

Watershed Master Plan Update Protocol

Watershed Master Plan Updates

The San Antonio River Authority (SARA) has been working with partner agencies since 2009 to complete watershed master plans for the Upper San Antonio River, Leon Creek, Salado Creek, Medina River, Lower San Antonio River, and Cibolo Creek watersheds. The master plans have two primary objectives:

- Identify needs and opportunities related to flood risk, water quality issues, low impact development, stream restoration, nature based park planning, mitigation banking, and conservation easements.
- Develop and assess proposed projects to address the identified needs and preserve identified opportunities.

As the master plans are completed, digital copies of the documents will be available at the San Antonio River Authority website in the public resource library: <https://www.sara-tx.org/public-services/reports-and-studies/>. A GIS Master Plan Platform has been developed to incorporate the spatial data developed for the watershed master plans. The spatial data will be accessible to partner agencies through a Web Viewer with login information required.

SARA's Watershed Engineering Department intends to maintain the master plans by updating the following elements:

- Needs and opportunities based on project implementation and changing conditions in the watersheds.
- Candidate project list and scoring.

In order to perform this maintenance, SARA will request project information from partner agencies. SARA will then update the project information and assessments in the master plan data. SARA will also incorporate updates to supporting data periodically to account for other changes in the watershed. Document updates will occur on an annual basis in March. The information will be presented to the Bexar Regional Watershed Management (BRWM) group at their monthly meeting and to the downstream communities at the quarterly summit workshops. Spatial data will be updated according to the schedule in Appendix A.

This document outlines the project information requested from partner agencies, guidance for using the watershed master plans and web viewer, and SARA's watershed master plan maintenance program. The master plans are intended to be living documents in order to plan for the changes anticipated in the river basin. The more information available for key decision makers in our communities, the more holistic and comprehensive the project planning can be.

Project Updates

Partner agencies are requested to submit updates to master plan projects and new projects to SARA's Watershed Engineering Department at any time, as the project status changes or new information becomes available. SARA will also reach out to partner agencies in December as a reminder to submit progress updates. Submittals received by January 31 each year will be included in the annual update of master plan documents. The primary contacts for this task for Watershed Engineering and each partner agency are listed in Appendix B.

Projects can be flood control, stream restoration, water quality, low impact development, nature based parks, mitigation bank sites, or conservation easements. Updates to existing master plan projects can include status updates, more detailed design or cost information, notes if it was determined to be infeasible, etc. Within Bexar County, SARA will coordinate with the BRWM Watershed Technical Committee for new project scoring. Other

capital improvement project information provided by partner agencies will be shown in the viewer for informational purposes.

What to submit:

Project Info Summary (Appendix C)

Site photographs

Outline of project area (GIS format, see guidelines in Appendix A)

Technical data depending on project type:

Flood control - H&H models or C/LOMR case number if submitted to SARA LOMR Delegation

Stream Restoration – Plans and specs, vegetation requirements

Water quality and LID – Plans and specs, BMP details, inspection reports

Master Plan Data

The master planning effort produced two primary data sets: needs/opportunities and recommended projects. It also compiled reference data from a variety of sources. The master plan documents provide information about data sources and development while the web viewer provides more up-to-date data and results.

Section 1. Flood Risk

Data in Viewer and Master Plans

Assessment Results

Flood risk was assessed in the master plans using building and road inventories. Concentrations of at-risk buildings and road crossings were used to identify damage centers. The number of buildings and roads flooded by a variety of storm events and estimated annualized damages were summarized by damage center to assist in the development and prioritization of flood control projects. Damage centers and road crossing results are provided in the web viewer. Building inventories are maintained to support reanalysis of damage centers but are not included in the web viewer due to the size of the data set.

Floodplain Maps

The River Authority is the local LOMR Delegate for the Federal Emergency Management Agency (FEMA) in the San Antonio River basin. The River Authority reviews all LOMRs submitted in the basin and submits them for final adoption by FEMA. Access to the LOMR site with the digital data and modeling repository can be accessed through SARA's website: <http://gis.sara-tx.org/D2MR/>. FEMA is ultimately responsible for any final updates to the Flood Insurance Rate Maps. The floodplain maps on the web viewer will be updated quarterly and will include all new FEMA adopted changes.

Flood Complaints and High Water Marks

Partner agencies have provided information about historic flooding in the form of flood complaint records and high water rescue locations. At this time, a system for maintaining this data in SARA's web viewer has not been defined. Until the maintenance system is developed, any historical flooding data shown in the web viewer should be verified through the partner agency responsible for maintaining the data.

Reassessment Frequency

The flood risk assessment will be updated as projects are completed using the post-project hydrology and hydraulics models provided by partner agencies. This includes re-assessing the depth of flooding for buildings and roads, estimated annualized damages, and boundaries of damage centers.

Building inventories will be updated annually with appraisal district data.

Section 2. Stream Restoration Potential

Data in Viewer and Master Plans

Streams in the San Antonio River Basin watersheds have been categorized as preservation, rehabilitation, restoration, natural channel design (NCD) 1, or NCD 2 to indicate their stream restoration potential. This data can be viewed on the web viewer and is presented in the master plan documents for Medina River, Lower San Antonio River, and Cibolo Creek. The assessment was performed for Leon Creek, Salado Creek, and Upper San Antonio River after their master plan documents were produced. The assessment is intended to be used by partner agencies when scoping a project in the channel area to determine whether the project is a candidate for natural channel design or, in the case of preservation streams, if impacts to the stream can be avoided or minimized.

Tools Available

To support partner agency efforts to incorporate natural channel design into projects, SARA has developed a Natural Channel Design Protocol. The purpose of this manual is to provide a Standard Operating Procedure and Standard of Care criteria guidance for performing natural channel design projects in the San Antonio Watershed. The manual is intended for the engineering community, SARA staff, and all public and private entities within the SARA four county jurisdiction of Bexar, Wilson, Karnes and Goliad counties engaged in such projects. Goals presented in this manual for incorporating natural channel design into projects include:

- Creating geomorphically stable conditions for appropriate stream reaches;
- Improving and restoring hydrologic connections between the streams and their floodplains;
- Improving aquatic and terrestrial habitat;
- Improving water quality by establishing buffers for nutrient removal from runoff, and by stabilizing stream banks to reduce bank erosion and sediment contribution to stream flows;
- Improving in-stream habitat by providing a more diverse bedform with riffles and pools, creating deeper pools and areas of water re-aeration, providing woody debris for habitat and, reducing bank erosion; and
- Providing storage within a floodplain to retain and attenuate flood flows.

The Natural Channel Design Protocol is available as a download from SARA's website: <https://www.sara-tx.org/wp-content/uploads/2015/04/Natural-Channel-Design-Protocol.pdf>.

Reassessment Frequency

The stream restoration potential classifications will be updated on an as-needed basis with the goal of completing targeted re-analysis of all watersheds every three years. The targeted reanalysis will consist of desk top evaluations and field verification to determine if the stream restoration potentials have changed in areas where development or project work has occurred.

Section 3. Water Quality Assessment and BMPs

Data in Viewer and Master Plans

Assessment Results

SARA developed water quality models and categorized the water quality conditions of Leon Creek, Salado Creek, and the Upper San Antonio River watersheds. Modeling of the Medina River, Lower San Antonio River, and Cibolo Creek watersheds is in progress. The results of the water quality modeling provide three main sets of data for use in project scoping and future planning. The data are:

- Estimates of where constituent levels exceed the levels required for a desired use. The estimates are based on sampling data and land use.
- Estimates of the constituent load reductions needed for each subbasin to meet the constituent load criteria.

- Recommended best management practices (BMPs) for achieving the load reductions for each subbasin.

Some water quality elements can be considered for more traditional flood control projects to contribute to load reductions. For detention projects, these may include providing a low flow outfall designed to slowly release the first-flush volume of runoff, designing the basin shape to be elongated with a longer flowpath and energy dissipation at the inflow side to allow for settling and to reduce resuspension of sediment. For channel projects, natural channel design elements can contribute to improved water quality.

The findings may also be used to in street projects and parks planning to identify areas where BMPs can be implemented on public property where the amount of flow is less than in the streams themselves.

303(d) Listed Impaired Streams

Texas Water Quality Inventory and 303(d) List now called the Texas Integrated Report of Surface Water Quality evaluates the quality of surface waters in Texas and provides resource managers with a tool for making informed decisions when directing agency programs. The report is a requirement from the EPA for the federal Clean Water Act Sections 305(b) and 303(d). The term "303(d) list" is short for the list of impaired and threatened waters (stream/river segments, lakes) that the Clean Water Act requires all states to submit for EPA approval every two years on even-numbered years. The states identify all waters where required pollution controls are not sufficient to attain or maintain applicable water quality standards, and establish priorities for development of TMDLs based on the severity of the pollution and the sensitivity of the uses to be made of the waters, among other factors. The Integrated Report and impaired streams list can be found here: <https://www.tceq.texas.gov/waterquality/assessment>.

Tools Available

Water Quality Models

The water quality assessment was performed using HSPF water quality models. The following HSPF tools were developed to assist in the evaluation of the data produced by the models.

- The Load Reduction Tool was developed to allow users to determine the constituent load reductions needed to reach water quality standards in model reaches within a watershed through the application of BMPs.
- The Enhanced Best Management Practices Tool was developed to assist users in identifying LID BMPs to achieve needed load reductions. The Enhanced BMP tool reports recommended BMP types, the number of BMPs needed, cost of BMPs, and reduction results achieved by the recommended BMPs by subbasin.

Low Impact Development Design and Implementation

The San Antonio River Authority in partnership with the BRWM has developed a manual that outlines standard practice for design and implementation of BMPs for Low Impact Development (LID). LID is a group of sustainable land planning and engineering design techniques for minimizing the impact of urban development and human use on the environment. It is a design option to reduce the impacts of stormwater on San Antonio streams and rivers that has the potential to realize cost savings as compared to traditional infrastructure. LID also has the potential to reduce impacts on regional stormwater infrastructure. To provide technical design standards, SARA and the BRWM group developed the San Antonio River Basin Low Impact Development Technical Guidance Manual which is available as a download from SARA's website: <https://www.sara-tx.org/wp-content/uploads/2015/05/Full-LID-Manual.pdf>.

Reassessment Frequency

Every five years, SARA will evaluate the changes in the river basin and in sampling data to determine whether reassessment of water quality, load reduction, or BMP recommendations is warranted. If so, one or more of the following updates will be performed:

- The HSPF water quality models will be updated and calibrated with new sampling data.
- The Load Reduction Tool will updated with the distressed reaches and load reductions needed in the sub-watersheds. Implemented projects will be accounted for indirectly through changes in sampling data and recalibration.
- The Enhanced BMP Tool will identify subbasins where implementation of select BMPs are recommended on updated water quality analysis and load reduction results.

Section 4. Riparian Zone Preservation and Connectivity

Data in Viewer and Master Plans

Assessment Results

Areas with existing riparian buffer vegetation or which offered opportunities to connect parks or habitat were identified to serve as guides for future parks planning, planning landowner engagement activities, identification of potential mitigation areas, and teaming with conservation organizations to obtain strategic conservation easements.

Parks

To develop comprehensive projects that include multiple benefits, the River Authority included available spatial information on existing and future park facilities including parks, linear hike and bike trails, and paddling opportunities.

Mitigation Bank Sites

Any data obtained related to mitigation banking sites will be added to the viewer.

Reassessment Frequency

Existing parks and conservation easement data will be evaluated annually to determine if an update is needed. Proposed information will be updated as it is received.

Parks and preservation opportunities will be reassessed by watershed on a rolling basis with the goal of completing all watersheds in the river basin every three years.

Appendix A: Detailed Spatial Data Updates

GIS Dataset	Required Field Updates	Schedule	Responsible Party	Notes
WSMP Projects	ProjectID; ProjectName; Description; Cost; Watershed; StreamName; Score; ProjectStatus (Concept, In Design, Bid, In Construction, Complete, Not Feasible); ProjectPhase; DC_ID; LastUpdate	Annual	Bexar County; CoSA; SARA - WSE	Points and polygon shapefiles of project areas (in development)
CoSA Drainage Projects	ProjectNo; ProjectName; ProjectScope	Annual	CoSA GIS	Informational. Polyline shapefile of project locations
Bexar Flood Control Projects (Flood_CIP)	PROJ_ID; NAME; LOCATION; PRECINCT; SOURCE; LIMITS; TYPE; STATUS; PHASE_YEAR; WATERSHED	Annual	Bexar County GIS	Informational. Points and polygon shapefiles of project locations
Damage Centers	DC_ID; area_sqmi; area_acres; StreamName; Watershed; ProjectStatus (Identified, Needs Study); Project;WMP_Status; Cost; Notes; STR0_10; STR10_50; STR50_100; STR100_500; STR_500; STR_100F; ESTDMG10YR; ESTDMG50YR; ESTDMG100YR; ESTDMG500YR; ESTDMG100F; UXS10YR; UXS50YR; UXS100YR; UXS500YR; UXS100F	Annual	SARA - WSE	Polygon. Notes on "ProjectStatus": either "Identified" (project name next field) or "Needs Study" if no projects have been identified. If multiple projects were identified, the recommended/highest ranking project is listed until it is completed or marked "Not Feasible" in the WSMP projects shapefile. Then the next best project will move up.
Impaired Streams (303(d) Listed)	Segment Name; Segment Length; Segment Description; Dissolved Oxygen Grab Minimum; Dissolved Oxygen 24hr Minimum; Bacteria Single Sample E. coli; Bacteria GeoMean E. coli; Nitrate; Orthophosphorus; Total Phosphorus; Chlorophyll-a; Ammonia; Fish Community; Habitat; Macroinvertebrate Community; Toxic Substance Sediment - Silver; Toxic Substance Sediment - Cadmium; DSHS Fish Consumption Advisories; Chloride	Every 3 years	SARA - ESD	Fields need to be populated with text descriptions (e.g. Fully supporting, Non supporting, No concern, Screening concern, etc). Can provide additional detailed guidance as needed.
Stream Restoration Potential	Rest_Pot	Annual	SARA - WSE	Desktop evaluation to update stream restoration potential
	SEGNAME; DC; Type; Hy_Type; Valley_Typ; Slope; HMS_node; Cum_DA; Q_1_1; Q_1_5; Q_RC; Q_RAS; Width_RC; Width_RAS; Depth_RC; Depth_RAS; Area_RC; Area_RAS; Max_Depth; FPW; ER; K; WD_Ratio; Rosgen; Channel_Cl; DE; MBW_1; Meander; ER_pot; MBW_2; Step_pool; Local_Inst; Riparian_C; Tree_Dens; Threat_Lev; Comments; Rest_Pot; Pattern; Reach; _100_SM	Every 3 years	SARA - WSE	Stream restoration analysis update
WQ Distressed Reaches	SubBasinID; StreamName; Segment Length (mi); Ammonia nitrogen; Temperature; Nitrate-nitrogen; Orthophosphorus; Organic phosphorus; Dissolved oxygen; Chlorophyll-a; Bacteria		SARA - WSE	Field values need to be populated with text descriptions (e.g., Below screening level, Above 7x screening level, etc). Can provide additional detailed guidance as needed.
WQ Load Reductions	SubBasinID; CatchmentArea (acres); CatchmentArea (sqmi); Load Reduction %: Carbonaceous biochemical oxygen demand, Organic nitrogen, Ammonia nitrogen, Nitrate-nitrogen, Organic phosphorus, Orthophosphorus, Bacteria, Sediment, Lead, Zinc, Chlorophyll-a		SARA - WSE	Field values need to be populated with percentages. Can provide additional detailed guidance as needed.
Future Parks/Trails	FundingStatus (Funded, Future Non-funded)	Annual	SARA - GIS	Acquire from CoSA Parks and SARA GIS
Parks	ParkName; ParkType; Acres	Annual	SARA - GIS	Compile from multiple sources
Bexar Parcels	prop_id; Owner; LandVal; ImprVal; TotVal	Annual	SARA - GIS	Acquire from BCAD
Floodplain (NFHL)	FLD_ZONE; ZONE_SUBTY	Quarterly	SARA - GIS	Download from FEMA MSC
CoSA Council Districts	District; Name	Annual	SARA - GIS	Download from CoSA GIS
Commissioner Precincts	Precinct; Name; Comm_Web	Annual	SARA - GIS	Download from Bexar County Open Data portal

Appendix B: Agency Contacts

As of March 26, 2015

Agency	Primary Contact Dept.	Primary Contact Name	Email
San Antonio River Authority	Watershed Engineering	Erin Cavazos	ecavazos@sara-tx.org
Bexar County	Flood Control Program	Todd Putnam	tputnam@bexar.org
City of San Antonio	TCI - Storm Water	Robert Reyna	roberto.reyna@sanantonio.gov
Other Suburban Cities	City Administrators		
Falls City	City Administrator		
Floresville	City Administrator		
Stockdale	City Administrator		
La Vernia	City Administrator		
Poth	City Administrator		
Wilson County	Judge/Floodplain Administrator		
Karnes County	Judge/Floodplain Administrator		
Goliad County	Judge/Floodplain Administrator		
Karnes City	City Administrator		
Kenedy	City Administrator		
Runge	City Administrator		
Goliad	City Administrator		

Appendix C: Watershed Master Plan Project Update

Project Information Summary Form

Project Name		
ID Number (If applicable)		
C/LOMR Case Number (If applicable)		
Watershed	Choose an item.	
Location/Limits		
Project Type (Mark all that apply)	<input type="checkbox"/> Flood Control <input type="checkbox"/> Stream Restoration/NCD <input type="checkbox"/> Water Quality <input type="checkbox"/> LID	<input type="checkbox"/> Parks <input type="checkbox"/> Mitigation Bank <input type="checkbox"/> Conservation Easement
Project Status (Select one)	<input type="checkbox"/> Pre-scoping/Concept <input type="checkbox"/> Preliminary Design <input type="checkbox"/> Detail Design <input type="checkbox"/> Bid	<input type="checkbox"/> In Construction <input type="checkbox"/> Complete (Year Completed: _____) <input type="checkbox"/> Not Feasible Choose an item.
Funding Status	<input type="checkbox"/> Not Funded	<input type="checkbox"/> Funded
Project Cost	Cost: Cost Basis Year:	Included in Cost: <input type="checkbox"/> Design <input type="checkbox"/> Construction <input type="checkbox"/> ROW <input type="checkbox"/> Permitting <input type="checkbox"/> Fees <input type="checkbox"/> Other _____
Project Scope (Brief description)		
Additional Data (As applicable) Attached or Submitted In Digital Format	<input type="checkbox"/> Site photographs <input type="checkbox"/> Outline of project area (GIS format) <input type="checkbox"/> H&H models/drainage report <input type="checkbox"/> Plans and specifications	<input type="checkbox"/> BMP details (plan view) <input type="checkbox"/> Vegetation requirements <input type="checkbox"/> Inspection reports