Appendix 5.8-1

Model Orange County Stormwater Retention Credit Framework for Regional LID Implementation and Retrofitting

CONCEPT PROPOSAL APPLICATION

A. Program selection & General FAAST Information

1. PROJECT SELECTION

Prop. 84 Storm Water Grant Program Public Resources Code (PRC) Section 75072 – Planning & Monitoring

2. GENERAL INFORMATION

Project Title: Model Orange County Stormwater Retention Credit Framework for Regional LID Implementation and Retrofitting

Project Description: The project comprises an environmental and economic analysis of on-site versus regional-scale Low Impact Development (LID) Best Management Practice (BMP) implementation and development of a model stormwater retention credit framework, including consideration of an in-lieu fee payment structure. The project study area will use the 918 acre urban area tributary to the Fletcher Basin, which is a detention basin currently being retrofitted for enhanced runoff retention for groundwater recharge in Orange, California, as a case study model watershed. Elements of the projects include GIS mapping, water quality and hydrologic modeling, economic analysis and monitoring for model calibration and verification. The goal of the project planning and optimizing LID BMP implementation at the watershed scale to support NPDES stormwater permit compliance and sustainable water quality and water supply objectives. The project will have countywide and wider regional applicability.

Applicant Details: County of Orange/OC Public Works, 2301 N. Glassell Street, Orange CA 92865-2773

Project Director: Chris Crompton, Manager OC Watersheds/Environmental Resources

Project Manager: Richard Boon, Chief, Orange County Stormwater Program

Grant Funds Requested: $200,000

Total Budget: $250,000

Latitude/Longitude: Latitude: 33.828478 Longitude: -117.859726

Watershed: Santa Ana River

County: Orange County

Responsible Regional Water Board: Region 8 – Santa Ana Regional Water Board

3. LEGISLATIVE INFORMATION

State Assembly Districts: District 72 – Chris Norby; District 60 – Curt Hagman
State Senate District: District 33 – Mimi Walters
US Congressional District: 40th Congressional District – Edward (ED) Royce

4. COOPERATING ENTITIES

Orange County Water District
18700 Ward Street
Fountain Valley, CA 92708-6930
(714)378-3200
Contact: Greg Woodside

City of Orange
300 E. Chapman Avenue
Orange, CA 92866
Contact: Gene Estrada

City of Anaheim
200 S. Anaheim Blvd. Suite 525
Anaheim, CA 92805
Contact: Keith Linker

Building Industry Association of Southern California
Construction Industry Coalition on Water Quality
17744 Sky Park Circle, Suite 170
Irvine, CA 92614
Contact: Mark Grey

Inland Empire Utilities Agency
6075 Kimball Avenue
Chino, CA 91708-9174
Contact: LeAnne Hamilton

5. AGENCY CONTACTS

Santa Ana Regional Water Quality Control Board
3737 Main Street, Suite 500
Riverside, CA 92501-3348
Contact: Mark Adelson

6. APPLICATION QUESTIONNAIRE
7. PROJECT CLASSIFICATION

B. PRC 75072 Proposal Questions

1. APPLICANT TYPE

Q1. Public agency

2. PROJECT TYPE

Q2. Describe how the proposed project meets the Planning and Monitoring project types outlined in Section VI.F and Appendix F-1

The creation of a Model Stormwater Retention Credit Framework will enable proponents of development projects to meet stormwater runoff retention requirements through sub-regional and regional scale LID implementation when on-site stormwater retention is determined to be infeasible or if it is determined through an approved Watershed Master Plan that implementation of LID BMPs will provide a greater benefit if implemented on a sub-regional or regional scale. The environmental and economic analysis and model fee structure framework will advance the practice of stormwater management in Orange County by creating a tool to support a flexible approach that will enable the delivery of multiple benefits, including improved outcomes for receiving waters, enhanced augmentation of local groundwater recharge, increased flexibility for regulated redevelopment, better integration of stormwater management with "Smart Growth" strategies, and better assured long-term maintenance of runoff retention infrastructure, to be optimized based upon specific watershed conditions.

Q3. Describe how the proposed project is necessary for the successful design, selection, and implementation of SWGP projects

The proposed project is necessary for planning, enabling and ultimately optimizing watershed-specific approaches to stormwater runoff retention using on-site, sub-regional and regional runoff retention infrastructure. While MS4 stormwater permitting presumes that runoff will be retained and infiltrated on-site in the first instance, less than 25% of an urban landscape may ultimately be suitable for infiltration at the project scale. In the absence of sufficient reliable on-site demand for harvested stormwater, development project proponents will need to meet runoff retention obligations off-site. The project will compare the environmental and economic performance (costs and benefits realized) of onsite retention and off-site retention infrastructure using current building industry cost estimates of LID BMP implementation, and cost information from the retrofitting of a flood control detention basin (Fletcher Basin) for enhanced stormwater retention and infiltration into groundwater. The findings of the project will provide the regulatory, institutional, and legal basis for creating a model stormwater retention credit system and/or fee payment framework which, upon implementation, will allow regulated development projects to purchase stormwater retention credits, thereby creating a mechanism for effecting stormwater retrofits and enabling LID BMPs to be implemented at the most appropriate scale based upon specific watershed conditions.

3. PROBLEM DEFINITION / BACKGROUND

Q4. Describe the proposed research or project, why it is needed, and how it is of Regional or Statewide significance

The proposed project is an environmental and economic analysis comparing on-site runoff retention at parcels qualifying as priority development projects with off-site retention in a detention basin (Fletcher Basin) being retrofitted for enhanced stormwater retention and infiltration into groundwater. The findings of the project, which will use actual cost data from the Orange County Flood Control District/Orange County Water District Fletcher Basin project, will be foundational elements of a model stormwater retention credit system and/or fee payment framework. This analysis and framework is needed to enable stormwater retention to be optimized based upon specific watershed conditions. The project has both local and statewide significance, as it is the first environmental and economic analysis of on-site versus regional LID BMP implementation in California and the first project intended to create and demonstrate a model retention credit framework with countywide and regional applicability.

Q5. What is the specific topic(s)/question(s) the proposed research or project intends to address?

The specific questions the project will address include:

(1) What are the long-term (20 to 50-year) capital and O&M costs of retrofitting/installing LID BMPs site by site on all parcels that could qualify as priority development projects in the Fletcher Basin watershed?

(2) What is the annual volume of runoff retained upon retrofitting/installing LID BMPs site-by-site on parcels likely to qualify as priority development projects in the Fletcher Basin watershed?

(3) What are the regulatory, institutional, and legal issues that need to be addressed to establish a stormwater retention credit or fee payment in lieu system? What are the most effective approaches to address these issues?

(4) What are the capital and O&M costs of retrofitting a stormwater detention basin for retention and groundwater recharge?

(5) What is the volume of the runoff captured in the stormwater detention basin that is subsequently recharged into the groundwater basin and what is the estimated value of the recharged water that becomes a new source of water supply?

(6) What are the incremental costs and benefits that accrue from an enhanced schedule of retention basin maintenance to maximize runoff infiltration and groundwater recharge?

(7) What is the cost basis of a stormwater retention credit (SRC)?

(8) How do the water quality benefits of retrofitting/installing LID BMPs site-by-site on parcels likely to qualify as priority development projects in the Fletcher Basin watershed compare to the water quality benefits expected from operation of the stormwater detention basin?

Q6. If the research/project is conducted at a specific location, attach a map or diagram depicting the project location.

The study area is the Fletcher Basin watershed area in Orange, California

Q7. Is this a phased study or part of a larger project effort? Please explain the objectives, framework, and scheduling for the larger project.

The study is ancillary to the planned retrofitting of Fletcher Basin by Orange County Water District and the Orange County Flood Control District. This project includes construction of a facility to capture and provide treatment for storm water and nuisance water coming from the fully developed 918 acre upstream watershed and other infrastructure to maximize use of the facility for water quality treatment and groundwater recharge. The existing Fletcher basin watershed does not have any water quality treatment facilities to treat runoff that discharges into the Santa Ana River. Although originally constructed for flood control, subsequent backfilling of the basin removed any stormwater detention or treatment function. Project objectives include improving storm water quality, increasing water resources, and providing increased flood control.

The proposed project is a cooperative effort of the Orange County Water District (OCWD) and the Orange County Flood Control District (OCFCD). The proposed retrofit improvement project will provide for treatment of stormwater and nuisance flows, which have elevated concentrations of pollutants using extended detention techniques. The water resources goal for this project is to increase the percolation area of the basin and channel system and remove the layer of low permeability soils to expose the existing sand layer within the basin. This project employs onsite and regional practices on public lands to provide for improvement of the natural hydrologic functions for existing and proposed land development projects. Construction of this project is expected to begin in the Spring of 2012 and be completed in August 2013.

The proposed project is also intended to be complementary to Inland Empire Utility Agency's proposed Urban Runoff Capture Retrofits at Recharge Sites--Feasibility and Case Study project.

Q8. Describe any previous studies or data collection efforts that directly relate to the proposed research/project.

The study will be informed by:

(1) OCWD Fletcher Basin engineering and CEQA documentation;

(2) Orange County Stormwater Program LID BMP cost estimating studies prepared by the Construction Industry Coalition on Water Quality (currently draft documents);

(3) Nitrogen-Selenium Management Program work on credits in Newport bay Watershed, and;

(4) Orange County Stormwater Program Model Water Quality Management Plan and Technical Guidance Document.

4. PROGRAM LINK

Q9. How will your research/project support the purpose of the SGWP, which is to implement projects that will directly prevent and reduce storm water contamination of rivers, lakes and streams?

The project will evaluate and compare the water quality benefits, local potable water supply augmentation benefits and economic implications of retrofitting/installing LID BMPs site-by-site on parcels likely to qualify as priority development projects in the Fletcher Basin watershed with the water quality benefits and local potable water supply augmentation benefits expected from operation of a regional stormwater detention basin serving the same watershed for which actual project cost data is available. In addition, by resolving the regulatory, institutional, and legal issues that need to be addressed in order to establish a stormwater retention credit system and in-lieu fee payment program, the project will create a model approach for watershed-specific LID BMP implementation optimization to support water quality and water supply objective in Orange County and across the region.

5. IS THE RESEARCH LIKELY TO BE SUCCESSFUL

Q10. Explain how the proposed project can or will be applied to advance the understanding and management of storm water?

Renewals of municipal stormwater permits in California are requiring local government to revise their land development planning approval processes to implement LID BMPs for stormwater management. The principal obligation of these requirements is meeting an on-site retention standard for the 85^{th} percentile, 24-hour rainfall event on a parcel-by-parcel (or project-level) basis unless technical and economic infeasibility can be demonstrated. Concurrently, Southern California's water providers, local governments and the land development community are concerned that strict on-site retention requirements may prevent implementation of retention projects at sub-regional and regional scales that could produce equal or superior environmental outcomes in terms of water quality protection and improvement, water supply, and the long-term sustainability of drainage and flood control infrastructure.

The study will directly compare the environmental and economic implications of parcel-by-parcel and regional scale LID BMP implementation for runoff retention based on an

urban landscape that drains to a detention basin being retrofitted for enhanced stormwater retention and infiltration into groundwater. A model framework for retention credit system or fee payment is needed to enable development project proponents to support regional and sub-regional scale projects in-lieu of on-site retention when infeasibility of on-site retention is demonstrated and off-site retention is preferred (because of equal or better environmental benefits and outcomes).

Q11. Explain the study design in the context of statistical reliability, controls, and ability to address and resolve potential confounding factors.

The technical analysis and research associated with this investigation consists of several work phases: (1) GIS watershed characterization and priority site identification, (2) hydrologic and water quality assessment, (3) site specific BMP performance evaluation, (4) regional facility performance, (5) implementation cost analysis, (6) economic and environmental benefits analysis, (7) hydrologic field monitoring and data collection, (8) model calibration and verification, and (9) stormwater retention credit framework development. The watershed characterization and priority site identification, including demographic analysis and hydrologic analysis, will use established data sources and analytical methods for reliability. In addition, all hydrologic and pollutant loading modeling, and economic analyses will employ established, peer-reviewed analytical methods and procedures. The proposed approach to use a "model" watershed (Fletcher Basin watershed) as the organizing unit for comparison to on-site implementation of LID BMPs provides strong analytical control and limits variation. A field monitoring component will be performed to collect performance related data related to water quality improvement and water recharge benefits of the regional facility that can be then used to calibrate and adjust the "equivalency" analysis.

Q12. Describe any computer models, management practices, specialized testing, or other extraordinary methods and materials that will be implemented or used as part of the project.

Watershed GIS Characterization – A detailed GIS mapping database and information tool will be developed to assess the hydrologic characteristics of the watershed.

Hydrologic and Water Quality Assessment – Watershed models will be developed to quantify the runoff characteristics from the priority sites as well as the entire watershed.

Local Site Specific BMP Performance – An initial screening tool will be generated to determine the different potential site-specific LID BMPs and their performance.

Regional BMP Performance – Hydrologic modeling will be developed for multiple storm events to assess the basin performance for annual water infiltration and pollutant load reduction. An average annual water balance will be generated.

Implementation Costs – Estimates of the capital and operation and maintenance costs for implementation of the different LID BMP approaches will be prepared. Costs will also be obtained for Fletcher Basin.

Economic and Environmental Benefit Analysis – A comparison of the benefits associated with use of site-specific LID BMP approaches with a regional facility will be prepared. The analysis will principally consider (1) the value of the water captured, and (2) the cost for treatment of the pollutants removed. Additional monetizable and non-monetizable benefits will be considered and used to construct the Stormwater Retention Credit Framework.

Hydrologic Field Monitoring Data Collection – Field monitoring will be performed to assess the change in pollutant load removal and runoff volume captured for groundwater reuse.

Model Calibration and Verification – The data obtained from the field monitoring will be utilized to calibrate the results of the initial computer modeling and desktop analyses.

Stormwater Retention Credit Unit Assessment – An assessment to develop the basis for the stormwater retention credit unit, based on the equivalent treatment volume and the corresponding implementation costs for the regional BMP, will be undertaken.

Q13. Indicate the expected research benefits to water quality and beneficial uses

The principal research benefit will be an informed understanding of the environmental and economic implications of on-site versus regional LID BMP implementation. In addition, the research conducted will create an approach that municipalities can use to optimize stormwater infrastructure improvements, including retrofits of existing stormwater infrastructure. Finally, the project will create a model fee structure framework that is considered vital to the effective practice of stormwater management in Orange County given its generally built-out condition and need for water quality infrastructure improvements at a range of scales that provide multiple environmental benefits.

Q14. If necessary, provide additional information about your planning and monitoring project that are not addressed in the previous questions.

Numerical "benefits equivalency" analysis background: The expected performance of onsite LID BMPs for priority projects will be used as the primary technical basis for the equivalency analysis to determine the stormwater retention credit unit. This analysis will be prepared to demonstrate that (1) the regional/subregional facility has adequate capacity to meet or exceed the stormwater LID performance criterion for the entire project site, or (2) regional BMP can provide sufficient pollutant of concern load reduction. The analysis is designed to provide a scientifically based and technically sound analysis to demonstrate that equivalent or improved benefits related to water resources objectives can be achieved through the use of regional/subregional facilities. The specific type of "benefits equivalency" analysis is dependent on (1) site conditions, (2) type of

regional/subregional BMP, (3) expected performance and capacity of the BMP, and (4) receiving waters limitations. Equivalency will be quantified in terms of (1) the volume of stormwater captured (and retained or biotreated) on an average annual long term basis, or (2) the load of each pollutant of concern removed by the subwatershed BMP. The "unit" for the stormwater equivalency that will be developed by this analysis will correlate the onsite runoff treatment volume and the similar treatment requirement for the same amount of runoff to a regional facility.

Q15. Will your anticipated results be beneficial to other projects and/or geographic areas?

The project has both local and statewide significance since it will be the first environmental and economic evaluation in California of on-site and regional stormwater retention and LID BMP implementation using a model watershed approach. The project includes development and demonstration of a stormwater retention credit system and/or a fee payment structure framework. Project outcomes will be foundational to enabling other regulated entities to plan for and optimize stormwater retention at the watershed-scale to meet water quality and local potable supply augmentation goals and results and work products are anticipated to be readily transferable to other municipal stormwater programs in California. Indeed, the proposed project is intended to be complementary to Inland Empire Utility Agency's proposed Urban Runoff Capture Retrofits at Recharge Sites--Feasibility and Case Study project.

6. PROJECT EFFECTIVENESS

Q16. Explain the anticipated research/project results.

The research/project results will include:

(1) Accurate and timely estimates of the capital and long-term O&M costs of retrofitting/installing LID BMPs s on all parcels likely to qualify as priority development projects in the Fletcher Basin watershed.

(2) A calculation of the annual volume of runoff retained upon retrofitting/installing LID BMPs on parcels likely to qualify as priority development projects in the Fletcher Basin watershed;

(3) Resolution of the regulatory, institutional, and legal issues that need to be addressed to establish a stormwater retention credit system and fee payment structure;

(4) Estimates of the capital and long-term O&M costs of retrofitting a stormwater detention basin for retention and groundwater recharge;

(5) A calculation of the volume of the runoff captured in the stormwater detention basin that is subsequently recharged into the groundwater basin and an estimate of the value of the recharged water that becomes a new source of water supply;

(6) An estimation of the incremental costs and benefits that accrue from an enhanced schedule of retention basin maintenance to maximize stormwater runoff infiltration and groundwater recharge;

(7) The framework for calculation of the cost of a stormwater retention credit and the basis for that credit, and

(8) Quantification of the water quality benefits of retrofitting/installing LID BMPs site-by-site on parcels likely to qualify as priority development projects in the Fletcher Basin watershed compared to the water quality benefits expected from operation of the regional stormwater detention basin.

Q17. What is the greatest challenge in the proposed research/project, and what are the potential benefits that could be attained if the challenge is successfully overcome? Describe the proposed method(s) to overcome the challenge.

The greatest challenge in the proposed project is anticipated to be achieving broad consensus regarding the methodological approach to the study. To directly address this challenge, the project will be conducted under the aegis of a technical advisory group comprising local government, development community, regulatory agency, environmental advocacy group (invited) and special district representation. Such an approach has previously been used successfully in Orange County for development of contentious stormwater compliance program initiatives including the recent Model Water Quality Management Plan. The principal benefit of consensus support is eventual implementation of true watershed master planning to meet water quality and local potable supply augmentation goals.

Q18. How do you propose to measure and document your project's benefits?

While the project has been conceived to answer a specific set of questions (see Q.5 and Q.16), the ultimate validation of the project will be use of the stormwater retention credit framework to support watershed master planning and LID BMP implementation both in Orange County and on a broader regional basis.

7. COST EFFECTIVENESS

Q19. Describe how the match requirement will be met.

The match will be provided by County of Orange/OC Public Works.

Q20. Does the project leverage any existing or potential funds from the State, local and other sources?

The match is anticipated to be met from the Orange County Stormwater Program's NPDES Shared Cost funding contingent upon budget approval. This funding comprises

entirely local contributions from 34 municipal entities, including the County of Orange, Orange County Flood Control District and cities of Orange County.

Q21. Explain how the project costs were estimated and provide a reasonable estimate of cost for each work item.

The costs are derived from planning level estimations of costs solicited separately from two consulting firms with extensive histories of stormwater planning and program development support to the Orange County Stormwater Program. The costs are based on estimations of time and industry standard hourly rates for project manager, design engineer, technician, GIS analyst and project administrative staff.

Item No. - Work Item Description = Total Fee for Work Item
1 - Watershed GIS Characterization = $32,000
2 - Hydrologic and Water Quality Assessment = $36,000
3 - Local Site Specific BMP Performance = $23,000
4 - Regional BMP Performance = $31,000
5 - Implementation Costs = $35,000
6 - Economic and Environmental Benefits = $7,000
7 - Hydrologic Field Monitoring = $40,000
8 - Model Calibration and Verification = $10,000
9 - Stormwater Trading Unit Assessment = $16,000
10 – Education & Outreach = $5,000
11 - Reporting & Administration = $18,000

Item No.	Work Item Description	Total Fee for Work Item
1	Watershed GIS Characterization	$32,000
2	Hydrologic and Water Quality Assessment	$36,000
3	Local Site Specific BMP Performance	$23,000
4	Regional BMP Performance	$31,000
5	Implementation Costs	$35,000
6	Economic and Environmental Benefits	$7,000
7	Hydrologic Field Monitoring	$40,000
8	Model Calibration and Verification	$10,000
9	Stormwater Trading Unit Aseessment	$16,000
10	Reporting & Administration	$18,000

8. READINESS TO PROCEED

Q22. Provide a description of all necessary environmental documents.

[GET]

Q23. Explain the scope and schedule of the research project

The schedule of the project is 12 months from the date of receipt of the grant. The project comprises eleven (11) principal task deliverables.

Item No. - Work Item Description
1 - Watershed GIS Characterization
2 - Hydrologic and Water Quality Assessment
3 - Local Site Specific BMP Performance
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7	Hydrologic Field Monitoring
8	Model Calibration and Verification
9	Stormwater Trading Unit Assessment
10	Reporting & Administration

Q24. Please describe the roles and qualifications of participating researchers

The principal researchers will be:

Bruce Phillips, PE, Senior Vice President, Pacific Advanced Civil Engineering Inc.
M.S. Civil Engineering Water Resources, California State University, Long Beach
M.S. Petroleum Engineering, University of Southern California
B.S. Civil Engineering, University of Southern California

Bruce Phillips has water resources civil engineering experience dating back to 1981. Mr. Phillips is experienced in all aspects of floodplain management and regional flood control facility design for the public and private sector, including the development of drainage criteria manuals and knowledge of drainage design procedures throughout the nation. He has been involved in regional hydrologic/master planning, desert hydrology, and alluvial fan analysis. Mr. Phillips has experience with numerous computer hydraulic models for steady state and varied flow analysis, along with two dimensional hydraulic analysis.

Tony Howze, GIS Project Manager, Pacific Advanced Civil Engineering Inc.
B.A. Geography California State University, Long Beach

Tony Howze has over 13 years of GIS experience with public works, planning, and engineering. Mr. Howze has a Bachelors of Arts degree in Geography along with numerous certificates in the field of GIS: Hydrology and Hydraulics Analysis, Spatial Analysis, 3D Analysis, and Application Development. He has specialized skills in database management and high-end cartography. He has developed spatial models and applications for hydrologic model input, provided a mapping system to produce Altas-book style maps for large hydrologic studies, and produced more efficient methods on creating detailed hydrologic/hydraulic statistics.

PACE will be contracted to the County of Orange through February 2014.

APPLICANT INFORMATION
9. BONUS POINTS
10. DISCLAIMER