



Chapter 9

Improve Flood Management

Table of Contents

9.1	Improve Flood Management	9-3
9.1.1	Findings	9-3
9.1.2	Recommendations	9-4
9.2	Imperial Region Conditions.....	9-5
9.2.1	Watershed and Drains.....	9-6
9.2.2	Management Policies and Plans.....	9-6
9.2.3	State Programs.....	9-8
9.2.3.1	Statewide Flood Management Plan	9-8
9.2.3.2	Stormwater Flood Management (SWFM) Grant Funding	9-8
9.3	Opportunities	9-9
9.4	Constraints	9-9
9.5	Integration and Relation to other Resource Management Strategies	9-10
9.6	Support for Mitigating or Adapting to Climate Change.....	9-11

Chapter 9. Improve Flood Management

9.1 IMPROVE FLOOD MANAGEMENT

California Water Plan Update 2009 includes a Resource Management Strategy (RMS) addressing regional flood control. During stakeholder assessment and interviews by the Imperial IRWMP facilitator (see Appendix Q) and subsequent evaluation of Disadvantaged Community (DAC) needs, Imperial Region stakeholders identified conveying stormwater off from developed areas, reducing localized flooding, and improving economic development potential within the urban areas as high priorities.

The Water Forum integrated the CDWR Urban Runoff Management resource management strategy and a regional flood control into the Improve Flood Management objective.

The Projects Work Group discussed stormwater and flood control in their early meetings, and a Flood/Stormwater Workshop was held May 2011 to draft findings and recommendations. The draft findings and recommendations were introduced to the Water Forum in June 2011. Subsequently, local agency staff sought input from other groups, including the Imperial County Transportation Commission's City Managers Committee and Technical Advisory Committee composed of local public works engineers. Flood control challenges and opportunities were also discussed at a local American Society of Civil Engineers meeting. The Water Forum adopted findings and recommendations at the March 2012 meeting, as follows.

9.1.1 Findings

- Stakeholder assessments and DAC needs analysis have documented localized stormwater and runoff concerns and an awareness of the need for regional solutions.
- Economic development of planned urban areas will be constrained without management structures, capital facilities, and funding mechanisms to provide regional and local drainage solutions and benefits.
- The Preliminary Drainage Master Plan prepared by IID (Black and Veatch, 1994) and other city and county master plans provide a basis for discussion of structural solutions and for development of priorities for regional drainage.
- IID, Imperial County and the Cities cannot solve flood and stormwater management problems independently. The lack of a regional organization with a stable funding mechanism and a clear mission is the largest constraint to solving stormwater and flood problems.
 - IID is not chartered as a flood control district. IID has drainage facilities that meet their intended purpose within the service area. If improved, these facilities could provide the

underlying infrastructure for additional regional stormwater benefits and solutions to the developing areas.

- As the Cities develop, they will potentially increase runoff and impair drain and river water quality. The Cities have the largest need for improved regional stormwater management and conveyance, but do not have authority to deal with regional drainage or manage areas outside of their jurisdiction.
 - The land use authorities have the ability to require improvements, condition new development and make improvements to develop stormwater facilities and mitigate increased runoff or water quality impairments.
 - Imperial County has the appropriate jurisdictional authority to lead formation of a regional flood control district, or to combine land use authorities of the County and the Cities to address both urban stormwater runoff and the larger regional flood control issues. IID, Imperial County, and the Cities all face financial limitations. Competing for funding within the Imperial Region and not combining resources or authorities to address the issues will limit the ability to successfully obtain grant funding and compete with other regions.
- CDWR funding is available through the Proposition 1E IRWM Stormwater Flood Management (SWFM) grant program; however, it requires 50 percent cost sharing by the local region, with local matching funds secured prior to contract award.

9.1.2 Recommendations

1. Use the Water Forum process to evaluate and set up a framework for a regional flood control district, including evaluating alternative institutional structures, management programs, and funding mechanisms for project solutions to stormwater management and flood control.
2. The Imperial IRWMP should include both program solutions and potential integrated stormwater/flood projects that would qualify for CDWR grant funds under Propositions 84 and 1E and serve to demonstrate regional stormwater planning ideas.
3. The Imperial IRWMP Projects Work Group should have sessions that focus on preferred projects for the region that collectively reduce flood damage, show multiple benefits and are competitive for future SWFM grant solicitations. One or more of those projects could be singled out as a regional stormwater retention project or similar flood reduction project.
4. Identify a regional stormwater retention project to serve as a case study and demonstrate economic costs and benefits of regional facilities to serve developing areas.
 - Fund the project through an MOU of multiple partners willing to provide the local match.
 - Provide a basis for future planning efforts aimed at detailed study of populated areas in Imperial Region to identify specific drainage system improvements and provide a model of how the Cities, County, and IID can coordinate.

5. Initiate high-level policy discussion among select members of the County Board of Supervisors, IID Board of Directors and City Council representatives for creation of a Flood Control District or Joint Powers Authority for flood management. This will likely be needed to secure region-wide funding that would benefit more than a single local water supplier or local stormwater interest.
6. The IRWMP should lay out a program that can be phased in over time. In setting priorities, the Water Forum should consider the following:
 - Possible loss of life or injury to people would take precedence over major property damage, and major property damage would take precedence over occasional flooding that could result in inconvenience and/or annoyance.
 - More highly developed areas should be protected prior to less developed areas.
 - Main drains that serve as collectors for tributary reaches should have priority over more localized reaches.
 - Improvement of a downstream reach would have priority over an upstream reach.
 - Thorough regulatory and legal reviews should be performed to determine what constraints and opportunities associated with the existing drainage system would impact the potential formation of a flood control district.
7. Develop a Hydrology Manual (or similar set of regional standards) that defines consistent methods for engineering evaluation of pre- and post-project stormwater runoff. This would support design of on-site and off-site retention facilities based on regional analysis of runoff from drainage areas that contribute storm flow to the watershed areas drained by IID facilities and to the New River and Alamo River.
8. Develop a stable funding stream to: a) establish the program and needed policies, b) draft engineering plans and prepare engineering reports to seek voter approval for benefit assessment zones; c) implement programs approved by voters.
9. A regional funding program for multiple agencies will likely require significant public outreach, particularly if the regional agency would be securing local cost-sharing funds through a Proposition 218 assessment or similar means.

9.2 IMPERIAL REGION CONDITIONS

The U.S. Army Corps of Engineers (USACE, 1989) noted that two types of flooding occur in Imperial County: 1) major regional floods (as during a hurricane event), and 2) localized floods from runoff originating in developed (agricultural and urban) areas. Major destructive flood flows result from runoff that originates outside the developed areas of the Imperial Region (in general, from the West Mesa or East Mesa) is conveyed by alluvial fan washes. No facilities exist to convey these flows through developed areas, so flows impact developed areas before they reach points of disposal such as the New and Alamo rivers, their tributaries, and ultimately the Salton Sea. Runoff within the developed area of the Imperial Region constitutes the second type of flooding. This runoff arises from rain falling directly

on these areas. Existing interior drainage facilities—irrigation drains in the agricultural areas, and storm drains in the communities—convey part of the interior runoff to IID drains and other the points of disposal cited above.

9.2.1 Watershed and Drains

Regional flood control facilities are minimal. Structural flood protection measures in the Imperial Region include a system of dikes that provide flood protection from 100 to 500-year events for areas adjacent to the Salton Sea. Additionally, breakwaters have been sited at some locations near the shore of the Salton Sea to prevent damage from wave action. Natural channelization of washes along the western shore of the Salton Sea has allowed many of those channels to contain the 100-year flood within the channel banks.

IID's drainage system includes a network of 1,456 miles of open and closed (pipeline) drains, 750 surface and subsurface drainage pumps, and thousands of miles of landowner-developed subsurface tile drains. IID's drains are designed to collect surface and subsurface discharge waters from the Region's agricultural operation and convey them to the Salton Sea, either directly, or through the New and Alamo rivers. Each quarter-section of land (160 acres) is permitted one 12-inch diameter tailwater outlet for discharging surface runoff from irrigation. Consequently the system has little capacity to intercept and convey storm runoff from the surrounding desert, mountains, or municipal areas in the Imperial Region.

To the degree possible and based on design capacity, IID operates and maintains the drainage system to provide flood control benefits. The Cities, County, and private landowners rely on IID drains and expect to be able to discharge into the IID system. A clear delineation of roles and responsibilities between the agencies in the County has not been developed. IID is providing stormwater and flood control services that are not part of the design of the drainage system. IID rates and charges do cover providing flood control, improving drains to provide flood or stormwater relief, nor to accommodate anticipated increased stormwater runoff from new urban development.

9.2.2 Management Policies and Plans

Imperial County developed the Imperial County Flood Management Plan (FMP) (Imperial County, 2007) to review flood history; identify the County's known flood problem areas; establish goals, objectives, policies, and implementation programs to reduce flooding and flood related hazards; and ensure that natural and beneficial functions of the floodplains are protected.

Imperial County continues to plan and implement solutions for flooding conditions. In an effort to reduce costs associated with flood hazard mitigation and flood insurance, the Imperial County FMP identifies flood hazards within Imperial County and proposes potential mitigation measures. The Imperial County FMP is a future-oriented approach to planning in flood risk areas. It is a pre-disaster planning approach that is required by the Federal Emergency Management Agency (FEMA) as a condition of the County's continued participation in the National Flood Insurance Program (NFIP). Imperial County and the cities of Brawley, Calexico, Calipatria, El Centro, Holtville, Imperial, and

Westmorland all participate in the NFIP Program. The Imperial County General Plan Seismic and Public Safety Element (Imperial County, 2003) sets the overall flood control goals and objectives for the County. Imperial County and the Cities' land use plans and local ordinances require development to mitigate for stormwater impacts.¹ The County FMP summarizes the City policies.

IID Rules and Regulations (IID, 2007) do not require pre- and post- development runoff flows to be the same. The IID Developer Project Guide (IID, 2008) contains standard drawings for connecting to IID facilities and an explanation of the process by which these facilities are authorized (planning phase, design phase, construction phase, and close-out), but does not specify pre- or post-development runoff requirements.

County, City, and IID policies require on-site retention at the time of development, and the developer is responsible for mitigating stormwater impacts. The County does have an ordinance requiring detention basins to empty a 100-year storm within 72 hours; however, the basins rarely drain in the allotted time due to factors that include tight soils with slow percolation, a high water table (just below the agricultural tile drain system), and insufficient capacity to discharge into IID drains (one 12" pipe for every 160 acres). The Cities have general plans, building codes, and drainage management requirements to retain stormwater consistent with the regional requirements of IID, Imperial County, and/or the state.

IID coordinated development of the Preliminary Drainage Master Plan, cited above, that investigated regional options for flood control and stormwater management. This document was a comprehensive study of drainage issues and possible solutions. Projects that were identified included development of procedures for analyzing and designing storm drainage systems, identification of capital improvements to mitigate flooding problems, development of water quality criteria for handling storm drainage, evaluation of steps required to finance the improvements, and the outline of an organizational structure needed to implement the plan. The study identified facilities and improvements (both regional and stormwater related) at a conceptual level. It was not detailed enough for final design, but focused on planning and engineering efforts that would need to be conducted before proceeding to construction.

The IID board did not adopt the Preliminary Drainage Master Plan due to funding and jurisdictional considerations. IID also has a Drain Water Quality Improvement Plan (IID, 2005) which was approved by the Regional Water Quality Control Board, and a Vegetation Management Plan to minimize drain water quality degradation during system maintenance.

A number of cities in the Imperial Region are working to develop master drainage plans, but such plans are reliant on improvement to regional flood conveyance. The County has developed master drainage plans for Heber (Nolte, 2006) and Niland (Nolte, 2007).

¹ County of Imperial Title 9 Land Use Ordinance, Division 16, Flood Damage Prevention

9.2.3 State Programs

9.2.3.1 Statewide Flood Management Plan

The Statewide Flood Management Planning (SFMP)² program is led by CDWR through the FloodSAFE Initiative.³ The SFMP program is working on a draft report titled, “Flood Future: Recommendations for Managing California’s Flood Risk” (Flood Future Report)⁴ that will identify flood risks, challenges and opportunities along with recommendations for improving and financing integrated flood management. The state is exploring financial, institutional, legislative, and policy options to help improve local and regional flood management systems.

CDWR is collaborating with local, state, and federal agencies and tribes throughout California and has met with representatives in the Imperial Region. The SFMP will help guide the state’s decisions, and inform federal decisions about policies and financial investments related to Integrated Flood Management (IFM) throughout California, including the Imperial Region. IFM is an approach to dealing with flood risk that recognizes the connection of flood management actions to water resources management, land use planning, environmental stewardship, and sustainability. IFM evaluates opportunities and potential impacts from a system perspective, and promotes coordinating across geographic and agency boundaries.

9.2.3.2 Stormwater Flood Management (SWFM) Grant Funding

The Proposition 1E grant program⁵ is a source for financial support. Proposition 1E applicants must engage in the IRWM Planning process, and adhere to both CDWR IRWM Guidelines and to the Proposal Solicitation Package (PSP). Proposition 1E seeks to fund projects that show measurable reductions to local/regional flood risks and potential reductions in flood damage costs while yielding other multiple benefits such as groundwater recharge, water quality improvement, and/or ecosystem enhancement.

Proposition 1E is limited to \$30 million per project. To participate, local resource agencies need to devise their local cost-share of at least 50 percent by Proposition 218 Assessments and/or by other funding mechanisms. The Proposition 1E solicitation is unclear whether concessions will be allowed for lowering the cost-sharing percentages below 50 percent for DACs. Similar to other Imperial IRWM funding programs, Proposition 1E funding requires monitoring, assessment, and performance measures. Only seismic related improvements will be funded in future grant solicitations.

2 Statewide Flood Management Planning Program. <<http://www.water.ca.gov/sfmp/update.cfm> >

3 FloodSAFE California. <www.water.ca.gov/floodsafe>

4 SFMP Team Continues Moving Forward on Flood Future Report. <www.water.ca.gov/sfmp/update.cfm#team>

5 IRWM Grant Program – Proposal Solicitation Package for Stormwater Flood Management Grants.
<http://www.water.ca.gov/irwm/integregio_stormwaterflood.cfm>

9.3 OPPORTUNITIES

- The Preliminary Drainage Master Plan provides a valuable analysis of structural and management opportunities to improve regional flood and localized stormwater management. City and County drainage master plans identify projects, funding requirements, and benefits. Numerous opportunities for more efficient flood management include the following:
- Identify local projects in City and County drainage master plans that are ready to proceed, have funding, and can be competitive for state and/or federal grant monies.
- Develop a regional hydrology manual to establish standards and guidelines for the Imperial Region.
- Adopt a regional drainage master plan, or at minimum, localized drainage master plans for specific areas slated for future development or experiencing stormwater runoff problems.
- Develop regional integrated stormwater management facilities that provide multiple benefits. Sample projects include:
 - A total storage approach to provide flood protection, as advocated in the Preliminary Drainage Master Plan. This would include on-site, in-city and off-site stormwater detention and retention ponds,⁶ along with flood/stormwater improvements to IID drainage.
 - Regional detention and retention ponds that have multiple beneficial uses, instead of development-specific detention ponds, which occupy acreage and reduce development potential.
 - Adapt IID drains to convey additional flow from increased urban runoff.
- Work with developers to identify specific areas where multiple benefits can be attained.
- Clarify regional roles and responsibilities, and consider formation of benefit assessment zones, special districts, or a joint powers authority to manage and fund implementation of flood master plans.

9.4 CONSTRAINTS

A number of constraints affect the ability to implement effective flood risk and urban runoff management strategies in the Imperial Region. Technical constraints and flood problems are documented in the Preliminary Drainage Master Plan, County FMP, and the City drainage plans,

⁶ A retention pond is designed to hold a specific amount of water indefinitely. Usually the pond is designed to have drainage leading to another location when the water level gets above the pond capacity, but still maintains a certain capacity. A detention pond is a low lying area that is designed to temporarily hold a set amount of water while slowly draining to another location. 9 July 2012. <<http://www.newton.dep.anl.gov/askasci/eng99/eng99219.htm>>

including areas subject to frequent flooding and where structural improvements are needed. However, the lack of defined regional flood management roles and responsibilities, combined with local economic and fiscal constraints have prevented improvements in flood and stormwater management.

The Imperial Region has no countywide or regional flood control districts, nor any benefit assessment zones. No regional master plans for drainage have been adopted to coordinate the activities of the County, IID, and the Cities. Jurisdictional roles and responsibilities are not clearly delineated, and zones of benefit and revenues are not defined. This constrains regional solutions and an integrated approach.

The cost of structural solutions can be substantial and competition for local resources and legal requirements for approval of new funding may impede implementation of structural flood improvements. Additionally, maintenance of flood facilities has the potential to impact sensitive environmental resources, such as riparian habitat and special-status species.

The lack of management structure and limited funding capacity on the part of Regional agencies make it challenging, if not impossible, for Imperial IRWMP projects to be competitive for state or federal grant funds when they become available.

9.5 INTEGRATION AND RELATION TO OTHER RESOURCE MANAGEMENT STRATEGIES

Other RMS's related to Regional Flood Control include:

- **Land Use Planning and Management**—agency decisions influence potential risk to lives and property on floodplains and alluvial fans from flooding, and may affect the intensity and duration of some flood events. Application of appropriate standards at the time of project development can mitigate both on-site and off-site flood, stormwater and water quality impacts.
- **Water Quality Protection**—must be factored into development of a regional program, with specific facility designs to reduce loading from agricultural and urban nonpoint sources of pollution during flood events in accordance with the Water Quality Control Plan, Colorado River Basin – Region 7 (Basin Plan).⁷
- **Ecosystem Restoration**—can be integrated into regional flood retention facilities to provide multiple benefits.
- **Recharge Area Protection**—can be achieved by preserving the 100-year flood plain.

⁷ Colorado River Basin – Basin Planning.

http://www.waterboards.ca.gov/coloradoriver/water_issues/programs/basin_planning/

- **Conveyance**—strategies could include improving the IID agricultural drainage system to meet regional stormwater management objectives using the concepts identified in the Preliminary Master Plan of Drainage.

9.6 SUPPORT FOR MITIGATING OR ADAPTING TO CLIMATE CHANGE

The Imperial Region may be vulnerable to climate change which may increase the frequency and severity of flood events due to changes in precipitation and runoff patterns. As stream flows and velocities change, erosion patterns will also change, altering channel slopes and depths. A regional approach to flood control and stormwater management will help the Imperial Region plan for and adapt to climate change.

