APPENDIX 5B

Multiple Benefits Evaluation Methodology Technical Memorandum

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WEST YOST ASSOCIATES
Consulting Engineers

TECHNICAL MEMORANDUM

DATE: December 21, 2017

Project No.: 285-10-17-13
SENT VIA: EMAIL

TO: Manu Dhaliwal, City of Yuba City

FROM: Natalie Muradian, PE, RCE #84895

REVIEWED BY: Doug Moore, PE, RCE #58122

SUBJECT: Yuba City Basin SWRP—Multiple Benefits Evaluation Methodology

This Technical Memorandum (TM) presents the Yuba City Basin (YCB) Storm Water Resource Plan (SWRP) multiple benefits evaluation methodology.

This TM includes the following sections:

- Planning Area Watershed
- SWRP Project Categories
- Quantitative Evaluation Methodology
- Ranking and Prioritizing Projects

PLANNING AREA WATERSHED

The planning area watershed (PAW) for this study was defined by West Yost Associates in the *Stormwater Resource Plan Planning Area Description, Map, and Boundaries* letter to Manu Dhaliwal dated November 28, 2017. Figure 1 of that letter defined the planning area, and it is reproduced as Figure 1 of this TM.

SWRP PROEJCT CATEGORIES

As discussed in the revised *Eligibility and Feasibility Screening of Initial Projects* letter to Manu Dhaliwal (dated December 11, 2017), 26 Initial Projects were submitted for inclusion in the SWRP and were grouped and consolidated to a list of 23 Initial Projects. The grouped and consolidated Initial Projects were screened to a set of 12 SWRP Projects.

The SWRP projects included a mixture of different types of stormwater projects, including planning studies and implementation projects. The projects were separated into two categories: plans and studies (hereafter referred to as planning projects) and implementation projects. See Table 1 for how each of the 12 SWRP projects were categorized.

Table 1. Categorized SWRP Projects

Planning Projects[(a)]	Implementation Projects[(a)]
E1. Standards for detention basins: Modify detention basin standards to allow recreational use of the basin, while meeting flood control, infiltration requirements, and trash control. Adjust low flow channel design standards to provide infiltration. E2. Standards for Gilsizer Slough: Minimize erosion, improve side slope, and standardize pipe inlets into the canal to increase trash capture. E3. Trash capture master plan: Identify locations of where trash capture is needed. Include standards for installing pipes into channels to control trash sources, and for installing trash screens in detention basins.	A1. Modify existing detention pond: Gilsizer Slough North (includes water quality upgrades in city corporation yard) A2. Modify existing detention pond: South Yuba City Improvement District Detention Pond – North A3. Modify existing detention pond: Pond just east of City's Wastewater Treatment Plan F1. Trash capture project: Walton Pipeline along Lincoln Road - daylight storm drain and add an infiltration swale and trash rack F2. Trash capture project: Onstott Pipeline along Highway 99 - daylight storm drain and add an infiltration swale and trash rack F3. Trash capture project: Add a trash rack at Orchard and Park. F4. Trash capture project: Daylight storm drain and add an infiltration swale and trash rack on Lincoln Road storm drain F5. Trash capture project: Add infiltration area and trash rack on Jefferson Ditch F6. Trash capture project: Daylight storm drain and add an infiltration swale and trash rack on Del-Monte Square Commercial Park Storm Drain

(a) The projects numbers refer to the category and number of the project as identified in the *Eligibility and Feasibility Screening of Initial Projects Letter,* dated December 11, 2017.

QUANTITATIVE EVALUATION METHODOLOGY

Projects will be evaluated both quantitatively and qualitatively for how well they meet the State's Benefit Categories. The State-identified benefit categories are defined in Table 4 of the California State Water Resource Control Board's *Storm Water Resource Plan Guidelines* (December 15, 2015), and include:

- Water Quality
- Water Supply
- Flood Management
- Environmental
- Community

The Technical Advisory Committee (TAC) prioritized the State's Benefit Categories for the YCB watershed. The prioritization is shown in Table 2; 1 is the least important and 10 is the most important. This prioritization was used to calculate the maximum score possible for each benefit category, also shown in Table 2.

Table 2. Maximum Score for each Benefit Category

Categories	TAC Prioritization of Category	Maximum Score Possible for Project Evaluations
State Benefit Categories		
Water Quality	8	80
Water Supply	8.1	81
Flood Management	9.4	94
Environment	4	40
Community	5.4	54

Due to the difficulty of evaluating quantitative benefits from plans, projects included in the planning category will be evaluated qualitatively based on how well they achieve each of the five State-identified benefits relative to the other SWRP Planning projects. Planning projects will be evaluated based on a general idea of what will be included in the plans. Table 3 shows how the five benefit categories will be evaluated for planning projects.

Implementation projects will have direct impacts on State- and community-identified benefits. Implementation projects will be evaluated both qualitatively and quantitatively based on how well they achieve each of the State- and community-identified benefits relative to the other implementation projects. Table 4 shows the multiple evaluation criteria under each State-identified benefit category and explains the method of analysis for each criterion. The dark grey rows indicate a primary benefit, while light grey rows indicate an additional benefit, as defined by the State.

Table 3. Method of Evaluation for Planning SWRP Projects				
Evaluation Criteria	Qualitative Evaluation Criteria (Metric)	Method of Analysis	Point Allocation	Possible Points
Water Quality Benefit Category	None, Low, Medium, High	Project Specific Evaluation	None (0 pts), Low (3 pts), Medium (6 pts), High (10 pts)	10
Water Supply Benefit Category	None, Low, Medium, High	Project Specific Evaluation	None (0 pts), Low (3 pts), Medium (6 pts), High (10 pts)	10
Flood Management Benefit Category	None, Low, Medium, High	Project Specific Evaluation	None (0 pts), Low (3 pts), Medium (6 pts), High (10 pts)	10
Environmental Benefit Category	None, Low, Medium, High	Project Specific Evaluation	None (0 pts), Low (3 pts), Medium (6 pts), High (10 pts)	10
Community Benefit Category	None, Low, Medium, High	Project Specific Evaluation	None (0 pts), Low (3 pts), Medium (6 pts), High (10 pts)	10

Table 4. Method of Evaluation for Implementation SWRP Projects

Evaluation Criteria	Quantitative Evaluation Criteria (Metric)	Qualitative Evaluation Criteria (Metric)	Method of Analysis	Point Allocation
Water Quality Benefit Category (Increased filtration and/or treatment of runoff)				
- Natural water drainage and treatment		Not Improved, Improved	Improved = Establish natural water drainage (allow more infiltration)	Not Improved (0 pts), Improved (10 pts)
- Nonpoint source pollution control. See Priority Pollutants, (i.e. 303(d) List Pollutants) and common storm water conaminants listed below.				
- Sediment, mercury, Group A Pesticides, and oxygen demanding substances	lbs/year of sediment (TSS) removed		*Mercury concentrations associated with sediment concentrations, so projects that remove sediment will also remove mercury. Constructed wetlands enhance mercury methylation. The amount of flow treated is relative to the mercury removed.* *Group A Pesticides include DDT and Dieldrin: Urban SW preliminary data summary found that DDT in urban storm water exceeded health criteria of DDT in water. Eventhough DDT was banned in 1970s, its very persistent and thus likely present in soils. Organochlorine levels are declining in environment as a whole. Projects that remove sediment may also remove DDT. Dieldrin was banned in 1985. Very persistent and thus likely present in soils. Organochlorine levels are declining in environment as a whole. Projects that remove sediment may also remove Dieldrin.* *The Effectiveness Evaluation of BMPs in Portland Oregon (2005) uses TSS as a surrogate for oxygen demand, including biochemical oxygen demand, chemical oxygen demand, and total organic carbon.* - Calculate flow per year to project within drainage watershed. - Calculate loading to project per year, using average inflow concentration in Table 7. - Use average precent removal for pollutant in Table 7.	0 to 10 points based on estimated load reduction relative to the maximum load reduction for all implementation SWRP Projects.
- Chlorpyrifos, Diazinon, Oxyfluorfen		None, Medium, High	*Diuron is a non-banned pesticide. Chlorpyrifos and diazinon are restricted use pesticides.* None = No change in pesticide use Medium = Reduces use of pesticides High = Eliminates use of pesticides	None (0 pts), Medium (5 pts), High (10 pts)
- PCBs	lb/year of PCBs removed		PCBs can enter a watershed through trasnformers, atmospheric deposition, and eroded or re-suspended particles. PCBs tend to behave like sediment, and can be settled out. BMPs that remove PCBs will need to be maintained with special handling and disposal. - Calculate flow per year to project within drainage watershed. - Calculate loading to project per year, using average inflow concentration in Table 7. - Use average precent removal for pollutant in Table 7.	0 to 10 points based on load reduction relative to the maximum load reduction for all implementation SWRP Projects.
- Trash	lbs/year of trash removed		- Calculate flow per year to project within drainage watershed. - Calculate loading to project per year, using average trash generation rate in Table 8. - Assume full capture equivalency trash systems will be implemented.	0 to 10 points based on trash removal relative to maximum trash removals for all implementation Projects.
trash will be calculated in gallons per each high trash generating land use				
- Fecal Coliform	MPN/year		- Calculate flow per year to project within drainage watershed. - Calculate loading to project per year, using average trash generation rate in Table 8. - Use average precent removal for pollutant in Table 7.	0 to 10 points based on load reduction relative to the maximum load reduction for all implementation SWRP Projects.
- Heavy Metals (cadmium, copper, lead, and zinc)	lbs/year of heavy metals removed		These metals are detected in nearly all of urban storm water samples and exceed aquatic life standards. Typical sources include roofing, brake pads, tire wear, and vehicle emissions. - Calculate flow per year to project within drainage watershed. - Calculate loading to project per year, using average inflow concentration in Table 7. - Use average precent removal for pollutant in Table 7.	0 to 10 points based on load reduction relative to the maximum load reduction for all implementation SWRP Projects.
- Oils and grease (polyaromatic hydrocarbons or PAHs)	lb/year of PAHs removed		- Calculate flow per year to project within drainage watershed. - Calculate loading to project per year, using average inflow concentration in Table 7. - Use average precent removal for pollutant in Table 7.	0 to 10 points based on load reduction relative to the maximum load reduction for all implementation SWRP Projects.
- Total Nitrogen	lb/year of Nitrogen removed		- Calculate flow per year to project within drainage watershed. - Calculate loading to project per year, using average inflow concentration in Table 7. - Use average precent removal for pollutant in Table 7.	0 to 10 points based on load reduction relative to the maximum load reduction for all implementation SWRP Projects.
- Total Phosphorus	lb/year of Phosphorus removed		- Calculate flow per year to project within drainage watershed. - Calculate loading to project per year, using average inflow concentration in Table 7. - Use average precent removal for pollutant in Table 7.	0 to 10 points based on load reduction relative to the maximum load reduction for all implementation SWRP Projects.
- Infiltration	acre-feet/year		-Estimate the amount of flow to the project - Estimate the amount of infiltration based on BMP design and saturated hydraulic conductivity	0 to 10 points based on infiltration volume relative the maximum infiltration volume for all implementation SWRP Projects.
			Possible Points	**100.00**
Water Supply Benefit Category				
- Water supply reliability		None, Low, Medium, High	High = augments a water supply, replaces a water supply, and reduces dependence on imported water Medium = does 2 out of the 3 Low = does 1 out of the 3 None = does 0 out of the 3	None (0 pts), Low (3 pts), Medium (6 pts), High (10 pts)
- Conjunctive Use		Not Improved, Improved	Improved = Stormwater used as an additional or alternative water supply	Not Improved (0 pts), Improved (10 pts)
- Water Conservation	acre-feet/year		- Estimate the amount of water this project may conserve	0 to 10 points based on estimated volume relative to total range of estimated volumes for all implementation SWRP Projects.
			Possible Points	**30.00**

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Table 4. Method of Evaluation for Implementation SWRP Projects

Evaluation Criteria	Quantitative Evaluation Criteria (Metric)	Qualitative Evaluation Criteria (Metric)	Method of Analysis	Point Allocation
Flood Management Benefit Category				
- Reduction of runoff rate/volume		None, ~~Low,~~ Medium, High	None = project does not reduce runoff rate/volume Medium = reduces runoff rate/volume High = eliminates runoff	None (0 pts), Medium (5 pts), High (10 pts)
- Sanitary sewer overflow reduction	acres of urban floodplain reduction		Estimate how many acres are removed from the floodplain	0 to 10 points based on estimated acreage reduced relative to maximum acreage reduced for all implementation SWRP Projects.
- Improved flood protection	number of houses/businesses protected		Estimate how many buildings are removed from the floodplain	0 to 10 points based on estimated number protected relative to maximum of estimated buildings protected for all implementation SWRP Projects.
- Reduction of flood risk-life and safety		None, Low, Medium, High	None = project does not reduce flooding Low = reduces flooding slightly Medium = reduce street flooding High = protect houses and businesses	None (0 pts), Low (3 pts), Medium (6 pts), High (10 pts)
			Possible Points	**40.00**
Environmental Benefit Category				
- Create or improve wetland/riparian habitat	acres		Estimate amount of acres created or improved acres of grassy swales	0 to 10 points based on estimated acreage relative to total range of estimated acreages for implementation SWRP Projects.
- Environmental flow (Instream Flow)		Decrease, no change, increase degrade, no change, enhance	Increase = increase environmental flows. No change = no change Decrease = Decrease environmental flows through reduction in runoff	Decrease (0 pts), no change (5 pts), increase (10 pts)
- Urban green space		Increase, no change, decrease	Increase = increase in urban green space No change = no change Decrease = decrease in urban green space	Increase (0 pts), no change (5 pts), decrease (10 pts) switch these point allocations
- Energy use and greenhouse gas		Increase, no change, decrease	Project specific evaluation	Increase (0 pts), no change (5 pts), decrease (10 pts)
- Restore natural hydrograph		degrade, no change, restore	Degrade = less infiltration is allowed No change = project does not change infiltration Restore = project provides increase in infiltration.	degrade (0 pts), no change (5 pts), restore (10 pts)
- Water temperature		Increase, no change, decrease	Increase = riparian trees are removed, hardscapes are added No change Decrease = plant trees along creeks for shade or remove dark colored hardscapes to decrease heat islands	Increase (0 pts), no change (5 pts), decrease (10 pts)
			Possible Points	**60.00**
Community Benefit Category				
- Employment opportunities		Decrease, no change, increase	Decrease = Project will eliminate jobs No change = project will not change employment Increase = project will create or expand job opportunities (i.e. increase in maintenance)	Decrease (0 pts), no change (5 pts), Increase (10 pts)
- Public education		None, Low, Medium, High	(Educational signs, educational programs, media reports) None = Uses 0 out of 3 Low = Uses 1 out of 3 Medium = Uses 2 out of 3 High = Uses 3 out of 3	None (0 pts), Low (3 pts), Medium (6 pts), High (10 pts)
- Community involvement		None, low, medium, high	None = project will not involve community at all Low = project will have educational signs Medium = project will have outreach programs to educate community on how project works High = community will help implement project	None (0 pts) Low (3 pts), medium (6 pts), high (10 pts)
- Public use / recreation	acres		Project specific evaluation	0 to 10 points based on estimated acreage relative to total range of estimated acreages for implementation SWRP Projects.
			Possible Points	**40.00**

Legend:

	Dark grey indicates a Primary Benefit, as defined by the State
	Light grey indicates an Additional Benefit, as defined by the State
	White indicates an evaluation criteria not required by the State, but considered important

Italics = background info

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Storm Water Quality Evaluation Criteria for Implementation Projects

The evaluation criteria listed in Table 4 are analyzed using either qualitative or quantitative methods. While many of the analysis methods listed in Table 4 are straight forward, the evaluation criteria method for the qualitative water quality parameters need additional explanation:

To calculate the flow per year to each project requires the following steps:

1. Delineate a tributary watershed to the SWRP implementation project using the City's storm drain mapping or site visits.
2. Estimate impervious and pervious areas of a tributary watershed based on the tributary land uses. The City's land uses are shown on Figure 2. The impervious coverage for each City land use type is presented in Table 5.
3. Estimate the annual runoff volume based on the annual runoff depth per year, shown in Table 6.

To calculate pollutant loading and removal for each project requires the following steps:

1. Estimate the pollutant load using the typical pollutant concentration shown in Table 7 multiplied by the annual runoff volume.
2. Estimate the volume of infiltration using saturated hydraulic conductivity for each BMP and estimate the percent of pollutant removed through infiltration, shown in Table 7.
3. Estimate the volume of flow through each project (by subtracting out the infiltration volume) and estimate the pollutant load reduction for each project by multiplying the pollutant load by its associated removal percentage, shown in Table 7.
4. For trash removal load reduction calculations: The trash load rates are available by land use type, and are independent of the runoff volume. Consequently, the trash load is estimated by multiplying the area of the tributary land uses by the trash generation rates. Table 8 has trash generation rates by land use.

Land Uses and Impervious Percent

Subsheds and the percent of the subshed that is impervious and pervious will be delineated for each project site. Typical impervious percentages for various land uses are provided in Table 5. Figure 2 shows land uses in the City.

Table 5. Typical Impervious Percent for Land Uses	
Land Use	Impervious Percent
Commercial and Services	90
Industrial/Manufacturing	85
High Density Residential	70
Public, Government Facilities, K-12 Schools, Mixed Use	50
Low Density Residential	40
Urban Parks	5
Agriculture/Open space/Vacant	2

Annual Runoff Volume to Project Site

The runoff depth to a project site per year will be estimated using the mean annual precipitation depth and subtracting out the infiltration and depression storage. The annual runoff depth for impervious areas depends on depression storage. A depression storage value of 0.1 inch per storm was used for impervious surfaces. The annual runoff depth for pervious areas depends on both the depression storage and infiltration. A depression storage value of 0.35 inch per storm was used for pervious surfaces. Infiltration capacity depends on the hydrologic soil group (HSG) in the watershed, so a different runoff depth was estimated for each HSG. Figure 3 shows HSG for the PAW.

Table 6 shows the annual runoff depth for each HSG and impervious areas. This runoff volume will be used in conjunction with the inflow concentrations in Table 7 to estimate a pollutant loading to the site.

Table 6. Annual runoff depths and parameters					
	Impervious Area	Pervious Area, HSG A	Pervious Area, HSG B	Pervious Area, HSG C	Pervious Area, HSG D
Mean Annual Precipitation, in/year	19.5				
Depression Storage, in	0.1	0.35	0.35	0.35	0.35
Infiltration rate, in/hr	Not applicable	0.35	0.19	0.11	0.08
Annual Runoff Depth, in/year	19.27	1.6	2.6	3.8	4.7

Pollutant Concentrations

Table 7 has pollutant concentrations found in urban stormwater runoff averaged from a variety of land uses that are used to estimate the benefit the SWRP projects will have on water quality.

Table 7. Average Inflow Concentrations for Urban Stormwater Runoff Pollutants and Percent Removals for LID

Storm Water Contaminant	Average Inflow Concentration	Average Percent Removal for BMPs				Source
		Swales	Wet Basins	Dry Basins	Infiltration	
Sediment – TSS, mg/L	47.0	16%	78%	67%	90%	WE&RF, 2016 CWP, 2007
Fecal Coliform, MPN/100 mL	4857.1	10%	70%	76%	90%[b]	WE&RF, 2016
Heavy Metals[a], ug/L	725.7	21%	59%	36%	76%	WE&RF, 2016 CWP, 2007
Total Nitrogen, mg/L	1.3	30%	27%	10%	42%	CASQA, 2003
Total Phosphorus, mg/L	0.2	38%	60%	19%	65%	CASQA, 2003
Polychlorinated biphenyls (PCBs), ng/L	14.5	16%[b]	78%[b]	50%	90%[b]	CSN, 2015
Polyaromatic Hydrocarbons (PAHs), ng/L	9600.0	62%	78%	22%	90%[b]	CSN, 2015 NSCEP, 1999

[a] Heavy metals include total cadmium, total copper, total lead, and total zinc.
[b] Values for this percent removal were not found in literature, and therefore were assumed to act like sediment.

The averages for each of the inflow concentrations and percent removals were derived from a highly variable data set. Using averages is sufficient for the SWRP as the point of this study is to compare *relative* performance to develop a prioritization of the SWRP projects relative to each other.

Trash will be evaluated using averages of the BASMAA (2014) trash generation rates. See Table 8 for trash generation rates in urban stormwater runoff.

only evaluate high trash generating land uses

Table 8. Trash Generation Rates by Land Use (Adapted from BASMAA, 2014)

Land Use	Average for this study, gal/acre
Commercial and Services	6.2
Industrial	8.4
High Density Residential, Multi-Family Residential, and Mobile Homes	47.7
~~Low Density Residential~~	~~8.7~~
Commercial/Services for areas with a mean household income of under $50,000/year[(a)]	114.1
~~Public/Government Facilities~~	~~6.2~~
~~Urban Parks~~	~~5.0~~

(a) Yuba City has a median household income of $49,683/year (http://www.yubacity.net/city_hall/departments/economic_development/community_profile/demographics/)

RANKING AND PRIORITIZING PROJECTS

Tables 9 and 10 illustrate the methodology that will be used to rank and prioritize the SWRP Projects.

- Table 9. SWRP Planning Project Evaluations
  - Evaluation Result – The qualitative results of None, Low, Medium, or High.
  - Evaluation Points – The points corresponding to the qualitative result, where None = 0 points, Low = 3 points, Medium = 6 points, and High = 10 points.
  - At the bottom of each category is the points total and the normalized score for each project.
  - At the bottom of the table is a Total Project Score, which represents the total of the normalized score for all categories.
- Table 10. SWRP Implementation Project Evaluations
  - Evaluation Result – For qualitative evaluation criteria, this column will have the qualitative results of None, Low, Medium, or High. For quantitative evaluation criteria, this column will have the numerical results of the evaluation. A column is provided for each SWRP project.
  - Evaluation Points – For qualitative evaluation criteria, this column will have the points corresponding to the qualitative result, where None = 0 points, Low = 3 points, Medium = 6 points, and High = 10 points. For quantitative evaluation criteria, points from 0-10 will be scaled relative to the other SWRP Projects. A column is provided for each SWRP project.
  - At the bottom of each category is the points total and the normalized score for each project.
  - At the bottom of the table is a Total Project Score, which represents the total of the normalized scores for all categories.

The SWRP Projects from both Tables 9 and 10 will be combined, ranked, and prioritized based on the Total Project Score, with higher scores being better than lower scores.

DISCLOSURE STATEMENT

Funding has been provided in full or in part through an agreement with the State Water Resources Control Board, using funds from Proposition 1. The contents of this document do not necessarily reflect the views and policies of the foregoing, nor does the mention of trade names or commercial products constitute endorsement or recommendation for use.

This work product is part of Task 4.4 of Grant Agreement No. D1612615 between the City of Yuba City and the California State Water Resource Control Board.

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Table 9. SWRP Planning Project Evaluations							
		E1. Detention Basin Standards		E2. Gilsizer Slough Standards		E3. Trash Capture Master Plan	
Evaluation Criteria	Evaluation Result Units or Rating	Evaluation Result	Evaluation Points	Evaluation Result	Evaluation Points	Evaluation Result	Evaluation Points
Water Quality Benefit Category	None (0 pts), Low (3 pts), Medium (6 pts), High (10 pts)						
	Normalized Score						
Water Supply Benefit Category	None (0 pts), Low (3 pts), Medium (6 pts), High (10 pts)						
	Normalized Score						
Flood Management Benefit Category	None (0 pts), Low (3 pts), Medium (6 pts), High (10 pts)						
	Normalized Score						
Environmental Benefit Category	None (0 pts), Low (3 pts), Medium (6 pts), High (10 pts)						
	Normalized Score						
Community Benefit Category	None (0 pts), Low (3 pts), Medium (6 pts), High (10 pts)						
	Normalized Score						
	Total Project Score						

Table 10. SWRP Implementation Project Evaluations

Evaluation Criteria	Evaluation Result Units or Rating	A1. Gilsizer Slough North Detention Pond		A2.South Yuba City Detention Pond – North		A3.Pond just east of City's Wastewater Treatment Plan		F1. Trash Capture Walton Pipeline		F2. Trash Capture Onstott Pipeline		F3. Trash Screen at Orchard and Park		F4. Trash Capture Lincoln Road Pipeline		F5. Trash Capture Jefferson Ditch		F6. Trash Capture at Del-Monte Square Commercial Park	
		Evaluation Result	Evaluation Points	Evaluation Result	Evaluation Points	Evaluation Result	Evaluation Points	Evaluation Result	Evaluation Point Score	Evaluation Result	Evaluation Point Score	Evaluation Result	Evaluation Point Score	Evaluation Result	Evaluation Point Score	Evaluation Result	Evaluation Point Score	Evaluation Result	Evaluation Point Score
Water Quality Benefit Category																			
- Natural water drainage and treatment	Not Improved, Improved																		
- Nonpoint source pollution control. See Priority Pollutants, (i.e. 303(d) List Pollutants) and common storm water conaminants listed below.																			
- Sediment, mercury, Group A Pesticides, and oxygen demanding substances	lbs/year of sediment (TSS) removed																		
- Chlorpyrifos, Diazinon, Oxyfluorfen	None, Medium, High																		
- PCBs	lb/year of PCBs removed																		
- Trash	lbs/year of trash removed																		
- Heavy Metals (cadmium, copper, lead, and zinc)	lbs/year of heavy metals removed																		
- Oils and grease (polyaromatic hydrocarbons or PAHs)	lb/year of PAHs removed																		
- Total Nitrogen	lb/year of Nitrogen removed																		
- Total Phosphorus	lb/year of Phosphorus removed																		
- Infiltration	acre-feet/year																		
	Water Quality Points																		
	Normalized Score																		
Water Supply Benefit Category																			
- Water supply reliability	None, Low, Medium, High																		
- Conjunctive Use	Not Improved, Improved																		
- Water Conservation	acre-feet/year																		
	Water Supply Points																		
	Normalized Score																		

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Table 10. SWRP Implementation Project Evaluations

Evaluation Criteria	Evaluation Result Units or Rating	A1. Gilsizer Slough North Detention Pond		A2.South Yuba City Detention Pond – North		A3.Pond just east of City's Wastewater Treatment Plan		F1. Trash Capture Walton Pipeline		F2. Trash Capture Onstott Pipeline		F3. Trash Screen at Orchard and Park		F4. Trash Capture Lincoln Road Pipeline		F5. Trash Capture Jefferson Ditch		F6. Trash Capture at Del-Monte Square Commercial Park	
		Evaluation Result	Evaluation Points	Evaluation Result	Evaluation Points	Evaluation Result	Evaluation Points	Evaluation Result	Evaluation Point Score	Evaluation Result	Evaluation Point Score	Evaluation Result	Evaluation Point Score	Evaluation Result	Evaluation Point Score	Evaluation Result	Evaluation Point Score	Evaluation Result	Evaluation Point Score
Flood Management Benefit Category																			
- Reduction of runoff rate/volume	None, Low, Medium, High																		
- Sanitary sewer overflow reduction	acres of urban floodplain reduction																		
- Improved flood protection	number of houses/businesses protected																		
- Reduction of flood risk-life and safety	None, Low, Medium, High																		
	Flood Management Points																		
	Normalized Score																		
Environmental Benefit Category																			
- Create or improve wetland/riparian habitat	acres																		
- Environmental flow (Instream Flow)	Decrease, no change, increase																		
- Urban green space	Increase, no change, decrease																		
- Energy use and greenhouse gas	Increase, no change, decrease																		
- Restore natural hydrograph	degrade, no change, restore																		
- Water temperature	Increase, no change, decrease																		
	Environmental Points																		
	Normalized Score																		
Community Benefit Category																			
- Employment opportunities	Decrease, no change, increase																		
- Public education	None, Low, Medium, High																		
- Community involvement	None, low, medium, high																		
- Public use / recreation	acres																		
	Community Points																		
	Normalized Score																		
	Total Project Scores																		

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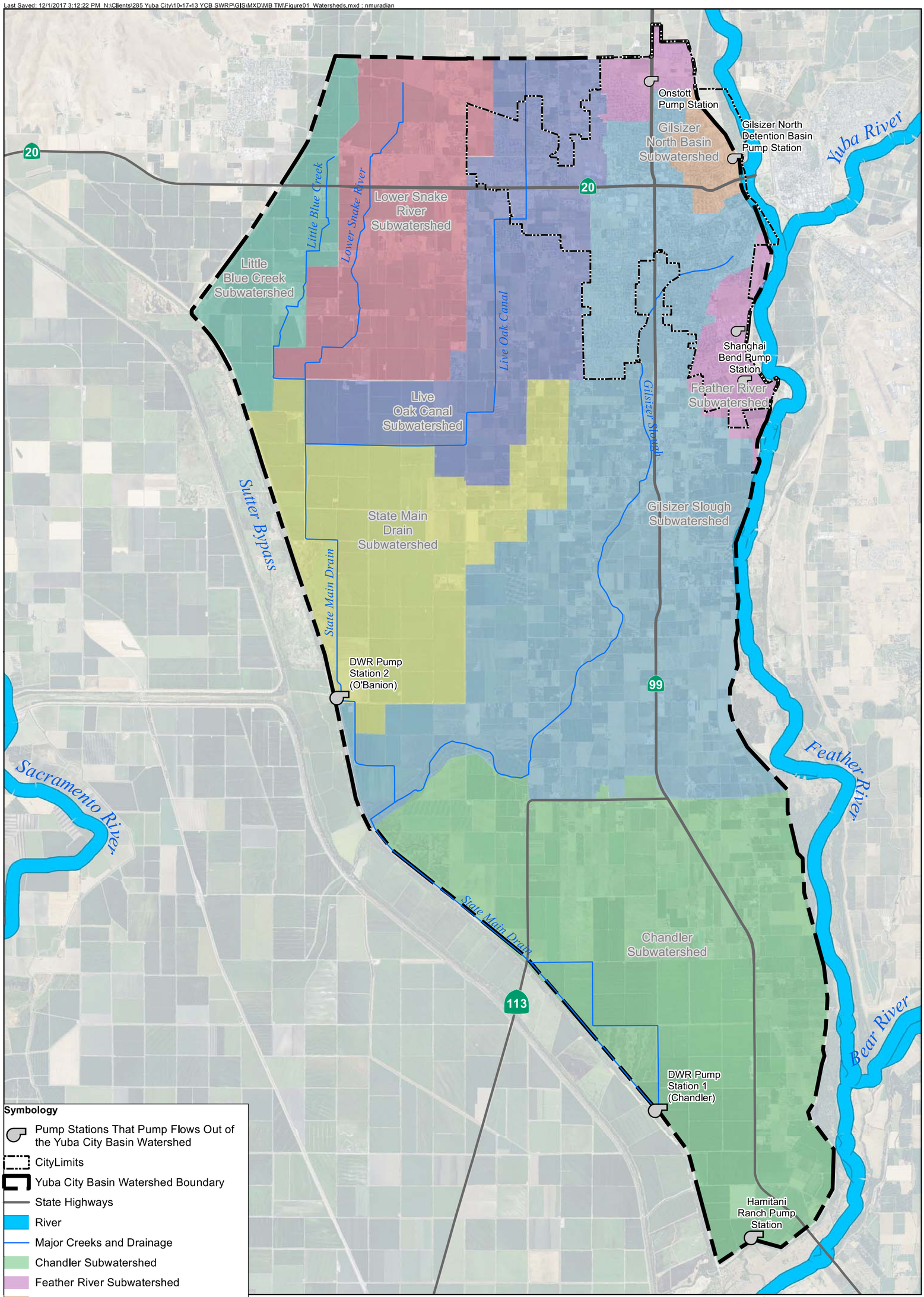

Symbology

- Pump Stations That Pump Flows Out of the Yuba City Basin Watershed
- CityLimits
- Yuba City Basin Watershed Boundary
- State Highways
- River
- Major Creeks and Drainage
- Chandler Subwatershed
- Feather River Subwatershed
- Gilsizer North Basin Subwatershed
- Gilsizer Slough Subwatershed
- Little Blue Creek Subwatershed
- Live Oak Canal Subwatershed
- Lower Snake River Subwatershed
- State Main Drain Subwatershed

Notes:
1. Watersheds shown are named after their local subwatershed names.

N

0 0.7 1.4
Miles

YUBA CITY STORM WATER GRANT PROGRAM

WEST YOST ASSOCIATES

Figure 1

Planning Area Watershed and Subwatersheds

Yuba City Basin Storm Water Resource Plan

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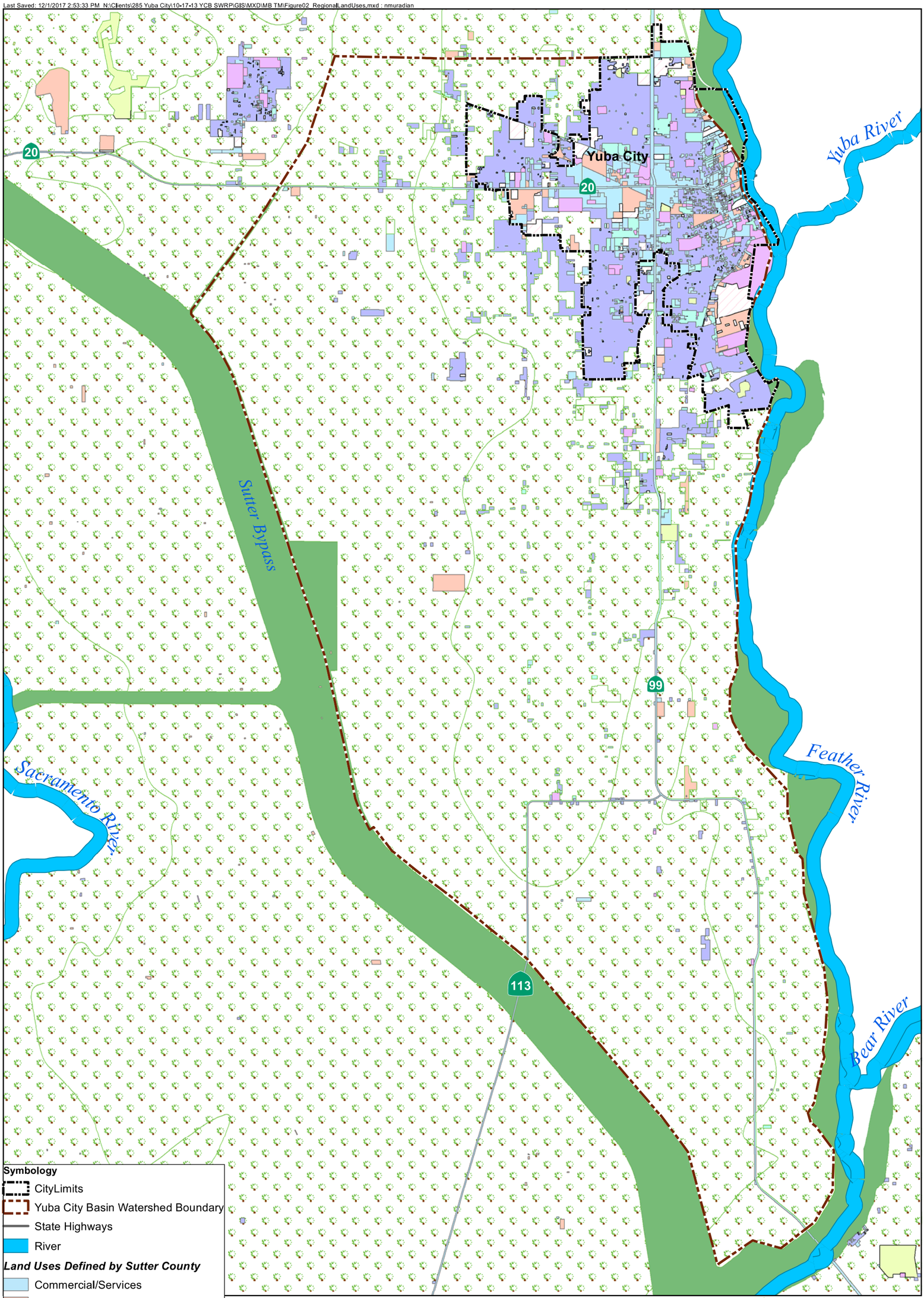

Symbology

- CityLimits
- Yuba City Basin Watershed Boundary
- State Highways
- River

Land Uses Defined by Sutter County

- Commercial/Services
- Industrial
- Public/Government Facilities
- High Density Residential
- Low Density Residential
- Parks
- Open Space
- Agriculture
- Vacant

N

0 0.75 1.5

Miles

YUBA CITY STORM WATER GRANT PROGRAM

WEST YOST ASSOCIATES

Figure 2

Existing Land Uses

Yuba City Basin Storm Water Resource Plan

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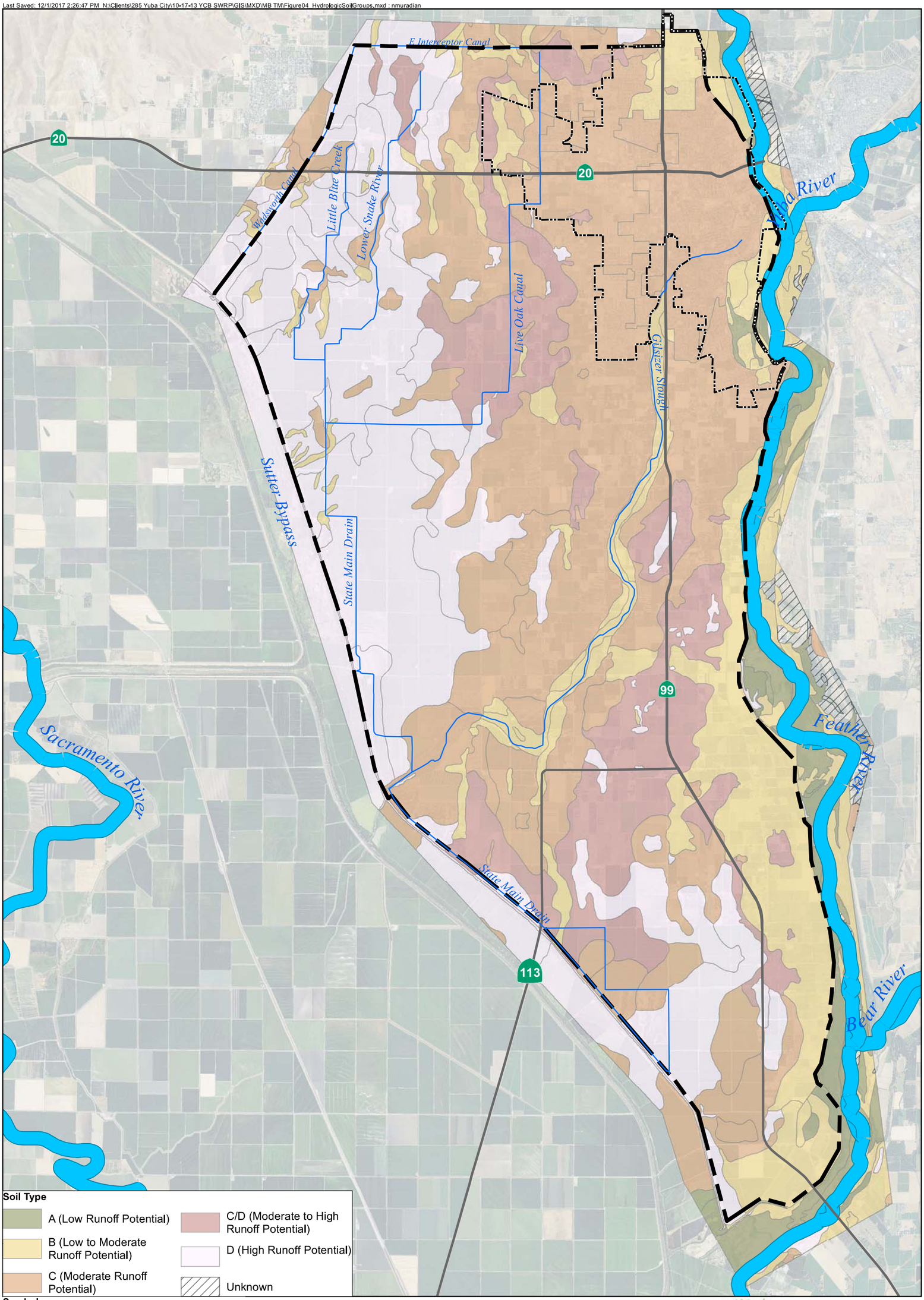

Soil Type

- A (Low Runoff Potential)
- B (Low to Moderate Runoff Potential)
- C (Moderate Runoff Potential)
- C/D (Moderate to High Runoff Potential)
- D (High Runoff Potential)
- Unknown

Symbology

- Yuba City
- Yuba City Basin Watershed Boundary
- State Highways
- River
- Major Creeks and Drainage

N

0 0.7 1.4

Miles

YUBA CITY

STORM WATER GRANT PROGRAM

WEST YOST ASSOCIATES

Figure 3

Hydrologic Soil Groups

Yuba City Basin Storm Water Resource Plan

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