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IMPERIAL IRRIGATION DISTRICT

INTEGRATED WATER RESOURCES MANAGEMENT PLAN

Vol. 1 Executive Summary

IMPERIAL IRRIGATION DISTRICT
SEPTEMBER 2009

Executive Summary

The Imperial Irrigation District (IID) Strategic Plan adopted by the IID Board of Directors (Board) in 2008 included an objective to develop an integrated water resources plan by the end of 2009, adopt recommendations outlined in the plan in the first quarter of 2010, and implement the actions by mid-year 2010. IID has developed an Integrated Water Resources Management Plan (IID Plan) to address the changing water needs of the community and provide water for economic development while meeting its agricultural water needs and complying with existing agreements and regulations.

The Board directed staff and the consultants to "leave no stone unturned" and to provide a wide array of potential capital projects, demand management measures and policy alternatives that it could select from in developing a ***Water Supply Portfolio.*** All these opportunities could be implemented to meet future municipal, commercial and industrial (MCI) water demands without affecting historical water uses.

IID Plan Goal

"To provide a strategic road map that defines a portfolio of water projects, demand management measures and policies intended to deliver a reliable water supply for municipal, commercial and industrial water users over a 37-year planning horizon from 2010 to 2047; and garners local consensus for a course of action that anticipates and thus avoids conflicts over water within the IID service area."

The IID Plan describes the planning process used to identify and screen a wide range of ***water management strategies***. The water management strategies provided the building blocks used to configure ***capital project solutions*** and non-structural ***policy or programmatic solutions*** (e.g., urban water conservation programs, policies for allocating water during times of shortage, etc.). It is anticipated that the IID Plan would be used by the Board to obtain input from stakeholders on the proposed actions, to build consensus and to reduce the potential for conflicts and competition amongst the various classes of users for the supplies available to the District.

These project and policy alternatives were further combined and integrated to develop immediate, near-, mid- and long-term actions that could be implemented over a 37-year planning horizon, from 2010 to 2047.

Immediate	**Near-term**					**Mid-term**	**Long-term**
2010	2011	2012	2013	2014	2015	2016-2020	2021-2047

The Board adopted the following objectives for the IID Plan, which were used to screen water management strategies, projects, demand management measures and policies:

- Prevent impacts to existing agricultural users of water and protect IID water rights.

- Define cost-effective projects and equitable cost-sharing agreements with those entities and water users that would receive benefits from proposed water management actions.
- Identify projects that are consistent with existing agreements on use and management of the Colorado River, including the Quantification Settlement Agreement and Transfer Agreements (QSA/Transfer Agreements).
- Recognize and resolve potential conflicts over use of available water resources.
- Promote economic development consistent with IID policies, standards, and guidelines for new consumptive uses of water.

Purpose and Need for the IID Plan

The IID Plan was initially motivated by the need to find water for proposed geothermal projects and for other economic development and growth opportunities that would provide jobs and diversify the local economy. The new project water demands, coupled with the 3.1 million acre-feet (MAF) cap placed on IID's annual Colorado River entitlement, have strained the limits of IID's existing supply and resulted in the potential for conflicts between historical and newly proposed water uses as well as among different types of water uses (agricultural, urban, industrial, environmental).

The QSA/ Transfer Agreements and federal operating rules for the Colorado River define a new reality and changed circumstances under which IID must manage the water resources of the Imperial region.

Water supply planning and the role of water agencies during the land use planning process have received increased attention from both the State Legislature and the California Courts. Recent legislation and judicial rulings have increased the requirements for IID, IID Cities, and Imperial County to adhere to more rigorous planning standards and to consult when projects are proposed that could intensify water use or have an effect on water supplies or current users.

The IID Plan provides a framework to address and resolve conflicts, reduce competition and polarization in the community, provide an alternative to litigation as a means of solving problems, identify funding strategies to build projects and develop appropriate IID policies to ensure reasonable and beneficial use of its Colorado River water entitlement.

Relation to Other IID Planning Efforts

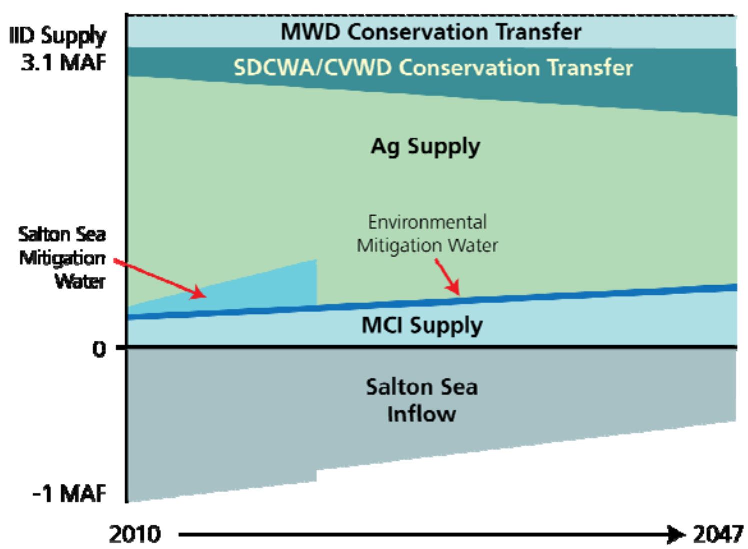
As originally conceived, the IID Plan was intended as a document primarily for IID use to identify a ***Water Supply Portfolio*** for MCI and environmental uses, and define actions that IID could take independently to develop projects or policies to meet increasing demands and support economic development. The IID Board was under pressure to find firm and sustainable water supplies for projects that are already being considered by Imperial County and the IID Cities, so staff was directed to develop an Interim Water Supply Policy to serve as a bridge to the IID Plan and the implementation of longer-term alternatives. The actions contemplated in the interim plan have been incorporated into the IID Plan.

The state of California is encouraging water districts, land use agencies and local stakeholders to work together to develop Integrated Regional Water Management Plans (IRWMPs). While the IID Plan is not an IRWMP, as part of the work on the plan, the IID Board directed staff and the consultants to submit information to the California Department of Water Resources (DWR) to have an Imperial region approved for the purpose of developing an IRWMP. The state has approved the Imperial region, and IID intends to work with Imperial County, the IID Cities and interested community members in a facilitated process to develop an Imperial IRWMP to define regional projects, help the community resolve conflicts and qualify for funding opportunities. Development of the Imperial IRWMP will require an extensive stakeholder involvement process. The IID Plan will serve as a foundation upon which to build the Imperial IRWMP.

$36 million of Proposition 50 and 84 monies are available to agencies located in the DWR Colorado River Hydraulic Region that have prepared an Integrated Regional Water Management Plan and that meet state requirements.

Existing Water Supplies

The IID Plan describes the existing district supplies, including the facilities, entitlements and contracts that define what water is available to meet current and future demands. The amount that the district can divert may vary if significant drought conditions occur, but IID has 3.1 million acre-feet (MAF) per year of senior rights to Colorado River water that are less subject to cutback in dry times than almost any of the other rights on the river system. Given the tremendous volume of IID's annual entitlement and the seniority of its water right, IID's future water supply concerns may be more appropriately characterized as a matter of demand management than as a supply problem. Historically, approximately 1 MAF of the Colorado River water diverted by IID has flowed to the Salton Sea as tailwater and drain water. In the future, planned system efficiency measures and reduction in agricultural use are expected to decrease IID's annual discharge of Colorado River water to the Salton Sea to roughly 700,000 acre-feet per year.



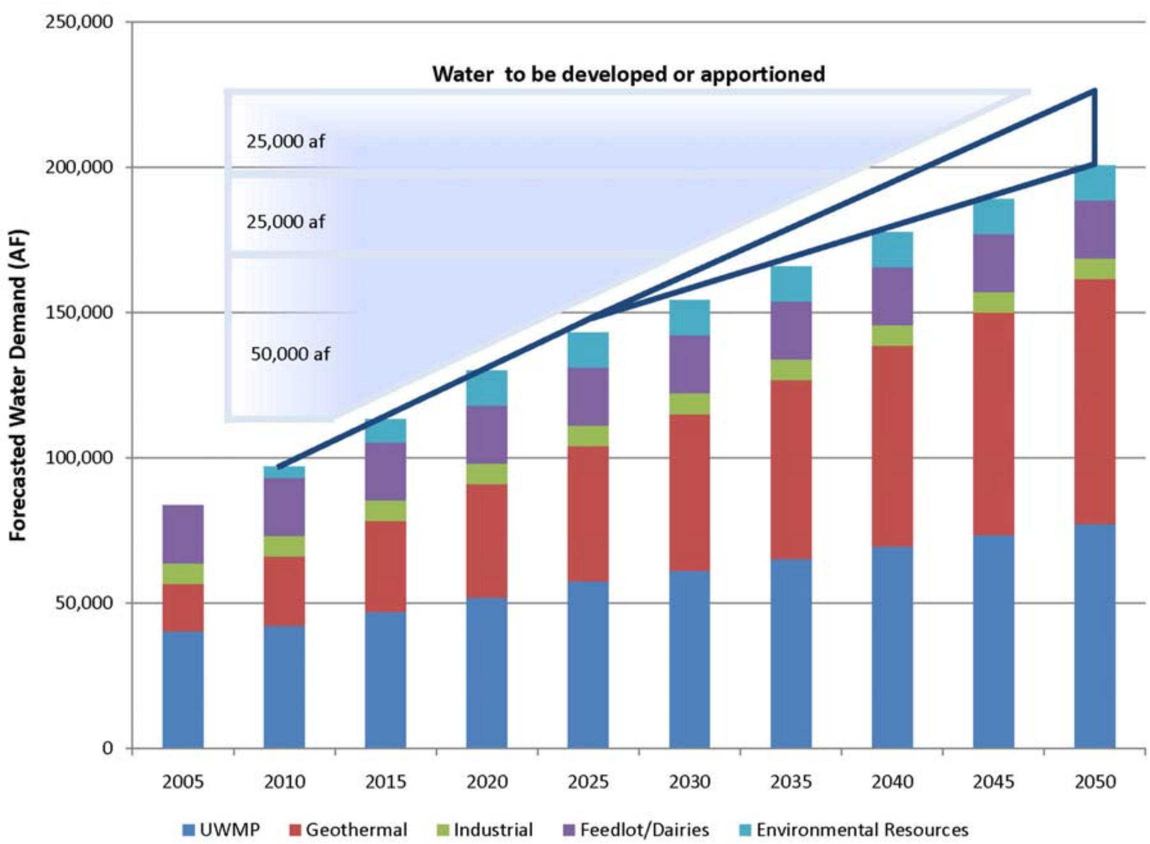
The QSA/Transfer Agreements require IID to conserve and transfer an additional 303,000 acre-feet per year from 2027 on, through implementation of both on-farm and system efficiency conservation measures. Combined with the existing IID/MWD Water Conservation and Transfer Program, this will result in a total annual conservation and transfer of 408,000 acre-feet when fully implemented. Fallowing for purposes of transferring water is generally prohibited under the terms of the transfer agreements, with the exception of some fallowing early in the QSA during the ramp-up to efficiency conservation and to provide Salton Sea mitigation water through 2017.

The beneficiaries of the conserved and transferred water are the Metropolitan Water District of Southern California (MWD), San Diego County Water Authority and Coachella Valley Water District (CVWD). It is important to note that by implementing efficiency conservation projects, water demands will be reduced by an amount equivalent to the conservation value. The on-farm conservation program is designed to maintain existing levels of agricultural production by reducing deliveries to the participating fields, not by any reductions in crop water use.

The result of these water conservation transfer programs is to effectively reduce IID's annual diversion from the Colorado River to between 2.6 and 2.7 MAF, with a like reduction in its use. In the meantime, MCI demands are expected to grow over the planning horizon, and IID is also required to provide environmental water to wetlands created for mitigation purposes.

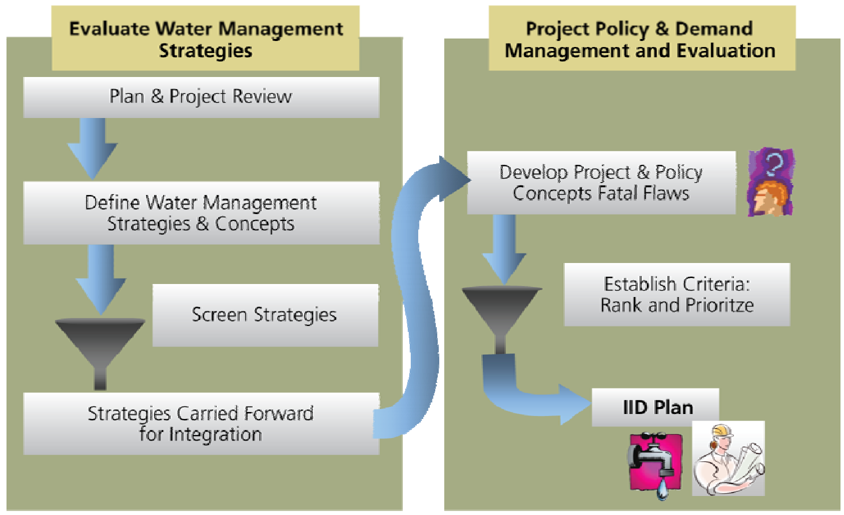
Future Demands

Future demands were forecasted to quantify the amount of water needed for non-agricultural water uses including MCI demands. Three future demand scenarios were analyzed: low-, medium- and high-water demands. The medium-water demand scenario was chosen for purposes of planning. Under this scenario, annual non-agricultural water demands are forecasted to increase by approximately 100,000 acre-feet from 2010 to 2047. A set of target planning objectives is recommended and includes development of annual supplies of 50,000 acre-feet by 2020, expanded by an additional 25,000 acre-feet by 2047, with provision for a contingency of 25,000 acre-feet. As such, the IID Plan should seek to define at least 100,000 acre-feet per year of water to be developed or managed through new capital projects and/or policies that would manage demand and define how supplemental water would be apportioned.



Process and Planning Framework

The planning process identified alternatives to meet the forecasted future demands through a number of sequential steps. The first step included review of the DWR-recommended water management strategies for inclusion in integrated plans. The state Legislature made procurement of state grants or bond funds contingent on review and integration of these strategies. Preliminary findings were made and some of the water management strategies were carried forward for further review as part of the IID Plan, a number of strategies were determined not to meet the IID Plan objectives, while others were identified as being appropriate for further review during development of the Imperial IRWMP.



The water management strategies carried forward were then integrated and used to develop ***capital projects, demand management or policy alternatives***. The alternatives were then evaluated and compared using ranking and screening criteria to identify fatal flaws, compare the range of solutions, make findings and conclusions, and prioritize recommendations for inclusion in the ***Water Supply Portfolio*** for consideration by the Board for implementation.

The IID *Water Supply Portfolio*

The IID Plan seeks to identify a ***Water Supply Portfolio*** of 100,000 acre-feet per year to meet future MCI and environmental water demands through 2047 by:

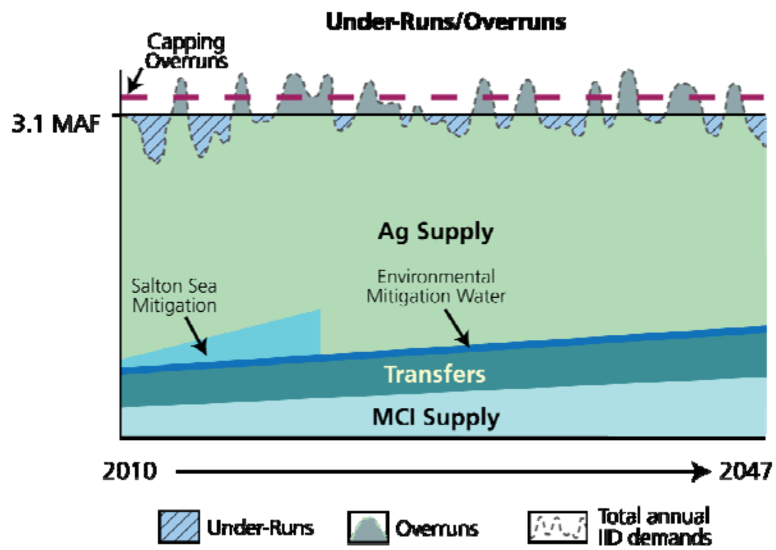
- Groundwater banking and storage to make best use of the existing IID supply
- Developing available supplies through recycling municipal wastewater, desalting drain water that would otherwise be discharged to the Salton Sea, desalting East Mesa groundwater, or by blending East Mesa groundwater with other Colorado River supplies
- Demand management – efficiency/conservation
- Annual apportionment of IID's 3.1 MAF water supply

The potential sources of water for the ***Water Supply Portfolio*** are discussed along with project alternatives to develop the sources, yields and costs, constraints and project timing. There are options to develop additional supplies for new MCI users, but these will be at a cost per acre-foot that is higher than those previously observed in the IID area. Project alternatives were developed at a reconnaissance level and further work is needed to firmly establish engineering feasibility, develop preliminary designs, evaluate environmental impacts, identify final costs, and set rates and fees.

Projects alternatives and cost information are presented in Table 1. Project alternatives were given a lower priority if their costs exceeded $600/acre-foot, if they generated potential groundwater impacts, if they entailed a large plant size and did not produce cost-effective yield; or if they required partnering or other institutional arrangements. Some of the lower-rated projects could be implemented if partnering can be worked out (e.g., recycling) or if local costs are reduced through grants (e.g., Propositions 50/84).

Groundwater Banking of Under-Runs

Groundwater banking and storage is needed to maximize IID's annual 3.1 MAF entitlement of Colorado River water. Groundwater storage/banking in the Coachella Valley or East Mesa areas should be a priority for IID in order to best manage its fluctuating agricultural demands, annual water supply limitations, and overrun obligations.



Water for groundwater banking would come from under-runs that occur when IID diverts less than its annual entitlement. There are years when IID diverts less that its full entitlement (under-runs); and years when it diverts more (overruns). The years with overruns and under-runs are about equally split, but under-runs tend to be larger than overruns on the average and this creates the opportunity for IID to generate a long-term gain in its ***Water Supply Portfolio*** from the storage of under-runs. If IID does not store the under-runs each year, this water can be diverted by MWD or another Colorado River contractor and is a lost opportunity to IID. Overruns must be paid back in subsequent years through extraordinary conservation, which at present consists primarily of the fallowing of agricultural lands. The IID Equitable Distribution Plan defines how IID responds when there is a forecasted supply/demand imbalance; but while limiting overruns, the EDP does not address the under-run scenarios. Groundwater banking will only yield new water if overruns are kept to a minimum; otherwise, the banked water would be needed to pay back the overruns rather than being available for agricultural and future MCI uses.

Groundwater banking of under-runs could yield 20,000 to 50,000 acre-feet per year over the project life-cycle. A Coachella Valley groundwater storage project has been configured and evaluated and has costs that are in the range of $260/acre-foot. Other opportunities in or adjacent to the Imperial region include partnership with CVWD to use its groundwater facilities, use of the old Coachella Canal, and development of percolation and recharge facilities in the East Mesa. East Mesa groundwater banking opportunities were integrated into groundwater development/desalination and blending project alternatives as discussed below. It is likely that these projects could be completed in the near- to mid-term and come online by 2016 should additional pilot testing and monitoring programs prove the projects long-term viability.

Table 1- Projects Ranked by Cost

Name	Description	Capital Cost	O&M	Equivalent Annual Cost	Unit Cost ($/AF)	Yield (AF)
GW 18	Groundwater Blending- East Mesa Well Field Pumping to All-American Canal	$ 39,501,517	$ 198,000	$ 2,482,000	$ 99	25000
GW 19	Groundwater Blending- East Mesa Well Field Pumping to All-American Canal with Percolation Ponds	$ 48,605,551	$ 243,000	$ 3,054,000	$ 122	25000
WB 1	Coachella Valley Groundwater Storage Project	$ 92,200,000	$ 7,544,000	$ 5,736,746	$ 266	50000
DES 8	25 KAF East Brawley Desalination with Well Field and Groundwater Recharge	$ 100,991,177	$ 6,166,000	$ 12,006,000	$ 480	25000
AWC 1	Systems Conservation Projects (2)	$ 56,225,000	N/A	$ 4,068,000	$ 504	8000
DES 12	East Mesa 25 KAF Desalination with Well Field and Groundwater Recharge	$ 112,318,224	$ 6,336,000	$ 12,831,000	$ 513	25000
DES 4	50 KAF Keystone Desalination with IID Drainwater/Alamo River	$ 147,437,743	$ 15,323,901	$ 23,849,901	$ 477	50000
DES 14	South Salton Sea 50 KAF Desalination with Alamo River Water and Industrial Distribution	$ 158,619,378	$ 15,491,901	$ 24,664,901	$ 493	50000
DES 15	South Salton Sea 50 KAF Desalination with Alamo River Water and MCI Distribution	$ 182,975,327	$ 15,857,901	$ 26,438,901	$ 529	50000
DES 2	50 KAF Keystone Desalination with Well Field and Groundwater Recharge	$ 282,399,468	$ 13,158,000	$ 29,489,000	$ 590	50000
RW 5	Regional Plant Serving Tertiary Water to IID Canal	$ 20,818,710	$ 829,853	$ 2,033,801	$ 308	6600
RW 1	Disinfected Secondary Effluent from Existing Wastewater Treatment Plants Applied to Adjacent Agriculture	$ 18,779,688	$ 486,671	$ 1,572,702	$ 118	13300
RW 3	Upgrade Existing Plants to Tertiary and Deliver Effluent to IID Canal System	$ 90,531,216	$ 2,992,257	$ 7,498,347	$ 562	13300
RW 6	Regional Plant Serving Tertiary Water to Local Service Area and IID Canal	$ 102,374,854	$ 2,280,145	$ 8,200,493	$ 488	16800
DES 7	East Brawley 25 KAF Desalination with Well Field	$ 100,409,542	$ 6,157,000	$ 11,964,000	$ 479	25000
DES 11	East Mesa 25 KAF Desalination with Well Field	$ 111,746,590	$ 6,327,000	$ 12,789,000	$ 512	25000
DES 1	Keystone 50 KAF Desalination with Well Field	$ 281,817,834	$ 13,149,000	$ 29,447,000	$ 589	50000
DES 10	East Brawley 5 KAF Desalination with Well Field	$ 24,751,185	$ 1,525,000	$ 2,956,000	$ 591	5000
DES 6	Keystone 25 KAF Desalination with Well Field	$ 160,695,766	$ 7,061,000	$ 16,354,000	$ 654	25000
DES 17	Heber 5 KAF Desalination with Well Field	$ 95,899,356	$ 2,476,000	$ 3,303,000	$ 661	5000
DES 13	East Mesa 5 KAF Desalination with Well Field	$ 33,027,263	$ 1,648,000	$ 3,558,000	$ 712	5000
DES 16	South Salton Sea 5 KAF East Desalination with Well Field	$ 62,177,056	$ 1,971,000	$ 5,567,000	$ 1,113	5000
DES 3	Keystone Desalination 50 KAF with Well Field and Groundwater Recharge and MCI Distribution	$ 306,357,788	$ 13,518,000	$ 31,235,000	$ 625	50000
DES 9	East Brawley 25 kAF Desalination with Well Field, Groundwater Recharge and MCI Distribution	$ 162,175,609	$ 7,084,000	$ 16,463,000	$ 659	25000
RW 2	Upgrade Existing Plants to Tertiary and Deliver Effluent to a Local Market	$ 140,568,145	$ 2,597,145	$ 10,726,215	$ 919	11700
RW 4	Regional Plant Serving Tertiary Water Locally	$ 51,323,358	$ 1,438,723	$ 4,406,758	$ 938	4700
DES 5	Keystone 25 KAF Desalination with Well Field, Groundwater Recharge & Evaporation Ponds	$ 372,088,101	$ 10,232,000	$ 31,750,000	$ 1,270	25000
	Project alternatives were considered to have a lower priority - Unit cost > $600/AF , and were not ranked (NR) in the overall Alternatives Ranking Criteria Matrix					
	Project Alternatives were considered to have a lower priority due to no groundwater banking/storage elements and not enough annual yield production < 5,000 AF, and were not ranked (NR) in the overall Alternatives Ranking Criteria Matrix					
	Project Alternatives were considered to have a lower priority due dependance on outside agency parternability, and were not ranked (NR) in the overall Alternatives Ranking Criteria Matrix.					
(1)	Assumed 50 year lifespan, 5% interest. Other project used 30 yrs and 4%. Costs will be normalized in final report					
(2)	Systems Conservation includes 24 projects, costs from $398/AF to $1169/AF, averaging $504/AF					
(3)	Source water collected from Imperial and proposed Keystone Development					
(4)	Source water collected from Imperial, Brawley, El Centro, Colexic and proposed Keystone Development					

Developing Available Supply Sources

The existing supply could be expanded by importing water, developing local groundwater by blending or desalting, desalination of drain water, use of recycled wastewater and participation in regional desalination projects.

> *IID should use an integrated approach to developing the available water supply. This could include groundwater banking, desalination of groundwater or drain water, recycling wastewater, groundwater development and blending.*

Importing additional supplies from the Colorado River or other parts of California could be a long-term opportunity but would be constrained by competition, high cost, and legal, economic and political constraints. Costs could range from roughly $250/acre-foot to $1,000/acre-foot for temporary transfers and up to $20,000/acre-foot for long-term or permanent transfers. This is not considered feasible for IID when compared to other alternatives, but nothing would prevent private parties from seeking to import water and wheeling it through IID facilities for a fee.

Local groundwater supplies are available in the East Mesa but have elevated salt concentrations in the range of 1000 to 3000 parts per million (ppm) total dissolved solids. The salts in the water require that pumped groundwater be blended with existing Colorado River water or treated through desalination to improve water quality sufficient for IID water users. An additional uncertainty comes from the variations in source water temperature that can influence the desalination process. Temperature is dependent on the level of the aquifer pumped (i.e., shallow, middle or deep). The water currently in storage in the groundwater basin is the result of 90 years of irrigation operations and seepage from the irrigation delivery systems. It is believed that there is upwards of 1 MAF in storage in the groundwater basin that could be developed at a rate of 25,000 acre-feet a year for the next forty years without negative effects. There is very little natural recharge, and developing this resource by blending or desalting the groundwater, without providing recharge, would result in mining of the water and depletion of groundwater storage over time. Excessive groundwater depletion could create the potential for land subsidence. Close coordination with Imperial County is needed to develop groundwater resources, manage any overdraft, collect data, monitor elevations, and comply with County policies.

Two groundwater development and blending projects were configured. Both projects include well fields in the East Mesa to pump water that would then be conveyed through a pipeline to the All-American Canal (AAC) for blending with Colorado River water. The first project does not include recharge ponds, was designed to yield 25,000 acre-feet ($100/acre-foot) and potentially could be brought on line in the mid- term prior to 2015. The second project was also configured to yield 25,000 acre-feet per year, but includes percolation basins and conveyance from the AAC or Coachella Canal to the percolation ponds to recharge under-runs ($122/acre-foot). This would reduce the potential for land subsidence. The banking and groundwater storage of under-runs in the East Mesa would result in reduced water quality of the stored water, but 'put and take' recharge operations could be designed to reduce this effect over time. Annual yields for the project with ponds was conservatively estimated at 25,000 acre feet per year but could be much higher (up to 50,000 acre-feet) depending on the existing groundwater quality, aquifer capacity, access to land, number of wells and sizing of recharge ponds. Blending of pumped groundwater with All-American Canal or East Highline Canal water was found to be feasible but could increase the total dissolved solids concentration in those canals to levels that would require growers to increase the amount of water applied for leaching to maintain productivity. As a result, yields would vary based o the salt concentration of the groundwater. Collection of groundwater data and pilot testing are needed to confirm the feasibility and long-term viability of these projects, and to obtain data for design of groundwater pumping and blending operations.

Seventeen different desalination/groundwater development projects were configured and evaluated, including projects of different desalination plant sizes to test economies of scale (5,000, 25,000, and 50,000 acre-feet per year); projects with and without groundwater recharge and banking; and projects with different distribution infrastructure to provide water to both MCI and agriculture. Disposal of brine waste is a large cost constraint for all of the desalination alternatives. Options investigated for disposal of brine waste included evaporation ponds, new injection wells and use of injection wells at existing geothermal operations. The ability to discharge brine to the Salton Sea is uncertain because the Salton Sea Restoration Plan has not been finalized by the state. Groundwater recharge and banking in areas where the well fields are developed would mitigate for groundwater depletion and related impact. Costs ranged between $480/acre-foot and $1,100/acre-foot. Groundwater Development/Desalination projects could be completed in the near-term time frame, roughly by 2016 or 2017.

Desalination of drain water is technically feasible. Even after the QSA/ Transfer Agreements and efficiency conservation measures are fully implemented by IID, there will still be up to 600,000 acre-feet per year of KAF drain water going to the Salton Sea. Drain water quality varies from approximately 2,500 to 4,500 ppm total dissolved solids. Between 50,000 and 100,000 acre-feet of drain water could be captured annually, desalinated and put to beneficial use; however, reductions in drain flows and flow to the Salton Sea may require additional mitigation. Three different drain water or Alamo River water desalination projects were configured and evaluated and prices ranged from approximately $540/acre-foot to $590/acre-foot. Local desalination programs are considered to be expensive but feasible near- to mid-term opportunities since IID can act independently or in cooperation with local interests to move relatively quickly. A major benefit of desalination of local groundwater or drain water to the region is the reliability of the supply. Future MCI users within IID need a high degree of reliability, both seasonally and during times of shortage, which these projects would provide. Desalination of drain water projects could be brought online in the mid-term time frame, roughly by 2016 or 2017.

Recycled wastewater is a viable strategy that could help meet IID objectives, provide new water and help meet future MCI demands. Six different recycled water projects were configured and there are opportunities for recycling municipal wastewater that could annually yield 6,000 to 14,000 acre-feet with a cost range of $120/acre-foot to $560/acre-foot. Costs vary depending on the level of treatment, and the size of distribution systems used to convey water to the treatment plant and from the plant to the place of use. IID would need to enter into partnerships with the water treatment agencies that own the water if they were not inclined to pursue this opportunity on their own. It is believed that a recycling project could be brought online in the near-term, roughly by 2014 or 2015. A number of IID Cities are actively pursuing recycled water project concepts.

Regional desalting projects are being evaluated by a number of public and private organizations, including the United States Bureau of Reclamation Yuma Desalting Plant Pilot -Project;

International Boundary and Water Commission proposed projects in Baja and Sonora, Mexico; the Navagua and Sea-to-Sea projects sponsored by different private/public interests. These are considered near- to long-term propositions that should be tracked to determine their cost-effectiveness.

Demand Management - Efficiency/Conservation

It is important for all users within IID to do all that is technically and economically feasible to save water to demonstrate that all Colorado River water is reasonably and beneficially used. If water can be conserved through these efforts, it could also be made available for other uses. The IID Plan investigated projects to save additional agricultural water beyond those projects already proposed for implementation as part of the IID's Efficiency Conservation Definite Plan (Definite Plan). Urban water conservation measures and water reduction opportunities by geothermal power plants were also evaluated.

Agricultural Water Conservation could result in approximately 10,400 acre-feet per year of additional system conservation and canal lining projects that are identified in the Definite Plan but not targeted for implementation, could be built in the mid- to near-term to conserve water that may then be made available to MCI uses that pay for these projects. The costs for these projects are in the $500/acre-foot range. Other agricultural conservation savings cannot be easily quantified, and it is recommended that opportunities for further savings be investigated after 2020 once the Definite Plan has been more fully implemented and there is an operational history to better define remaining conservation opportunities.

Urban Water Conservation can save water both now and in the future**.** The IID Cities and retail water purveyors are responsible for ensuring efficient urban water use as defined in their Urban Water Management Plans and by requiring conservation technologies and best management practices (BMPs) to be included as a condition of all new development. Aggressive conservation by existing urban users could save up to 8,000 acre-feet, but this would be at relatively high cost and savings should not be considered transferable to other uses. IID's role in urban conservation should be to focus on future uses and programs to ensure that urban BMPs and demand management measures are implemented at the time that projects are built. This will ensure that there are net reductions in demand, in the range of 10,000 to 20,000 acre-feet over the planning horizon, as land is converted from agricultural to MCI uses between now and 2047. These demand reductions, in conjunction with the appropriate conversion of use and apportionment policies, could result in additional water availability for future MCI uses.

Power Plant Water Conservation would be primarily related to use of cooling water**.** Power plants that rely on wet cooling could reduce their water demands by adopting hybrid cooling technologies. The investment in hybrid technology needs to be compared to the cost of developing supplemental water supplies to meet new or proposed non-agricultural demands. State and Imperial County standards encourage power generation facilities to investigate the economic and engineering feasibility of alternative sources of cooling water and the use of water saving technologies. IID does not have MCI policy standards or guidelines at this time and should consider developing these requirements for projects utilizing IID water for cooling purposes.

Apportionment of Water within the Existing 3.1 MAF Supply

If no new water is developed or brought into the IID area, then managing or apportioning IID's 3.1 MAF Colorado River annual entitlement is essential to help meet future MCI demands. A range of alternative management concepts is reviewed in the IID Plan. IID staff has also developed an Interim Water Supply Policy that is anticipated to be approved by the Board shortly. This policy will allow action on pending projects while the Board works to refine a longer-term approach.

In the near-term, IID should consider developing policy and regulations for an annual apportionment that expands on the existing Equitable Distribution Plan. In conjunction with the program for annual apportionment and building on its existing fallowing program, it is recommended that the Board develop a type of MCI Water Exchange along with related policies that would allow fallowing for in-valley uses and apportionment of any reduction in water use associated with land being converted from agricultural to MCI uses. These waters can be used to create an industrial water supply for the exchange. It is further recommended that a system be established that the IID Board can use to review, approve and manage changes in the place of water use and type of water use needed to meet future MCI demand.

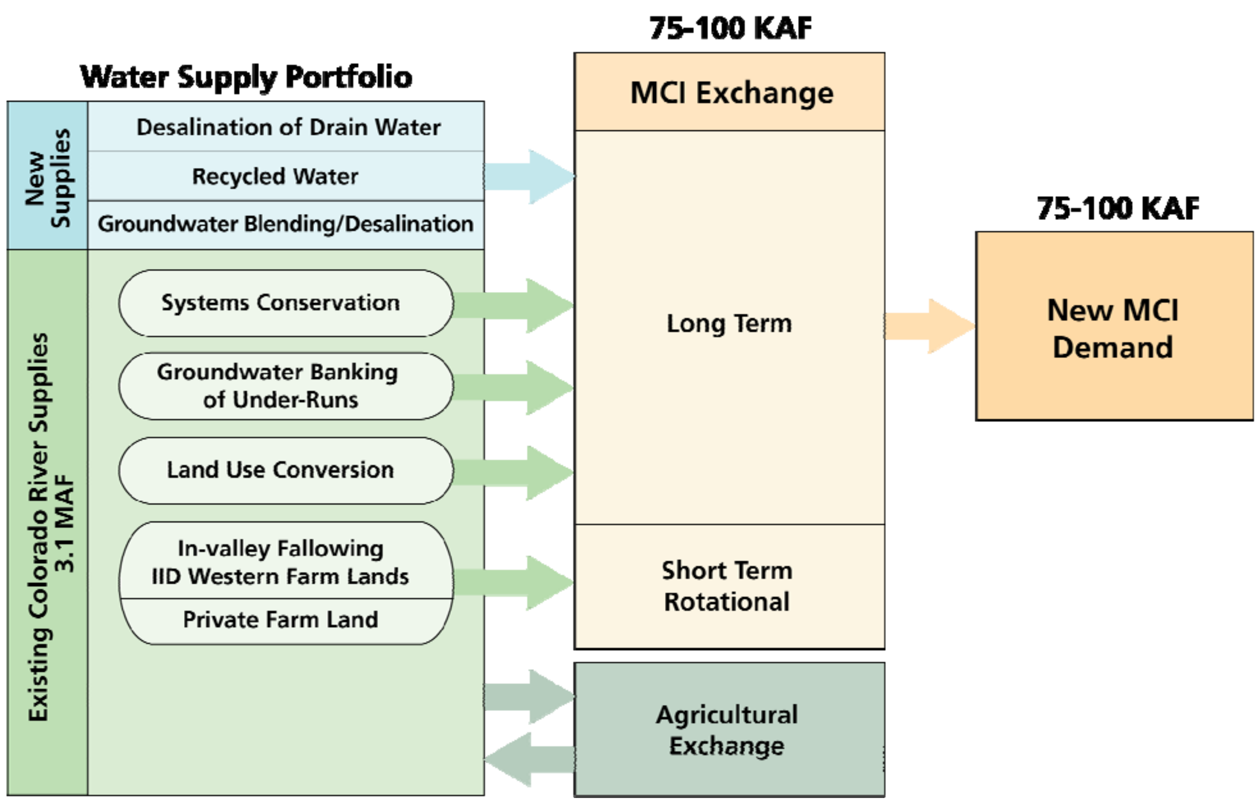
Water for an MCI Water Exchange could come from planned capital projects to be funded by new MCI uses, or from conserving water via additional agricultural fallowing for new in-valley uses or when land use conversions are approved by IID Cities or Imperial County and IID determines that water savings are being realized.

In-valley fallowing could be achieved through the rotational fallowing of private farmland or IID trust land. An options' program was also proposed and would involve paying growers for the option of fallowing the land with additional payment should the option to fallow the property actually be exercised. This type of program has been developed in other parts of the state.

Alternatively, or in conjunction with the In-valley fallowing alternative, policies pertaining to land use conversion and changes in land use, which are the purview of the IID Cities and Imperial County, could be utilized to create non-agricultural water supplies. Planned changes in land use, from agriculture to MCI, could result in intentional demand reductions that could be credited to an MCI exchange for apportionment to MCI uses (long-term or permanent changes in place/type of use). For example, Imperial County could rezone lands for renewable energy uses that require less water (e.g., solar farm) and this water could then be put into the MCI Exchange. IID would be responsible for determining the amount of water that had been freed up by this conversion.

An annual apportionment policy and an MCI water exchange are technically feasible, though implementation of new policies and programs will face a host of challenges that will require the Board to develop guidelines, standards and/or regulations in consultation with its water users and the local land use authorities.

MCI Exchange/IID Water Supply Portfolio



IID should develop a standard contract or a permit system to review and approve proposed changes in place or type of water use; apportion water from an MCI exchange; verify a water supply for purposes of communicating with the IID Cities and County and define conditions to mitigate impacts. The goal of the IID process will be to minimize substantial injuries to any other legal user of water, no third-party effects and a net economic benefit to the IID service area. Final pricing, fee structures and rates need to be worked out, but a tiered rate structure is recommended to encourage conservation. As noted above, an "options" program has been proposed as one means of compensating growers and landowners for fallowing, and could be utilized to generate funds for construction of capital facilities intended to develop new water supplies as mid- and long-term solutions. The program for annual apportionment should be integrally linked to a financial mechanism that would fund administration of the MCI Water Exchange, provide compensation for fallowing and establish a mitigation fund that could be used to build capital projects that result in increases to the IID ***Water Supply Portfolio***.

Guiding Principles

After reviewing and discussing the range of policy alternatives, the Board developed broad policy concepts that were then presented to the Water Planning Group composed of two members of the IID Board and two members of the Imperial County Board of Supervisors.

1. <u>Annual apportionment to all water users</u>: IID board should make a yearly determination of forecasted water use among all categories of users, and apportion in a manner that is

consistent with existing or revised equitable distribution program guidelines. Multiple benefits are associated with an annual apportionment, including the ability to better manage annual overruns, the creation of an MCI water exchange, and the development of 'pools of water' for the various classes of users to facilitate long-term planning and business development efforts.

2. Joint land-use conversion policy: Imperial County, as the land-use planning entity, and IID, as the purveyor of water to the region, should agree to the establishment of designated corridors that would facilitate the conversion of agricultural lands for the development of renewable energy production.

3. Joint groundwater study: Imperial County and IID should conduct a joint feasibility study, focusing on data collection and groundwater monitoring, to better ascertain the availability and accessibility of groundwater resources throughout the region.

4. Fallowing for in-valley water utilization: IID will consider rotational fallowing of Western Farmlands and/or private lands, and fallowing options program similar to that utilized in the Palo Verde region to generate water for MCI purposes.

5. Water storage and banking projects: IID will pursue storage projects it has already identified within its service area and banking opportunities outside its service area. While building projects to augment the existing water supply is generally more expensive than implementing the policy options listed above, the district recognizes that storage is vital to the long-term management of its water supply and that storage provides the most durable and defensible means of addressing fluctuations in agricultural usage from year to year.

6. Commitment to regional planning model: In concert with Imperial County and the larger community, IID will develop a regional water plan that actively solicits and relies on stakeholder advice and consent in balancing the needs of diverse interests. It will be guided in this process by the twin goals of multiple use and sustained yield.

It is recommended that the following additional guiding policies be considered.

7. Recognition of impacts: Projects that intensify water use and have an impact on existing IID supplies and water uses should be responsible for mitigation of the impacts. Certain MCI uses would increase demand over that historically used, and/or result in a 'hardened' demand that requires a highly reliable supply that cannot be easily cut back in times of shortage or supply/demand imbalance. These demands would impact existing agricultural uses in times of overrun and have the potential to increase the frequency and amount of extraordinary conservation fallowing needed from agriculture. Mitigations could include development and financing of new supplies obtained under a permit from IID, contracts with IID for a new supply, or participation in the MCI Water Exchange.

8. Those who benefit pay: Development of funding strategies should be based on the principle that those who benefit pay. MCI projects that rely on IID water should pay for the benefits they derive from use of this highly reliable supply.

9. Credit new water to investors: New water developed should be credited to the entities that invested in its development even if they do not take direct delivery of the water if those flows are used by IID in that calendar year or stored for a future use. In other words, if new water was delivered anywhere in the IID system and applied in-lieu of Colorado River water or if such water was stored, such water would be credited to the new water users and could be used to mitigate for any impacts to existing IID supplies or historical water users.

Summary of Overall Findings

Supply Augmentation

- Local water supply augmentation opportunities are available and IID could implement capital facilities alone or in partnership with IID Cities and Imperial County to increase supplies in the mid- to long-term. The capital projects will require debt service and investments in infrastructure to provide new water for future MCI uses.
- Regional supply augmentation projects for importation or desalination exist but are considered long-term propositions that would require complex permitting, partnering, extensive negotiations and planning. Importation of water supply from other areas would be in a highly competitive market involving other Southern California and Colorado River interests with large tax bases and revenues.
- Groundwater banking to maximize IID's 3.1 MAF annual Colorado River entitlement is needed to make full use of IID's existing water rights and should be a priority .
- Agricultural water users and IID Cities, most of which are economically disadvantaged, have limited willingness or ability to pay for new projects. Changes in rates to fund capital projects would likely be required to adhere to IID's Proposition 218 protest regulations.
- Contracts with new water users could expedite and fund development of capital projects.

Demand Management

- With the exception of some smaller system improvement projects, there are very few practical opportunities to implement additional agricultural water conservation projects in the near- or mid-term, beyond those already planned. It is advisable to move forward to implement the Definite Plan and to revisit additional agricultural conservation after there is an operational history that can be used to better define remaining conservation opportunities.
- IID's role in urban conservation should be to coordinate with IID Cities and Imperial County to ensure that future water users implement BMPs to reduce future consumption and save an expected 10,000 to 20,000 acre-feet per year over what would occur in the absence of requirements for such best management practices and demand management measures.
- A regional Urban Water Management Plan and appropriate standards and guidelines would help ensure implementation of demand management measures.
- Geothermal power plants could save water through implementation of hybrid cooling.
- Results of the study of water conservation cooling technologies and costs indicate that the price per kilowatt of power produced is not sensitive to the price of water, indicating that

there is an ability to pay for water at price points ($/acre-feet) of up to $400 per acre-feet as specified in the cost of capital facilities analysis in the IID Plan.

- IID raw water should be viewed as a water supply of last resort to be consistent with state laws and to confirm that all reasonably feasible measures are being taken to reduce cooling water demands.
- Regardless of whether wet or hybrid cooling is used, power plants that require cooling water in excess of historical uses should mitigate for their new water demands by supporting development of, or independently developing, capital projects to produce new water supplies or participate in some type of water exchange managed by IID and supported by the agricultural community to offset their water demands.

Water Policies and Program

- New policies and programs are needed by IID, whether to manage development of capital projects, to create new water supplies or to apportion water between existing users. If supply augmentation capital projects are not funded and implemented, the only alternative to supply water for new MCI projects is through an annual apportionment to the various classes of water uses such as agricultural and MCI.
- An annual apportionment program should be considered to apportion water on an annual basis to the use categories and to major MCI accounts.
- Annual apportionment implies reduction in agricultural water use by willing participants so that water can be made available for new demands. As opportunities for additional agricultural water conservation are extremely limited, any reduction in agricultural water supplies would come from an "in-valley" fallowing program or land use conversions.
- Annual apportionments would allow for the development of an MCI Water Exchange for new non-agricultural uses within the IID service area and include an IID-managed process to review and approve changes in the place or type of use within the IID service area. Water for MCI Exchanges would come from:
    - Capital projects
    - In-valley fallowing of private farm land or on Western Farm Lands
    - Land use conversions from agricultural use to MCI uses that save water
- In-valley fallowing and land use conversions represent changes in place or type of use of IID's Colorado River water within the district's service area and should be accounted for by IID to ensure fairness, equity and reasonable and beneficial use of the water.
    - Land use conversions are the responsibility of the IID Cities and Imperial County and can increase or reduce water demands on a parcel. The amount of the change in demand and how to apportion that change is to be determined by IID.
    - Land use conversion also implies a change in the place or type of use of IID Colorado River water within the district's service area, and this change is the responsibility of IID.
    - The responsibilities are coequal and interrelated.
    - IID, the IID Cities and Imperial County have some shared responsibility to ensure that all of IID's Colorado River entitlement is reasonably and beneficially used and that any third-party or environmental impacts are mitigated.

- IID should develop a contracting, permitting or other refereed process to apportion, quantify and track water to new MCI demands from an MCI Water Exchange. The Equitable Distribution Plan and existing fallowing program provide a basis from which to start.
- There are opportunities to formalize and streamline the water and land use decision-making processes and ways to offset any increases in MCI water use.
- With an adopted IID Plan or Imperial IRWMP that defines capital facilities and interim measures such as the Interim Water Supply Policy, IID can assess impact fees to fund these plans provided these monies are reserved for implementation of the planned projects (e.g., capital facilities to create new water). These monies cannot be used for other nonrelated purposes.

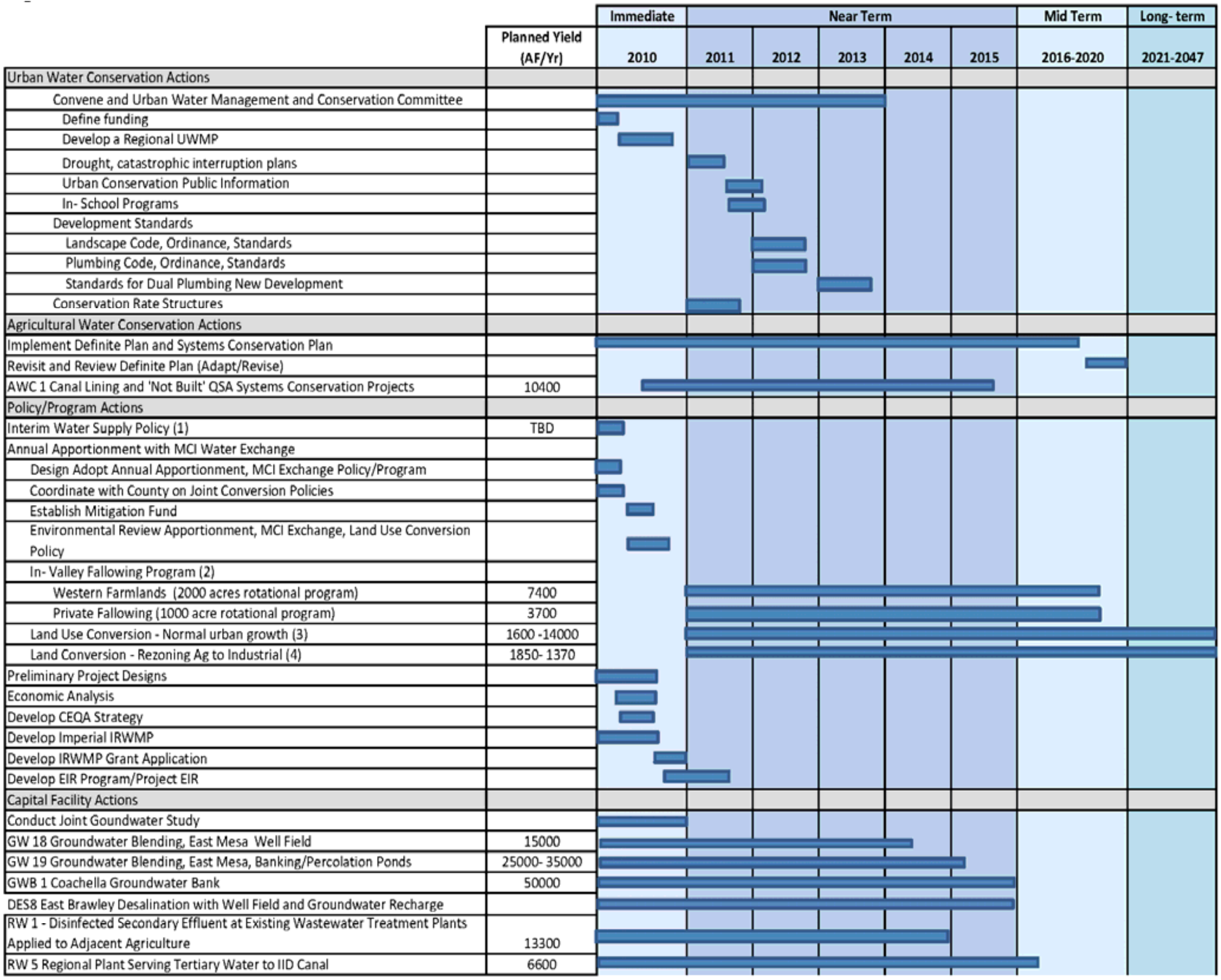
Integrated Regional Planning and Funding

- IID should work with regional stakeholders to develop an Imperial IRWMP that defines regional projects, helps the community resolve conflicts and obtains grant funding.
- IID has proposed an effective plan for governance and oversight of the effort to develop an Imperial IRWMP.
- A facilitator should be used to assist the community to move forward with this process and to maintain a schedule, so that a plan can be adopted in a timely manner and an expedited application can be submitted for Imperial IRWMP implementation grant funding.
- The IID Plan identifies funding sources that can be accessed by the district to conduct additional feasibility and design studies, complete environmental review and implement capital projects.
- IID is likely to be more successful in obtaining grant funding if a unified local front is developed with the IID Cities, Imperial County, the agricultural community and other stakeholders.

Implementation Schedule

Figure 1 presents the schedule for the capital project alternatives and shows the timing of potential yields (acre-feet per year) from both the capital projects and the policy/program actions. A preferred alternative has not been selected by the IID Board and there are a number of approaches to combining the non-structural policy/program actions with capital projects to create new water. A final implementation plan can be configured once the Board has received public comment, reviewed that information and provided further direction.

Figure ES-1. Project Implementation Schedule



Timing of Industrial Water Portfolio Planned Yields (AF)

MCI Exchange: Policy for Land Use Conversion and In Valley Fallowing	Unit Cost ($/AF)	Timing of Yield (AF/yr)							
In-Valley Fallowing w/ Option Program (2)									
Western Farmlands	$200		7400	7400	7400	7400	7400	7400	
Private Fallowing	$200		3700	3700	3700	3700	3700	3700	
Land Use Conversion - Normal urban growth (3)	$0		1600	1600	1600	1600	1600	4300	14000
Land Use Conversion - Rezoning Ag to Industrial (4)	$0		1850	1850	1850	1850	1850	3700	3700
Capital Facilities, IID Developed									
GW 18 Groundwater Blending, East Mesa Well Field	$91					15000	15000	15000	15000
GW 19 Groundwater Blending, East Mesa Well Field, Percolation Basins (5)	$129						25000	25000	25000
WB 1 Coachella Valley Groundwater Storage Project	$265							50000	50000
DES 8 East Brawley Desalination with Well Field and Groundwater Recharge	$480							25000	25000
AWC 1 Canal Lining & 'Not Build' Systemwide Projects	$504						10,400	10,400	10,400
Capital Facilities, Recycled Water, Multiple Participants									
RW 1 Disinfected Secondary Effluent from Existing Wastewater Treatment Plar	$118						13300	13300	13300
RW 5 Regional Plant Serving Tertiary Water to IID Canal	$308							6600	6600
Total Potential Combined Yield		0	14550	14550	14550	29550	78250	164400	163000

(1) IWSP savings linked and accounted for as part of In-Valley Fallowing actions.
(2) In-Valley fallowing would be in addition to the QSA/Transfer Fallowing as assumed. 2000 acres of Western Farmlands and 1000 private acres at 3.7 AF/acre
Initial Western Farmlands Fallowing for Interim Water Supply Policy. Yield will vary by participation in the program. Yield set as a goal to match new demands.
Plan is to include "Option" Contracts exercised in overrun years as part of managing the cap.
(3) Based on average growth and 1.75 AF/acre savings from land conversion over the periods identified.
(4) Assume 500 acres, between 2010 and 2015; 500 additional 2016-2020 at 3.7 AF/acre
(5) Yield is conservatively estimated pending field study and modeling. With Recharge could go to 50,000 AF