

Executive Summary

In 1985 the Nevada Legislature passed legislation that allowed the local entities the opportunity to create the Clark County Regional Flood Control District (CCRFCD) in response to severe flooding problems in Clark County. The CCRFCD is responsible for developing and implementing a comprehensive flood control master plan to alleviate flooding. In 1986, in accordance with Nevada state law, the original flood control master plan was developed addressing flood control needs for the entire CCRFCD service area, (i.e., Clark County).

Nevada Revised Statute 543.596 requires that flood control master plans must be reviewed and updated at least every 5 years. The 2008 Las Vegas Valley Flood Control Master Plan Update (MPU) is one of those updates. Master Plan Updates for Las Vegas Valley were prepared and adopted in 1991, 1997, and 2002. The purpose of the update is to add any new relevant information, to assess progress towards fulfillment of the Master Plan, to identify obstacles in completing the Plan, and to recommend changes resulting from growth and development. The 2008 MPU has been developed to satisfy these requirements.

The study area for Las Vegas Valley MPU is divided into ten hydrographic planning areas or watersheds to facilitate the implementation of the flood control plan. Each watershed is analyzed using consistent criteria and methodology. The 2008 MPU and previous MPUs are based on assumptions about future growth and development in Las Vegas Valley in order to represent the ultimate hydrologic condition and to aid in the planning and preliminary design of future flood control facilities. The ultimate hydrologic condition uses land use data that represents the full build out condition and to facilitate the use of this condition, an Ultimate Development Boundary (UDB) was generated for the Las Vegas Valley. This boundary is based on the mountainous terrain that surrounds the Valley and the locations of protected lands. Future land use is used in conjunction with the 100-year frequency flood event and soil data to develop hydrologic models that establish peak flow rates and flow volumes for drainage corridors. These peak flow rates and flow volumes are then used to analyze the flood control system to identify deficiencies in the existing flood control plan. The final flood control facility plan is then recommended to mitigate these identified deficiencies.

The 2008 MPU serves as a planning tool for implementation of the flood control system in Las Vegas Valley and the design and construction of master plan facilities. The flood control system identified and described in this MPU may be subject to further amendments and revisions in the future as more detailed analyses are completed for facilities during pre-design, design, and other activities that may warrant modification of the flood control plan. The hydrologic analyses developed with the 2008 MPU are intended to aid in the planning of the flood control system in the Las Vegas Valley. Therefore, more detailed hydrologic analyses should be completed during the design phase of flood control facilities.

The information presented in the 2008 MPU was developed in close coordination with CCRFCD staff and representatives of several local and regional agencies and their assistance towards the development of the 2008 MPU is greatly appreciated.

Modifications made to the flood control plan during development of this 2008 MPU are based on the following:

- Identification of flood control facilities constructed after the 2002 MPU
- Modifications made, through Master Plan Amendments, to the flood control plan after the 2002 MPU
- Updated UDB and land use data
- Revised watershed and subbasin boundaries
- Updated hydrologic models that reflect changes in the watershed that have occurred since the 2002 MPU was completed.
- Revisions to facility sizes and alignments due to changes in flow rates and volumes generated from the updated hydrologic models.
- Addition of new facilities where deemed necessary to better address flood hazards

The 2008 MPU is based on current information available during its development in 2006, 2007, and early 2008. The resulting plan should be viewed as a flexible document capable of being adjusted in response to changing conditions and priorities.

Key enhancements and updates that were made in the 2008 MPU include:

- The land cover (open space) distribution of grass landscaping (good condition) and natural desert landscaping used for each applicable land use category associated with future development was adjusted to reflect restrictions on the amount of allowable grass landscaping per the SNWA drought ordinance.
- Conversion of the HEC-1 hydrologic models into HEC-HMS models. It is anticipated that these HEC-HMS models will be used for future MPU hydrologic modeling efforts. HEC-HMS supersedes the HEC-1 program and was designed to use advances in computer science and engineering wherever possible to improve the quality of simulation results.
- Major Updates to the facility construction Cost Estimation Tool include:
 - Unit costs equations were updated to 2006/2007 dollars.
 - Right-of-way cost was computed for all facilities as 16 percent of the total facility cost. In the 2002 MPU, right-of-way acquisition needs were determined individually for each facility based on property ownership and

- assessor maps. The right-of-way cost was then estimated based on zones of land cost developed specifically for the MPU.
- Major lateral collector storm drain costs were added to all channels and storm drains as 12.5 % of the total facility cost. This cost encompasses the major collector storm drains that would fall under the ¼ mile funding rule for Capital Improvements Projects.
- During the 2008 MPU, several enhancements were made to the Geographic Information System (GIS) data in an effort to improve the quality and completeness of the data. Major improvements made to the GIS data and cartographic representation of the data include:
- All of the pertinent GIS data used throughout the 2008 MPU was incorporated into a geodatabase, which is the primary data format used in ArcGIS for editing and managing data.
 - Unique ID-Mile identifiers were updated and assigned to all flood control facilities to more clearly distinguish between existing and proposed facilities and to better facilitate project funding and programming.
 - A GIS feature (point, arc, or polygon) was created for all regional flood control facilities (corresponding with each unique ID-Mile), whereas in the 2002 MPU, existing facilities with proposed replacement facilities were grouped together and represented by a single GIS feature.
 - The alignments and spatial representations of the facility layers were reviewed and updated when necessary to more accurately represent actual conditions and to ensure that the facilities are shown within their associated right-of-way. In addition, several attribute fields were added to the attribute tables of the facility layers, including data such as facility descriptions, facility lengths, detention basin storage volumes, HEC-1 model, HEC-1 flow, HEC-1 node, tributary area, and facility geometry data (e.g., depth, width, height, number of barrels, facility slope, and channel side slope).
 - All of the relatively short flood control facilities (e.g., culverts or bridges) that were previously represented in GIS using a point feature have been converted to arcs in GIS. This was done to create connection between upstream and downstream facilities and to better represent actual facility alignments.
 - Remove and Replace / Parallel facilities are displayed on the H- and F-Maps using a dashed line (red and blue for Category A and green and blue for Category B) to avoid confusion about which facilities are existing and proposed.
 - The scale on the H- and F-Maps was modified from 1 inch = 3,000 feet to 1 inch = 2,000 feet. The revised scale allows for more detail on each sheet.
- An Arc Hydro geodatabase was generated to represent the regional flood control facilities. The Arc Hydro geodatabase will be the foundation for building tools to facilitate the continuous update/maintenance of the master plan.

- An Automated Facility Inventory Tool was developed to facilitate the generation of facility inventory tables that accompany the F-Maps in Volume 2.

Approximately 745 miles of conveyance facilities are included within the Las Vegas Valley planning areas in the 2008 MPU. Approximately 386 miles of these facilities have been constructed to date. This leaves approximately 359 miles of proposed facilities left to be constructed. The remaining proposed facilities include approximately 222 miles of Category A and 137 miles of Category B facilities (see description of Category A and B facilities below).

Ninety-four detention/debris basins are included within the Las Vegas Valley planning area in the 2008 MPU, with 65 detention/debris basins having been constructed to date. Fourteen existing detention/debris basins need to be upgraded (expanded) of which 2 are Category B expansions. Similarly, of the remaining 29 proposed detention/debris basins, 9 are Category B basins.

Approximately 106 miles of conveyance facilities and 18 detention/debris basins have been constructed within the Las Vegas Valley planning area since the 2002 MPU.

Category A proposed facilities are given priority for CCRFCD funding over Category B facilities. Category A facilities are considered essential for the protection of existing development and constitute nearly 60 percent of all proposed facilities. Category B facilities are either located in undeveloped areas and primarily protect undeveloped land (that is planned to be developed in the future) or they will eventually replace an existing facility which provides a high level of flood protection but cannot convey the entire 100-year peak flow. Category B facilities associated with future development are not expected to require public funds for implementation.

The total estimated value of all existing regional flood control facilities constructed to date is approximately \$3.2 billion. The total estimated construction cost of all proposed Category A facilities is approximately \$2.5 billion. The total estimated construction cost of all proposed Category B facilities is approximately \$1.1 billion. The total estimated construction cost of Category A and Category B proposed facilities has increased from that estimated in the 2002 MPU (\$2.3 billion) and can be attributed to either the modifications made to the Cost Estimation Tool (primarily rising construction costs) or modifications made to the flood control facility plan (see **Section 4.5.6** for more detailed information).

Table A-1. 2008 MPU Facility Cost Summary

WATERSHED	EXISTING	CATEGORY A PROPOSED				CATEGORY B PROPOSED			
	Total Cost	Design & Admin. Cost	Right-of-Way Cost	Construction Cost	Total Cost	Design & Admin. Cost	Right-of-Way Cost	Construction Cost	Total Cost
	(\$ x 1000)	(\$ x 1000)	(\$ x 1000)	(\$ x 1000)	(\$ x 1000)	(\$ x 1000)	(\$ x 1000)	(\$ x 1000)	(\$ x 1000)
Range	\$153,513	\$26,471	\$21,515	\$190,115	\$238,100	\$9,658	\$7,726	\$66,037	\$83,420
Upper Northern Las Vegas Wash	\$195,173	\$46,375	\$38,999	\$349,612	\$434,986	\$42,828	\$34,263	\$302,563	\$379,654
Lower Northern Las Vegas Wash	\$269,908	\$23,828	\$20,264	\$181,210	\$225,301	\$14,242	\$11,393	\$101,125	\$126,760
Gowan	\$367,633	\$23,758	\$19,266	\$185,950	\$228,974	\$15,924	\$12,739	\$112,983	\$141,645
Central	\$485,163	\$65,986	\$56,373	\$502,849	\$625,208	\$6,829	\$5,463	\$48,826	\$61,118
Flamingo/ Tropicana	\$813,537	\$22,517	\$18,331	\$163,085	\$203,933	\$6,878	\$5,503	\$49,179	\$61,559
Duck Creek/ Blue Diamond	\$308,215	\$34,803	\$28,820	\$253,849	\$317,472	\$5,506	\$4,405	\$39,371	\$49,283
Pittman	\$481,426	\$16,509	\$13,604	\$119,542	\$149,655	\$14,024	\$11,219	\$98,376	\$123,620
C1	\$157,726	\$4,988	\$3,990	\$36,976	\$45,954	\$1,643	\$1,314	\$11,748	\$14,706
Lower Las Vegas Wash	\$82,737	\$3,243	\$2,594	\$23,141	\$28,979	\$1,281	\$1,025	\$97,692	\$99,999
Total	\$3,315,030	--	--	--	\$2,498,564	--	--	--	\$1,141,764

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2008 Ultimate Development Boundary

PBS