regional water exchange where by those that fund development of desalination facilities would receive credit for the produced water and receive Colorado River water in exchange.
 - Cooperative public/private partnerships should be investigated for purposes of creating a new water supply for non-agricultural water users using desalination technologies.
 - Economic incentives and pricing would need to be worked out to finalize a business model, and additional economic evaluations are recommended.

1.4 Conveyance- Regional\local, CALFED

IIDs conveyance and water distribution system provides benefits to the entire region that needs adequate resources to be maintained. Any new local conveyance would be integrated with other capital projects.

Large interregional conveyance coupled with treatment could meet IRWMP goals and objectives and provide a source of supply, but projects are not yet defined or ripe for decision and the current costs estimates are higher than current users would be willing to pay in the near term. Large interregional conveyance could be an opportunity and part of a long term plan that could be integrated with efforts to restore the Salton Sea. At this time large regional conveyance is not a near- or mid- term opportunity for purposes of the IRWMP.

CALFED conveyance is not related to the Imperial IRWMP.

- Local IID conveyance infrastructure
 - There are no major local conveyance improvements to the IID system that were identified as stand- alone projects for inclusion in the Imperial IRWMP.
 - The IID conveyance infrastructure provides regional economic benefits to all of the water users.
 - IID regional supply, conveyance and distribution infrastructure is aging and faces a backlog of maintenance. The backlog of maintenance is not being met due to

- revenue constraints. Additional investment is needed to preserve and protect these assets.
- IID does not currently have a policy for other agencies or interests to use their distribution canals and should adopt a wheeling policy.
 - Existing IID drainage facilities convey flood water to the New or Alamos Rivers from the developing urban areas, but were not designed as flood/stormwater conveyance and need improvements to meet these objectives.
 - Integration of local conveyance improvements with other strategies
 - Conveyance needs or requirements for individual or regional projects will be integrated into those projects.
 - Local conveyance will be integrated evaluated in context of individual Imperial IRWMP water supply or flood/stormwater management projects.
 - IID Definite Plan and System Conservation Plan identify conveyance systems improvements to conserve water that are not currently being implemented and these improvements could be included in the IRWMP through the agricultural demand management strategy.
 - Disadvantages Community Water Supply and Quality Needs.
 - System reliability- Improvements to local conveyance to provide supply reliability and back up in the event of catastrophic supply interruptions. Cities could realize regional benefit by planning and designing regional interconnections for domestic or wastewater systems.
 - Water Quality- conveyance and systems interconnection should also be factored into evaluation of larger regional efforts for wastewater treatment and recycling; and drinking water treatment and distribution.
 - System expansion and annexation- Continue to evaluate connecting areas that surround existing larger water systems and are served by individual pipe connections to the larger municipal water systems.
 - **Large Interregional Conveyance** projects should be integrated with other strategies like desalination, and could be long term prospects for inclusion in updates of the IRWMP, but such projects are low priority for action because of the following consideration.
 - IRWMP Objectives - Large interregional conveyance coupled with water quality treatment could meet IRWMP goals and objectives, but the current costs estimates are higher than any current users would be willing to pay in the near term, and since long term mitigation to the Salton Sea are not part of the Imperial IRWMP.
 - Complexity – Large scale interregional conveyance projects would be very complex and face permitting, economic and engineering challenges. Projects could involve complex international boundary water issues.
 - Resolve Conflicts, Colorado River- Large interregional conveyance could avoid conflicts on the Colorado River by providing a new source of supply. This is balanced by unknowns related to costs and benefits, and potential for legal conflicts between competing interests.

- Resolve Conflicts, Imperial Region- Until the project are better defined, it is hard to evaluate whether they would increase or reduce current conflicts or help avoid future conflicts.
- Regional Benefits- Large interregional conveyance has the potential to provide multiple benefits to multiple participants, but this is balanced against unknown environmental, economic and other impacts and the complexity of development.
- Timeliness- Large interregional conveyance require further definition and feasibility study to resolve technical, environmental, economic and institutional issues and would be considered a mid- to long term prospect.
- Political Acceptability, Local- Unknown until better defined. Neutral at this time.
- Political Acceptability Colorado River – Unknown until better defined. Neutral at this time.
- Adaptability to Climate Change- could support alternative water supplies to the region and help adapt to uncertainties related to climate change.
- CALFED Conveyance - CALFED conveyance projects are not directly related to the Imperial Region, though increased conveyance as anticipated by CALFED and the CWP could increase reliability of State Water Project and Central Valley supplies to southern California, potentially reducing competition for Colorado River supplies. The reverse is also true.

Recommendations

- IID should finalize and adopt wheeling policy to define the terms for others to utilize IID conveyance capacity when it is available.
- The Water Forum should support IID in defining the long term maintenance requirements for the regional conveyance infrastructure and a cost distribution model to preserve these assets to the Imperial Region.

1.5 Surface Storage- Regional\local, CALFED

- Small local storage projects
 - No stand- alone projects for small local storage have been identified.
 - Cities in the region have identified a need for raw or treated water storage facilities to meet state and local requirements and support responses to supply interruption and damages due to catastrophic events as was experienced in the recent 2009 earth quake.
- Small local storage projects will be integrated into:
 - Agricultural water use efficiency and conservation strategy through the Definite Plan and System Conservation Plan, and
 - Disadvantaged Community strategy and may be used to meet raw water storage needs.
- Large local or regional surface water reservoirs - Large surface water reservoirs would not be cost-effective or feasible in the Imperial Region when compared to other supply

and groundwater storage opportunities. Constraints and basis for eliminating from further consideration include:

- No local runoff or yield of Imperial Region watersheds, high evaporation rates.
- Development of surface storage of imported water would include high cost for construction and pumping lifts to reservoir sites.
- Potential for significant environmental impacts; major permitting and regulatory compliance issues.
- No opportunities exist for additional large-scale reservoir facilities on the Colorado River. Lake Powell and Lake Mead have sufficient storage.
- CALFED surface storage is unrelated to the Imperial Region, though increased surface storage statewide could increase reliability of State Water Project and Central Valley supplies to southern California, potentially reducing competition for Colorado River supplies.

1.6 Precipitation Enhancement

- With average annual precipitation of less than 3 inches per year, opportunities for precipitation enhancement are negligible and the potential yields do not merit investment in program development and implementation, and the strategy is not carried forward for further evaluation.