



# Executive Summary

## **EXECUTIVE SUMMARY**

### **ES-1 PURPOSE**

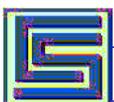
The primary purposes of this Update to the Dry Creek Watershed Flood Control Plan (Plan Update), prepared for the Placer County Flood Control and Water Conservation District (District), are to update the hydrologic analysis of the watershed, provide recommendations for feasible means to reduce future flood damages, identify possible means to mitigate development impacts on flooding, and recommend an updated funding plan. The 1992 Dry Creek Watershed Flood Control Plan (1992 Plan) recommended structural and non-structural measures to correct existing deficiencies and mitigate for impacts of future development. Some of the recommendations have been implemented while many have not due to environmental and/or economic constraints. This Plan Update evaluates the hydrology of the watershed and provides recommendations to correct existing deficiencies and mitigate impacts of future development using an overall watershed approach with the objective of identifying measures that will be both feasible and effective.

### **ES-2 BACKGROUND**

The Dry Creek watershed covers an area of 101 square miles in Placer and Sacramento Counties. The majority of the watershed (82 percent) is contained within the limits of Placer County. Some of the Sacramento County area drains through Placer County before draining back into Sacramento County. The Cities of Rocklin and Roseville and the Town of Loomis are wholly or partially contained within the watershed. Other unincorporated communities in the watershed include Granite Bay, Penryn, Newcastle, Orangevale, and Rio Linda. A vicinity map of the watershed is provided on Plate 1 and a watershed overview is provided on Plate 2.

The purpose of the 1992 Plan was to provide the District and other governmental agencies (in both Placer and Sacramento Counties) with the information and policies necessary to manage the storm waters within the Dry Creek watershed. The 1992 Plan was intended to provide an approach for meeting existing and future flood control needs in the watershed. In addition, the 1992 Plan recommended structural and non-structural measures to correct existing deficiencies and mitigate for impacts of future development within the watershed. The 1992 Plan was formally adopted by the District Board in June 1995.

The 1992 Plan focused on the ability of on-channel regional detention basins to mitigate both existing flooding problems and the increase in flood flows due to upstream development. Based on costs and corresponding flood flow reduction efficiency at Vernon Street in Roseville, seven detention basin sites were selected for inclusion in the 1992 Plan. These sites could have provided peak 100-year flood flow reduction of nearly 4,000 cubic feet per second (cfs) at Vernon Street. However, none of the on-channel regional detention basins included in the 1992 Plan have been, nor are currently expected to be, implemented due to environment and permitting constraints.



### **ES-3 CURRENT CONDITIONS**

From a hydrologic standpoint, imperviousness of a watershed, which is directly linked to land use, is the single most important factor used in determining stormwater runoff rates and volumes. Establishing current runoff quantities is a required step in the preparation of this Plan Update. The 1992 Plan evaluated existing conditions based on 1989 land use and future conditions based on General Plan build-out data available at the time it was prepared. This Plan Update uses available aerial imagery and information about development to estimate how much of the watershed was covered with impervious surfaces. This estimate forms the basis for a hydrologic evaluation of impacts that have occurred since the 1992 Plan was implemented, and what impacts may be associated with development from the current conditions moving forward to build-out based on current General Plans. It is estimated that 43 percent of the impervious area expected to be added to the portion of the watershed within, and upstream from, Placer County from 1992 to build-out had already occurred through 2007.

Though there has been significant progress towards reducing flood risks in the Dry Creek watershed through the implementation of local improvement projects including bridge replacements, flow bypasses, building elevation projects and residential buy-outs, there are still numerous flood hazard areas and roadway stream crossings that do not have adequate capacity. One regional flood control project, Miners Ravine Off-Channel Detention Basin, was completed in 2007. The Miners Ravine project does provide some peak discharge reductions, but these reductions generally just provide partial mitigation for development that has already occurred. Since the 1992 Plan, flood damages occurred in January 1995, January 1997, February 1998 and December 2005. Other than some local bridge improvements, no flood hazard reduction projects are currently planned, although the City of Rocklin is in the process of investigating the feasibility of a flood damage reduction project along Sucker Ravine and the District has applied for grant funding for use on a project on Antelope Creek that is recommended in this Plan Update.

### **ES-4 HYDROLOGY**

A major component of this Plan Update is a new hydrologic modeling system that provides the tools necessary to evaluate the dynamics of stream flow routing throughout the watershed. With this new modeling system, it is possible to quantify project impacts and benefits that could not be evaluated with the technologies available at the time that the 1992 Plan was prepared. The new modeling system has been calibrated to reproduce measured stream flows based on rainfall gage records, thereby establishing the validity of the models. The District's Stormwater Management Manual provides procedures for applying design storm rainfall. These procedures were followed in the Plan Update, but do not match the rainfall and rainfall to runoff transformation process used in the 1992 Plan. Therefore, results based on the new modeling system are not consistent with results from the 1992 Plan. The Plan Update provides a new 1992 baseline model that is consistent with the other models used in the Plan Update so that valid comparisons between 1992 and future conditions can be made. A series of



models were developed to determine impacts from 1992 through 2010 and expected impacts that expected due to development from 2010 conditions through general plan build-out. Build-out scenarios were computed for unmitigated development, development with an assumed amount of Low Impact Development (LID) benefit because firm LID requirements have not yet been established, and for build-out with LID and identified potential projects. Tables ES-1 and ES-2 summarize peak flows and impacts in cubic feet per second (cfs) at Vernon Street for key scenarios for the 100-year storm event. Vernon Street is used as the primary reference location, consistent with the 1992 Plan.

Table ES-1: Peak Flows (cfs) at Vernon Street

Description	Scenario	Discharge (cfs)
1992 Baseline	A	12,635
2010 Current Conditions	B	12,908
Future Impacts w/o Mitigation	C	13,535
Build-out with LID	D	13,361
Build-out with LID and All Projects	E	12,276

Table ES-2: Impacts (cfs) at Vernon Street

Description	Scenarios		Difference (cfs)
Impacts to Date	B	A	273
Future Impacts w/o Mitigation	C	B	627
Total Impacts	C	A	900
LID Benefit	D	C	-174
Project Benefits (all)	E	D	-1,085

Flow rate impact and mitigation values contain a degree of uncertainty, and there is flexibility in what potential mitigation measures will ultimately be implemented. The amount of LID benefit that is ultimately realized depends on criteria that have yet to be established and the effectiveness of the measures as actually installed and maintained.

## ES-5 RECOMMENDATIONS

To manage the risks and reduce potential hazards associated with existing local and regional flooding deficiencies, the Plan Update provides the following recommendations:

1. Implement the two phases of the Antelope Creek at Atlantic Street project and ALERT system upgrades to mitigate for development impacts as funding becomes available.
2. Pursue other regional flood flow reduction projects with consideration for additional multi-objective components along with stream corridor if and when opportunities for funding develop.
3. Implement bridge and culvert improvements in a manner that does not exacerbate flooding at other locations in the watershed. Stream crossing modifications may provide opportunities for additional projects that could improve the flood control benefit of the existing floodplain.



4. Support building elevation and floodplain property buy-outs as these programs are expected to be the most effective means available to reduce future flood damage to existing structures.
5. Require onsite (local) detention where mitigation is necessary due to local flood impact considerations.
6. Incorporate LID measures into future development design that promotes infiltration.

Five potential flood flow reduction projects are identified in the Plan Update. The two most effective of these projects include weirs that span the stream channels to limit the impacts of the proposed projects on typical flows in the streams while increasing floodplain storage during major floods. The goal of all of the projects is to modify flood flow timing to reduce peak downstream discharges at key locations.

Table ES-3 summarizes the planning level cost estimates for the five projects and each project's reduction in peak discharge at Vernon Street in Roseville based on the single design storm that generates the 100-year discharge at Vernon Street. The expected flow reduction benefit of each project taken individually and the expected net flow reduction benefit of all five projects together are listed. The combination of all of the projects would result in a slightly greater benefit than the sum of the individual projects due to flow timing. Evaluations based on other design storms (other storm centerings) could indicate greater or lesser benefits. Information about potential project benefits based on other design storms is presented in the report and its appendices.

Table ES-3: Potential Mitigation Measures Identified by the Plan Update

Description	Cost	Flow Reduction (cfs)	Cost/Benefit (cfs flow reduction)
Antelope Creek at Atlantic Street	\$ 3,367,000	825	\$4,000/cfs
Secret Ravine at Sierra College Boulevard	\$ 3,234,000	175	\$18,000/cfs
Linda Creek at Old Auburn Road	\$ 932,000	28	\$33,000/cfs
Linda Creek at Wedgewood Drive	\$ 1,019,000	13	\$78,000/cfs
Linda Creek near Auburn-Folsom Road	\$ 1,008,000	12	\$84,000/cfs
<b>Total Cost and Net Flow Reduction @ Vernon</b>	<b>\$ 9,560,000</b>	<b>1085</b>	

The District and City of Roseville have a flood warning ALERT System that monitors numerous precipitation and stream gages and provides a good source of advance flood warning information. Enhancing the flood warning system with flood forecasting software based on rainfall predictions and the modeling system developed for this Plan Update is recommended. The Plan Update recommends \$234,000 in upgrades to the ALERT system including new gages and enhanced flood forecasting capabilities.

Three options for the basis of a funding plan are provided with each consecutive option providing a slightly higher amount of peak flow mitigation at Vernon Street. Each option can be reasonably justified and the District can select which option they determine is most appropriate.



Option 1: Implementation of the Antelope Creek flood flow reduction project plus the ALERT system upgrades for an expected cost of \$3,601,000. This option provides an estimated 999 cfs of peak flow reduction and assumes low impact development (LID) measures are fully implemented.

Option 2: Implementation of the Antelope Creek and Secret Ravine flood flow reduction projects plus the ALERT system upgrades for an expected cost of \$6,835,000. This option provides a more consecutive total amount of peak flow reduction as compared to Option 1, with up to 1,174 cfs of reduction at Vernon Street, including the benefit assumed from LID measures.

Option 3: Implementation of all five flood flow reduction projects plus the ALERT system upgrades for an expected cost of \$9,794,000. This option provides the largest amount of peak flow reduction of all three options at up to 1,127 cfs at Vernon Street, including the benefit assumed from LID measures.

## **ES-6 FUNDING**

The funding plan identifies a potential set of funding sources to adequately fund the capital improvements envisioned in the Plan Update and to fund ongoing costs of operations and maintenance. Potential sources include government grants, development impact fees, general funds, and fees collected through County Service Areas (CSAs), Mello Roos Community Facility Districts (CFDs) and utility districts. The recommendations in this Plan Update are intended to both correct existing deficiencies in the drainage system and to accommodate future development based on build-out conditions identified in the current General Plans of the various governmental jurisdictions within the Dry Creek watershed. Development impact fees are proposed to cover the costs of mitigating for impacts of future development, not to pay for correcting existing deficiencies.

